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U.S. Army Engineer School
573-563-8080 / DSN 676-8080

COMMANDANT
MG R.L. Van Antwerp
563-6158
<vanantwerpr@wood.army.mil>

ASSISTANT COMMANDANT
BG William H. McCoy, Jr.
563-6192
<mccoyw@wood.army.mil>

REGIMENTAL COMMAND SERGEANT MAJOR
CSM Clinton J. Pearson
563-8060
<pearsonc@wood.army.mil>

DEPUTY ASSISTANT COMMANDANT
COL John (Pat) Leake
563-8080
<leakej@wood.army.mil>

DEPUTY ASSISTANT COMMANDANT–USAR
COL Gerald Lago
563-8045
<lagog@wood.army.mil>

DEPUTY ASSISTANT COMMANDANT–ARNG
LTC Dennis V. Smith
563-8046
<smithde@wood.army.mil>

CHIEF OF STAFF
LTC John D. Drolet
563-7116
<droletj@wood.army.mil>

TRADOC SYSTEMS MANAGER for ENGINEER COMBAT SYSTEMS
COL John H. Holler
563-4081
<hollerj@wood.army.mil>

TRADOC PROGRAM INTEGRATION OFFICE–TERRAIN DATA
COL David A. Kingston
563-4086
<kingstond@wood.army.mil>

COMMANDER, 1st ENGINEER BRIGADE
COL Paul W. Kelly
596-0224, DSN 581-0224
<kellyp@wood.army.mil>

DIRECTOR OF TRAINING
COL Thomas E. O'Donovan
563-4093
<odonovant@wood.army.mil>

DIRECTOR OF ENVIRONMENTAL INTEGRATION
Dr. Rebecca N. Johnson
563-4119
<johnsonr@wood.army.mil>

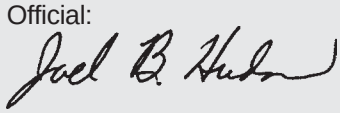
CHIEF OF DOCTRINE
LTC Reinhard W. Koenig
563-7537
<koenigr@wood.army.mil>

HUMANITARIAN DEMINING TRAINING CENTER
Mr. Paul Arcangeli
596-3869, DSN 581-3869
<arcangelip@wood.army.mil>

COUNTERMINE/COUNTER BOOBY TRAP CENTER
LTC Billy G. Tollison
563-7347
<tollisob@wood.army.mil>

By Order of the Secretary of the Army:
PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
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Front and Back Cover:

Soldiers with the 205th Engineer Battalion fill sandbags and load them onto a truck at Kandahar Army Airfield, Afghanistan, 25 August 2003. Photo by PFC Hugo A. Barry-Vasquez.

FEATURES

DEPARTMENTS

Clear The Way

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

Now that 2004 is here, we reflect on our accomplishments of the past year. We have activated the largest number of Reserve and Army National Guard soldiers since the Korean War. We helped liberate 23 million people in Iraq and maintain liberation for another 23 million in Afghanistan.

Today in Iraq, almost every city, town, village, and province has a government or a council chosen by and run by local Iraqis. More than 130,000 Iraqi Security Forces are taking responsibility for security for their own country. More than 150 Iraqi newspapers are now in circulation—a free press in that country for the first time in decades. Hospitals, clinics, schools, and universities are open—with an increased load of students. Water, power, and essential services are at or above prewar levels in most of the country. These successes and many more are documented in this issue of *Engineer*.

I am pleased to report that we had a great turnout at the Engineer Warfighter Conference in November, held in conjunction with the Society of American Military Engineers (SAME)/Army Engineer Association (AEA) Regional Meeting in Savannah, Georgia. My thanks go to these two organizations for hosting such a professional event. Thank you also to all who took the time to attend and especially to those of you who made expert presentations. The joint and multinational perspectives brought home the fact that no matter what uniform we wear, we are all engineers with the same skills and challenges. The conference validated the issues associated with initial lessons learned for engineers and has mapped out the way ahead for us. To truly make these lessons "learned," we must find solutions before the next war.

We will continue the progress we made at the Warfighter Conference and give an update to the field at the ENFORCE Conference on 26 - 30 April 2004. The theme for ENFORCE 04 is "Forging Our Future—Shaping Engineers for Joint and Multinational Operations." Many of you have already expressed an interest in attending, hosting a breakout session, or making a presentation to the group. I encourage you to come prepared to share lessons learned with the rest of the Regiment.

During my recent trip to Iraq, I was impressed with the total professionalism of our engineer soldiers. I had the honor of visiting with soldiers and leaders who are making a difference and preserving our freedoms. I am proud of you! Let me close by remembering those in our Regiment we have lost there since the last issue of Engineer was published. As we begin this New Year, let us resolve not to forget their ultimate sacrifice. Essayons!

Sergeant Benjamin Biskie	5th Engineer Battalion, Fort Leonard Wood, Missouri
Captain Christopher Soelzer	5th Engineer Battalion, Fort Leonard Wood, Missouri
Major Christopher Splinter	5th Engineer Battalion, Fort Leonard Wood, Missouri
Specialist Charles Haight	14th Engineer Battalion, Fort Lewis, Washington
Specialist Curt Jordan	14th Engineer Battalion, Fort Lewis, Washington
Specialist Cory Hubbell	Bravo Company, 46th Engineer Group, Fort Rucker, Alabama
Specialist Nathan Nakis	Bravo Company, 52d Engineer Battalion, Fort Carson, Colorado
Specialist James Wolf	Headquarters Company, 52d Engineer Battalion, Fort Carson, Colorado
Private Jonathan Falaniko	Alpha Company, 70th Engineer Battalion, Fort Riley, Kansas
Specialist Marlon Jackson	Alpha Company, 94th Engineer Battalion, Vilseck, Germany
Private Algernon Adams	Charlie Company, 122d Engineer Battalion, Graniteville, South Carolina
Specialist Raphael Davis	Bravo Company, 223d Engineer Battalion, Calhoun City, Mississippi
Private First Class Rayshawn Johnson	Charlie Company, 299th Engineer Battalion, Fort Hood, Texas
Private Scott Tyrrell	Charlie Company, 299th Engineer Battalion, Fort Hood, Texas
First Lieutenant Joshua Hurley	Charlie Company, 326th Engineer Battalion, Fort Campbell, Kentucky
Lieutenant Colonel Wayne Kimbrough	416th Engineer Command, Darien, Illinois
Staff Sergeant Eddie Menyweather	Charlie Company, 588th Engineer Battalion, Fort Hood, Texas
Specialist Joseph Norquist	Headquarters Company, 588th Engineer Battalion, Fort Hood, Texas
Staff Sergeant Thomas Christensen	652d Engineer Company, Ellsworth, Wisconsin
Staff Sergeant Stephen Hattamer	652d Engineer Company, Ellsworth, Wisconsin
Specialist James Chance	Charlie Company, 890th Engineer Battalion, Columbia, Mississippi
Specialist Jon Fettig	957th Engineer Company, Bismarck, North Dakota

Lead The Way

By Command Sergeant Major Clinton J. Pearson
U.S. Army Engineer School

It is indeed an honor to be selected to serve as your Regimental Command Sergeant Major (CSM) and very difficult to express how grateful and blessed I feel. This is a position of *service* to our soldiers, Regiment, and Army and to our great nation. I use the word "serve" because being selected to a nominative leadership position has little to do with the person being selected—but rather how well you have served others, the Army, and the nation. I will continue to serve others as I have for the past 26 years.

I once read a quote that states, "To whom much is given, much is expected." This is true in our profession. I am truly grateful to Major General (MG) Joe Peterson, whose leadership and guidance over the previous two years in the 1st Cavalry Division is sincerely appreciated; MG R.L.Van Antwerp for selecting me; and Brigadier General (BG) William McCoy for embracing me. I thank CSM Bill McDaniel, U.S. Army Maneuver Support Center (MANSCEN), and CSM Michael Balch, U.S. Army Corps of Engineers (USACE), for their unwavering support during my transition from Fort Hood, Texas.

On 26 November 2003, CSM McDaniel and I executed the battle handoff. As I stood among the leadership of the installation and the MANSCEN team, I felt sincerely humbled. The presence of MG Jack Waggoner (Retired), the honorary colonel of the Regiment; CSM Jack Butler (Retired), the honorary CSM; and CSM Robert Dills (Retired), previous USACE CSM, made it more meaningful. I was again reminded that this position is about serving something greater than myself. These gentlemen have given so much to our Regiment and nation and are three superb examples of selfless service.

I charge all leaders to embrace the Regiment's T3s (**Transform the Regiment, Train Soldiers and Leaders,** and **Take Care of the Regiment**). Leaders must lead the Regiment with a vision that is focused on the Army's Future Force as we continue transformation. The key is understanding where the Army is going with transformation, staying abreast of those changes, and ensuring that our engineer forces are where they should be to support any environment. Training the Regiment must remain our top priority. We must continue to produce the most highly trained engineer soldiers in the world. This begins with instilling pride and the Army's core values in initial-entry soldiers. Our noncommissioned officer (NCO) education system (NCOES) must be structured to meet the demands of a fast-paced, challenging, and changing environment. It is important to exploit every opportunity to conduct joint and multi-component training, bridging the gap with all engineers across the armed services. It is absolutely crucial that engineers in the Reserve Component—approximately 76 percent of our engineer force—receive the same training opportunities as our active force. Training must be tough and conducted in the most realistic environment we can provide. Taking care of the Regiment means equipping soldiers with the most advanced equipment and technology the Army has to offer; ensuring that we have the right people in the right jobs; and placing quality NCOs with coaching, teaching, and training experience at our training base.

We have such NCOs at the 1st Engineer Brigade. I had the privilege of spending a week with CSM Gerald Jones and the CSMs of the 1st Engineer Brigade, visiting each of their training battalions. This is one of the largest (if not the largest) brigades in the Army, responsible for training officers, NCOs, and soldiers of our Regiment. Colonel Paul Kelly, CSM Jones, and their battalions are charged daily with the sacred responsibility of ensuring that soldiers are fully integrated into the Army and Regiment. This team is always seeking ways to improve training and readiness because training remains our top priority. I must say that after the week ended, I was amazed at the professionals in the 1st Engineer Brigade. As I marched alongside soldiers on Day Seven of basic training—with their chests out and arms swinging, singing cadence with such pride in their voices—I was especially proud to be a soldier. I couldn't help but reflect on the new Soldier's Creed (printed on page 62). Being a soldier is the greatest contribution one can make to his country. It is serving something greater than yourself, because you're charged with the protection of an entire nation and a way of life. Be proud to be called a soldier wherever you go.

As we continue our course, we will not forget those soldiers who have given their lives in the defense of our great nation and our way of life. CSM Balch and I recently visited the Regiment's wounded soldiers at Walter Reed Army Medical Center. Although they have injuries far beyond our imagination, their spirits remain intact and indestructible. They are a constant reminder that freedom is not free. I'm very proud of the soldiers serving in harm's way and of the unsung heroes—their families—serving on the home front. My daily prayers are with you. God bless America! Essayons!

Victory Sappers: V Corps/CJTF-7 Engineers in Operation Iraqi Freedom

Part 2: Since the Liberation . . .

By Colonel Gregg F. Martin

Part 1, "The Attack to Baghdad and Beyond . . ." was published in the July-September 2003 issue of Engineer.

"Our engineers continue to excel, both in leading the way toward the reconstruction of Iraq and in providing route clearance, force protection, quality-of-life improvements, and troop construction for our deployed Coalition Joint Task Force. They remain flexible, committed, and professional during this challenging campaign."

—Major General Walter Wojdakowski
Deputy Commanding General, V (U.S.) Corps/CJTF-7

With the fall of Baghdad and the collapse of Saddam Hussein's regime in early April 2003, Iraq was liberated. Since then, V Corps and other coalition forces have grown in size and combat power; expanded into and attacked enemy forces throughout the battlespace of Iraq; and conducted humanitarian, civic action, and reconstruction operations simultaneously. The V Corps engineer force of fewer than 4,000 soldiers that attacked into Iraq on 21 March grew to more than 19,000 under Coalition Joint Task Force - 7 (CJTF-7). This engineer force consists of nearly every type of unit within the U.S. Army Engineer Regiment (active duty, National Guard, Reserve, and civilian), as well as engineers from the Marine Corps, Navy, and Air Force and from coalition forces.

With the mission to reconstruct Iraq and win the peace, this powerful engineer force has performed every type of mission in a complex combat environment across hundreds of thousands of square kilometers, to include—

- Combat engineer and infantry missions.
- Construction and repair of infrastructure, base camps, and facilities.
- Fixed and assault float bridging.
- Ground and riverine patrols.
- Topographic/geospatial engineering from the tactical through strategic levels.
- Diving, well-drilling, and fire-fighting missions.
- Electrical-power repair, generation, and distribution.
- Infrastructure assessment, repair, and reconstruction.
- Contract construction and facilities design and management.
- Asphalt, concrete, and crushed stone production.
- Captured enemy ammunition and missile destruction.

This article highlights what the 130th Engineer Brigade and echelon-above-division (EAD) engineers have accomplished since the liberation of Iraq, as well as the leadership and organizational challenges that have been overcome. This article, in conjunction with "130th Engineer Brigade Lessons Learned and Recommendations From Operation Iraqi Freedom" (page 11) captures important lessons which will help the Engineer Regiment and improve the Future Force.

(Note: The role of divisional and echelon-above-corps (EAC) engineers, as well as the U.S. Army Corps of Engineers (USACE) and contractors, each of whom played a major role, is beyond the scope of this article.)

Background

In December 2002, V Corps and the 130th Engineer Brigade were ordered to deploy to Kuwait and prepare for possible combat operations. The brigade deployed in January and February 2003 and in late February finalized the initial EAD engineer task organization to support V Corps's initial maneuver elements, which included the 3d U.S. Infantry Division (3ID) (V Corps main effort) and the 11th Attack Helicopter Regiment (V Corps supporting effort.)

In March, the 130th conducted rehearsals, prepared for combat, and helped supervise the reduction of the Kuwait-Iraq border obstacle complex. On 21 March, the 130th crossed the line of departure in support of V Corps in the liberation of Iraq. V Corps attacked up the southwest side of the Euphrates River past An Nasiryah, through As Samawa, and on to An Najaf, while the 1st Marine Expeditionary Force (1MEF) attacked along the Euphrates River to An Nasiryah, north to Al Kut, and then along the eastern side of the Tigris River. Fighting a tough and determined enemy, V Corps secured its lines of communication and continued to build combat power

The Minnesota National Guard's 142d Engineer Battalion places concrete for a high-voltage power plant at LSA Anaconda in Balad, Iraq.

at Logistics Support Areas (LSAs) Cedar in the vicinity of An Nasiryah and Bushmaster in the vicinity of An Najaf, as it prepared for the final attack on Baghdad.

Near the end of March, the 101st Airborne Division (Air Assault) and the 82d Airborne Division (-) joined the attack, conducting major military operations in urban terrain, which relieved pressure on the main effort (3ID). This enabled 3ID to launch the final push through the Karbala Gap on 3 April, attack over the Euphrates River, complete the destruction of the Medina Republican Guard Division, and seize objectives south and west of the city of Baghdad—to include Baghdad International Airport. Simultaneously, 1MEF was pushing into objectives southeast and east of Baghdad. Within a few days, V Corps and 1MEF forces were executing "thunder runs" throughout Baghdad.

Before the enemy could mount an effective defense, V Corps and 1MEF had won the much-anticipated "Battle for Baghdad." The shock and speed of U.S. military power, combined with the courage and leadership of our ground forces, overwhelmed the enemy. With this new freedom came a vacuum in power and authority as the regime's surviving army and police forces collapsed or melted away.

By late April, V Corps had gained the 4th Infantry Division and 3d Armored Cavalry Regiment and controlled the northern 60 percent of Iraq; 1MEF and United Kingdom forces controlled the southern 40 percent. In May, the 1st Armored Division moved into Baghdad and completed a relief in place with 3ID.

In May, V Corps learned that it would form the nucleus of CJTF-7, which would stand up on 15 June. In addition, an enormous EAD engineer force had arrived in Kuwait (to supplement the engineers already in place) and completed reception, staging, onward-movement, and integration (RSOI), and its members were either in Iraq or preparing to move north for subsequent operations.

Task Organization

By June, the V Corps (and subsequently CJTF-7) engineer force had increased to 19,000 soldiers (6,000 divisional engineers and 13,000 EAD engineers) organized into 3 brigades, 6 groups, 36 battalions, 21 numbered companies, and 28 detachments. (Note: These figures do not include coalition engineers embedded inside the multinational divisions; joint engineers from the Marines, Navy, or Air Force; or EAC engineers under the 416th Engineer Command or Coalition Forces Land Component Command (CFLCC).

Depending on mission requirements and the tactical situation, which fluctuated over time, each division ultimately received an EAD package that generally consisted of a group headquarters; 1 or 2 corps combat battalions; 1, 2, or even 3 combat heavy battalions; 1 or more multirole bridge companies; an additional construction company (combat heavy or combat support equipment [CSE]); a utilities detachment; a facilities engineer team (FET) or portion of a facilities engineer detachment (FED); and a fire-fighting detachment. Well drillers, divers,

Prime power soldiers from the 249th Engineer Battalion prepare wiring for a branch circuit to refrigerate Army and Air Force Exchange Service storage containers.

and topographic, bridging, and prime power soldiers, as well as USACE Forward Engineer Support Teams (FESTs) were also provided on an as-needed basis.

Although the size and composition of the 130th Engineer Brigade has changed, a typical snapshot from June to September revealed a unit composed of approximately 6,500 to 7,000 soldiers organized into 3 groups; 5 combat heavy battalions; 2 corps wheeled battalions; 2 corps mechanized battalions; a bridge battalion with an assault float bridge company and a medium girder bridge company; a Korean battalion (plus a Republic of Korea army medical company); 3 combat support equipment companies; 3 multirole bridge companies; a construction support company; a prime power company; a topographic engineer company; and numerous detachments and teams, including utilities, fire-fighting, diving, well-drilling, FETs, FEDs, and FESTs.

Operating throughout Iraq since the end of the ground offensive, this robust, multifunctional brigade has executed more than 3,000 missions, focused on V Corps and CJTF-7 priorities, and backstopped every division and major subordinate command (MSC) on a wide variety of missions.

(Note: Always adapting to meet the needs of the battlefield and providing the best possible engineer support, several of the above-mentioned units have since been moved to maneuver units.)

Missions, Priorities, and Commander's Guidance

Missions

Once maneuver forces had secured their areas of operations, the priority of engineer effort was to provide mobility, survivability, and general engineering support to V Corps forces to allow the Iraqis to rebuild their nation, establish a stable government, and develop a peaceful, prosperous society. Reconstruction of civil infrastructure and humanitarian construction in support of the Iraqi people were to be accomplished by civilian contractors under the supervision of the coalition's Office of Reconstruction and Humanitarian Assistance (ORHA). The original plan was for military engineers to focus almost exclusively on support to V Corps and coalition forces. The 130th was to provide humanitarian engineering only under emergency circumstances. Contractors were to take on as much work as possible to regenerate the economy, put people back to work, and rebuild the country. (Note: The USACE-led Task Forces Fajir [New Light] and Restore Iraqi Oil [RIO] were already well under way to restoring Iraqi electrical power and oil, using a combination of USACE and Iraqi expertise and civilian contractors.)

The 3ID engineer team, working in Baghdad since the collapse of the regime in early April, was already responding to the urgent situation and was performing extensive civil and humanitarian construction. By late April and early May, after V Corps forces had expanded into the battlespace of northern and western Iraq, the dire straits of the Iraqi people and their dilapidated infrastructure became more apparent. Soon, military engineers were called on to provide emergency assessments, construction, and repairs. By 12 May, it became clear that the situation demanded a focused emergency response. Military engineering resources were diverted to immediate civil requirements as civilian engineer contractors were unable to respond to demands. With the original Task Force Neighborhood in Baghdad—a concept conceived by the V Corps commander and assigned to the 130th Engineer Brigade for planning and execution—military engineers leaped fully into the fray of civil-military operations and humanitarian construction. This concept rapidly expanded to maneuver and engineer units throughout Iraq. By mid-May, V Corps engineers were fully engaged in both military engineering in support of V Corps forces and humanitarian/civil-military engineering operations in support of the Iraqi people and society.

Standing Up the C-7. Upon learning that V Corps would form the nucleus of the new CJTF-7, the 130th Engineer Brigade

and the V Corps staff engineer section went to work planning, sourcing, and standing up the new CJTF-7 staff engineer section (C-7)—a 55-person coalition-joint staff that would take over engineer staff planning and coordination from the 18-person V Corps staff engineer section. This enormous planning, leadership, and logistical challenge was made even more difficult because it was accomplished in the midst of RSOI, combat, and stability operations. With "cover-down" personnel from both V Corps and CFLCC to temporarily fill the joint manning document, the new C-7 officially took over the engineer fight in Iraq on 15 June.

The C-7 immediately faced three strategically critical missions: providing facilities for the new Iraqi army, bedding down and constructing operational infrastructure for coalition forces, and destroying captured enemy ammunition. Taking into account the relative strengths of troop units, USACE, and contractors, the C-7—in conjunction with the other elements of the CJTF-7 engineer team—developed innovative solutions for these missions. Next, C-7 needed to rapidly increase electrical power production throughout Iraq to make an immediate positive impact on the lives of the Iraqi people. The solution was to form "Task Force 4400," which put coalition military engineers into Iraqi power plants to improve management and operation, expedite repairs, and quickly increase power production across the nation to 4,400 megawatts.

Transitioning to a Theater Army Engineer Brigade. Simultaneously, the 130th Engineer Brigade became the de facto theater Army engineer brigade (TAEB) in Iraq. Manned and trained to perform as V Corps's combat engineer brigade, the 130th had to stretch itself physically, mentally, organizationally, and doctrinally to effectively perform this new role. Adding to the challenge was the need to staff three command posts: a rear command post in Kuwait to command and control the RSOI of incoming EAD forces; the brigade main command post at the V Corps logistics and air hub in north-central Iraq; and the brigade tactical command post in Baghdad, where it played a key role in standing up the new C-7. Although the 130th was transitioning to a TAEB, it was still fulfilling its primary mission of supporting V Corps's MSCs throughout Iraq.

Exacerbating the situation was the requirement to send the 130th Engineer Brigade deputy commander to work as the V Corps engineer at ORHA in downtown Baghdad. Supplementing and reinforcing ORHA and then the Coalition Provisional Authority (CPA) was critical to the planning, funding, and execution of both civilian and military engineering programs in Iraq. His experience in both USACE and joint engineering operations made him ideal for these key strategic roles, where he has made a valuable contribution.

Fortunately, the commander of the 18th TAEB dispatched one of his key lieutenant colonels to be the new deputy commander of the 130th. Having just served as the operations officer of the 18th TAEB, where he planned and developed military infrastructure for the northern option, the new deputy commander brought his organizational expertise to the fight in Iraq. Arriving in late June and serving as the deputy commander for 101 days, he helped recast the 130th from a combat-focused corps engineer brigade to a construction-focused TAEB.

The 565th Engineer Battalion patrols the Tigris River at Tikrit, Iraq.

A soldier from the 320th Engineer Company (Corps) (Topographic) uses an automated integrated survey instrument at LSA Anaconda.

Cooperating with the C-7, the 130th Engineer Brigade played a key role in fulfilling several major functions which went beyond its doctrinal mission. (Note: Several of these functions were ultimately taken over by the C-7.)

- Engineer oversight and construction/design support to theater/CJTF-7 enduring bases.
- Execution of the theater/CJTF-7 construction program.
- Engineer reinforcing support to the MSCs for master planning, design, and assessments; oversight of Class IV supplies; and direct support when MSC engineering requirements exceeded their capabilities.
- Assistance to the C-7 in theater engineer planning, force structure management, and personnel.
- Establishment of a theater bridge park.

The 130th Engineer Brigade faced the following challenges:

- It was a corps combat brigade now cast in the role of a TAEB.
- It did not have an organic construction management section (CMS) comparable to the robust 36-person CMS in a TAEB. (Note: The 130th does have a small CMS element which will return to the 18th Engineer Brigade, from which it came about a decade ago.)
- With the stand-up of the C-7, the 130th lost its organic staff engineer section, which became the nucleus of the C-7.
- Of the engineer groups assigned to the 130th for command and control of construction in Iraq, two are combat groups with no CMS, and the one construction group has very few personnel with engineering degrees. This reinforced the need for a strong CMS in the 130th.
- Development of LSA Anaconda was the largest construction mission in Iraq, but the assigned FET was not resourced adequately for such a huge mission.
- Division engineer brigades and combat engineer groups throughout Iraq are not staffed to manage large construction missions, which means the 130th must be prepared to backstop the construction program throughout the theater, as required.
- There was no theaterwide plan to provide quality assurance for contract construction in support of coalition forces, so the 130th must be prepared to backstop this effort.

To accomplish its mission as TAEB, the 130th Engineer Brigade made the following organizational adjustments:

- Relocated and embedded a portion of a FED into the 130th staff and combined it with the remnants of the 130th CMS to perform the functions of the TAEB's "missing CMS."
- Relocated the V Corps FEST from the C-7 and aligned it under the 130th CMS.
- Created a 16-person 130th CMS that, in cooperation with the C-7, performed construction management at the CJTF-7 enduring base camps; provided master planning, design, assessments, and contract facilitation to theater enduring base camps; managed Class IV supplies; and provided reinforcing support throughout Iraq to the C-7 and MSCs.

130th Engineer Brigade Commander Priorities

In July, after "sprinting" for six months through the deployment, preparation for combat, ground offensive, movement into the Iraqi battlespace, and stand-up of the C-7, the one-year tour length for Operation Iraqi Freedom was announced. It became clear we could not function effectively without developing a way to accomplish the mission, train, maintain, take care of people, and sustain ourselves for the long haul. Since we were conducting combat operations but also were conducting many of our functions in a garrison-like environment, I directed the 130th Engineer Brigade staff to develop standard operating procedures (SOPs) that described how we would do business in Operation Iraqi Freedom, an

environment in which neither our field SOP nor our garrison SOP applied neatly.

Simultaneously, I reviewed my command philosophy, which was published in June 2002 after taking command of the 130th Engineer Brigade in Germany. My intent was to make sure that the vision laid out during peacetime in Europe still applied for the brigade at war in Iraq. I did not change a word, because it still applies to what we are doing:

- People are our essence. Care for, develop, and inspire them.
- Training is the glue that holds us together. Focus on the basics of "shoot, move, communicate, and survive" at individual, crew, and squad levels to ensure that our soldiers stay alive to accomplish the mission and get home safely when the time comes.
- Maintenance of equipment and people will sustain us over time and enable us to accomplish the mission.
- All of this must be encased under the overarching umbrella of discipline, safety, and force protection.

Commander's Guidance

With enormous demand for engineers but only limited resources, I established a priority of engineer effort that met the CJTF-7 commander's intent and guidance:

- Provide coalition forces with mobility, survivability, and general engineering support during military operations to create a safe and secure environment.
- Provide force protection and beddown construction to protect our soldiers and provide a decent quality of life (at a minimum: out of the dirt, environmental control units, toilets, and showers.)
- Support CPA and Iraqi people with civil infrastructure, humanitarian civic action, and Task Force Neighborhood missions.
- Train to survive on the battlefield. We can afford to lose a day on a project to ensure that our soldiers are prepared for the challenges and dangers they face daily.
- Do "good things" to help coalition forces and the Iraqi people. Let's work ourselves out of a job.
- Ensure that engineers are gainfully employed at all times—no idle engineers.
- Respond immediately to 911 calls. Be flexible and ready to respond. We are at war!
- Perform other missions as needed.

Subordinate commanders were instructed to develop a sustainable operational tempo which would ensure mission accomplishment while building better, stronger, more motivated soldiers and units that would be better and more inspired when they departed Iraq than when they arrived in theater. We enhanced our daily communications rhythm of battle update briefs, staff updates, and engineer video teleconferences with weekly maintenance conferences; biweekly planning and operations conferences; and monthly commanders conferences, training briefs, and unit status reports. The intent was to enhance our communications, connectivity, and future planning. In addition, my specific guidance to everyone in the brigade was as follows:

- We will be in Iraq for a full year. This is a grueling and dangerous "ultramarathon." Plan accordingly.
- Reestablish predictability and retain the ability to respond immediately to "hot missions" and 911 calls.
- Establish the proper balance between the mission and people/training/maintenance/supply, and emphasize the human dimensions of job/mind/body/spirit/family/friends.
- Learn continuously and grow as a professional each day.
- Encourage everyone to "sharpen the ax" and "recharge batteries" each day.
- Get enough rest, eat a healthy diet, work out, and maintain personal hygiene.
- Strive to take one day off each week, and when it makes sense, take leave or rest and relaxation.
- Support the chaplains' programs and help inspire soldiers to maximize their time in Iraq and on earth.
- Make time for physical training and sports and social events such as movie nights, karaoke nights, and soldier talent shows. Make this year in Iraq the ultimate soldier and life experience.
- Make a positive difference every day. Help others. Be a good person and friend.
- Stay positive and enthusiastic, and maintain an "attitude of gratitude" in all circumstances.
- Have fun, and enjoy each day. This is important in a combat zone, where any day could be your last.

Leaders relentlessly communicated, enforced, and tried to live this philosophy every day, while encouraging subordinates to follow suit.

Major Achievements

Since the liberation and end of major combat operations, the 130th Engineer Brigade has contributed to Operation Iraqi Freedom by completing more than 3,000 missions in support of CJTF-7, MSCs, CPA, and the Iraqis, to include the following highlights:

- Provided combat, construction, topographic, design, prime power, infrastructure assessment, bridging, riverine, fire-fighting, and diving support throughout Iraq.
- Planned and executed the original Task Force Neighborhood missions in Baghdad.
- Planned, organized, and stood up the C-7 for CJTF-7. Continues to provide a nucleus of personnel for this vital and successful staff section.

- Developed the prisoner holding areas, interrogation facilities, helipad, and coalition base camp for the Baghdad Central Confinement Facility.
- Planned, designed, and constructed the largest CJTF-7 base camp (LSA Anaconda) and repaired the heavily damaged airfield by placing more than 8,000 cubic meters of concrete.
- Provided construction support to both ORHA and CPA.
- Delivered and installed a 20-megawatt power plant at the Basra oil refinery, averting widespread rioting.
- Worked with Iraqis to repair high-tension electrical power lines in support of CPA.
- Upgraded a 100-kilometer stretch of Highway 1 in southern Iraq so it could serve as a safe main supply route.
- Reduced hundreds of kilometers of berms and fighting positions throughout Iraq that were potential ambush sites.
- Hauled tons of captured enemy ammunition to secure sites for destruction.
- Planned, coordinated, and provided command and control of Task Force Rocketeer, in which the 130th helped secure and destroy dozens of surface-to-air missiles throughout Iraq.
- Planned and executed more than 100 humanitarian and civic action projects throughout Iraq, to include the renovation of schools, health clinics, playgrounds, and sports facilities.
- Assigned units planned, executed, and managed nearly $900 million worth of contractor or contractor-equivalent construction. (Note: The 937th Engineer Group's facilities program for the new Iraqi army is valued at $800 million.)
- Trained forces on the South African Interim Vehicle-Mounted Mine-Detection System (IVMMDS) and developed combined arms tactics, techniques, and procedures to use this system to detect and neutralize enemy mines and improvised explosive devices (IEDs).
- Developed Task Force Right of Way, using the IVMMDS, sappers, and earthmoving equipment to detect and neutralize IEDs along main supply routes. Established a training academy and exported this concept to MSCs.
- Trained forces for the new Iraqi Civil Defense Corps in support of the Ukrainian brigade of the Polish-led multinational division in south-central Iraq.

Conclusion

The Victory Sappers of V Corps and CJTF-7 built a cohesive, motivated, multifunctional engineer team of more than 19,000 active duty, Reserve, and National Guard soldiers and civilians from all four Army corps, comprising every facet of the U.S. Army Engineer Regiment. This dynamic team has executed thousands of missions of every type over hundreds of thousands of square kilometers. It has incorporated joint and coalition engineers into the team as it continues to assure the mobility, survivability, and force beddown of first V Corps and now CJTF-7. The Victory Sappers "engineered the victory" during the ground offensive and have played a critical and larger-than-expected role in rebuilding Iraqi infrastructure. The Victory Sappers continue to play a key role in support of coalition efforts to win the peace and build a stable and prosperous Iraq.

Members of the 130th Engineer Brigade are grateful for the privilege of serving in Operation Iraqi Freedom. No matter how tough the situation, we have chosen to have "an attitude of gratitude" in all circumstances. We are thankful and proud to be engineers and are committed to ensuring victory. We hope that our experiences, lessons learned, and recommendations are beneficial to the Engineer Regiment and the Army so that we improve the Future Force.

Colonel Martin has served as commander of the 130th Engineer Brigade and as V Corps engineer since June 2002. After deploying to Kuwait, he led the brigade's attack on Day One of the ground offensive and has served in Iraq since. He also served as the CJTF-7 director of engineering C-7, responsible for standing up a coalition-joint engineer staff. Previous assignments include command of the "Fightin' 5th" Engineer Battalion, service with Joint Task Force Bravo in Honduras, and teaching at West Point and the Army War College. A graduate of the U.S. Military Academy, the Army and Naval War Colleges, and the Massachusetts Institute of Technology, he holds a Ph.D. in construction engineering management and public policy.

Photos by Jayme Loppnow, 130th Engineer Brigade Public Affairs.

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- Every member of the worldwide engineer team—military, civilian, and contractor—who had a role in fielding, training, deploying, supporting, and fighting with the Engineer Regiment in Operation Iraqi Freedom.
- Members of the 130th Engineer Brigade who provided ideas, input, and comments for this article.

(Note: For more information on the 130th Engineer Brigade, after-action reviews, SOPs, articles, and photos, see the 130th Engineer Brigade Web sites at NIPRNET <*http://www.130thengineers.army.mil*> or SIPRNET <*148.35.87.68*>.)

130th Engineer Brigade Lessons Learned and Recommendations From Operation Iraqi Freedom

By Colonel Gregg F. Martin

Using the Training and Doctrine Command's (TRADOC's) doctrine, organization, training, materiel, leader development, personnel, and facilities (DOTMLPF) format, this information is divided into strengths that should be sustained and areas of concern that should be improved.

Doctrine

Sustain

- We needed and received many EAD engineers, but we needed them earlier in the force flow.
- The military decision-making process works. Teach and use these concepts, along with ways to modify them on the fly in combat.
- The assured mobility concept is sound. Continue to develop and teach it.
- Aggressive, rapid execution works. Teach "A partial solution now!" and ways to tailor and employ flexible mission modules in combat.
- Active and Reserve Component integration worked. Teach leaders how to build a cohesive team in combat. Build on this success.
- Units simultaneously commanded and controlled deployment, RSOI, high- and low-intensity conflict, stability operations, and support operations. Understand how this was done, and continue to develop this flexibility in our leaders.
- The adaptability and flexibility of engineers in rapidly executing numerous nondoctrinal missions was excellent. Build on this success.
- The ability to task-organize to tailor the right mix of skills and forces for the mission was a success.
- The integration of hard-skilled USACE engineers into the fight worked well.

Improve

- We must do a better job of "telling the engineer story" to the Iraqi, American, and world media. Public affairs and information operations are fundamental and must be an integral part of the plan and campaign—not a nice-to-do add-on. The entire force needs extensive education, training, and organizational adjustment to improve in this strategically crucial pillar of modern warfare.
- We must understand the proper use of command and support relationships. Leaders must resist the urge to assign "units to missions" and must instead assign "missions to units," especially in stability operations and support operations.
- Engineers are flexible and possess a "can-do" spirit. However, leaders must resist the urge to use them for everything because we quickly run out of engineers and do not have them available to perform critical engineer missions, especially during stability operations and support operations.
- We need to better understand and teach "how-to-fight" combat heavy battalions, CSE companies, multirole bridge companies, FEDs, FETs, FEST-As, etc.
- The transition from the ground offensive to stability operations and support operations was very challenging. We need to understand, teach, and plan this better.
- Construction contractors did not deliver as much or as quickly as planned and expected. Troops must be ready to go it alone with little contract construction support for a long time in an austere and dangerous environment. We need to use host-nation engineer capabilities as much as possible.

Organizations

Sustain

- Combat heavy battalions, CSE companies, and corps wheeled battalions provide powerful, multifunctional capabilities. We need more of these units in the Active Component.
- All engineer headquarters—brigade, group, and battalion—are huge force multipliers. We need to embed or plug in key enablers such as a CMS, civil affairs, linguists, and contracting, especially for stability operations and support operations.
- The O-6 division engineer brigade headquarters has been a huge force multiplier in all phases of the campaign. We must retain these in the heavy divisions.
- Always attach separate companies and detachments to a battalion, which provides "family, love, and discipline." When this did not happen, we had problems.
- The FEST-As were a huge success in terms of reachback and technical expertise. We need to resource and fund one per corps, division, and armored cavalry regiment. We should embed this in organization and doctrine.
- Employment of the 1138th Engineer Battalion headquarters (Missouri Army National Guard) as the V Corps/CJTF-7 Mine Explosive Ordnance Information Command Center was a success. It resulted in a superb "fusion center" for information and analysis of enemy mines and explosive threats.

Improve

- A TAEB or engineer command would have been ideal for the enormous engineer mission in Iraq, especially after the ground offensive. At a minimum, the equivalent CMS and contracting capability should have been provided to the corps combat brigade.
- The optimal task organization evolves over time but is very hard to change, especially if it means taking units away from an MSC. We need to plan and agree in advance on solid disengagement and change criteria for task-organization transitions.
- Leaders need a better understanding and appreciation of low-density engineer units such as prime power platoons, multirole bridge companies and utility detachments, as well

as well drillers, divers, firefighters, FETs, FEDs, and FESTs. Their capabilities must be introduced in professional military education, and the leaders of these units must go to warfighter and other training exercises in order to educate the force through seminars and discussion.

- We need to develop multifunctional EAD engineer battalions that combine combat, construction, and bridging capabilities.
- Quarrying, rock-crushing, and paving capabilities are needed in Active Component combat heavy battalions.
- The Army should officially recognize and staff the 565th Engineer Battalion (Provisional) headquarters and make it our expert bridging unit. The 565th played a crucial role in Operation Iraqi Freedom, because it planned and constructed assault float bridges, medium girder bridges, and Mabey-Johnson bridges throughout Iraq. Other than the 565th, there are no centers of expertise on the proper employment of tactical bridges. The 565th could fill this role.
- We must better educate leaders to resist the urge to break up and farm out the elements of combat heavy battalions to such a degree that we diminish the huge impact they can make on the battlefield. The potential effects of massing EAD engineers—especially in stability operations and support operations—is greatly diminished when they are piecemealed out.
- Every O-6 engineer headquarters needs a construction management capability on its staff. Habitual training associations with FEDs, FETs, or FESTs could fulfill this role.

Training

Sustain

- Our training philosophy was validated in Operation Iraqi Freedom. Focus on the basics. Train better on less.
- Topographic engineering was a huge success. Build on what we have, and continue to improve our topographic training, organization, materiel, and doctrine. This is a huge force multiplier.
- The development of flexible, adaptive, innovative leaders and soldiers was a success. All engineers must be trained on basic infantry and engineer skills. All engineer leaders must understand maneuver and combined arms operations, as well as the fundamentals of combat engineering and construction management.
- We continued to train on the threat and enemy situation as they evolved, with weapons ranges, live fires, mounted live fires on the move, situational training exercises that reflect the reality of the threats in Iraq, combat first aid, tactical convoy procedures, reaction to enemy contact and ambushes, and communications procedures. This was critical to soldier readiness and morale, mission accomplishment, and protecting our troops.
- Mobile training teams from the U.S. Army Engineer School were highly beneficial.

Improve

- Engineer Qualification Tables, training programs of instruction, and mission-essential task lists must include stability operations and support operations in a hostile environment. Examples are convoy operations, ambushes, IEDs, and mounted gunnery.
- Education and training of leaders for postconflict stability operations and support operations should include topics such as contracting, language and cultural knowledge, employment of local workers, and use of local materials and building techniques.
- All Army units need a simple, self-help construction program for nonengineers so their units can quickly enhance their own quality of life with tent floors, basic wiring, burn-out latrines, and field showers. A booklet with simple drawings, instructions, and bills of materials should be developed and issued Armywide. This will allow engineers to focus time and effort on more complex engineer missions.

Materiel

Sustain

- TeleEngineering Toolkits were extremely valuable. We need to distribute them down to the battalion level.
- D9 dozers provided a powerful capability throughout the campaign, and the M1 Panther was also useful. Program and field this equipment with dedicated heavy equipment transports, communications, and weapons.
- The hydraulic excavator (HYEX) or trackhoe and Bobcat® skid steer were big winners.
- The South African IVMMDS was valuable for both counter-IED and countermine operations.
- Continue to use blanket purchase agreements, prime vendors, International Merchant Purchasing Authorization Cards (IMPACs), and local construction materials.

Improve

- Develop and procure a technology to detect and neutralize explosive hazards at a safe standoff distance. Given the threat of IEDs, mines, and ambushes, this is the single most important thing that needs to be improved with the greatest sense of urgency.
- Logistics should be simpler and more responsive. Pre-positioned stocks of engineer supplies would make engineers far more responsive and effective.
- Rebuild or replace old engineer equipment such as the M113 armored personnel carriers, armored vehicle-launched bridges, bucket loaders, water distributors, and small emplacement excavators. Of note, water distributors are absolutely essential for construction in the desert.
- Standardize force protection gear for all soldiers and equipment, such as weapons mounts, improved body armor, Kevlar® blankets, improved armor for high-mobility, multipurpose wheeled vehicles (HMMWVs), and more crew-served weapons.
- Develop and fund a secure cellular telephone system for use on the battlefield. All units should deploy with satellite nonsecure Internet protocol router (NIPR) systems for reliable official communications and morale, welfare, and recreation support.

- All military equipment needs to be dual voltage.
- National Guard units must deploy with IMPACs and pre-purchased spare parts (prescribed load list [PLL] and authorized stockage list [ASL]).

Leader Development

Sustain

- Strong, positive, caring leadership works. We validated our philosophy of leadership in training, deployment, preparation for combat, combat operations, stability operations, and support operations.
- A clear mission, task and purpose, and commander's intent are critical; then power down and let folks amaze you. Keep teaching and rewarding this.
- Commanders must be forward and present on the battlefield. Figure out the critical missions and locations, and then go there.
- There is no substitute for "eyes-on" and face-to-face communications, especially in combat.
- Many leaders developed and nurtured strong and productive relationships with Iraqi civil leaders. This must be encouraged, taught, and expanded in the future.
- The Army grows and selects great battalion commanders.
- Leaders must take care of themselves with rest, food, water, hygiene, and time to recharge their batteries. Otherwise, they burn out.
- One-year tours are like an ultramarathon. Leaders must establish a pace to finish the race strong. Balancing mental, physical, spiritual, and social needs is key to thriving in a grueling and dangerous environment. Mission comes first, but strive to make time for training, maintenance, and officer and noncommissioned officer professional development, as well as physical training, chapel, sports, and events such as movie nights, karaoke nights, and soldier talent shows. Leaders must make time for fun! They must grow better leaders and build a stronger team every day. Balance is key to sustaining the force today in Iraq, as well as over the long term for the future.

Improve

- All engineers must be builders. Basic and career course curriculums must ensure that engineer leaders are prepared to build.
- Engineer officers need more knowledge in contracting and facilities management, as well as civil affairs, culture, and language, especially during stability operations and support operations.
- Work to develop even smarter, more flexible, adaptive, and determined leaders who are comfortable in a volatile, uncertain, complex, ambiguous, and dangerous environment. Never assume that engineers will perform only "engineer missions."
- Leaders (especially at engineer group/brigade level and above) need a better understanding of low-density EAD units, such as FEST-As, FEDs, FETs, utility detachments, prime power platoons, firefighters, divers, and well drillers.
- While deployed, fill empty Reserve Component platoon leader slots with excess Active Component lieutenants.
- Leaders need to better prepare themselves and their troops for extended deployments of one year or more. This is a leadership challenge.

Personnel

Sustain

- Our people are everything. Most of our leaders understand and live this.
- Engineer enthusiasm and can-do spirit, along with initiative, flexibility, adaptability, dedication, professional expertise, and team spirit were hallmarks of the campaign.
- Engineers displayed raw courage and bravery every day, all over Iraq.

Improve

- Manage and pay better attention to low-density units from the start.
- Keep unit integrity during deployments.
- Fix the Reserve Component replacement system; they received no replacements during Operation Iraqi Freedom.
- Many units were not filled to authorized strength before deployment. Strive to meet authorized manning levels.
- Management and rotation of captains is out of sync with the needs of the field. New career course captains serve on brigade and corps staffs before getting company command. Once branch-qualified, they immediately depart the theater and cannot be used on brigade- or corps-level staffs, where their expertise is sorely needed.

Facilities

Sustain

- We did a good job of using captured Iraqi facilities, as well as tapping into and developing Iraqi construction capability.

Improve

- Before the fight, we must develop a comprehensive strategic plan for postconflict engineering, base camps, and force beddown. Simultaneously, we must streamline and expedite approval and funding of contingency military construction projects.
- Engineers are expected to be the experts on all aspects of infrastructure, to include civil, military, and captured enemy facilities. They need more training in these areas, as well as in facilities and contract management.
- We need clear legal rules early on regarding the purchase and/or construction of beddown facilities such as containers and trailers.
- We must develop, procure, and deliver Force Provider packages for deploying units.
- FEST, FED, FET, and prime power representatives must be present during the early phases of planning and on the ground early, located forward with the units they will support.

Force Protection of Forward Operating Bases in Baghdad

By Captain Jason M. Railsback

As the 16th Engineer Battalion arrived on the ground in Baghdad, Iraq, the No. 1 priority for all units was force protection. Units under 1st Brigade, 1st Armored Division, occupied central Baghdad east of the Tigris River. The major challenge facing units in the heart of the densely populated city was finding suitable and defendable terrain for forward operating bases (FOBs). This article reflects the impressions and experiences of a mechanized combat engineer company commander. It also describes the engineer mission three months into the deployment. Before deploying to the U.S. Central Command area of responsibility, our unit was unsure if we were going into high-intensity conflict (HIC), stability operations, or support operations. As it turned out, we are supporting all three. This article provides the military engineering community—particularly lieutenants and captains—some practical tactics, techniques, and procedures (TTP) used during Operation Iraqi Freedom and shows the flexibility required to accomplish the many nontraditional missions.

Task Organization

Charlie Company, 16th Engineer Battalion, is a mechanized combat engineer line company with a standard modified table of organization and equipment (MTOE). With the available resources, stability operations and support operations are challenging but not impossible. The company did not task-organize in support of a task force as we typically execute during HIC training. We remained under the command and control of the engineer battalion. Missions in this theater typically require a platoon-sized element. Remaining under the engineer battalion allowed the company to work throughout the area and support all task forces under the brigade combat team. On several occasions, missions required an operational control (OPCON) relationship of engineer squads and platoons to the maneuver company teams for support during raids and listening post/observation post execution.

The most valuable resource we have is our M998 high-mobility, multipurpose wheeled vehicles (HMMWVs). To move quickly and effectively in an urban setting, HMMWVs are critical. M113 armored personnel carriers (APCs) provide better force protection and make a more forceful presence, but with narrow streets, congested traffic, and low-hanging power lines, the HMMWVs provide better mobility and flexibility. We were supported by National Guard and Reserve combat engineers with dump trucks, bucket loaders, wheeled cranes, and additional HMMWVs. On many missions, these OPCON units proved invaluable due to their lifting and hauling capabilities and because they augmented our force protection strength. Because of the threats of ambushes and improvised explosive devices, the 1st Armored Division requires that convoys have a minimum of two vehicles with at least two crew-served weapon systems. As the threat and associated force protection levels changed, some convoys required three or more vehicles. This made it very difficult to execute concurrent missions. Even though our current MTOE does not support it, units on

a stability operations and support operations deployment need an increase of at least two HMMWVs per platoon. Even with the additional support from outside military units, many missions still require host nation support.

Contracting and Host Nation Support

A great deal of the manpower and equipment resourcing in Baghdad is contracted though local businesses. There are many difficulties. In addition to the language barrier, there are problems with paying for services, ensuring that the service quality is acceptable, and ensuring that the job is completed on time. The first step in contracting is linking the right contractor to the job requirements. Once the contractor is selected, you must escort him to the job site and allow him to make an estimate. After an agreement on the payment has been reached, the battalion must find resources for the project. If the project is for an FOB, the funds come from a battalion-level field ordering officer. If the project is outside of an FOB (to improve Iraqi public services or for emergencies), the funding is from the brigade commander's Emergency Response Program fund. All other contracts are submitted though the division resource manager**,** who will approve the overall project and forward it to the contracting office. Contracting receives bids from local contractors and selects the contractor. Once the price is agreed upon and the funding is obtained, the local national contractor begins work. The engineer company's responsibility is to report the progress of the project and ensure that standards are maintained. Once the project is completed, the company will revisit the site, ensure that all the work was completed to standard, and arrange payment for the contractor.

Location

Charlie Company was responsible for FOBs in the oldest and most built-up urban areas of Baghdad, east of the Tigris River. Units either occupied the previous unit's structures or established new ones. The various facilities included one of Saddam's palaces, an amusement park on an island, a bank, and many government ministry buildings. Providing adequate force protection in these areas was challenging.

Military vehicle selection for missions depends on the time of day and the area. The HMMWV is optimal to maneuver in downtown Baghdad, compared to the alternative—the M113 APC. During the day, the streets are virtually impassable in certain areas. Streets designed to handle four lanes of traffic are narrowed down to one direction by vendors moving their carts into the road, closing off the outer lanes. Pedestrians, automobiles, and donkey carts clog the streets. In some sectors of the city, it can take more than an hour to move one to two city blocks at midday.

Mission Planning and Execution

Constructing force protection in an urban environment follows the same principles learned at the U.S. Army Engineer School and the combat training centers (CTCs). It is still the engineer lieutenant on the ground coordinating linkup with the maneuver force, assessing the situation, making a plan, and executing it. Serpentines and fighting positions must still be proofed. Unlike at the Engineer School and the CTCs, your work is tested the next day. You know very soon if the barriers you constructed will prevent drive-by shootings, car bombings, sniper attacks, or angry mobs from interfering with FOB operations. Certain aspects of working in Baghdad add a new complexity to the combat engineer role. Many lessons on Class IV and barrier materials, equipment, and emplacement were learned—and learned quickly.

Construction Materials and Equipment

Initially the supply and resupply of Class IV materials was an issue. Units from the 3d Infantry Division used whatever was available for the immediate force protection requirement. This included vehicles—both military and civilian—as barriers, Iraqi "concertina/barbed wire," rubble, and earthen berms. As the battalion accepted the mission in East Baghdad, improvements were needed for a longer-term solution. Hesco® bastions (see photo on page 14) and concertina wire became the primary resources for temporary barriers and walls. Units should be prepared to hit the ground with an initial combat load of barrier materials and understand the terrain they may occupy.

Hesco fill material is another issue when working in an urban environment. Sources within the confines of a concrete landscape are limited. Contracting through local sources was crucial to mission accomplishment. Initially, combat heavy engineers and corps wheeled engineer units were not available to assist. Our battalion does have six organic small emplacement excavators (SEEs), but they could not fill the large number of Hescos required. Company FOBs needed an average of 100 Hescos for their perimeter, entrance gates, dismounted and mounted positions, and serpentines at entrances. The SEE tractor can fill a Hesco in about 10 trips as opposed to a 5 1/2-yard bucket loader that can load three large Hescos at a time in only two trips. Hescos proved to be an adequate temporary solution, but in high-traffic areas, they tend to break apart after vehicles cut corners too sharply.

The battalion formed and supervised Task Force Rascal, which consisted of 60 Iraqi civilians, one 5 1/2-yard bucket loader, and two civilian 15-cubic-meter dump trucks. The Iraqi workers would arrive on-site with loads of gravel or dirt and refill from a pre-positioned dumpsite at the 16th Engineer Battalion base camp (Camp Ultimo). On many occasions, fill material was drawn from within the FOB where we were working or from the immediate outer perimeter. This was a temporary fix, but in some instances this created a mobility concern. Digging in the city exposes water and sewer lines and creates large amounts of dust. As the availability of Hesco bastions ran short, the 3d Infantry Division's Engineer Brigade (distributor of Class IV supplies for the division) provided 55-gallon drums and other materials.

A barrier in front of the Palestine Hotel in Baghdad was constructed using 55-gallon drums with pickets and concertina wire.

We were able to find additional uses for these drums, other than as clearing barrels and fuel reservoirs. By using them as supports for 8-foot pickets, and also as a barrier filled with rock, the nonstandard wall proved efficient and readily available. This method of fencing was invaluable in concrete terrain when the only alternative was using the SEE truck's hydraulic picket pounder to drive an 8-foot picket through the highway pavement or sidewalk.

New Jersey barriers, better known as concrete highway dividers, were initially in short supply. Measuring 9 feet long by 3 1/2 feet high, they are perfect for the urban terrain and were used primarily as serpentines to FOB entrances and traffic lane dividers. The heavy expanded-mobility tactical truck (HEMTT) with a crane can transport and emplace up to ten barriers.

The SEE proved invaluable for FOB construction. The front bucket easily moves concrete flowerpots (similar to ones used at U.S. military facilities to impede traffic) to incorporate them into the defense plan. We also used flowerpots to redirect traffic and control movement on streets, sidewalks, and bridges. Fortunately, the former regime used flowerpots throughout the city for the same purpose, and they were in ample supply. We simply relocated them for our benefit.

Based on location and available resources, the use of Hescos around some perimeters was impractical. Initially, Bravo Company, 1st Battalion, 36th Infantry Regiment's FOB consisted of 300 meters of new cars that the previous unit had parked around the compound and then disabled. Seeking a better solution for force protection, the 1st Armored Division commander required the removal and upgrade of any FOB that used disabled vehicles. We hired an Iraqi contractor with a crane and flatbed trucks to remove the disabled vehicles. Due to the extensive frontage of the perimeter and the low supply of Hescos at the time, we used storm water piping (6 meters long by 1 1/2 meters in diameter) as barriers. These required a 30-ton crane, either from an Iraqi contractor or a heavy engineer company, to haul and emplace. The pipes will stop any attempt to ram or run the perimeter of the compound and are excellent protection from small arms and rocket-propelled grenade attacks.

Emplacement

The platoon and company leadership quickly learned that part of terrain analysis was thinking like an urban traffic engineer. As in other operations, assured mobility was essential. Traffic flow had to be considered not only for potential congestion but also for mission-execution planning. Closing off all civilian traffic in the vicinity of an FOB would be ideal for force protection. It would also assist in moving equipment in the area and giving soldiers the battlespace to work. However, during stability operations and support operations and trying to return a city to normal, city infrastructure and civilian traffic mobility must enter into planning considerations.

The weather is an important consideration. The temperature in June, July, and August can reach higher than 120 degrees Fahrenheit during the day. For soldiers traveling in a military vehicle with body armor and Kevlar®, the temperature far exceeds this. It is safer and equipment efficiency/productivity is much higher if the unit operates on a reverse-cycle schedule.

The Coalition Provisional Authority and U.S. forces imposed a 2300 curfew on the Iraqi people. The local population is out in the city and on the streets from 0800 until about 1600. After that, most people in Baghdad return to their homes to defend their property from looters. During the day, differentiating between the friendly and the enemy may be impossible until it is too late.

Banking District Missions

The missions we executed in the banking district help illustrate the benefits of performing missions at night in Baghdad. A platoon from 1st Battalion, 36th Infantry Regiment, had the mission to occupy and guard a series of Saddam's former banks in the oldest and most congested area of Baghdad. During the day, thousands of Iraqi people swarmed this platoon FOB, most with the intent to exchange currency, but some with the intent to do harm to each other and to the American soldiers guarding and regulating traffic in the facility. Working in this area in daylight was out of the question. We started force protection upgrades around 2100. Local gangs spent much of the night shooting at each other. Our vehicles moved to the side of the road, closer to buildings, to avoid being hit by the bullets that frequently whizzed up and down the narrow streets. Imagine working the controls of a HEMTT cargo crane, downloading New Jersey barriers, and stopping every 10 minutes to take cover. Once the shooting subsided, we returned to the mission and stopped work only when the mission was complete.

These experiences add definition to the term "combat engineer." Returning fire is difficult. Rarely do you see a muzzle flash, and the source of the rounds is usually unseen. Echoes make it extremely difficult to home in on the direction of fire. Even though the shots were close enough to "pop" the sound barrier and fill the air with the now-too-familiar cracking sound of a bullet passing close by your head, we could not return fire on a target.

On this site and others, FOB construction was driven by immediate necessity. FOB force protection became a phased operation: First, we built what we thought needed to be built. Second, we assessed what reaction the enemy had to our fortifications. Third, we developed controls based on the enemy reaction. It was an ongoing process. A day after we completed a Hesco and concertina perimeter at the banking district FOB, an enemy combatant threw a pipe bomb over the wall, hitting a tree the soldiers on guard were using for shade. The bomb exploded at eye level, killing one soldier. The next day our unit was back on-site with more wire, installing a guard tower and cutting down the tree inside the perimeter with chainsaws. We ensured that the guards were off the ground, eliminated obstructions, and increased the perimeter standoff. We hired Iraqi contractors to erect a 15-foot-high chain-link fence secured atop the Hescos, preventing further hand-thrown ordnance attacks.

Working at night also has its drawbacks. Iraqi unwillingness to work at night, rolling blackouts, and the lack of visibility are just some of the concerns. Iraqi civilians contracted to haul fill material and operate bucket loaders must be convinced to work at night. They must keep the vehicles at their homes to prevent theft. They are fearful of retribution due to contact with American forces. Many of our contracted truck operators received gunfire when leaving the work site. Iraq has rolling electrical blackouts. The grid system cannot support 100 percent power to all of Baghdad, and power production cannot meet the demand. To alleviate the strain on the utilities, officials turn power grids on and off throughout the day. Entire city blocks go dark for periods of two to four hours. Most work in the city is performed under white light. Night vision devices are used to spot snipers in windows and rooftops but overall are ineffective due to the lights of the city.

Storm water piping was used as a barrier for the perimeter of the compound.

Before 1st Battalion, 36th Infantry Regiment, could use this area inside the perimeter of its FOB for a motor pool, 26 dump truck loads of garbage had to be removed.

Nontraditional Combat Engineer Missions

Baghdad has a serious trash problem. Initially, all government agencies shut down during the major assault and occupation by U.S. forces. This included services such as trash removal. The local people turned to dumping their waste directly in front of their businesses or homes or on the highway. Many of the locations we intended to use as FOBs had to be cleared of debris first. The FOB site for Headquarters, 1st Battalion, 36th Infantry Regiment, for instance, required the removal of 26 dump truck loads of garbage. We took an Iraqi contractor to the site, estimated the amount of debris, agreed to a price and contracted for the removal, and provided security during the removal process.

We also supervised the destruction of biowaste from a hospital complex. The hospital's incinerator was non-operational, so the hospital staff deposited medical waste (to include needles, body parts, and used bandages) directly in front of the hospital. Moving the material posed a health risk, even for the contracted labor force, so we used armored combat earthmover teams to dig a large trench. All the waste was pushed in the trench, soaked in JP-8 jet fuel and motor gasoline (Mogas), and set aflame.

Another area of concern was the massive number of Iraqi military vehicles in the city and surrounding area that had been abandoned by Iraqi forces or destroyed by U.S. forces. As engineers, we accepted responsibility for hulk removal. Our battalion not only worked in the heart of the city but also in the outlying areas consisting of farmland, orchards, and irrigation canals. Again, the civilian population was used, contracting crane support and flatbed trucks to haul more than 100 vehicles out of the sector. Some of the vehicles included SA-7 rocket launchers, T-70 tanks, and bridging vehicles. Looters were quick to descend on these vehicles, mainly with the intent of taking wiring, aluminum, and other resources they could sell. We worked closely with 1st Brigade and Canadian explosive ordnance disposal (EOD) personnel to identify and supervise the removal of rockets and other explosives. We then turned the hulks over to Iraqi contractors for removal. We also worked with EOD personnel to identify caches of Iraqi Class V materials (mortars, rockets, bullets, and grenades) and assisted in their disposal.

Conclusion

Combat engineers in Iraq adapted to the conditions and met the challenges head-on. All the mission-essential task list-based training conducted before deployment could not have prepared us completely for the missions we received upon arrival. Many of them are very different from what we study at the Engineer School or during CTC rotations. To prepare, units must emphasize command and control at the platoon and squad levels, ensure redundancy of trained crews on crew-served weapons, and license all soldiers on the HMMWV.

As the Engineer School continues to train engineer leaders and develop the training plan for the Future Force, we need to add training on urban operations, stability operations, and support operations. Engineers must cross-train on TTP used by military police. New lieutenants given a fundamental background on nonlethal tactics, traffic control points, crowd control, and convoy operations would be better prepared to lead an operation that is somewhere between HIC and stability operations or support operations.

A typical mission requires the platoon leader to prepare, brief, and execute convoy operations, maintain control of crowds of curious spectators, and remain vigilant for those who wish to do harm. Much of the success on-site came from innovative and creative squad leaders and platoon leaders who used initiative to work with limited resources to accomplish the commander's end state.

Regardless of the spectrum of conflict, U.S. forces need force protection. Now our units operate from safe and secure FOBs, taking the fight to the enemy. Units are able to focus on offensive operations with their "backyards" secure.

Captain Railsback is commander of Charlie Company, 16th Engineer Battalion, Geissen, Germany.

Capturing the Lessons of War - The Engineer Perspective on Operation Iraqi Freedom

By Lieutenant Colonel Jack Drolet and Major Glen Masset

Upon completion of Phase III of Operation Iraqi Freedom, the U.S. Army Engineer School determined the need for a comprehensive review of engineer issues. The forum for this was achieved from 3–5 November 2003, when senior leaders of the Engineer Regiment met in Savannah, Georgia, in conjunction with the Savannah post of the Society of American Military Engineers and the Army Engineer Association Regional Conference. As an integral part of the conference, a Warfighter track was established to give leaders an opportunity to hear from those who participated in Operation Iraqi Freedom and to discuss emerging issues for engineer units and soldiers.

The conference began with presentations ranging from operational planning down to the tactical execution of ground combat. The intent was to have the operational perspective set the foundation for tactical-level presentations. To examine all aspects of the conflict, representatives from the sister services and coalition partners presented their views of engineer operations. The culmination of the conference was a series of breakout sessions designed to stimulate discussion and generate issues that need to be resolved for both present and future engineer operations.

Colonel Charles Smithers, assistant chief of staff, C7 (Engineer), 3d Army/Army Central Command (ARCENT)/ Coalition Force Land Component Command (CFLCC), and Colonel John Lendrum, G3, 416th Engineer Command, provided the operational-level presentations and highlighted theater planning, the design of engineer force packages, and the unique aspects of command and control of Active and Reserve Component unit deployment. The joint and multinational panel consisted of Colonel Michael Boyd, U.S. Marine Corps, Colonel Neil Kanno, U.S. Air Force, Captain William McKerall, U.S. Navy, and Colonel John Shanahan, United Kingdom Royal Engineers, who discussed engineering aspects from their services' perspectives and joined in a panel discussion with members of the conference. The tactical-level perspective was provided by Colonel Gregg Martin, Commander, 130th Engineer Brigade, and Colonel John Peabody, who commanded the 3d Infantry Division's Engineer Brigade. This forum provided a close look at the tactical employment of engineers on the drive to Baghdad.

The panel discussion provided a candid view of some of the most critical engineer issues facing the Regiment today. The U.S. Army Corps of Engineers (USACE) involvement was detailed by Major General Carl Strock, Director of Civil Works, USACE. His presentation outlined the wide breadth of USACE involvement, from support to the Coalition Provisional Authority in restoring the basic infrastructure of Iraq, down to direct support of combat forces on the battlefield. Breakout sessions were designed in a round-robin fashion to ensure that all conference participants were able to discuss each of the subject areas of battle command, mobility, and construction.

In total, the Engineer School has formally captured roughly sixty engineer issues taken from Operation Iraqi Freedom lessons learned (Phases I through III). To address these issues, the school has assembled an Operation Iraqi Freedom doctrine, organization, training, materiel, leader development, personnel, and facilities (DOTMLPF) action officer board, with representation from across the Maneuver Support Center. The purpose of this board is to analyze engineer lessons learned in detail and formally document recommendations for improving the Regiment, utilizing the full DOTMLPF framework. The ultimate goal is to implement actions to resolve the majority of these issues or explain why an issue cannot or should not be solved. As this board continues its work, it will share periodic updates with the field and intends to publish a formal document before ENFORCE 2004 (26-30 April).

As Operation Iraqi Freedom and Operation Enduring Freedom missions continue into the future, we encourage units to keep sending relevant lessons learned and after-action reviews to the Engineer School Center for Engineer Lessons Learned (CELL). Submissions remain vitally important to support the Current Force and to take into consideration as we shape our Future Force. Unclassified information can be sent to the CELL by e-mail to <*reggie.snodgrass @us.army.mil*>. Classified information can be sent by secret Internet protocol, routed (SIPR) e-mail to <*massetga @monroe.army.smil.mil*>.

Lieutenant Colonel Drolet is Chief of Staff, U.S. Army Engineer School.

Major Masset is Deputy Chief of Staff, U.S. Army Engineer School.

Innovative Engineers Pave New Paths in Afghanistan

By Major Steven A. Baker

Operation Enduring Freedom moves into its second year, and the engineers in Afghanistan have moved beyond initial-entry operations. They have started to attack some of the daunting general engineering and mobility challenges posed by this arid and austere environment. The 82d Airborne Division's 307th Engineer Battalion airfield repair team at Kandahar International Airport has introduced several construction initiatives in runway repair that will not only prolong the lifespan of the deteriorating airfield but also may change the way contingency airfields are repaired in the future.

One of the first problems that the team noticed in July 2002 was that the concrete runway repairs made by the first coalition engineers to arrive at Kandahar were causing the asphalt around those patches to crack excessively. (See *Engineer*, July 2002, page 8) The cracks were due to the cold joint between the flexible asphalt pavement and the rigid Portland cement patches. While this technique kept the runway open for the first deployments and resupply, it created unacceptable debris after the summer relief in place of major combat forces. This method of repair—aggravated by extreme temperature swings between the day and the night and extremely dry air—did not provide a suitable long-term solution.

To overcome the cracks in the asphalt around the patches, the airfield repair team initiated several successful material and procedural changes that have been approved by Air Force officials throughout the area of operations. The first significant method involved cleanly cutting and removing damaged areas, setting the concrete form inside the hole, and then filling the resultant gap between the asphalt and the Portland cement patch with cold-patch asphalt. The technique creates a flexible, easily maintained joint and a repair that can withstand thousands of sorties of traffic with only minimal additional maintenance.

The first step of the method is cutting out and excavating the damaged areas of asphalt. The key to this step is the use of a concrete saw with a diamond-tipped blade to create clean, linear cuts and a skid steer loader to quickly excavate the damaged asphalt down to the subgrade. The subgrade is then compacted and additional fill gravel is added so that the concrete patch created

Task force engineers inspect a damaged section of asphalt.

will be 8 to 10 inches thick. The form is cut and installed to create individual cells that are typically no bigger than 300 square feet. Plastic sheeting is placed over the gravel to prevent water required for hydration from percolating through the gravel. No. 5 rebar (12 inches on center with lateral bracing that is 16 inches on center) provides additional strength and minimizes cracking.

Finally, the site is ready for concrete placement with Type I cement, a change from the initial repairs that were done with Type III cement. The summer heat and lack of humidity caused the team to switch to Type I cement. It provided a mix with slower hydration but still offered the strength required for an airfield. The concrete is placed with an M919 concrete mobile and worked with standard tools and methods, including a hand-operated concrete vibrator, provided and operated by the 769th Engineer Battalion from the Louisiana Army National Guard.

To ensure that enough water is available for hydration, sandbags are placed over each new pad and watered regularly. After several days of curing, gravel is placed in the gap up to the level of the existing asphalt and then cold-patch asphalt is added and compacted to create a level surface for aircraft use. Asphalt sealant is then spread over the asphalt and the cold-patch to waterproof the joint. The result is a durable surface that can receive thousands of sorties, to include C-5 Galaxy aircraft, with little or no additional maintenance.

Offset framework, complete with vapor barrier, is ready for the arrival of the concrete truck and crew.

Kandahar is such an important logistics hub in the region that the amount of time the airfield can be closed, or its usable threshold altered, is very limited. This is especially true in the summer when hot, thin air and a 5,000-foot altitude force many aircraft to use much of the total length of the 10,475-foot runway. This, combined with the fact that much of the runway is infected with deep spider and alligator cracks, requires rapid runway repair when the pavement does fail. The solution to this challenge was achieved after operational testing. The result is a quick and effective soil patch that requires minimal maintenance, produces little debris, and can be constructed in 2 to 3 hours by a trained crew.

The early steps in this method mirror those of a preplanned concrete patch. A square or rectangular patch is cut and excavated down to the level of the subgrade. Then 2-inch slump concrete is placed in 2- to 3-inch lifts, raked of large aggregate, and covered with a thin layer of coarse sand. This process is repeated until the grade of the existing asphalt pavement is reached.

The last step of the method involves dust control. To prevent "brown-out" conditions that hamper visibility, EK 35®, a commercial dust control agent, is spread over the soil patches in several thin coats until the agent begins to pool. This nonflammable, noncorrosive binding agent not only prevents brownouts, it actually increases the durability of the soil patch. The dust control agent has been so successful that it has been used on many of the high-traffic shoulder areas of the airfield and on many of the helicopter landing zones throughout the Afghanistan area of operations.

A recently stabilized soil patch is prepared for an application of dust control agent.

An overhead view of Runway 23 shows that Federal Aviation Administration-approved reflective paint, plus a recent application of asphalt sealant, can make a runway look new despite its age.

The advantages of this unique soil patch technique are more than just speed and durability. When the patches fail, as they typically do after about 2,000 sorties, they fail in thin layers that tend to crumble into a nonthreatening sandy residue rather than into dangerous pieces of gravel that could destroy an aircraft engine. This technique does not require cumbersome airfield matting to be drilled into the existing runway surface before aircraft can land. In July and August 2002, more than a dozen C-5s landed on these soil patches without incident.

As a result of the success of these durable soil patches and the outstanding performance of the skid steer, the 307th Engineer Battalion is reviewing its current doctrine and equipment required for the rapid runway repair mission. A significant savings in the airframes required for a light airfield repair package mission could be seen if the skid steers (after heavy-drop certification) replace the current dozer—the deployable universal combat earthmover (DEUCE)—and if the extremely heavy runway repair matting was simply deleted and replaced with additional cement and finishing tools.

Another innovative construction technique used at the Kandahar airfield involved the close coordination of the airfield repair team, the airfield manager, and the U.S. Air Force. As the long-range plan for the repair of the runway was being jointly scripted, it became obvious that some of the major repairs would reduce the usable threshold of the runway by several thousand feet due to the position of the damaged sections. This was unacceptable during the heat of the summer because the heavily laden aircraft needed as much runway as possible to lift off.

Because Kandahar's main runway is 148 feet wide, the team agreed it would be feasible to offset the runway centerline to the east and then to the west to accommodate repairs on each shoulder. This would keep them from postponing much of the necessary construction into the cooler weather of the fall and winter when the threshold could be reduced without affecting air traffic. While this scheduling option required the airfield repair team to paint and repaint the runway centerlines, and required the airfield manager to issue numerous Notice to Airmen warnings, it allowed the runway construction to proceed so that much of the major construction would be complete before the onset of winter precipitation.

Major Baker is the executive officer of the 307th Engineer Battalion, 82d Airborne Division, at Fort Bragg, North Carolina. He recently returned from a six-month tour in Afghanistan as the Coalition Task Force C-7/Task Force Panther engineer. His previous assignments include commander of A Company, 307th Engineer Battalion, and commander of the 82d Airborne Division Advanced Airborne School. He served in the 547th Engineer Battalion in Germany and in Saudi Arabia during Operation Desert Storm and with the New York District Corps of Engineers in New Jersey, Greenland, Albania, Macedonia, and Kosovo. He is a graduate of the United States Military Academy and holds a master's in civil engineering from the University of Florida.

Uncovering Mysteries in the Iraqi Desert

By Sergeant Jodie Stansbury

There are many mysteries hidden under the sand dunes of the Iraqi desert, and soldiers of Alpha Company, 142d Engineer Battalion (Combat)(Heavy), North Dakota Army National Guard, had the opportunity to help uncover five of them.

The land surrounding Peacan Base is littered with man-made sand hills intended to conceal Iraqi fighter jets. Many soldiers have yearned for the chance to dig them out, but until now they had no authorization. A team from the Iraq Survey Group (ISG), consisting of American, British, and Australian soldiers, was sent to the abandoned Iraqi air base where the 142d Engineer Battalion is located, with authorization to unearth five of the preserved aircraft hidden there to study their capabilities.

The team called on the engineers to help excavate the jets to shorten the recovery process from possible months to just days. Without the assistance of the engineers and their equipment, the jets would have been dug out by hand, which would not have been a good mission for any soldier in the desert heat.

The project, completed in five days, was one of teamwork and patience. The joint crews excavated one jet per day, working from 0500 until noon. The work hours were crucial to the mission, not only to prevent heat casualties but also to avoid working around the aircraft when excessive heat creates volatile conditions for the jet's fuel and any ammunition that might still be stored inside.

The aircraft, once uncovered from the sand, were towed back to a hangar at the air base by a heavy equipment transport trailer, and numerous ground guides made sure the jets made it back in one piece. Once within the secured perimeter, the Russian-made fighter jets were then either stripped of necessary parts or parked to wait for transportation to the United States for further research into their power and capabilities.

The combined efforts of the coalition forces showed the soldiers the endless possibilities of working together.

A soldier from the 142d Engineer Battalion uses a Bobcat® to dig out the wheels of a jet.

Sergeant Stansbury is a member of Alpha Company, 142d Engineer Battalion (Combat) (Heavy), North Dakota Army National Guard.

Environmental Issues Associated With Operation Enduring Freedom

By Mr. Robert J. Chartier

Military action in Operation Enduring Freedom was the first measurement of the concepts of integrating environmental considerations in military operations since the June 2000 publication of Field Manual (FM) 3-100.4, *Environmental Considerations in Military Operations*. According to the manual, "National security strategy and operational end states support lasting victories. End states include environmental components."[1] In the first year of deployment to Afghanistan and Uzbekistan, U.S. forces faced numerous challenges in meeting these end states related to protecting the environment from the effects of the coalition footprint and protecting the force from existing environmental hazards. These hazards, in many cases, were the result of years of inconsistent application of environmental laws, regulations, and programs by the host nation. Without host nation laws and regulations, U.S. forces were required to default back to U.S. environmental policy requiring that all joint U.S. military operations include effective environmental integration. U.S. Army engineers on joint staffs and below are responsible for incorporating environmental considerations into military operation plans (OPLANs) and operation orders (OPORDs). However, it is the responsibility of soldiers to execute the Army's environmental mission, whether deployed or at their home station. This article discusses Operation Enduring Freedom environmental considerations as a command guidance issue.

Levels of Environmental Consideration

Even though Department of Defense Directive (DODD) 6050.7, *Environmental Effects Abroad of Major Department of Defense Actions*, specifically exempts combat operations from meeting environmental requirements, it was an assumption in the combatant commander's OPORD that press coverage and worldwide public interests could scrutinize U.S. environmental security actions. This assumption becomes reality if leaders at all levels fail to recognize the impacts of their operations on the environment. Joint Publication (JP) 4-04, *Joint Doctrine for Civil Engineering Support*, states, "Joint Forces Commands (JFCs) should demonstrate proactive environmental leadership, instill environmental ethics, and promote environmental awareness throughout the joint force."[2] Consideration for the environment is nothing more than the integration and application of environmental risk management incorporating all aspects of the natural environment as they interact with the conduct of military operations. This process can be as simple as conducting oil spill battle drills or as complex as avoiding environmentally sensitive areas. Thus, in the context of risk management, environmental considerations should receive a minimum level of thought no matter what conditions and constraints U.S. forces operate under. Environmental considerations need not become mission-constraining.

A prescribed burn at the Baghram landfill sends smoke from incomplete combustion blowing across the base camp.

The leaking containers at right should be in the plastic-lined pit at left. Unopened containers at left should be stored elsewhere.

FM 3-0, *Operations*, states, "As missions change from promoting peace to deterring war itself, the combination of and transition between these operations require skillful assessment, planning, preparation, and execution."[3] This holds just as true when considering the environment depicted in Figure 1, page 25. It shows how the level of environmental considerations changes as the intensity of operations

transitions from peacetime operations through the employment of forces and back to peacetime operations. As operations transition from peacetime to wartime, the opportunity to fully incorporate environmental considerations decreases. However, once in theater, there are still opportunities to incorporate environmental considerations into daily activities whether forces are employed in high-intensity conflict (HIC) operations such as direct combat or low-intensity conflict (LIC) operations such as peace enforcement. The shaded area of Figure 1 depicts an area between pure LIC and HIC operations where the level of environmental consideration may fluctuate within any given time.

The base camp is the most logical setting for this transition to occur, because hostilities have likely decreased and force protection levels and work priorities allow increased efforts in other areas, such as the environment. The relationship between Karshi Khanabad—the base camp in Uzbekistan—and those in Afghanistan exemplifies this point. Karshi Khanabad supported operations in Afghanistan and was not involved in direct combat operations. Thus environmental considerations were integrated into daily activities from the base camp design stage to present-day operations.

In Afghanistan, the base camps at Khandahar and Baghram progressed more slowly, because the primary concern was force protection. As force protection infrastructure improved, such as the establishment of a fixed perimeter, more effort was focused on environmental issues. These issues included waste stream and wash rack operations, construction of landfills, and construction of hazardous waste and used oil collection points. A disparity also existed between the base camps within Afghanistan: Baghram was a more primitive camp than Khandahar, so environmental initiatives had yet to be elevated in the priority of work. However, environmental conditions that presented an acute health hazard received the highest priority at all base camps and were quickly resolved. This included construction of consolidated landfills and information messages to help soldiers avoid potential chemically contaminated sites.

There were no controls over material placed in this Baghram landfill.

Environmental Guidance

Environmental guidance was provided from three command levels, each with varying degrees of success. The combatant commander of U.S. Army Central Command (ARCENT) issued Environmental Annex L, *Environmental Considerations*, to the OPORD and directed that environmental baseline surveys be conducted at the proposed base camps. The coalition joint task force (CJTF) commander issued an OPORD (mirroring the combatant commander's OPORD), a trifold environmental user's guide, a task force Contingency Environmental Guide, and an environmental policy memorandum. The local base operations (BASOPS) commanders also issued two policies governing actions on the base camps.

ARCENT Guidance

Annex L, produced three months after the initial deployment of forces, was written by the Joint Forces Command engineer staff. This annex provided the groundwork for resolving situations where real or perceived conflict existed between environmental protection and mission accomplishment. The annex directed that preservation of the natural environment

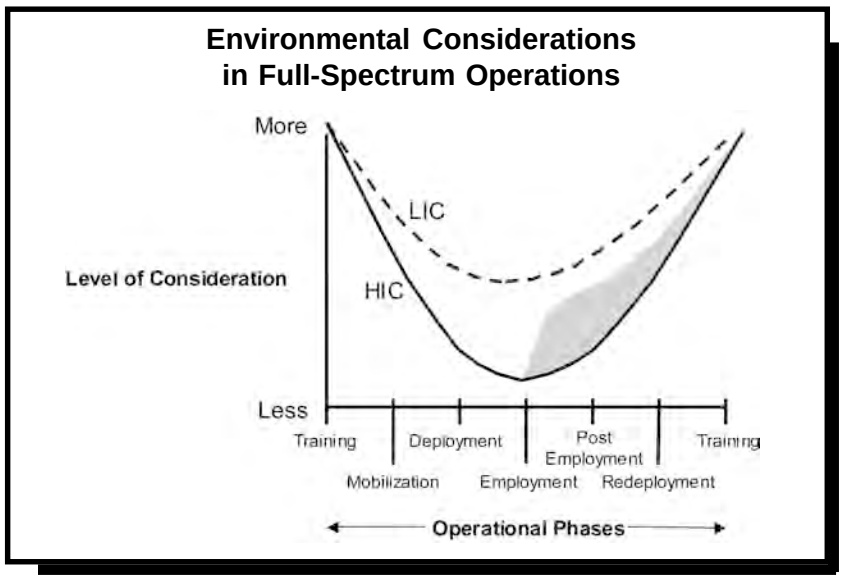

Figure 1. Levels of Environmental Consideration

A lack of secondary containment structures at this pump location allows leaking fuel to contaminate the ground and possibly the groundwater.

should not be ignored in the execution of orders but that environmental considerations would always be subordinate to the preservation of human life and force protection. These statements, and the publishing of the annex three months into the initial deployment, made environmental considerations a nonissue for the initial deployment forces. This presented a challenge for leaders during relief-in-place operations because follow-on forces continued to operate in the same manner as the initial force even though Annex L existed. This was a result of the nature of the relief-in-place operations and the use of fragmentary orders (FRAGOs) that never required the review of the annex.

Annex L contained very descriptive information and requirements that would have helped follow-on forces if the information had been disseminated effectively. The annex was composed chiefly from the requirements in Army Regulation (AR) 200-1, *Environmental Protection and Enhancement*, which provided extensive guidance through all phases of the operation, from predeployment to redeployment. This included requirements for assigning unit-level environmental coordinators; conducting predeployment training; obtaining required manuals; and shipping adequate storage containers and spill containment and cleanup materials. Commanders were also required to provide familiarization training covering the contents of Annex L, unit-level plans, and standard operating procedures. This information could have prevented the waste stream problems that occurred later in the deployment, including two lithium battery fires due to improper storage procedures. Had they referred to FM 3-100.4, each member of the staff would have had clear guidance on conducting their respective missions in coordination with the commander's intent.

Improper disposal of lithium batteries presents a fire hazard.

As the first in-theater measure, the combatant commander requested that the Corps of Engineers and the Center for Health Protection and Preventive Medicine (CHPPM) conduct separate surveys. The surveys detailed existing environmental conditions at sites selected for base camps and were conducted within the first four months of Operation Enduring Freedom. Engineers conducted an environmental baseline survey (EBS) to document existing environmental conditions for use in base camp planning. When U.S. forces depart, the survey will also be used as a basis for comparison against a site closure report that documents the end state condition of the sites. U.S. forces effectively become the caretakers of the sites and under international law are subject to litigation for any environmental damage not justified under the laws of war. Both the EBS and site closure reports are critical documents that record activities of U.S. forces and are maintained with the resident facility engineer team, which doctrinally assumes the role of the deployed public works directorate. Examples of an EBS and a site closure report are available in FM 3-100.4.

CHPPM surveyed environmental conditions to determine the potential for both short- and long-term health implications on the force. This information was used to conduct a force health protection risk analysis for each site with risk mitigation procedures published as a FRAGO almost five months after the last survey. The FRAGO reached the maneuver forces much quicker and was more effective in providing environmental information than either Annex L or the policy memorandums from the maneuver or BASOPS commanders.

CJTF Guidance

The next in-theater measure was the publication of CJTF guidance documents aimed at maintaining a high level of environmental quality during contingency operations. The CJTF developed its guidance about ten months into Operation Enduring Freedom, using Annex L, the EBS, and the CHPPM survey. In addition, U.S. Air Force doctrine and reachback to the Air Force Center for Environmental Excellence were used, because the resident expert in the CJTF engineer staff was an Air Force officer who was most familiar with Air Force procedures. As U.S. doctrine shifts to the Future Force, more headquarters staffs will become joint services. Therefore, commanders must be prepared to use all available assets and work potential intraservice doctrinal differences to provide the most adequate information to the force.

BASOPS Guidance

The final level of in-theater environmental guidance, developed by the facility engineer team assigned to the BASOPS, was directed at forces conducting life-support activities on base camps**.** The environmental engineer assigned to the team was tasked with developing and implementing this guidance while working within force protection priorities assigned by the CJTF and task force commanders. This was often difficult, because no resident environmental representative was on the task force engineer staff to champion environmental initiatives. This resulted in a disruption of environmental information reaching maneuver units and prevented environmental concerns from being addressed to soldiers at the lowest level. In Khandahar and Baghram, the BASOPS commander addressed these issues during the daily battle update briefing, once they were elevated to his level. Future plans called for incorporating this information into the in-process briefing for soldiers and for conducting unit environmental assessments. Karshi Khanabad provided this information to soldiers in the in-process briefing and through command information programs such as information boards (Figure 2) and policy letters. Facility engineer teams that deployed with an environmental engineer were better prepared and more aggressive in developing and providing this information to soldiers. The environmental engineer, often without support, conducted small cleanup operations and trained soldiers one-on-one as the situation arose. This individual should be regarded as a valuable asset when assessing mission-manning requirements.

Conclusion

The U.S. Army Engineer School is the Army proponent for integrating environmental considerations into doctrine, organization, training, materiel, leadership, personnel, and facilities (DOTMLPF) and military operations. As the proponent, engineer leaders at all staff levels must be prepared to champion mission-focused environmental considerations as outlined in FM 3-100.4. Higher-level guidance documents such as an overseas environmental baseline guidance document or a foreign governing standard

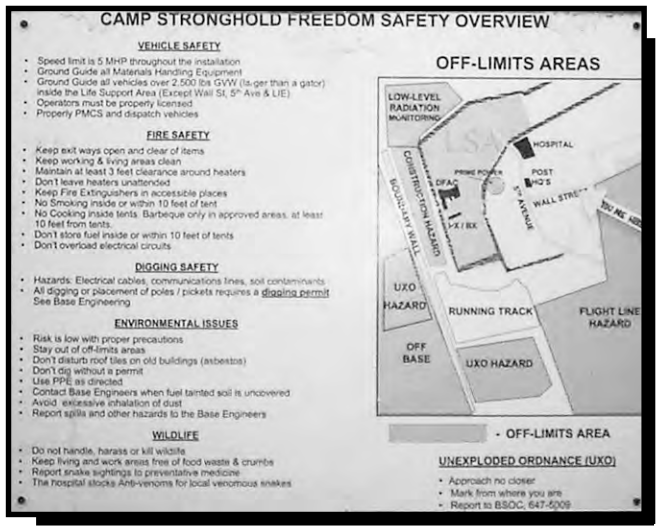

Figure 2. An information board at a base camp provides environmental and safety information to newcomers.

are not detailed enough to provide useful information to maneuver forces. Thus engineers at a minimum must ensure that an environmental annex is developed and disseminated to the force in the earliest stages of the operation. They must also ensure that an environmental criterion receives the appropriate visibility in the commander's critical information requirement. This information is necessary for leaders and soldiers because they are likely to endanger themselves and the environment unnecessarily. Ultimately, U.S. forces are bound by an environmental ethic equal to that found in the United States and should be provided the direction to act accordingly.

Endnotes

[1] FM 3-100.4 *Environmental Considerations in Military Operations*, 15 June 2000, p. 1-1.

[2] JP 4-04, *Joint Doctrine for Civil Engineering Support*, 27 September 2001, p. xii.

[3] FM 3-0, *Operations*, 14 June 2001, p. 1-16, 17, para 1-49.

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Mr. Chartier is an environmental training specialist at the U.S. Army Engineer School's Directorate of Environmental Integration, Fort Leonard Wood, Missouri.

Increasing Safety in Afghanistan

Clearing Large Areas in a Fast and Reliable Way: A New Engineer Task

By Lieutenant Colonel Thomas Sponfeldner

In August 2002, German engineers expanded their equipment inventory with another special vehicle. A representative of the German army chief of engineers took over the Minebreaker, a mine-clearing vehicle manufactured by Flensburger Fahrzeugbau Gesellschaft (FFG). Now, German engineers can clear large areas of mines quickly and reliably.

Area clearance became an issue for the first time during the International Force peacekeeping mission in Kosovo and Stabilization Force mission in Bosnia, and later during the Kosovo Force peacekeeping mission. The requirement was to quickly proof and clear large areas that were possibly contaminated by mines and unexploded ordnance (UXO). Only then would it be possible to increase the safety of friendly forces in the vicinity of airfields, warehouses, and logistic transshipment sites and along roads. Previously, the Keiler armored mine-clearing vehicle had been used for that purpose, but the Keiler is a tactical vehicle for making fast breaches through minefields under combat conditions. The vehicle provides a safety lane 4.7 meters wide, milling the ground in the lane down to a depth of 25 centimeters. The soil, including any ordnance, is thrust to the side. Ordnance that is not activated remains in an inert state.

With the Afghanistan mission, the International Security Assistance Force (ISAF) requirement of large area military clearing was quickly brought back into focus. The first contingency forces used the Danish ISAF explosive ordnance-clearing platoon, which was equipped with a Hydrema mine-clearing vehicle. However, when the Danish platoon withdrew, this capability was no longer available.

The chief of the Mine/Countermine Division at the German army engineer school, second from left, accepts the first Minebreaker manufactured by FFG.

In cooperation with the German Office of Defense Technology and Procurement, a market screening was performed. Among the systems that were tested and rated operational, the FFG Minebreaker was the only system that was readily available. A final test with live antitank mines at the technical center of the German forces confirmed that the system could clear up to 7.5 kilograms of TNT without serious damage to the clearing device. In preparation for their mission, operators and maintenance staff were familiarized with the Minebreaker during company-sponsored training.

Next came the leap in the dark. Information about the conditions at Kabul had been collected, preliminary doctrine for Minebreaker operations had been written, and logistic support had been organized. Yet, we had to take a step into the unknown with new equipment and a new mission. This was quickly clear to the advance team when they arrived in Kabul on 4 September. There was a lot of work to do before it was possible to use the "Ferrari," as the red Minebreaker was nicknamed.

Because they had such short notice, the Turkish managers denied access to the predetermined clearing area at Kabul International Airport. Other potential areas were out of the question because they were too small or because their

location made it impossible for the Minebreaker to get there. As the United Nations Mine Action Center for Afghanistan (MACA) had also charged nongovernmental organizations with mine-clearing tasks at the airport, activities had to be precisely coordinated to avoid getting in each other's way. In order to get used to the soil on-site, the Minebreaker team got the opportunity to clear the mine belt between the double fence rows around the airport. It was a worthwhile task, since antipersonnel mines were surface-laid every 2 to 3 square meters.

The Minebreaker arrives at Kabul International Airport on 6 September 2002.

The arrival of the Minebreaker on 6 September was a welcome event. Within two days, the other members of the crew arrived, and the first clearing actions were started. We did not anticipate the tremendous amount of dust caused by clearing operations in this area. From trials in Germany, we were used to small dust clouds when working on sandy soil, but nothing compared to what occurred on-site. The driver sometimes could not see at all. It was fortunate that an ordnance-clearing specialist had a Fox armored personnel carrier because this vehicle could direct the Minebreaker driver. There was much room for improvement in the first few clearing lanes, but the driver's feel for the Minebreaker and for the soil improved by the meter. Maintenance started after the operation. Removing the dust was the first order of business.

On 14 September, the first real mission was to be carried out. All preparations had been completed, and the inner fence of the mine belt was opened. At 1100, we were able to tackle the final section of the access road. At 1125, there was the first detonation, followed by four more in the next five minutes. Then we had to postpone our work because Turkish medical support units took their lunch break. When we returned from our break, there were Afghan soldiers waiting with their rifles in firing position. There was no misunderstanding this gesture—the clearing work would not continue on this site. Despite extensive negotiations, it was not possible to reach an agreement, so we ceased working.

At a meeting the next day, Afghan representatives explained that the outer mine belt was required for airport security, and this was not the only critical section on the airfield. It was not apparent where clearing would be permitted. MACA objections that the Afghan government had agreed to permit the clearing of all mines were not accepted.

In cooperation with MACA, we found new sites appropriate for Minebreaker operations, and on 19 September, the formal introduction of the Minebreaker was held. A remarkable part of the mine-clearing project was the cooperation between the German and Afghan forces, who provided the transport vehicle for the Minebreaker. So far, more than 15,000 square meters have been cleared and more antipersonnel mines and some UXO have been destroyed. The proofing of the cleared areas is partly done by explosive ordnance-clearing specialists who employ visual means immediately after the Minebreaker operation and partly by nongovernmental organization workers with metal detectors. During the proofing, explosive ordnance-clearing specialists found only one live bomb fuze. It was a solid metal body that could not be broken by the Minebreaker, so Turkish explosive ordnance-clearing specialists disposed of it.

Despite adverse climatic and geologic conditions, the results of the clearing operations can be rated very highly. Currently, clearing operations out of Kabul International Airport are carried out in the Kabul area as well as along the road to Baghram. Another operational area covering 640,000 square meters is in the vicinity of Baghram, where we operate with U.S. Army units. If the Minebreaker is used there, it will take more than six months to clear the area.

Lieutenant Colonel Sponfeldner is the section chief for mobility and mine clearance in the Department for Combat Development of the German army Pionierschule at Munich. At the time this article was written, he was in charge of introducing the Minebreaker to the German ISAF contingent in Afghanistan. He has served as a platoon leader, battalion intelligence officer, and company commander of Pionier Bataillon 4 and as company commander of Armored Engineer Company 140.

(A version of this article was published in *Pionier News*, the German Corps of Engineers magazine, Edition No. 5, December 2002.)

Engineer Assessment Teams in Disaster Relief Operations

By Captain Thomas M. Turner

Engineer support to civilian authorities during disaster relief operations is one of the primary missions of U.S. Army National Guard engineers. In today's security-centered operations, it has become more apparent that efforts to "restore or recreate essential infrastructure" must be properly coordinated, supervised, and maintained by qualified officers and noncommissioned officers (NCOs) to properly represent the capabilities and professionalism of state military department assets.[1] As a leader assigned to an engineer assessment team (EAT), you will make initial assessments of disaster severity and help organize engineer work teams (EWTs) to execute assigned missions. EATs must make the immediate decisions on the ground that meet the intent and guidance of their command or state task force.

Depending on the requirements of EATs, they must coordinate, assess the situation, develop estimates, and report findings to higher headquarters. The initial assessments can be narrow or broad in scope, but estimates will give the requirements for assistance to local authorities. Whether used for civilian rescue in flood operations or debris cleanup after a tornado or hurricane, EATs must be readily available and on the ground as soon as possible to immediately address the needs of local agencies.[2]

Civil Coordination

Civil coordination is an essential task for EATs as they enter disaster areas. In most situations, EATs will already have a point of contact for the area who will give initial civil assessments, emphasizing areas where damage is heavy or is in especially critical locations. This person will continue to be the team's primary contact unless the team is handed off to another civil authority. You could coordinate with local officials such as the mayor, county commissioners, or elected officials; local authorities such as the sheriff or city police; or local public works authorities such as the county department of public works (DPW). Each of these resources has different assets to assist you and can outsource other assets as needed. It will be important to tour the area with the point of contact and make notes on a map. Most National Guard units maintain local maps for such occasions. Designate areas of operation for both military and civilian workers so as not to crowd work areas or impede traffic. Identify local medical facilities, billeting locations, and possible contract meal sites as well. This information will come in handy when your logistics team comes in to help manage soldier care.

Note: Be sure to properly brief your officer in charge (OIC) and NCO in charge (NCOIC) on their roles, duties, and chain of command before their arrival. They will have to brief their soldiers and prepare them for what they will be required to do and what they may be up against. For example, upon arrival at a tornado damage site, our initial duty was to assist police dogs in the recovery of civilians killed in the disaster. We also helped American Red Cross volunteers comfort home owners and family members.

Civilian Resources

Use of local resources such as roads and dump sites is normally coordinated with the point of contact. The roads must be passable and designated for dump routes. It is usually a good idea to set warning cones along the roadside where vehicles will be turning into the site. Warnings for civilian vehicles will slow traffic around the sites and give team vehicles unrestricted access. It will also slow team vehicles and designate the turns for transitioning soldiers. The site itself should be easily accessible and allow multiple vehicles to maneuver. Limited space for turning around can cause delays and unwanted traffic around the sites. Identify one dump site for construction materials and another for vegetation, because it is usually not desirable to dump both types of debris in the same location. Discuss this with the point of contact, and discuss the use of a spreader at each site. It will be important to your assessment if you are responsible for spreading or piling the material at the dump site. The U.S. Army Corps of Engineers (USACE) Disaster Guidebook contains checklists that can help with local dump site selection and operation.[3] However, keep in mind that state support planning is different from federal support planning, so you probably will not have the resources that are usually available to USACE or the Federal Emergency Management Agency.

During an assessment, city, county, private, or corporate assets may be designated to assist with the cleanup. It is your responsibility to coordinate these assets and include them in the assessment. The debris area will be located along city, county, or private land. Each entity will have assets operating along with the local authorities. Also, civilian aid agencies such as the American Red Cross may be established in the area to provide disaster assistance and comfort to victims. The local DPW or private/corporate groups will manage most of the equipment you will be interested in. Assets include civilian hydraulic excavators (HYEXs), cherry pickers, loaders, fork trucks, and trash trucks. Some county trash trucks are self-loading with clamshells, which will most likely be used for trash that civilians will gather in front of their homes or along trash pickup locations.

Military Resources

Initial military support, other than organic assets, will come from resources within the state military department. They will assist in the procurement and use of fuel, parts, supplies, and services. The state military department will usually put out a memorandum to units participating in state active duty, providing communication guidance to request assistance with purchase orders for just about anything needed for official business.

Soldier Services

Other resources will help with soldier care. You must plan for billeting, meals, medical treatment, and pay during the operation. Billeting can be established by convenience or through a contractor or charity. Convenience billeting alludes to a local military facility such as an armory. The logistics team will coordinate with a local hotel or motel to establish contract billeting if it is available. However, contract billeting will probably not be available due to the influx of emergency services in the area. Therefore, if convenience and contract billeting is not available, using local charities is

A civilian HYEX loads debris after an April 1999 tornado at Benton, Louisiana.

Hurricane Lili caused widespread damage to civilian housing in October 2002.

desirable. Local church, city, or county facilities can house soldiers in a comfortable environment. Some church facilities may also have recreation equipment/facilities and meals available for emergency service and disaster relief providers, which helps with morale and welfare. Rations can initially be coordinated through your point of contact at an established emergency services meal site, but it is better to identify a sole contractor to provide continued rations in case the emergency services move or discontinue operations.

Medical facilities must be coordinated between the state's National Guard health services department and the state military department. Though the soldiers will be on state active duty and under the state military department, the health services department probably has a designated facility in the area that it normally coordinates with. Check with them first to ensure that the facility you use for medical care has dealt with military services and accepts Workman's Compensation Insurance and the TRICARE Health Care Program. Also, contact your risk management office and get the medical point of contact so you can provide billing information to the facility.

Payroll should be coordinated weekly, ending on each Wednesday or Friday. Usually, your full-time manning adjutant or personnel services NCO will cut state active duty orders a week at a time and submit them to the state military department payroll section. These orders must be certified, faxed, or e-mailed and the originals mailed to the payroll coordinator. Your payroll section will print checks and mail them to your location in about three to four working days. Managing the payroll weekly will alleviate soldier hardship and keep better accountability of soldiers.

Contracting

Contracting services is extremely important to continued operations. Material and equipment identified or stationed as part of a rapid-deployment package must be maintained to ensure operational capabilities. The logistical support team will contract items already discussed, such as billeting and rations, but it will also manage operational support items such as maintenance and special services.

Maintenance parts fall under state contracting but will be handled through normal channels. The main difference is that parts such as tires, belts, and hoses will be contracted through a local vendor that maintains the size and durability required for the equipment. Hardware items such as chainsaws must either be contracted for initial or continued use during operations or just contracted for service and repair if they are organic to the unit. A local chainsaw center or hardware store can provide the services if they accept state purchase orders.

Special services and equipment usually include nonorganic items to assist soldiers. For example, in recent operations, soldiers used face masks during tornado damage cleanup. Debris, spoiled food, and spilled chemicals caused two cases of respiratory infection, which caused unwanted downtime and follow-up care. Soldiers may also need items such as ice, gloves, safety equipment, and laundry services to maintain safety, morale, and good hygiene.

Engineer Disaster Assessment

Problems with coordination and reporting to higher headquarters prompted the development of the Engineer Disaster Assessment (EDA). The EDA gives EATs a reference to assist in the development of EWTs, support personnel, and special equipment. The EDA is simple and is broken into four sections: site makeup, load/haul equipment, personnel, and specialty items.

Site Makeup

During the tour with the point of contact, identify the number of disaster areas and plot them on your map. Find out which areas you will be responsible for and areas where the disaster path crosses city property. Once you have determined the number of sites, you must name and rate their

priority based on the assessment of the point of contact. If five sites are identified, simply name them Alpha to Echo and rate them 1 to 5. Some areas may contain heavier damage or may pose a future risk to civilians. Let the point of contact make this determination, then you can report the information to higher headquarters.

A front-end loader clears away debris from road.

Sites may be divided into multiple areas based on their location and density. Grouping smaller sites will assist in the management and placement of EWTs in built-up areas. EWTs can usually manage about three to five blocks of a housing subdivision in one day. If the damage area is greater than the ability of the EWT to complete in one workday, then the site must be divided and an additional EWT must be requested. This is important for a number of reasons: First, the civilians will continue to pile debris near the street for the EWTs to pick up. Second, seeing and coordinating with a particular EWT will help the civilians properly manage debris flow and help control frustrations. Third, it will assist the OIC/NCOIC with command and control, logistical flow, and maintenance.

Site makeup also includes dump sites, entrance and exit points, and routes. These items must be identified by the point of contact and plotted on a map for reference and distribution. The construction material and vegetation dump sites will probably require a dozer on-site to pile debris and maintain dump points. Make sure to include this in your EDA, and plan for the possibility of moving these pieces of equipment if needed.

You will also need to establish an equipment park and maintenance area. Depending on your location, the point of contact may advise the use of a county motor pool, but it is more desirable to locate equipment near your billeting site or near the debris areas. Local schools offer the best locations for mass equipment storage and maintenance. You will find that emergency services will use these areas as well, so be sure to coordinate with your point of contact. Ask about environmental concerns and access to the area during off-peak operations, which may restrict use of the area.

Soldiers load debris after an April 2000 tornado at Minden, Louisiana.

Load/Haul Equipment

Load/haul refers to the use of loading and hauling equipment. Both depend on the unit table of organization and equipment (TOE) and the availability of civilian assets. However, this must not be the determining factor in the EDA. When reporting, ask for exactly the number of load/haul assets needed based on your assessment. (See figure on page 34.) In some cases, you may need to use your best judgment based on the number of assets available at the time. Unit personnel can then get additional pieces of equipment from outside the unit, such as a state

Estimating Load/Haul Assets Needed

Example 1 - Debris is spread across three blocks in a civilian housing subdivision and the dump site is 5 miles away. One EWT is needed, with one 2 1/2-yard load asset. How many 5-ton haul assets are needed?

1. Enter the average mileage to the dump site(s): 5
2. Enter the load factor (Lf) for the single load asset available: one 2 1/2-yard loader with clamshell scoop

   (2 1/2-yard loader Lf=1, HYEX Lf=1.3)
3. Enter the haul factor (Hf) for the type of haul asset needed: 5-ton dump trucks

   (5-ton Hf=1.25, 20-ton Hf=1)

   Complete the formula:

$$\frac{\text{Mileage}}{5} \times 2 \times Lf \times Hf = \_\_\_\_\_ \qquad \frac{5}{5} \times 2 \times 1 \times 1.25 = \underline{2.5 \text{ or } 3}$$

Example 2 - The debris is spread across five blocks of a mobile home park and the dump site is 13 miles away. Based on the density of damage and the work area, you determine that two EWTs are needed. There is one civilian HYEX and a private logging truck with a cherry picker on the back available to you. There are no city or county haul assets on the site. How many 5-ton or 20-ton haul assets are needed? Keep in mind your TOE (combat heavy) only authorizes the unit nine 20-ton dump trucks. The rest are 5-tons assigned to the line companies.

1. Enter the average mileage to the dump site(s): 13
2. Enter the load factor for the single load asset available: one civilian HYEX and one civilian cherry picker

   (2 1/2-yard loader Lf=1, HYEX/cherry picker Lf=1.3)
3. Enter the haul factor for the type of haul asset needed: 20-ton dump trucks and 5-ton dump trucks

   (5-ton Hf=1.25, 20-ton Hf=1)

   Complete the formula for each asset:

   HYEX with 20-ton dump trucks

$$\frac{\text{Mileage}}{5} \times 2 \times Lf \times Hf = \_\_\_\_\_ \qquad \frac{13}{5} \times 2 \times 1.3 \times 1 = \underline{6.76 \text{ or } 7}$$

Note: Know your assets, and never assume that all of them are or will remain mission capable (MC). Assume that five are not mission capable (NMC), and replace the 20-ton dump trucks with 5-ton dump trucks using a factor of 1.25. Example: Only four are MC and seven are needed. You can simply take the remainder and multiply it by the applicable Hf; 3 x 1.25 = 3.75 or 4. You will require four 20-ton dump trucks and four 5-ton dump trucks for a dump site 13 miles away.

Civilian cherry picker with 5-ton dump trucks

$$\frac{\text{Mileage}}{5} \times 2 \times Lf \times Hf = \_\_\_\_\_ \qquad \frac{13}{5} \times 2 \times 1.3 \times 1.25 = \underline{8.45 \text{ or } 9}$$

All assets must be tracked to account for the number of loads hauled and to estimate the amount of debris removed. Units can use a notepad, spreadsheet, or load ticket for load accounting. USACE has load accounting data elements as well as an example of a load ticket in its *Disaster Guidebook*.[4] Load tracking will help OICs and NCOICs ensure consistent work effort and enable them to establish process improvements during the operation.

mobilization and training equipment site or another unit, if it is needed. Also, load assets should be matched to the appropriate haul assets. If 5-ton dump trucks are requested, then ask for 2 1/2-yard loaders for them. Never ask for 5-yard loaders unless you intend to move dirt. The 5-yard loader does not have a clamshell scoop, which greatly enhances lift ability when dealing with debris. Match 20-ton dump trucks with military HYEXs or civilian assets such as cherry pickers. These larger load assets have higher lifting ability to get into the 20-ton dump bed. Without a ramp, 2 1/2-yard loaders do not have the necessary reach.

Haul assets can be a mixture of military and civilian equipment. To limit liability, it is best if military personnel load military equipment and civilians load civilian equipment, but do not assume that this will be the case. Haul capacity will vary based on the type of debris and the experience and training of the loader. The key is to ensure that no debris hangs out of the dump bed, where it could damage property or injure someone nearby.

Personnel

Soldiers selected for duty must have certain qualifications. Foremost, they must be qualified on the equipment being used. It is always a good idea to include disaster relief equipment as part of the unitwide driver's training program so that everyone is qualified on at least a high-mobility, multipurpose wheeled vehicle (HMMWV), 2 1/2-ton cargo truck, and 5-ton dump truck. Military occupational specialty (MOS)-specific operators, such as heavy construction equipment and general construction equipment operators, should be identified to operate equipment such as HYEXs, loaders, 20-ton dump trucks, and small emplacement excavators.

Soldiers must be available for duty for a minimum of one week, usually Saturday through Friday. They must bring all

items needed to sustain them during the week, such as a sleeping bag, uniforms, and civilian clothes. In addition, soldiers should bring personal entertainment items to keep them occupied after duty hours.

Estimates of the number of personnel needed are based on your equipment and guidance from higher headquarters. Initially, calculate the number of drivers and assistant drivers needed by multiplying the number of haul assets by two. Then estimate two operators per load asset. One soldier will operate the equipment while the other serves as a spotter. Factor in soldiers needed to operate specialty equipment such as chainsaws and add an OIC, an NCOIC, a driver, and a two-person logistical team to transport meals and other items. Add all these together, include MOS-specific information, and contact higher headquarters for maintenance support. Usually, the maintenance warrant officer or motor sergeant will tell you what they will do to support the operation. Do not include the logistical support team or any other group outside of the EWT control. Lastly, do not forget to assign a medic or qualified combat lifesaver to each EWT, and ensure that they inventory their aid bags before operations.

Soldiers use a cherry picker to load a dump truck.

Specialty Items

Specialty items include generators, chainsaws, pioneer trailers, tools, or any other specialty sets, kits, and outfits. They also include all the things needed to maintain and service the items mentioned. In areas where most debris is vegetation, chainsaws are the best asset. If chainsaws are included in your TOE, bring all of them and have those that are NMC serviced on the state contract. An added necessity for each haul asset is a set of branch shears to cut any loose vegetation hanging outside of the dump bed. The logistical team assigned to each site should maintain gas, water, two-cycle oil, bar oil, and any other needed petroleum, oil, and lubricants. Everything else will be coordinated through your logistical support team and either brought from the unit or purchased for your use.

Conclusion

Unlike engineer construction projects, there is little reporting, no completion certificate to get signed, and no clearly defined completion date. You will find that civilians will continue to place debris by the roadside long after the military operation is completed. The duty of the EATs and EWTs is to provide relief to local authorities and civilian workers until they can handle the problem on their own, using the equipment they have. Coordinate often with points of contact and higher headquarters to keep soldiers informed of current operations, and take the time to properly plan the EWT effort so they can successfully assist in disaster relief.

Endnotes

[1] Field Manual (FM) 3-0, *Operations*, Washington, D.C., 14 June 2001, page 10-5.

[2] CALL Newsletter 93-6, Operations Other Than War, Volume II - Disaster Assistance, Fort Leavenworth, Kansas, October 1993, Chapter 9.

[3] U.S. Army Corps of Engineers *Disaster Guidebook*, Galveston District, Galveston, Texas, 1 April 1999. Appendix D. <*http://www.swg.usace.army.mil/em/mg/mguide.asp*>.

[4] Ibid., Appendix H.

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Louisiana National Guard *Emergency Procedures Operations Plan for Natural Disasters*, Jackson Barracks, New Orleans, Louisiana, 10 March 1993.

Army Regulation 500-60, *Disaster Relief,* 1 August 1981.

FM 5-34, *Engineer Field Data*, Washington, D.C., 30 August 1999.

Captain Turner has served in the Louisiana Army National Guard for more than 16 years. He currently is in the Active Guard/Reserve as the plans officer and administrative officer of the 528th Engineer Battalion (Combat)(Heavy) in Monroe, Louisiana. He has participated in three tornado damage relief operations and one ice storm.

Disaster Relief After Hurricane Lili

By Captain Thomas M. Turner

In October 2002, Hurricane Lili made its way through Louisiana, prompting National Guard involvement in disaster preparation and relief. The 225th Engineer Group, which includes four combat heavy engineer battalions— the 205th, 527th, 528th, and 769th—and the state's other major commands supported the operation. The operation was divided into five phases: Phase I, alert and preparation at home station; Phase II, movement to forward staging areas; Phase III, employment into the area of operations; Phase IV, deploy back to home station; and Phase V, recovery and deactivation. Our battalion, the 528th, was assigned to an area in Opelousas, in south-central Louisiana.

The 225th Engineer Group task-organized each engineer battalion into two to three EATs and five EWTs, centrally controlled by the group but supported by their parent units. Later, the EATs were recalled, and the EWTs fell under the control of the established state task force. The EATs were made up of two soldiers—one officer and one NCO. Each EWT totaled 23 soldiers (including a medic) and had the following equipment: two HMMWVs, a HMMWV maintenance truck, five 5-ton dump trucks, two 2 1/2-yard loaders, an M920 with trailer, and a small emplacement excavator (SEE). EWTs were task-organized by the state task force, and the teams were broken up and deployed to separate sites to accommodate multiple needs. This method worked well for the larger sites but created difficulties for smaller teams that did not have the proper equipment for some tasks. In the case of the smaller teams, the SEE trucks were not utilized to their full potential because of their limited load capacity and lift height. The larger teams usually arrived on-site with two 2 1/2-yard loaders and four 5-ton dump trucks, which were very effective for debris removal. As this experience showed, it is always a good idea to train teams to handle different types of tasks and keep them together throughout operations. If you must develop a table of distribution and allowances (TDA) for EWTs, then create more than one TDA to handle large and small tasks using compatible loading and hauling assets.

Our EWT was lucky in that it replaced a unit that was moving to another site. All of the necessary contracts had already been established and functioned well with only minor coordination needed. Billeting was organized at the National Guard Armory in Opelousas, which was well suited to handle the number of soldiers and the EWT's administrative needs.

Chainsaws became a problem due to serviceability and the number requested (24) versus the 19 organic to our unit.[1] Usually, we set up a contract with a local hardware store or chainsaw retailer to provide service and support at larger disaster relief sites. However, smaller sites did not have this support and EWTs quickly ran into problems obtaining chains and bar oil. Most of the 5-ton dump trucks were drawn from mobilization and training equipment sites, which assisted in equipment recovery and distribution. We also provided our own fuel support with two heavy expanded-mobility tactical truck (HEMTT) fuelers.

Most of the power was out in the southern part of the state and cellular telephone usage was difficult because of downed towers. However, we used state-issued 800-megahertz radios and commercial telephones when they were available. Most EWTs used small hand-held radios for close communication between leaders and equipment operators.

We had to address issues of soldier care, including water and meals. We had not sent water buffalos ahead to the area of operations since we had been told that logistical support would come from another battalion that would be collocated with us. A problem was quickly identified when the other unit moved south, but we were able to support our soldiers with organic assets soon afterward. The lesson learned in this situation was to not depend on another unit to support our soldiers' needs unless the unit will exercise total operational control over them for the duration of the emergency. The contract meals issue was resolved quickly by coordinating with the vendor to lower the number of meals provided to the site and coordinating with the state purchasing and contracting office to change the supported unit.

Overall, the relief operations went well, with normal problems that were quickly resolved. Our battalion, and others, received kind words from the communities that we supported. We also took the time to recognize our soldiers, who had done extraordinary work in support of the Hurricane Lili Task Force.

The Hurricane Lili Task Force after-action review is available in Joint Universal Lessons Learned System (JULLS) format through the Louisiana Office of Homeland Security and Emergency Preparedness, 7667 Independence Boulevard, Baton Rouge, Louisiana 70806, <*http://www.loep.state.la.us*>, or Office of the Adjutant General, ATTN: JFHQs (J3), Bldg. #35, Jackson Barracks, New Orleans, Louisiana 70146-0330.

Endnote

[1] CALL Newsletter 93-6, *Operations Other Than War,* Volume II – Disaster Assistance, Fort Leavenworth, Kansas, October 1993, Chapter 6.

Wearing Synthetic Fiber Underwear Under the Nomex CVC Uniform

By Mr. Larry T. Hasty

A question that surfaces frequently among combat vehicle crewmen (CVC) is whether it is safe to wear underwear made with synthetic fibers such as polypropylene or polyester under the Nomex® CVC uniform. The answer is no—it can be a safety hazard in a fire.

This includes the new moisture-wicking T-shirt the Army is fielding. Nylon melts at about 480 degrees Fahrenheit, and other synthetics melt at 300 degrees Fahrenheit. Heat transfer through Nomex, which resists temperatures up to 700 degrees Fahrenheit, could be high enough to melt these synthetic undergarments.

An Army chief warrant officer quoted in the February 1995 issue of *Flightfax*, an Army aviation risk management publication, regarding his experience when his aircraft caught fire highlights this safety issue. "My chest, back, and buttocks were spared from any burns at all due to the cotton underwear that I had on. The burn literally went to where the underwear was and stopped. If I hadn't been wearing my Nomex protective equipment and wearing it properly, there is no doubt in my mind that I would very probably have either died in the fire or died as a result of the burns I would have received."

For protection, either wear underwear made of 50 percent cotton and 50 percent wool or of 100 percent cotton. These natural fibers won't melt and will provide protection that will keep the heat away from your body in a flash fire. Recommended items and their national stock numbers (NSNs) are shown in the table.

Keep the Nomex CVC uniform clean. Oil, grease, or household starch will cause the fabric to burn. Dry cleaning or laundering to remove these contaminants will restore the uniform's fire retardant properties.

Don't be the soldier who survives a vehicle fire only to find yourself with melted polypropylene stuck to your skin. Worn properly, the CVC uniform will protect you from burns should the unexpected happen in your combat vehicle. For more information on this subject or other CVC clothing and individual equipment, contact the Assistant TRADOC Systems Manager-Soldier at Fort Knox, Kentucky: Lieutenant Colonel Craig Carson, at (502) 624-3519, DSN 464-3519 or e-mail <*craig.carson@knox.army.mil*>; or Mr. Larry T. Hasty at (502) 624-3662, DSN 464-3662, or e-mail <*larry.hasty@knox.army.mil*>.

NSNs for Recommended Items

Drawers, 100% cotton, cold weather

8415-01-051-1175	X-Small
8415-00-782-3226	Small
8415-00-782-3227	Medium
8415-00-782-3228	Large
8415-00-782-3229	X-Large

Undershirt, 100% cotton, cold weather

8415-01-051-1174	X-Small
8415-00-270-2012	Small
8415-00-270-2013	Medium
8415-00-270-2014	Large
8415-00-270-2015	X-Large

Undershirt, flyers, man, Aramid

8415-01-043-8375	X-Small
8415-00-485-6547	Small
8415-00-485-6548	Medium
8415-00-485-6680	Large
8415-00-485-6681	X-Large

Drawers, flyers, Aramid

8415-01-043-4036	X-Small
8415-00-467-4075	Small
8415-00-467-4076	Medium
8415-00-467-4078	Large
8415-00-467-4100	X-Large

Gloves, combat vehicle crewman

8415-01-074-9428	Size 5
8415-00-074-9429	Size 6
8415-00-074-9430	Size 7
8415-00-074-9431	Size 8
8415-00-074-9432	Size 9
8415-00-074-9433	Size 10
8415-00-074-9434	Size 11

Mr. Hasty is the deputy and senior technical advisor to the Assistant TRADOC Systems Manager-Soldier at the U.S. Army Armor Center, Fort Knox, Kentucky.

Integrated Life Cycle Base Camp Sustainment

By Mr. Richard M. Marlatt

As the Army transforms and expects to occupy a smaller footprint in a theater, strategic base camp planning becomes critical. The current fragmented approach to design, construction, and operation needs to be reengineered to exploit information technology and integrate base camp management throughout the life cycle. The U.S. Army Engineer Research and Development Center (ERDC) has several ongoing efforts to address different components of this challenge.

Current Situation

For planning base camps (intermediate staging, forward operating, and forward staging), the Theater Construction Management System (TCMS) is the only automated tool available to military engineers. TCMS, developed by the ERDC Construction Engineering Research Laboratory (CERL) in the 1980s, has been used successfully but addresses only design and construction. Those responsible for theater engineering need the TCMS capability plus a means to make intelligent life cycle base camp sustainment decisions. This includes not only design and construction planning but also force protection; environmental considerations; health and safety issues; and base operation, transfer, and closure.

Doctrine for the design of base camps is weak, although field and technical manuals abound. Site selection techniques are also less than ideal. There is a lack of general engineering, environmental-baseline documentation, and sanitation input. The design is for an initial standard, but it usually becomes a temporary standard. The lack of strategic planning also contributes to high annual operating costs for base camps. For example, Defense Secretary Donald Rumsfeld noted during a June 2001 visit that Camp Bondsteel costs $148 million per year, which resulted in a memorandum to the Secretary of the Army recommending that costs be reduced. Finally, bases take time to deconstruct, and these activities can harm the ecosystem if environmental concerns are not addressed.

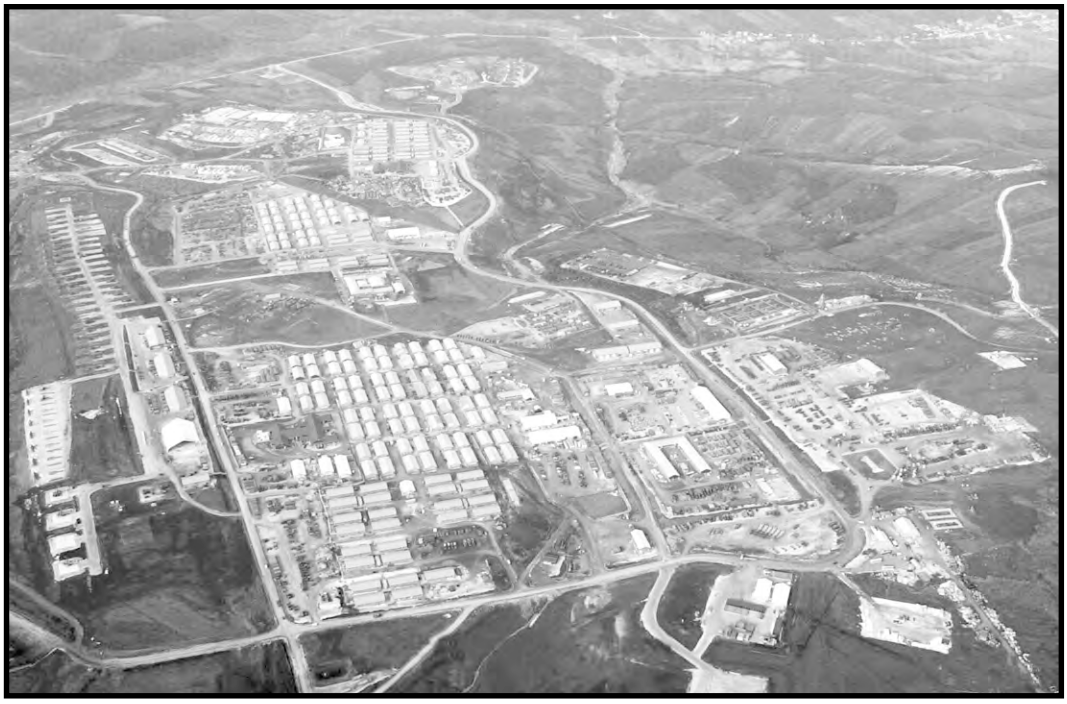
An Integrated Process

CERL leads an ERDC project to develop planning decision support tools that provide the forces with an expedient forward infrastructure to meet requirements for rapid deployment, minimal logistics tail, and safe haven. These tools focus on the maximum use of locally available materials, infrastructure, and utilities, resulting in a minimum permanent footprint that meets functional, operational, environmental, and other requirements. The intent is to provide base camp-equivalent facilities within 15 days of troop deployment.

Engineers and troops need a toolkit to help assess existing infrastructure in theater.

A totally integrated base camp facility management decision support tool would encompass general engineering, environmental-baseline information, field sanitation, force protection, and environmental issues over the life cycle of a base camp. Shifting the focus from just initial design to considering operation and maintenance, as well as environmental considerations, in an integrated life cycle manner is a unique and logical way to manage base camps.

The main objective of integrated base camp management is to accommodate a safe, healthy force able to accomplish the assigned mission and maintain combat power. Integrated base camp management will also—



Strategic base camp planning tools will be integrated into the modeling and simulation system of systems.

- Reduce logistic packaging loads (such as fewer shipping containers).
- Decrease costs for land restoration, land damage payments, and equipment maintenance.
- Provide more efficient base camp layouts, improve force protection, and reduce logistics footprint (economy of force). Soldiers get an improved quality of life in theater through rapid planning and time-phased logistics.
- Develop a five-phase base camp master plan within 24 hours of receiving minimal site data.
- Provide the base camp master plan (including a bill of materials) with the minimum construction logistics tail, permanent footprint, and cost within 24 hours of obtaining minimal site data.

ERDC currently has four ongoing projects to develop information, systems, and processes to support this integrated tool. Multiple agencies are involved in these developmental efforts.

Base Camp Planning

Work on this tool began in fiscal year (FY) 01 at ERDC and leverages aspects of the U.S. Air Force GeoReach initiative. A contractor for the Air Force developed a base conceptual planning system called Geographical Base Engineering Survey Toolkit (GeoBEST). The ERDC work focuses on developing sustainment models to rapidly assess mission needs and generate facility requirements for adjacency, minimum standoff, and utilities; constraint-based layout techniques that support rapid base camp planning and dynamic reconfiguration; and an underlying facility model that supports automatic explosive threat analysis and environmental-baseline data.

The intent is to enhance the Air Force tool with decision-support technologies developed for conventional continental United States (CONUS) facility planning, design, and construction—as part of the CERL engineering automation research—and with antiterrorist, logistics, and other military engineering tools from the ERDC Geotechnical and Structures Laboratory (GSL). This work is also being coordinated with the U.S. Army Engineering and Support Center, Huntsville, Alabama.

GeoBEST will include interfaces to existing ERDC tools, including the Antiterrorist Planner, TCMS/Army Facilities Components System (AFCS), TeleEngineering Toolkit, Terrain Modeling System, and Mobile Combat System–Engineer (MCS–E).

This decision-support tool will help military engineers develop a comprehensive list of facility and infrastructure requirements and then decide where and how best to provide those facilities using a three-dimensional, georeferenced map of the site. The planner will be able to construct alternative scenarios and compare the time, cost, and logistics required to modify or upgrade existing facilities with the construction of rapidly erectable temporary facilities.

Conventional Contingency Facilities

This ERDC project identifies Class IV reduction opportunities for conventional semipermanent construction. Currently, the construction of buildings in theater takes too long, costs too much, and ties up critical transportation resources. Previous contingency operations (such as up to 24 months in duration) have shown that forward operating base vertical construction materials constitute one-third of the Class IV supplies.

"Integrated life cycle base camp management tools support Army Transformation objectives by providing better-designed contingency facilities faster, with less logistics tail and a smaller footprint, and at the lowest cost to ensure the soldiers' comfort, health, safety, and combat readiness."

The South East Asia (SEA) hut, a commonly used semi-permanent construction facility, is the initial case study for this work. SEA huts use standard dimensional lumber and plywood construction and have been built for base camps in Vietnam, Kosovo, and Guantanamo Bay. They provide adequate shelter against the weather and are a temporary solution to housing forces for operations that exceed six months in duration. However, this conventional construction requires large quantities of Class IV supplies that generate logistical problems.

ERDC is exploring optimum-value engineering and materials substitution for designs that can reduce the Class IV burden. Optimum-value engineering will eliminate unnecessary design redundancies. Innovative materials substitution focuses on researching standard and hybrid sections (such as engineered wood composite) to develop new sections that inherit the best properties of their components. From the research, various design configurations will be generated and their subsystems evaluated. The capacity of these subsystems will be assessed against their construction weight, volume, and constructibility requirements.

Contributors to be brought on board when appropriate include the ERDC-GSL Base Camp Survivability Branch for materials procurement knowledge, the U.S. Army Engineer School for engineer training doctrine, the 412th/416th Engineer Commands, the Naval Mobile Construction Battalion and/or the Air Force RED HORSE Civil Engineering Squadron units for combat construction doctrine and knowledge, the Huntsville Center for logistics and forward operating base requirements, and Kellogg, Brown & Root for practical contractor experience.

In-Theater Infrastructure Assessment

One way to support rapid military deployment and reduce the Class IV materials needed in theater operations is by using or adapting the existing infrastructure. To ensure the adequacy of this infrastructure, theater engineers need tools to locate, inventory, and assess the condition of buildings and utilities. As part of this effort, ERDC is studying the feasibility of using remote assessment of the infrastructure to identify, sort, prioritize, and make initial evaluations. Once on the ground, the troops and engineers could perform more detailed inspections using simplified methods, checklists, design and material libraries, and a centralized reachback capability with skilled engineers who assist in finding and resolving complex problems.

The scoping phase of this project is looking at multiple approaches that would help engineers and troops in the field better use the existing infrastructure. A close look at lessons learned from recent mobilization efforts will be an important early step. Proponents within the Department of Defense will be identified and invited to participate in a base camp workshop scheduled to take place in FY04. The lessons learned, workshop, and investigation of current standards and promising technologies will focus the research efforts where the most effective improvements can be made. The following activities are being considered:

- Develop a database (or the framework and tools for collecting the data) of existing infrastructure outside CONUS.
- Establish infrastructure benchmarks based on local practices.
- Develop applications of remote assessment technologies for buildings and utilities.
- Develop assessment tools for engineers (building component inventories, inspection checklists, guidance, and self-contained reference materials).
- Develop assessment tools for soldiers (simplified methods).
- Produce standards for gathering information to optimize use of the ERDC TeleEngineering Operations Center.
- Provide rapid restoration techniques for utilities and buildings.
- Document innovative repair methods (such as using indigenous resources).

The findings will be used to focus research and development on tools that will assist in rapid theater inventory, condition assessment, planning, and repair of existing structures to meet the functional demands.

Utilities Technology Selection

During deployments, the Army establishes base camps in a wide variety of situations. Site conditions, such as the status of existing infrastructure and the environmental-baseline assessment, affect how base camps can be deployed and how utilities can be provided. Because each base camp scenario is unique, the Army must depend on an array of utility technologies to serve base camp needs. Selection is based on preexisting site conditions, the environmental-baseline assessment, the number of troops, and the duration of the stay.

AC-RC in the 21st Century
(From an AC Perspective)

By Captain Jason Meharg and Captain Michael Konczey

Many in the armor and engineer communities—and the Army community in general—perceive Active Component (AC)-Reserve Component (RC) assignments to be the "kiss of death" for their careers. Others see them as a sign that they have done something wrong and are no longer worthy of the more prestigious assignments, such as small group instructor (SGI) at a branch school or observer-controller (OC) at a combat training center. To dispel this perception, the Armor and Engineer Branches even state on their respective home pages, "The general rule is not *if* you will serve, it's more like *when* will you serve"[1] in an AC-RC assignment and "Most officers will be assigned to a '3R' (recruiting, Reserve Officer Training Corps, Reserve Component) assignment. The 3R assignment itself has no negative bearing on promotion, schooling, and battalion command."[2] While there are some disadvantages to an AC-RC assignment, we submit that these assignments are not career-enders and that the rewards far outweigh the challenges. The intent of this article is to address some of these challenges, highlight some of the rewards, and perhaps change the perception of AC-RC assignments across the force.

Within the AC-RC community, there are two different paths: First, there is the resident training support battalion. These units cover down with only one RC unit. Second, there is the observer-controller/trainer (OC/T) battalion. These units evaluate and assist in training several RC units within a specified region. This article focuses on the training support battalion.

Despite the negative connotations and personal feelings regarding AC-RC assignments, they remain a necessary, important, and rewarding aspect of the total Army assignments process. First and foremost, the AC-RC program is congressionally mandated and requires the Army to "provide Active Component advisors to Army RC units to improve readiness. As a result, AC-RC assignments are placed first or second on the priority list of fill."[3] These assignments are also important because the officers and noncommissioned officers (NCOs) who fill them play important roles in the personal and professional development of the supported RC units. Lastly, these assignments help AC soldiers understand how the RC functions. As we move more to an "Army of One," it's likely that many AC leaders will either work for or have RC units working for them in future deployments.

Since Operation Desert Storm in 1991, and the drawdown at its conclusion, the Army National Guard has continued to play an increasingly larger role in the U.S. Army's power projection capabilities. The National Guard has participated in Operations Southern Watch, Northern Watch, Joint Forge, Joint Guardian, and Deliberate Forge, to name just a few. In 2000, the 49th Armored Division took the lead in Bosnia for Stabilization Force 7 Operation Joint Forge, Multinational Division-North. This deployment marked the first time since American soldiers entered Bosnia in late 1995 that an Army National Guard unit served as the headquarters element and provided a troop component for this peacekeeping mission.[4] National Guard units continue to perform this mission today.

National Guard troops conduct a map reconnaissance for an upcoming training event with their resident trainer.

Since 11 September 2001, RC units have taken on even larger roles, ranging from Homeland Defense, to the United Nations Multinational Force Observer Mission in the Sinai, to operations in combat theaters of Operation Enduring Freedom in Afghanistan and Operation Iraqi Freedom. Currently, RC units provide the majority of operational and theater-level logistical support and maneuver control for combat operations. RC units are the primary force running aerial port of

debarkation operations in Uzbekistan. Similarly, RC units provide the majority of transportation assets in Kuwait. More significantly, follow-on forces for the next phase of Operation Iraqi Freedom will include RC combat units in addition to the many combat support and combat service support units already in theater. The 39th Infantry Brigade (Enhanced Separate Brigade), Arkansas Army National Guard, and the 30th Infantry Brigade (Enhanced Separate Brigade), North Carolina Army National Guard, recently received mobilization orders to deploy to Iraq with 1st Cavalry Division and 1st Armored Division, respectively.

Serving in an AC-RC assignment presents many challenges and rewards. First, we work on a daily basis with the supported RC unit. We work in their armories and live in the same communities. Our mission is to—

- Provide military occupational specialty (MOS)-specific training assistance to the leaders and soldiers of the unit.
- Focus efforts in planning, executing, and evaluating battle-focused training to improve the combat effectiveness of the company/battalion/brigade and to reduce post-mobilization training time.
- Perform duties as directed by the AC commander.
- Fill key vacancies and deploy with the unit, on order.

We assist the unit in planning, preparing, and resourcing their training. We help ensure that their training is battle-focused and in line with the guidance issued by their higher headquarters. We coordinate for outside support in the form of OC/Ts for their externally evaluated lanes and annual training. Often, we assist the OC/Ts in planning and resourcing this training, as well as issuing the operations orders and maneuver graphics for these exercises. We also play a vital role in planning and preparing yearly training briefs that culminate in annual training, combat training center rotations, and/or real-world deployments. In short, we assist in the planning, preparation, and execution of training at all levels for the supported RC unit. Of course this helps the unit as well as our own professional growth. Our bottom-line objective is to ensure that the unit is ready to deploy when the nation calls.

As part of training the unit, we help educate the RC soldiers and leaders we support. We teach officer and NCO professional development and other classes; assist platoon leaders, platoon sergeants, and junior NCOs in devising training for their soldiers; and even have the opportunity to develop soldiers on an individual level. In addition, we assist the supported RC unit in training, evaluating, and validating platoon leaders, platoon sergeants, and company commanders, focusing on their ability to issue operations orders, conduct troop-leading procedures, give after-action reviews, and conduct proper risk assessments.

Our presence in these assignments is a delicate balance. We are expected to be the subject matter experts in many areas. Similarly, we are expected to share this expertise with the supported RC unit with the expectation that they will

National Guard troops review personal data before deployment.

incorporate what is applicable. This does not always occur, however, mostly because we are outsiders; we are not members of the tight-knit RC family. It is important to keep in mind that success in this assignment is measured in small bites. We must establish our credibility—as with any new unit—and cultivate a relationship of trust to be truly effective. Therefore, we must maintain the technical and tactical competence that is expected of us as professional officers and NCOs. We must also maintain our doctrinal knowledge and stay current within our respective branches (which can be difficult being located in such far-removed locations). By doing all of these things, we again benefit the unit as well as ourselves.

By and large, we work with a large, professional group of soldiers. National Guard soldiers are consistently willing to listen to new ideas from the training support battalion as well as the OC/Ts and incorporate these ideas into their next training event. They are motivated, patriotic, willing to do the right thing, and ready to fight to protect America.

In addition to the opportunity to help make the National Guard units better, one also gains a better—and necessary—understanding of how the National Guard works. This assignment gives firsthand insight into the constraints the units face, as well as how competent they are despite how little time they actually spend in uniform. When it comes to external evaluations, either during monthly drills or annual training, they are held to the same standard as AC units. The biggest difference is the amount of quality training time available to the RC unit. Like AC units, RC units still have annual maintenance, mobilization, and inspector general inspections, as well as individual common task training, Army physical fitness tests, and weapons qualifications. But unlike AC units, RC units are authorized 48 multiple unit training assemblies (weekend drills) a year, resulting in just 24 eight-hour days to conduct all of their administrative and training requirements in preparation for their annual training.

Another advantage is the opportunity to assist in the personal and professional development of soldiers, which is always rewarding, no matter which patch they wear. Other benefits include unparalleled family time and the opportunity to further one's civilian education.

While AC-RC assignments have many personal and professional rewards, they also have a few disadvantages. Often, we work in remote areas that lack the military support channels we have grown accustomed to when living on or near a military installation. There may be no military medical or dental facilities, no commissary or post exchange, no military barbers, and no military dry cleaners. Some live and work in communities that lack the TRICARE Health Care Program or TRICARE Prime Remote providers. Some live in areas with inadequate housing and schools for family members (situations that are being addressed). But most importantly, we miss out on the routine life on a military installation. Like recruiters, we lose the everyday camaraderie with our work groups, peers, and other Army families.

As with any military assignment, there are good and not-so-good aspects. An AC-RC assignment has many more good points than bad, providing the AC participant with opportunities not often available in other assignments. The opportunity to professionally develop by "rebluing" on doctrine and tactics, techniques, and procedures; pursue civilian education; spend time with your family; and live in a civilian community are once-in-a-career opportunities. Most importantly, you can have a huge impact on the readiness of many soldiers who may be deployed, with little or no notice, to real-world missions all over the globe. AC-RC assignments are not a fad, nor are they anathema. The important thing is to keep such assignments in perspective. Any assignment, if analyzed enough, can reveal something to complain about, but remember that we all chose to serve. Lastly, remember the 1st Infantry Division's motto: "No mission too difficult, no sacrifice too great, duty first."

Endnotes

[1] Armor Branch Web site at *<https://www.perscom online.army.mil/OParmor/arcpt_old.htm>*

[2] Engineer Branch Web site at *<https://www.perscom online.army.mil/OPeng/BQassign.htm>*

[3] Armor Branch Web site at *<https://www.perscom online.army.mil/OParmor/arcpt_old.htm>*

[4] MAJ Ron Elliot. "49th Armored Division deploys to Bosnia." *ArmyLINK News* February 15, 2000.

Captain Meharg is the resident trainer for the 239th Engineer Company, Arkansas Army National Guard. An engineer officer, he has served in various positions at Fort Carson, Colorado, and in Korea, where he commanded Headquarters and Headquarters Company, 44th Engineer Battalion, 2d Infantry Division.

Captain Konczey is the operations officer for the Integration Division, Combat Training Center Directorate, at Fort Leavenworth, Kansas. He recently served as the resident trainer for Troop E, 151st Cavalry Regiment, Arkansas Army National Guard. An armor officer, he has served in various positions at Fort Riley, Kansas, and Fort Hood, Texas, where he commanded Alpha Company, 3-8 Cavalry Regiment, 1st Cavalry Division.

("Base Camp Sustainment," continued from page 40)

ERDC will prepare a matrix of base camp technologies that can provide utility services for water treatment and distribution, wastewater collection and disposal, solid waste disposal, and electrical-power generation under various deployment scenarios. Information in the matrix comes from a study completed in FY02, deployment doctrine, agencies active in supporting Army deployments, and military and civilian individuals with deployment experience. The matrix includes existing technologies, technologies under development, and commercial off-the-shelf technologies that could be adapted to deployment scenarios.

Based on the matrix, ERDC will estimate the impact that existing technologies have on deployments and determine the potential impact of replacing ineffective technologies with more effective ones. Evaluation of this impact will be based on mission, deployment logistics, cost, security, and quality of life for the soldier.

In the next phase of the research, ERDC will develop—or partner in the development of—technologies necessary to fill high-priority elements of the matrix. It is anticipated that technologies related to solid waste processing and wastewater sludge disposal will be developed. However, it is possible that other technology gaps with higher priority will take precedence. Any new technologies developed will be field-tested and validated before recommendation.

For this work, ERDC will consult or partner with other Corps of Engineers offices and laboratories; the Soldier Support Center at Natick Laboratories, Massachusetts; and the Air Force Research Laboratories at Tyndall Air Force Base, Florida.

Conclusion

Integrated life cycle base camp management tools support Army Transformation objectives by providing better-designed contingency facilities faster, with less logistics tail and a smaller footprint, and at the lowest cost to ensure the soldiers' comfort, health, safety, and combat readiness. Through an integrated approach, environmental, communications, force protection, and other issues can be considered simultaneously in planning and management rather than piecemeal or after the camp is built. These tools will help ensure base camp sustainability from design through disposal.

Mr. Marlatt is associate technical director for facilities acquisition and revitalization at CERL in Champaign, Illinois. Other contributors to this article are Kirk McGraw, Gary Gerdes, Stuart Foltz, and Jonathan Trovillion, all of CERL.

Seven Breaching Habits of Highly Effective Units

By Lieutenant Colonel Thomas H. Magness

Mobility is Job No.1. Without it our forces will go nowhere. However, enemy forces throughout history have found numerous methods of blocking roads, creating barriers, and limiting the movement of advancing forces. In turn, great armies have conducted combined arms breaching operations to overcome these obstacles to press the fight and destroy the enemy. The orchestration and execution of this task may be the toughest job a maneuver commander will ever face. The purpose of this article is to assess breaching operations based on lessons learned at the National Training Center (NTC), Fort Irwin, California, while also revealing the "Seven Breaching Habits of Highly Effective Units."[1]

In 1999, the Training and Doctrine Command (TRADOC) developed a trends-reversal program to review unit execution of numerous mission-essential tasks. One task, combined arms breaching, was high on the list for review and assessment. TRADOC designated NTC Rotation 00-10 as a combined arms breach-focused rotation and coordinated with the U.S. Army Engineer School to assess negative trends in breaching operations. This onerous task, executed by some tremendous maneuver and engineer leaders, validated one thing—the trend has not been reversed.

Combined arms breaching operations are difficult and remain a negative trend. This is no surprise to warfighters anywhere and is echoed by the Sidewinder (Combat Engineer) Observer-Controller Team at NTC. Opposed combined arms breaching, under fire, against a capable opponent like the NTC Opposing Force (OPFOR), is tough but not impossible.

Field Manual (FM) 3-34.2, *Combined Arms Breaching Operations* (formerly FM 90-13-1), says that breaching "is perhaps the single most difficult combat task a force can encounter."[2] The May 2001 issue of *Engineer* indicates that it took the U.S. Marines 2.5 to 9.5 hours to clear two lanes through an Iraqi obstacle belt during Operation Desert Storm.[3] It took another 24 to 48 hours for friendly elements to pass through the obstacle and continue their movement toward the enemy. This was an unopposed breach with the best available equipment, personnel, and planning and had been rehearsed for weeks.

We can and must reverse this trend. Many rotational units with great leaders, adequate equipment, and strong motivation culminate at the breach and never pass combat power to destroy the enemy. Some units never even get to the breach or cannot identify where or how to breach. This is despite the fact that breaching is the top deliverable for combat engineers and brigade combat teams (BCTs) in mid- to high-intensity combat operations. Combined arms breaching may be the ultimate team sport, and success relies on the skill, techniques, and training of all the players, not just the engineers.

Trends – What We See

First, I'll present a quick review of the combined arms breaching trends seen at NTC, based on observations during the planning, preparation, and execution of combined arms breaching operations. Repeated failures occurred in:

Planning

- Reconnaissance and surveillance (R&S) planning, and intelligence requirements are unfocused.
- Poor terrain analysis fails to answer the "So what?" question.
- Units fail to perform reverse breach planning.

- Units do not make detailed plans to set the conditions for breaching.

Preparation

- Observers fail to provide detailed obstacle intelligence.
- Units fail to interdict enemy engineer defensive preparations.
- Engineer and combined arms units fail to rehearse adequately.

Execution

- Breach execution is unsynchronized.
- Maneuver forces lack mass and move forces into the breach piecemeal.
- Maneuver forces "stumble" into obstacles.
- Engineers are not in position when conditions are set.
- Units fail to consider traffic control or expansion of lanes.

> "I approve of all methods of attacking provided they are directed at the point where the enemy's army is weakest and where the terrain favors them the least."
>
> Frederick the Great

Habit No. 1 – Mass Kicks A**!

Quite simply, most units lack sufficient mass to succeed in penetrating prepared enemy positions. Success or failure can often be predicted at the line of departure (LD) based on this fact alone. In fact, most brigade combat team attacks will effectively mass no more than one company team at the point of penetration. This is clearly not enough to penetrate the prepared fortifications of an enemy who conducts this defense mission three times to every one OPFOR regimental attack. This enemy is good. We should expect no less from our next enemy, wherever we may meet him. We should expect complex obstacle fortifications with antitank and antipersonnel mines, ditches, wire, booby traps, anti-handling devices, and whatever else the enemy can muster. Behind this line of obstacles, we can expect prepared fighting positions for both vehicles and personnel with interlocking fires, interior repositioning lines, and the massed effects of as many forms of contact as possible. We should not expect to be successful in this scenario without the massed effects of fire, maneuver, and every Battlefield Operating System (BOS) in the unit.

The standard for mass is articulated clearly in FM 3-34.2:

- Breaching is conducted by rapidly applying concentrated efforts at a point to reduce the obstacle and penetrate the defense.
- Massed combat power is directed against the enemy's weakness.

Seven Breaching Habits of Highly Effective Units

Habit No. 1 – Mass Kicks A**!

Habit No. 2 – Focus on the Enemy Engineers.

Habit No. 3 – The "Orchestrated Ballet of Farm Implements" Doesn't Just Happen.

Habit No. 4 – Don't Call Them Farm Implements!

Habit No. 5 – Obstacles Are Like Rivers; Learn to Breach or Learn to Swim.

Habit No. 6 – Use All Available Smoke Assets; Someone Is Always Watching.

Habit No. 7 – Breaching Operations in Restricted Terrain Are Not "Business as Usual."

- The location selected for breaching depends largely on weakness in the enemy's defense, where its covering fires are minimized.
- If friendly forces cannot find a natural weakness, they create one by fixing the majority of the enemy force and isolating a small portion of it for attack. [4]

Tactics, techniques, and procedures (TTP): Conduct detailed terrain analysis. Answer the "So what?" question. We are beginning to see units leveraging the technological advances of terrain visualization tools. The products from TerraBase®, the Digital Topographic Support System, and other visualization tools are just that—products. But with analysis comes answers to the question that maneuver commanders must demand: Where can we concentrate efforts against an enemy weakness, and where are the enemy's covering fires minimized? If a weakness is not identified, where must we create one? Where does the terrain facilitate the positioning of support forces? Where is the enemy's "red zone," and how can we stay out of it? The scheme of maneuver, scheme of fires, task organization, and BOS focus await the answers to these questions.

TTP: Plant the big fat tack (BFT). Mass on the point of penetration. We use a BFT (an extraordinarily big-headed pushpin) to help focus the planning and execution on the point of penetration. It is a great tool to ensure focus at the point where we must have massed effects. Take a look at your plan—how many maneuver units are focused at that point? Is every BOS focused at that point to ensure success? Is that point an enemy weakness? If not, how are we creating one there?

- When do we place the BFT? Early enough to ensure the massed effects of maneuver, fires, and every other BOS. In other words, before we finalize the friendly course of action (COA).

- Who (which BOS) is focused at the BFT? Who isn't?
- Can we adjust the BFT location? Of course. As information changes our understanding of the enemy, we will adjust the BFT location. Use this to trigger a resynchronization of the plan. Tactical operations center (TOC) battle captains and executive officers must ensure that we have a battle drill to confirm focus at the BFT through execution.

TTP: Isolate the point of penetration. Wherever we penetrate the enemy, we must ensure that the remainder of the OPFOR remains fixed. We do this with fires, close air support, maneuver, and scatterable mines. We must do this, however, without violating the principle of mass. The OPFOR has great success in the offense, fixing its Blue Force (BLUEFOR) enemy with motorized rifle companies and scatterable mines. The OPFOR does so without significantly reducing its ability to mass at the point of penetration. All too often, BLUEFOR units commit battalion task forces to this task—often one-third to two-thirds of their total BCT combat power.

TTP: Mass engineers at the breach. Breaching doctrine basically requires one engineer platoon (with attachments) to execute one lane. There is also a requirement for redundancy—typically 50 percent. In a maneuver task force supported by an engineer company, most of that company is required at the breach. Develop a scheme of maneuver and a task organization that masses engineers at this critical point. Identify triggers to change task organization as required to mass engineers at the breach and incorporate them into the decision support matrix.

Habit No. 2 – Focus on the Enemy Engineers

In postmission summaries at NTC, we often quote from FM3-34.2: "An unverified enemy template can lead to disaster because the force may aim an attack at the wrong place. Units may deploy to reduce expected obstacles early, wasting mission time to feel their way into nonexistent obstacles; or they may blunder into an unexpected obstacle or an enemy engagement area."[5] Attacking units routinely have little or no knowledge of how the defending enemy is shaping terrain with obstacles, and engineers are usually committed to breaching operations with very little information on the obstacles they are tasked to breach. It is this shaping of the terrain that will tell the story of how the enemy is defending, and where. Engineers, even enemy engineers, don't lie. They cannot—it simply goes against their nature. An obstacle on the ground means something. It probably means that, were you to back up to two-thirds of maximum effective enemy weapons range (typically 1,200 to 2,000 meters), there will probably be an enemy position. Terrain visualization tools can help confirm or deny these locations (more "So what?" questions).

Too often, we do little to find these enemy obstacles even though they are the one component of the enemy defense that can most easily be detected. They can be spotted during the day or night and are most easily detected during the construction of the obstacle. Men and machines are working, vehicles with supplies are forward, and the terrain is changing shape. Finding precise enemy positions, however, is very difficult. Most OPFOR positions are occupied for only a brief period during defensive preparation (position proofing, rehearsals, security operations), and then not occupied again until just before contact. Most R&S efforts focused on finding the enemy in those positions are unsuccessful because the enemy is simply not there.

TTP: Kill the enemy engineers. Enemy engineers will die. Kill them. Position observers early to detect and disrupt the enemy's defensive preparations. Target bulldozers, caches of construction material and ammunition, engineer soldiers and equipment, and all obstacle emplacement activity. The enemy's ability to disrupt our attacking formations and reduce our momentum is directly related to his ability to successfully emplace his obstacles. He knows he cannot defeat the BLUEFOR in a direct-fire battle without his battlefield shapers. Deny him this advantage. Mine emplacement now is a low-risk, high-payoff mission. We must reverse this, making it a high-risk mission for enemy soldiers to employ mines. When an enemy soldier gets the mission to emplace mines, he must tremble with the thought of his impending destruction.

TTP: Find the obstacles. This cannot be just an engineer reconnaissance task. This is something on which we must focus combat observation lasing teams (COLTs), Stryker vehicles, brigade and task force scouts, unmanned aerial vehicles, the Joint Surveillance Target Attack Radar System (JSTARS), and any other available "lookers." Find the obstacles to confirm or deny the enemy COA. Confirm the proposed point of breach or penetration. Consider layering reconnaissance assets by sending in initial forces to identify obstacles, with subsequent forces to obtain (before committing breaching forces) precise information such as—

- Obstacle location and type.
- Gaps and bypasses.

- Specific minefield composition, which may dictate what breach assets to use and in what sequence.
- Soil conditions, which may indicate suitability for plowing.

We do not have the technology to detect buried mines and many other low-cost, low-technology explosive devices. Therefore we must compensate for this with TTP, task organization, and focused reconnaissance. To be successful, we must focus all available lookers to let us detect mining activity and enemy obstacles before they are emplaced. (See "Kill the enemy engineers" on page 46.)

Habit No. 3 – The "Orchestrated Ballet of Farm Implements"[6] Doesn't Just Happen

FM 3-34.2 indicates that the "commander ensures synchronization through proper planning and force preparation. Fundamentals to achieve synchronization are—

- Detailed reverse breach planning.
- Clear subunit instructions.
- Effective C2.
- Well-rehearsed forces."[7]

The first two are fairly straightforward and are articulated very well in our breaching doctrine. Reverse breach planning works—do it! Determine the force ratios required on the objective and work backward through the breach to the LD. Assign clear tasks and purposes to all subunits with graphic and fire-control measures and triggers that take the unit from LD through the objective.

TTP: Command and control (C2). Ensure, as a minimum, that the following are clearly addressed in the plan and then rehearsed:

- Who determines that conditions are set?
- Who initiates the smoke (artillery and mechanical)?
- Who adjusts and controls the smoke?
- Who chooses the specific breach location?
- Who controls the breach assets?
- Who shifts suppressive fires?
- Who guides assault forces to the breach?
- How and when do we communicate this information, and on what nets? How do we do this digitally?
- Who is the breach force commander, and have we resourced him (without exceeding span-of-control considerations) to be successful?

> "A poor plan, well rehearsed and violently executed, is better than a perfect plan late and unrehearsed."
>
> General George S. Patton

TTP: Conduct combined arms, mounted suppress, obscure, secure, and assault (SOSA) rehearsals. You may be surprised to see the "R" (reduce) missing from the breach fundamentals acronym SOSRA. This is the one component that least needs rehearsal. It is the bread-and-butter battle drill for the engineers, but it is the one that has received the most attention when units indicate that they have conducted rehearsals. Where synchronization usually fails, and where rehearsals need the most focus, is in setting the conditions (suppress, obscure, secure) and in rapidly projecting combat power (assault) through the breach and onto the objective. Make this the focus of mounted rehearsals. Work through timing, triggers, positioning, and the C2 issues identified in the previous paragraph. Get the engineers to the breach, and they'll do fine.

Habit No. 4 – Don't Call Them Farm Implements!

We all (engineers, maneuver commanders, and Army leadership) recognize that our breaching assets are slow, old, and often inadequate for the assigned breaching tasks. But they're the best the Army gives us, so make them work. Generally, engineer and maneuver leaders fail to understand the capabilities and limitations of our breaching systems, do not identify appropriate commitment criteria for specific systems, and generally underestimate or undersell the capabilities of the most powerful breaching force on the combined arms battlefield—the sapper.

TTP: Fire the mine-clearing line charge (MICLIC). The lethality of the MICLIC should not be understated. It consists of 1,950 pounds of composition A4 and is capable of defeating most pressure-activated mines, clearing a 14- by 100-meter lane. Unfortunately, until sappers go to NTC (or are deployed to a combat theater), they generally have not fired a live MICLIC. Continental United States-based units are authorized only inert line charges, and even then not enough for one per MICLIC crew. This is the equivalent of tank crews achieving "qualification" having fired only practice rounds or, not having fired one themselves, reaching qualification by watching their buddy fire one. Needless to say, there are a host of issues associated with the firing of 1,950 pounds of explosive attached to 550 feet of cabling and electrical wiring. Work through them. Consider the following:

- In the rough, broken terrain that will likely characterize much of the ground surface on current and future battlefields, slow down. Consider putting the MICLIC on a good road or trail, or pick a point of breach that is suitable for the speeds and launch angle you require (more "So what?" questions for your terrain analysis).
- The MICLIC will destroy most pressure-activated mines in the 14- by 100-meter lane. Some mines in the lane may be unaffected by the blast effect of the charge. That is why we proof, using either rollers, mine plows, or sappers. That is also why we conduct detailed, specific reconnaissance at

the point of breach—to determine the type of mine and the suitability of the MICLIC as a primary breaching system.

- Until the Army fields a better system, the MICLIC is still the most capable breaching asset in the inventory that allows breaching without exposing soldiers to the risks of dismounted breaching operations. Know and understand its capabilities and limitations, and find opportunities to increase the tactical and technical proficiency of the soldiers who use it.

> "I've on many occasions wondered what it would be like to be a real soldier…if only I was an engineer."
>
> General George S. Patton

TTP: Never underestimate the breaching capability of a single sapper. There is no obstacle known to man, and certainly none seen on the NTC battlefield, that cannot be breached by an engineer soldier. We use mounted systems (MICLICs, tank plows/rollers, armored combat earthmovers) to provide speed or mitigate the risk to dismounted soldiers. There may be cases where the sapper is the best available breaching option (rough, restricted terrain, for example). And while there are certainly implications for timing, if the sapper is the only available breaching option, we should all be prepared to wait. The alternative—mission failure—is much worse, of course. This relates to the importance of gaining specific intelligence about the obstacle at the point of breach before the sappers arrive. Configuring an appropriate breaching package without losing momentum depends on timely and precise information. Your sappers demand it.

Habit No. 5 – Obstacles Are Like Rivers; Learn to Breach or Learn to Swim

Our breaching tenets, while all appropriate, probably should borrow a few bullets from FM 90-13, *River-Crossing Operations*:

- Surprise.
- Extensive preparation.
- Flexible plan.
- Traffic control.
- Organization.
- Speed.[8]

If units viewed the obstacle as a river that requires the passage of not just the lead maneuver formation but perhaps the entire BCT, division, or corps on one or two narrow lanes, perhaps we would be less inclined to "hand wave" the details of the breach or to push the requirement to "execute the breach" down to the lead task force or company team. There is little margin for error. If successful, we might have one or two 14-meter-wide lanes through which to project combat power. Smoke, dust, direct and indirect fires, scatterable mines, and chemicals all further narrow this margin for error.

TTP: Avoid the frontal attack. While our doctrine indicates that the frontal attack is the least desirable form of maneuver, it is the one most frequently seen at NTC. Find a flank and mass on it. Exploit a weakness or create one. Isolate the point of penetration. BLUEFOR units rarely if ever surprise the enemy but rather "telegraph" their intentions long before the LD. Find a way to tell a deceptive story without losing the ability to mass effects at the BFT. It's no easy task but one the OPFOR routinely executes. Use obscuration during preparations and movement to, through, and beyond the LD to make it difficult for the enemy to determine friendly intentions.

TTP: Plan for traffic control. Get the military police into the fight. Traffic control is a traditional task for military police but one they rarely execute at NTC. There must be a trigger to hand over the cleared lane from the breaching unit's engineers to follow-on military police and/or engineers. BCTs should plan for a forward passage of lines if more than one unit is passing through the lane. Consider detailed march tables with graphic control measures, much like those for a river crossing, that will facilitate the passage without losing momentum.

TTP: Shifts happen. Build flexibility into the plan. Most plans do not survive first contact with the enemy, let alone make it very far beyond the LD. Most units identify branch plans for alternate COAs but generally fail to include BOS implications as they develop these alternate plans. This is also where the TOC battle drill that refocuses all BOS at the revised BFT location must be in place. Regardless of where we breach, all team members must be refocused at the new breach location if it is to be successful.

Habit No. 6 – Use All Available Smoke Assets; Someone is Always Watching

Of the breach fundamentals—SOSRA—the most challenging may be obscuration. Mechanical smokers (wheeled or tracked smoke generators) rarely create the conditions necessary to allow maneuver formations to get into position to breach. Units rarely identify triggers to transition from artillery-delivered smoke to mechanical smoke and even to hand-emplaced smoke (smoke pots). This is one of the most critical components of the breaching operation that needs synchronization and rehearsal.

TTP: Give a clear task and purpose to mechanical smokers. Generally, orders to smoke units read like this: task—smoke; purpose—to provide smoke. Chemical units need a specific target (antitank systems, motorized rifle company- and platoon-sized formations), location (north wall of the valley, map coordinates NV123456), and desired effect (haze, blanket, curtain) to better use their capabilities. Rehearse their positioning within the formation as well as the triggers for employment and transition from one task to the next. There may be several: one to facilitate the movement of support forces into position, another to ease breaching operations, and perhaps a third to help assaulting forces moving through the breach and onto the objective.

TTP: Expend all ammunition. Most units identify appropriate targets and triggers for artillery-delivered smoke. Fewer use mechanical smokers during the approach to the obstacle or at the breach. Very rarely do units employ smoke pots and smoke grenades at the breach—perhaps because it adds to what already is a complicated menu of tasks. Units fail to do so at their own peril. Assume someone is watching and use every available asset to create the necessary conditions for committing soldiers to and through the breach.

Habit No. 7 – Breaching Operations in Restricted Terrain Are Not "Business as Usual"

Too many units fail to account for the implications of restricted terrain in the planning, preparation, and execution of breaching operations. Units cannot approach breaching operations in a defile as if it were an open valley floor. The implications for breach timing, maneuver unit positioning, observer positioning, and breach assets are too critical to overlook. For those who have trained in "Mojavia," visualize breaching operations in Alpha or Bravo Pass, and think about the applications for breaching in Korea, Kosovo, or Afghanistan. FM 3-34.2 (Appendix D) is a good place to begin to examine the implications of restricted terrain and to develop unit TTP and standard operating procedures (SOPs).

TTP: Restricted terrain operations are slow. Plan accordingly. The implications on the time required to maintain suppression, obscuration, etc., while working through a defile are tremendous and must be planned and rehearsed in detail. These are often dismounted operations to clear high ground and, quite possibly, to set support forces on the far side of the obstacle. The terrain may restrict the ability to execute mounted breaching operations, further adding to the timing challenges. All of these details point to a slow, deliberate process.

TTP: Traffic control is critical. Not only is the river long, it's wide and deep. Because defiles may not allow for two-way traffic and may extend for hundreds of meters, or even for kilometers, there is even less margin for error as units move to and through the breach. March tables are critical as are deliberate controls for entering and exiting the breach area.

Making the "Seven Habits" Habits

The challenge for most units is how to translate these habits into executable tasks. In a word—repetition. Units that practice these TTP—incorporating them into battle drills, SOPs, and mission plans—will develop these breaching habits. Multiple repetitions with all members of the combined arms team will make the successful execution of this extraordinarily complex combined arms task more likely.

These habits are designed to facilitate success in the most complicated scenario possible—breaching in contact. The goal must be to set the conditions, according to these seven habits, to breach out of contact with the enemy. Destroy every enemy in and around the point of breach and every enemy that can influence the point of breach—and then breach. Is this scenario possible? Yes. Is it possible without multiple repetitions and the total focus of every team member? Maybe, but not likely.

Ultimately, however, these habits are the responsibility of the breach orchestrator—the unit commander. Translate the TTP and breach habits into clear guidance and intent that focus the entire unit on penetrating the enemy and his obstacles. And while the use of the seven habits will not guarantee success at NTC or on any other future battlefield, their application—coupled with the warrior spirit that our soldiers consistently display—may help units begin to reverse a negative trend and give our force the mobility it requires.

Lieutenant Colonel Magness is commander of the Detroit District of the U.S. Army Corps of Engineers. When he wrote this article, he was assigned to the Sidewinder Team at NTC.

Endnotes

[1] Apologies to Steven Covey, author of *The Seven Habits of Highly Effective People*, Simon and Schuster, New York, NY, 1989. Combined arms obstacle breaching likely requires effective people as well as effective units.

[2] FM 3-34.2, *Combined Arms Breaching Operations*, 31 August 2000, Introduction, p. 1-1.

[3] Colonel Michael K. Asada, et al, "The Grizzly: A System of One," *Engineer*, May 2001, p. 41.

[4] FM 3-34.2, p. 1-11, para. 1-35.

[5] Ibid., p. 1-5, para. 1-6.

[6] Major Harry Green, "The Grizzly and the Wolverine: Alternatives to an Orchestrated Ballet of Farm Implements," *Engineer*, August 1996, pp. 2-6.

[7] FM 3-34.2, p. 1-13, para. 1-46.

[8] FM 90-13, *River-Crossing Operations*, 26 January 1998, p. 1-4.

(Note: A variation of this article was published in the May 2002 issue of *Armor*. The author wrote it while assigned to the Sidewinder Team at NTC. The opinions expressed are those of the author and do not represent the official position of NTC. Even though nearly two years have passed since they first appeared in print, the lessons of the "Seven Breaching Habits of Highly Effective Units" remain relevant. They are consistent with the concept of assured mobility, as well as the lessons learned on our most recent battlefields.)

Doctrine Updates:
A Bridge to the Future Force

By Lieutenant Colonel Reinhard W. Koenig

The recently approved capstone engineer manual—Field Manual (FM) 3-34, *Engineer Operations*—is now accessible on the General Dennis J. Reimer Training and Doctrine Digital Library. Several years in production, this manual provides a holistic construct for engineer operations within the current operational environment. It consolidates FM 5-100, *Engineer Operations*, and FM 5-114, *Engineer Operations Short of War*, and more importantly, links Joint Publication (JP) 3-34, *Engineer Doctrine for Joint Operations;* JP 3-15, *Joint Doctrine for Barriers, Obstacles, and Mine Warfare;* JP 4-04, *Joint Doctrine for Civil Engineering Support;* and FM 3-0, *Operations*, to our manuals. As the Engineer Regiment moves forward from FM 3-34 with implementing manuals, we must build into our doctrine a bridge to the Future Force that will rapidly incorporate future concepts and support the Current Force.

FM 3-34 Changes

Our capstone manual takes into account new concepts, technologies, and requirements and recognizes that the threat is continuously evolving. Written primarily at the operational level of war, it is applicable to commanders—both engineer and maneuver—at all echelons. It also recognizes that we operate in an environment of continuing transformation. Although it is a complete rewrite of engineer capstone doctrine, some key changes are to—

- Establish an engineer mission-essential task list (METL).
- Codify assured mobility.
- Include field force engineering (FFE).
- Recognize maneuver support (MANSPT) as a grouping of combat support functions.

Establish an Engineer METL

The Combined Arms Center published FM 3-0, *Operations*, in June 2001. As part of this effort, it established an Army METL to serve as an operational expression of the Army's core competencies. It also directed Army units to develop their battle-focused METLs in concert with FM 7-15, *The Army Universal Task List*. The table at right shows the Engineer Regiment's METL, which directly supports the Army METL.

Codify Assured Mobility

We codified our role (with other branches) to provide assured mobility to the force and recognized the invaluable role of the U.S. Army Corps of Engineers (USACE) to our nation. For the first time, we link the operational framework of FM 3-0 and the engineer battlespace functions that support the maneuver commander (combat, geospatial, and general engineering) into a construct that allows the force to deploy, move, and maneuver where and when it desires to accomplish the mission. Not to be confused with the Battlefield Operating System (BOS) function of mobility, assured mobility supports the maneuver commander's use of all elements of combat power to achieve decisive, shaping, and sustaining operations across the full spectrum of conflict. The four imperatives of assured mobility are—

- Develop mobility input to the common operating picture (COP).
- Select, establish, and maintain operating areas.
- Attack the enemy's ability to influence operating areas.
- Maintain mobility and momentum.

These imperatives are integrated into the military decision-making process to achieve the commander's intent. Achieving assured mobility rests on applying its six fundamentals: predict, detect, prevent, avoid, neutralize, and protect. They are all applicable from the strategic to the tactical level. They are most clearly defined in Chapter 3 of FM 3-34, and suggested resources to achieve each are shown in Figure 1 (which is Figure 3-3 of FM 3-34). Note that several units used the assured mobility construct with great success in planning and executing Operation Iraqi Freedom.

Army and Engineer Regimental METL	
Army Tasks	**Engineer Regimental Tasks**
Shape the Security Environment	Shape the Security Environment
Respond Promptly to Crisis	Respond Promptly to Crisis
Mobilize the Army	Mobilize Engineer Forces
Conduct Forcible Entry Operations	Support Forcible Entry Operations
Dominate Land Operations	Support Assured Mobility to Dominate Land Operations
Provide Support to Civil Authorities	Provide Support to Civil Authorities
	Provide Quality, Responsive Engineering Services to the Nation

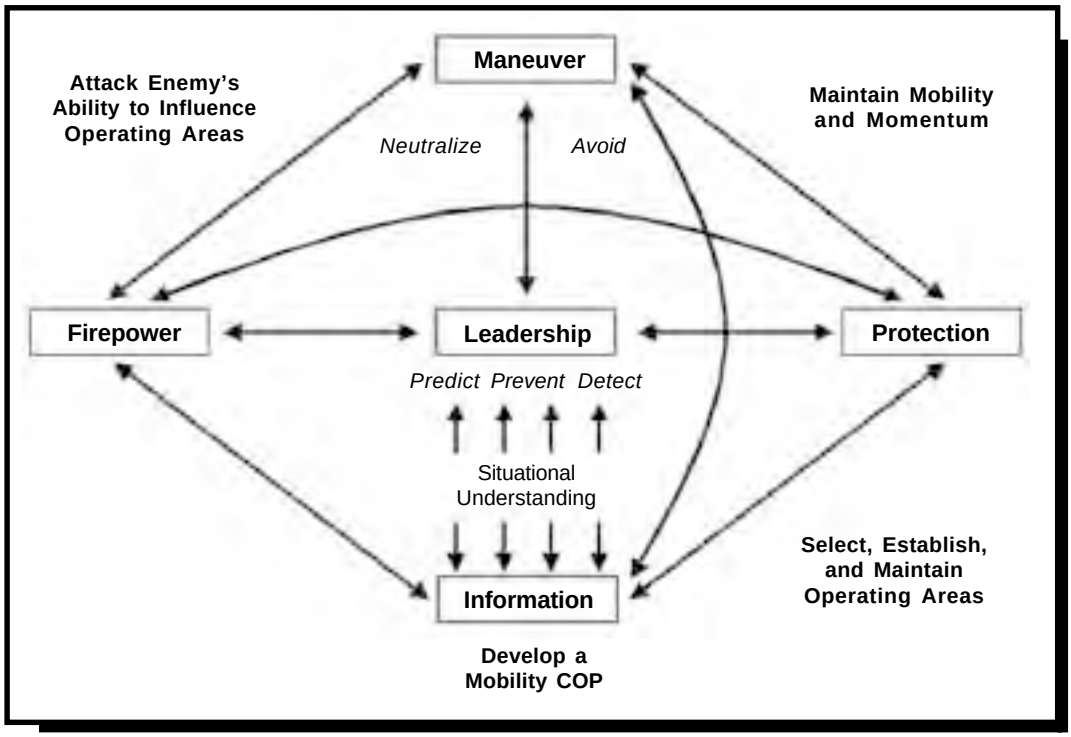


Figure 1. Imperatives of Assured Mobility and the Elements of Combat Power (Figure 3-3 from FM 3-34)

Include FFE

For the first time, engineer doctrine recognizes the role of the entire Engineer Regiment in the defense of our nation by establishing FFE as a means to access its specialized engineer capabilities. Particularly early in any contingency, FFE helps to meet the challenge of filling the gap between engineer requirements and assets on the ground. This is done through the combination of *reach* and *forward presence*. *Reach* is the ability of forward-deployed engineer elements to communicate with nondeployed subject matter experts—particularly from the seven research and development centers within USACE—to develop and implement solutions to engineer issues from tactical through strategic levels. The communication system of choice for reach is the USACE-developed TeleEngineering Toolkit. The system proved invaluable at every level during Operation Iraqi Freedom. USACE also operates the Tele-Engineering Emergency Operations Center to facilitate reach. *Forward presence* is the deployment and application of modular teams to support the joint force and Army service component commander's needs across the entire battlespace. Drawn mainly from the Engineer Commands (ENCOMs) and USACE, these teams are tailored to meet mission requirements:

- Forward Engineer Support Team – Main (FEST-M)
- Forward Engineer Support Team – Augmentation (FEST-A)
- Contingency Real Estate Support Team (CREST)
- Environmental Support Team (ENVST)
- Base Development Team (BDT)
- Infrastructure Assessment Team (IAT)
- Facility Engineer Group (FEG)
- Facility Engineer Detachment (FED)
- Facility Engineer Team (FET)

Appendix C of FM 3-34 describes the capabilities of each modular team and provides operational guidance for planning their employment.

Recognize MANSPT

MANSPT is the staff integration of the mobility, countermobility, and survivability BOS with the remaining BOS elements focused on enabling assured mobility for the friendly force. It focuses on enhancing tactical freedom of maneuver and force protection using the assured mobility imperatives and fundamentals as the framework. The Stryker Brigade Combat Team (SBCT) currently uses a MANSPT cell that integrates the functions of the Engineer, Chemical, and Military Police Branches, along with explosive ordnance disposal units. FM 3-34 lays out the concept for MANSPT, recognizing it as a future concept that is much broader than the SBCT and encompasses the means to enable, enhance, and protect freedom of action.

These are but a few of the major changes in the Regiment's capstone doctrine. Clearly the culmination of this effort has brought engineer doctrine in line with joint and Army doctrinal thinking and has provided the foundation and blueprint for the Regiment's future doctrinal efforts.

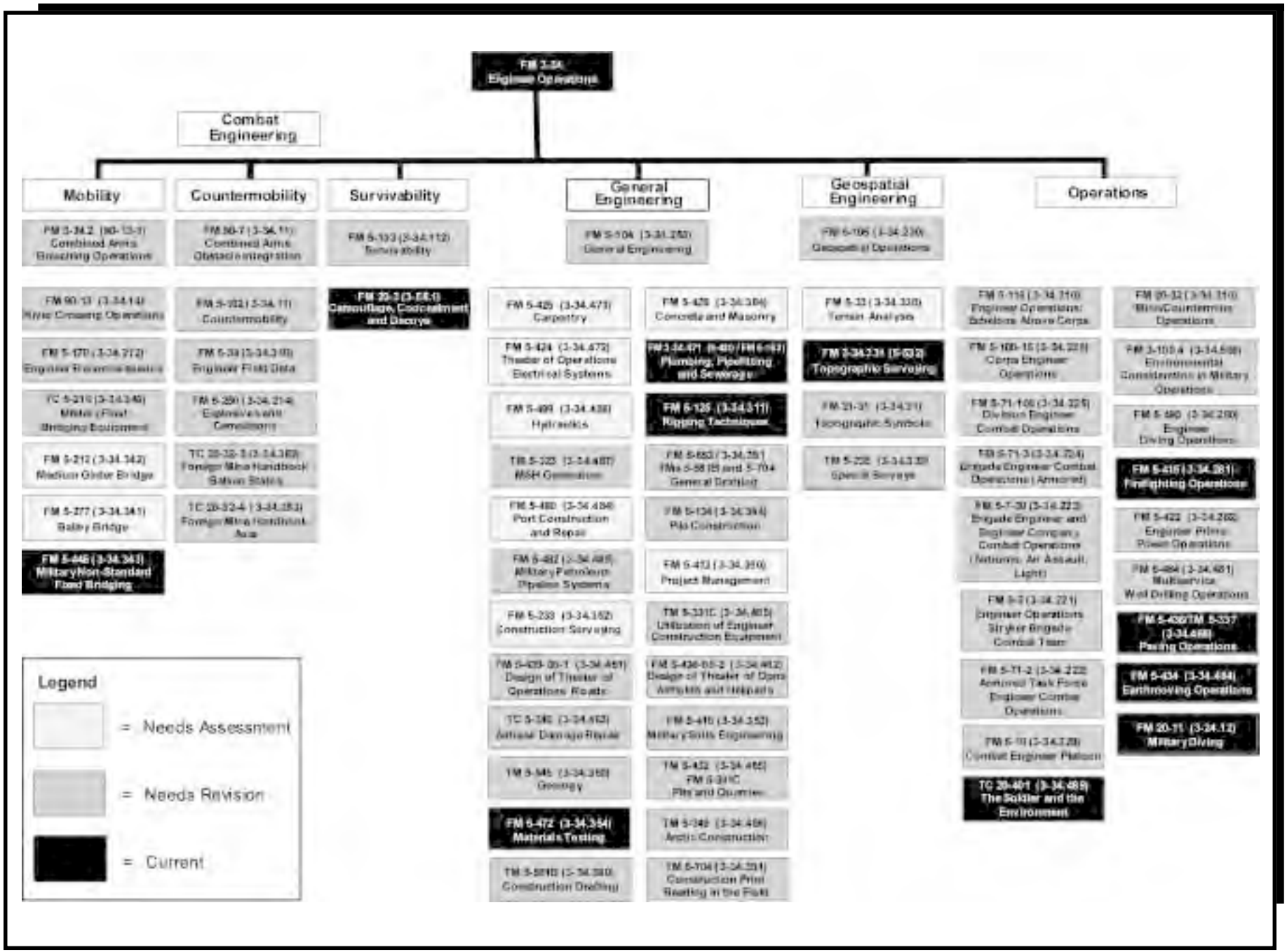


Figure 2. Current Status of Doctrinal Manuals

Near-Term Doctrinal Changes

The Engineer Regiment maintains a doctrinal library of 64 products, the second highest number of any branch. Keeping this diverse and often-technical library current requires effort from across the Regiment. Currently, 42 of these products need to be revised. (See U.S. Army Training and Doctrine Command [TRADOC] Regulation 25-36, *The TRADOC Doctrinal Literature Program*, for more on determining the status of a doctrinal product.) Included in this effort is support to Joint Forces Command and TRADOC for the upcoming consolidation of JP 3-34, *Engineer Doctrine for Joint Operations*, and JP 4-04, *Joint Doctrine for Civil Engineering Support*. The good news is that with the publication of FM 3-34, we can begin work on the key implementing manuals:

- FM 3-34.210, *Mine/Countermine Operations* (currently FM 20-32, *Mine/Countermine Operations*). Changes in the contemporary operating environment, equipment technologies, and doctrine make a complete revision necessary. We will use lessons learned from ongoing operations—and include improvements to sapper training involving explosive ordnance—to make this document relevant in the field.
- FM 3-34.250, *General Engineering* (currently FM 5-104, *General Engineering*). Last published in 1986, this FM needs to reflect the advent of FFE, updates to the engineer planning process and joint and Army doctrine, and lessons learned from Operation Enduring Freedom and Operation Iraqi Freedom.
- FM 3-34.11, *Countermobility* (currently FM 90-7, *Combined Arms Obstacle Integration*, and FM 5-102, *(Countermobility*). The consolidation and update of the old countermobility manual into FM 3-34.11 is almost complete. A final draft version is available on Army Knowledge Online (AKO), and comments are welcome.
- FM 3-34.230, *Geospatial Operations* (currently FM 3-34.230, *Topographic Operations*). The revision of this FM will reflect changes in organization, equipment, and lessons learned from an extremely successful topographic effort during Operation Iraqi Freedom.
- FM 3-34.112, *Survivability* (now FM 5-103, *Survivability*). This FM update will reflect almost two decades of advancement in technology and improvements to tactics, techniques, and procedures.

Publication of these manuals is critical to the Regiment, because they serve as the key implementing manuals to execute our battlespace functions of combat, general, and geospatial engineering. They also provide the doctrinal base for our operational and technical doctrinal products. Numerous other efforts are occurring throughout the Regiment. The U.S. Army Engineer School is partnering with many organizations that are stakeholders to produce doctrine that is timely and relevant. Examples include—

- FM 3-34.251 (FM 5-116), *Engineer Operations, Echelons Above Corps*.
- FM 3-34.465 (TM 5-332), *Blasting Operations in Pits and Quarries*.
- FM 3-34.483 (FM 5-422), *Prime Power Operations*.
- FM 3-34.486 (TM 5-349), *Arctic Construction*.
- FM 3-34.280 (FM 5-490), *Engineer Diving Operations*.

If you would like to become involved with assessing, reviewing, or writing any engineer publication, please contact the Engineer School Doctrine Development Division at <*doctrine.engineer@wood.army.mil*>.

Future Doctrinal Changes

Look for doctrine management to transform in the future. Current initiatives at TRADOC include object-based publishing and doctrine taxonomy initiatives that will revolutionize the way we write, produce, and access Army doctrine. More importantly, we must begin thinking now about how and when to codify Future Force concepts into our doctrine. With an initial operating capability of 2008, we must begin developing engineer doctrine for the Future Combat System in 2006 in order to provide the doctrinal bridge between the Current and Future Forces. In the meantime, our current doctrinal efforts must recognize transformation and integrate emerging concepts and technologies as they are developed. Only then will we be able to meet the doctrinal needs of the Future Force.

Lieutenant Colonel Koenig is the Chief of the Doctrine Development Division at the U.S. Army Engineer School, Fort Leonard Wood, Missouri.

Leadership the "Leahy Way"

By Colonel Gregg F. Martin

One of the most effective NCO leaders I have ever known was First Sergeant Edwin Leahy, Bravo Company, 79th Engineer Battalion, based in Karlsruhe, Germany, with whom I was privileged to serve from June 1984 to November 1985.

"Top" Leahy ran our company with a spirit, enthusiasm, and competence that was unmatched in my experience. Thanks in large part to his phenomenal leadership, Bravo Company excelled at just about everything. It seemed that all we touched turned to gold. The soldiers, NCOs, and officers were fired up with a can-do attitude and sense of pride. Our achievements in war-fighting readiness, training, maintenance, partnership, sports, and community support were usually rated "best in the battalion." We took care of our people and developed them as future leaders. We had fun and enjoyed our time together, whether in the mud, dust, or snow at Grafenwoehr; on the ranges or troop construction missions; in the field; with our allied partnership units; or on the athletic fields. Although Top and I were truly a "team," there was never any doubt in my mind—or anyone else's—that Top Leahy was "The Man."

Let me describe Top Leahy. First, he was an absolutely powerful presence. He exuded confidence, strength, and charisma. He looked old and mean, with a full head of black hair that he slicked back, 1950s style. He had "LOVE" tattooed on one set of knuckles, "HATE" on the other. He grew up in a rough part of New Hampshire and spoke with a thick Northeastern accent. Except for his tour on "The Trail" and some time in jail, he spent all of his Army time down in the trenches, leading engineer soldiers. He was a hard man.

Top was respected, admired, loved, and feared—all at the same time. He loved the company and his soldiers, and no one dared to cross him or mess

with his company. His ability to quickly cut through the fog and confusion of events, competing priorities, and complexities never ceased to amaze me. It seemed that a hundred things could be going on, then several crises would hit simultaneously, and Top would instantaneously know what to do, how to do it, and in which priority. He was brilliant. He would run his solution by me for input and concurrence, then we would proceed from there. Despite his tough exterior, he always took time to explain his logic and thought process. In short, he was a wonderful teacher and coach who was developing and mentoring "his" company commander, just as he had mentored his previous commander, then Captain Bob Derrick.

Totally dedicated to the company, the troops, and the mission, Top came to work early and worked a full day. He was always on top of everything in the company and always knew what was happening throughout the battalion. He maintained total "situational awareness" 24/7.

Although we did not have official family readiness groups (FRGs) in those days, Top and his wife did this informally, but most effectively. Mrs. Leahy was the "Company Mom." She pulled together the NCO, enlisted, and officer wives (the company was all-male) on a regular basis to talk business and have fun. The wives became a tight-knit group and took care of their own. She was originally from France, so they had many fun excursions across the border for shopping, restaurants, and sightseeing. When the company deployed, or when tragedy struck, this paid off big time. To this day, my wife says that this informal, close group of wives was the most effective FRG she has ever seen, and the beauty of it was that *they all wanted to get together because it was so much fun.*

Top always loved to have fun. He spoke French and German and was the most enthusiastic participant in partnership activities that I have ever seen. We trained with, did exchanges with, and simply had fun with our allies. Top never saw a partnership event that he didn't like. And I knew that once we went out the door, it was going to be a late night. Wisely, he always brought a designated driver. We built a tremendous amount of good will and truly enhanced our interoperability, which would have paid off in combat if we had ever fought the "big one" in Central Europe. Moreover, he included junior NCOs and soldiers in these events, which was a huge morale builder and one of his ways of growing leaders.

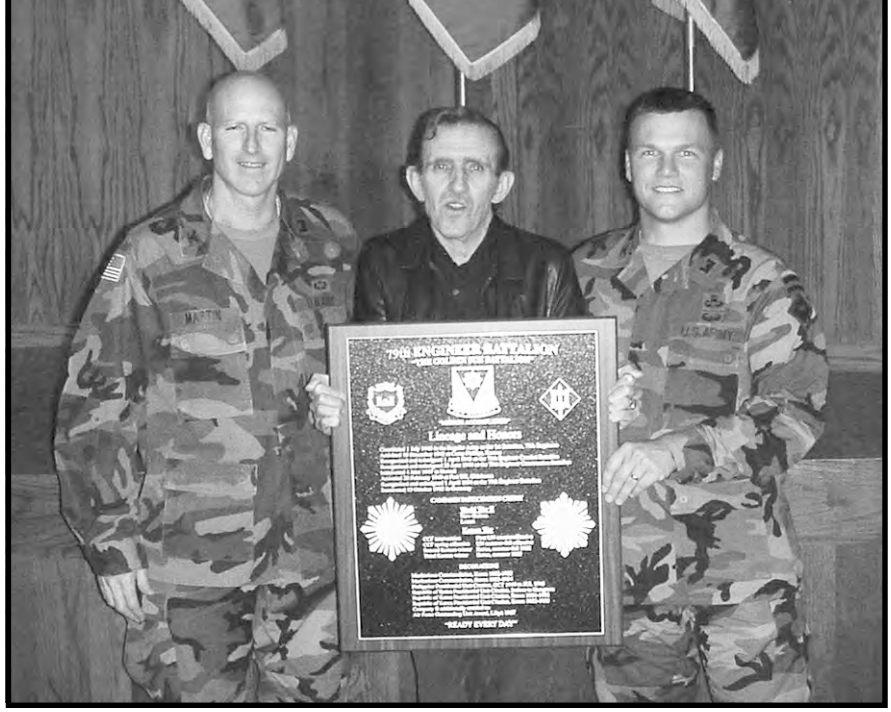
By today's standards, Top's physical condition was not as good as it should have been. Although not a big fan of PT, he was strong and robust and had unlimited energy. There is no doubt that he drank too much and ate too much delicious—but high-cholesterol—foods, and the two packs of unfiltered Camels he smoked every day did not help his wind. When I tried to convince him to change to

a healthier lifestyle, his response was, "Life is short, I've already lived longer than I should have, and I actually like this stuff... So thanks, Cap'n, but I ain't changin'." In terms of more running and aerobic fitness, his answer was, "Sir, I've been in combat, and although I did sprint some short distances from time to time, I never ran a long distance anywhere. And if I'm ever in combat again and need to get somewhere, I won't run! If need be, I'll hijack a truck, or cut some poor commie bastard's throat and take his. But thanks for your concern, Cap'n. I appreciate it."

In terms of technical and tactical competence, there was none better. He expertly ran the company with seeming ease. He knew and could execute every mission flawlessly—from weapons to demolition, to construction, to maintenance. In tense situations, I saw him leap into the fray (even if it was mud or wet concrete)—with spit-shined boots and starched fatigues—and take charge to make sure that the mission got accomplished to standard and that no one got hurt. He taught and coached through his personal example. There was nothing he asked his troops to do that he had not already done or wouldn't do again. And they all knew it.

Top always kept mission accomplishment, concern for his people, and loyalty up, down, and sideways in perfect harmony. He intuitively knew how to do this and was a wonderful coach and advisor to his young commander and lieutenants. Given the operational tempo, the number of competing priorities, and the rapid changes that demanded flexibility and adaptability, I would sometimes hit the frustration level and want to go do battle with folks up at battalion. Top was marvelous in calming me down and channeling my energy into more productive venues (and keeping his cap'n "from steppin' on it"). On the other hand, when it *was* time to do battle with higher headquarters, Top let me know, and we often went up to headquarters as a team. And when we did, we rarely lost.

We developed our quarterly training briefs together and briefed as a team from handwritten butcher charts. Top knew exactly how to orchestrate these in such a way that he charmed the battalion commander and command sergeant major and got them to grant Bravo Company much of what we requested. He was brilliant and a true master of how to be totally loyal to me, his soldiers, the battalion commander, and peers. Simultaneously, he could get the battalion commander to love him and the company and give us the resources we requested.



First Sergeant Leahy with author, left, and his other company commander (Colonel Bob Derrick, who was the Bravo Company, 79th Engineer Battalion, commander before Colonel Martin) on the right, dedicating the 79th Engineer Battalion plaque at ENFORCE 2002.

What is the relevance of this story? Top Leahy epitomized the NCO Creed. When I think of professional competence—tactical, technical, and leadership—I think of his calibrated and seasoned eyeball, evaluating any situation thrown at him and instantly knowing exactly what to do and how best to handle it. When I think about how to balance mission accomplishment with the welfare of my troops, I often think of Top Leahy. When I think about knowing my soldiers, keeping them informed, and being fair and impartial, I think of him. Top Leahy showed me how to earn the respect and confidence of my superiors as well as that of my soldiers. His life was an example of loyalty to those with whom he served: "seniors, peers, and subordinates alike." He always took the initiative and never compromised his integrity or moral courage. He was always totally candid, while also being diplomatic when necessary.

In short, Top Leahy lived and modeled—every day—what it meant to be a professional NCO in the U.S. Army. He and his NCOs in Bravo Company gave me and my officers maximum time to accomplish our duties, because we did not have to accomplish theirs. First Sergeant Edwin Leahy showed me—through his life—what it means to be an NCO, "The Backbone of the Army."

(Note: First Sergeant Edwin S. Leahy [1944-2003] passed away recently in Rolla, Missouri. He is survived by his wife Sandy, four children, one sister, and five grandchildren. His protégés from Bravo Company, 79th Engineer Battalion, include—among a large number of great Americans—Colonel Bob Derrick, who went on to command the 307th Engineer Battalion, the 20th Engineer Brigade, and now the U.S. Corps of Engineers Transatlantic Command; and Lieutenant Colonel Clarence "Dave" Turner, who currently commands the 14th Engineer Battalion in Iraq. To this day, the three of us are still in awe of First Sergeant Leahy.)

Colonel Martin commanded the Bravo "Bulldogs," 79th Engineer Battalion, from June 1984 to November 1985, in Karlsruhe and Grafenwoehr, Germany. He currently commands the 130th Engineer Brigade, of V (U.S.) Corps and CJTF-7, in Iraq.

Bad Day at Dalat

By Colonel Larry Saul

The resounding crash of rocket-propelled grenades (RPGs) and the staccato report of several automatic weapons were the first indications that things had just taken a turn for the worse. It didn't take long to figure out that this was going to be ugly. Along the length of the kill zone, the scene was one of smoke, flame, and bodies lying about—the unmistakable sight of death and destruction. A quick glance revealed that we were pinned down, under highly accurate enemy fire, and had taken numerous casualties. The North Vietnamese Army (NVA) had launched a thoroughly successful ambush against a U.S. unit in the central highlands of Vietnam.

In early May 1970, Delta Company, 815th Engineer Battalion, assigned to the 937th Engineer Group, 18th Engineer Brigade, and its sister unit, the 102d Engineer Company (Construction Support), moved from the area around Dak To and Kontum, in northern South Vietnam's II Corps, to an isolated base camp adjacent to the inconsequential village of Phu Heip, near the village of Di Linh, Lam Dong Province. Di Linh is situated roughly equidistant between the two provincial capitals of Bao Loc and Dalat, astride national highway QL-20. Dalat is the capital of Tuyen Duc Province and was the home of the Vietnamese National Military Academy and summer home for the president of South Vietnam. This idyllic town had been a tourist destination during the French colonial period. Dalat had a decent, well-maintained airstrip and served as a logistical support base for U.S. units in the area. Supplies and mail were shipped there for distribution. The main class of supply was Class I. For Classes III (petroleum, oil, and lubricants) and V (ammunition), units conducted major resupply convoys to the sprawling logistical support bases at Cam Ranh Bay or Long Binh. A rudimentary post exchange (PX) and Army post office (APO) were located at the airstrip. These were a major attraction for the troops.

The resupply convoys were becoming routine events. "Ad hoc" describes the composition, organization, and command and control of recent convoys. Troops volunteered for the somewhat dangerous task of convoy security for a variety of reasons: It offered a break from the routine, a chance to see some new scenery, and a chance to get away from our small base. The troops could shop at the PX and use the APO.

There had been little enemy activity in the weeks leading up to 21 May, a direct result and benefit of the allied incursion into Cambodia. Consequently, volunteering for security duty seemed like a safe bet. The security force consisted of no more than 15 personnel. The security detail would provide the "shotgun," or truck commander in current parlance, for the vehicles and also constitute the reaction force traveling in trucks at the front and rear of the convoy. Gun trucks were

"Wild Thing," Delta Company's gun truck, was equipped with two .50-caliber machine guns, a 7.62-millimeter machine gun, a six-barreled 7.62-millimeter "minigun," and a radio.

The high-pitched sound of the minigun's 6,000 rounds per minute struck fear into the hearts of the NVA.

either 2 1/2-ton or 5-ton cargo trucks with locally fabricated armored compartments mounted in the cargo bed. On occasion, the armored compartment was the hull of an M113 armored personnel carrier (APC). The trucks were usually armed with four machine guns—a mix of 7.62-millimeter M60s and .50-caliber M2s. On occasion, a 7.62-millimeter "minigun" was mounted. The minigun was a highly effective weapon. Designed for helicopter gunships, this electrically powered, six-barreled weapon could fire 6,000 rounds per minute. When fired, it made a terrifying sound. The NVA feared it.

The gun truck served several purposes. Obviously, it was a source of heavy firepower. It could fight off enemy attacks in ambush kill zones, allowing the other vehicles to clear out of the zone. The drivers, truck commanders, and gunners were brave men. The tactics employed, and the terrific firepower they possessed, made them very attractive targets for deadly and accurate enemy RPGs and machine gun fire.

We used a set pattern: the lead vehicle—an M151 1/4-ton vehicle, better known as a jeep—would be the convoy commander's, who was nicknamed the "Charlie Charlie." Following that would be the 2 1/2-ton cargo trucks, the famous "deuce-and-a-halfs." These included both mess and supply section trucks as well as the awesome gun truck.

Once the convoy was lined up for departure, it was standard operating procedure for the Charlie Charlie to conduct a convoy briefing. Incorporated in this briefing were the route, radio call signs, procedures for reaction to enemy contact, and the chain of command. On 21 May, no briefings were conducted, nor were rehearsals or precombat checks performed. We had become very complacent. This gross oversight would have serious implications later that day.

In recent weeks, our area of operations had been very quiet; the convoys had not encountered enemy activity. Closer to Dalat, we came across more and more local people. Small hamlets dotted the countryside. Woodcutters and farmers populated the villages, especially in the flatlands at the base of the mountains just outside the city. These peasants had one desire—to live their lives peacefully despite the war raging around them. Consequently, we saw more civilian vehicle traffic in this area. Drivers had to remain alert to trucks, pedestrians, farmers herding water buffalo, and youngsters playing near the road. Everyone remained alert and on the lookout for any possibility. As a result of the heavy foot and vehicle traffic, our convoy slowed down considerably and then came to an abrupt halt. Troops dismounted from the trucks and milled about haphazardly.

The Charlie Charlie drove back from the front of the convoy with the news that a civilian truck had swerved into the path of our lead 2 1/2-ton truck, resulting in a collision. We waited casually by our vehicles, not even bothering to take up defensive positions, thinking there was no real threat of an attack. We were lulled into the false security of thinking that we were too close to Dalat for enemy action. Moments after the Charlie Charlie drove off to inform the remaining vehicles in the convoy of the situation, an enormous explosion of rockets, command-detonated mines, and heavy automatic weapons fire erupted.

The Charlie Charlie's jeep came screaming back to our position. It was apparent from the look of sheer terror on his face that things had just taken a horribly ugly turn for the worse. The gunner of the jeep's pedestal-mounted M60 machine gun was crumpled in a bloody ball. Small arms fire had riddled the side of the jeep, severely wounding the machine gunner and destroying the radio. In short order, we had suffered a major attack and had lost a number of troops and the use of our radio.

While lying in the protection of a roadside ditch, we were able to look the length of the kill zone. From our position, we could see the friendly side of the road, and the convoy's trucks scattered about haphazardly. A few were on fire and smoking from well-placed RPG rounds. Several soldiers were lying in the road. From the looks of it, most of them were dead. A few could be seen moving, but when they did, a fusillade of enemy small arms fire would engulf them. Above the sounds of the enemy gunfire could be heard the unmistakable reports of the gun truck's heavy .50-caliber machine guns. If anything could

The UH-1 "Huey" served as a workhorse in Vietnam. At the scene of an ambush, casualties are loaded for evacuation to a field hospital.

Crewmen of "Wild Thing" frequently volunteered for dangerous duty as machine gunners.

break the enemy attack, it would be the overwhelming firepower of the gun truck. At least twice, the truck drove into and out of the kill zone. Our company gun truck, nicknamed "Wild Thing," was running back and forth, up and down the road. One soldier dismounted from the gun truck, retrieving the wounded and placing them in the relative safety of the armored box of the truck. With complete disregard for his own life, this young soldier pulled several wounded men to safety. Sadly, we had no medics to treat the wounded. This was an inexcusable omission.

The Charlie Charlie determined things were out of control and that we could not survive for long in our precarious position. He ordered us to retrieve the wounded closest to us, then mount up into the remaining vehicles and move out. We had his battered jeep and our overloaded 3/4-ton truck, plus a number of the 2 1/2-ton trucks and Wild Thing. We drove helter-skelter for Dalat.

We raced through the streets of Dalat, knowing we needed to get our wounded to the U.S. aid station quickly. Some of them were desperate for immediate attention. The realization that we needed to get back to the ambush site with additional ammunition, manpower, and heavier firepower was undeniable. We knew full well we had friends trapped in the kill zone.

While the medics tended to the wounded, we made final preparations for the trip back to the kill zone. We were reinforced with a platoon (-) of military police (MP) equipped with V-100 armored cars and a gun truck. The MP platoon leader took command and developed a plan.

The drive back down the mountain to the ambush site was short. We used the time to double- and triple-check our weapons, check ammunition, and make final preparations. The tasks we needed to accomplish, and the attention to detail required, helped keep the anticipation and fear in check. There was no traffic on the road from either direction.

We approached the kill zone, but when we were within one or two kilometers of the ambush site, we still could not hear any gunfire. As we drove around the curve leading to the site, we saw that the civilian truck that had collided with our 2 1/2-ton truck was gone. The MP V-100 armored cars moved quickly up to the near edge of the kill zone, near the spot where we had initially deployed from the 3/4-ton truck when the ambush started. The gun truck took up a firing position with a field of fire down the length of the kill zone.

The scene ahead was one of carnage. Lifeless bodies could be seen lying in the road. Smoke and the overwhelming smell of cordite hung over the position like a pall. It was hell. The armored cars and the gun truck were prepared to provide the dismounting troops with overwatching and suppressive fire.

It was obvious that the enemy was gone. Once again, his hit-and-run tactics had worked very well. We had to treat casualties and account for the soldiers we knew had been trapped in the kill zone. We had several men wounded, some grievously. Initial casualty reports stated that we had two confirmed dead. Two great young Americans had died while serving their nation. One of the fallen was a popular young sergeant. Later, word spread of his heroic act of pulling his wounded comrades into the gun truck.

Within a few minutes we accounted for all but one of our troops, those killed or wounded. There was no sign of the missing soldier anywhere. As is typical in any action, personnel accountability is critical. We had to determine the status of every member of the convoy force. As of that moment, everyone focused on finding the missing soldier or his remains. We were all horrified to think of what might have happened to him. Typically, the Vietcong and NVA killed junior enlisted men outright. No one wanted to ponder his fate. It was too horrible to consider.

This had been a very successful day for the NVA. The ambush had accomplished exactly what it wanted. For a very short time, the NVA enjoyed a brief tactical victory, albeit on a very small scale. The goal was to kill Americans, and it succeeded. A few more American soldiers would be going home in body bags.

Resupply convoys were an essential operation. There was no alternative. Units had to conduct routine convoys to Dalat, Long Binh, and Cam Ranh Bay. This was the only means of getting large and outsized equipment and bulk supplies such as fuel and ammunition. Convoys were, and remain, combat operations and must be treated as such. Even today, units

must plan, resource, rehearse, and conduct convoys, since these are critical combat operations.

What lessons were learned from the events of 21 May 1970? What conclusions could be reached? They were simple, and all were leadership-related.

- German Field Marshal Erwin Rommel said more than a half century ago that "in battle, death sanctions all faults." On 21 May, we had a lot of faults:
  - No commissioned officer was detailed to lead the convoy.
  - No clear chain of command was delineated.
  - No operations order, rehearsal, or concept briefing was prepared or conducted.
  - No redundant communications systems were set up within the convoy.
  - No convoy briefing for the drivers, truck commanders, or security force was conducted.
  - No proper cross-leveling of noncommissioned officers among the trucks was executed.
  - No medic accompanied the convoy.
  - No reaction plan in the event of enemy contact was planned or executed.
  - Neither precombat checks nor serviceability inspections were conducted.
- Another Rommel dictum is that "the more sweat on the training ground, the less on the battleground." We failed to conduct rehearsals or establish drills in the event of an ambush. We could have minimized the effects of this catastrophe with a proper rehearsal.
- A convoy is a combat operation. It requires detailed planning, from predeparture to conclusion. Contingencies must be anticipated and plans developed to meet any possible enemy action.
- Failure to plan means that you are planning to fail. Should you fail to consider the enemy, you deserve what you get.

The only happy ending of the 21 May 1970 fight came in February 1973, when his NVA captors released the missing soldier. His name was never identified on any prisoner of war list, and he had long been given up for dead. His survival surprised and elated everyone. The great young men of the 102d Engineer Company and Delta Company, 815th Engineer Battalion, served their country with pride and distinction. The vast majority did their job, served their tours, and returned to civilian life. Today, they are middle-aged and have gotten on with their lives.

Colonel Saul is director of the Center for Army Lessons Learned at Fort Leavenworth, Kansas. He previously commanded the 10th Mountain Division (Light Infantry) Artillery, Fort Drum, New York. He was a sergeant in 1970 when he was assigned to Delta Company, 815th Engineer Battalion, 18th Engineer Brigade. He was commissioned in the Field Artillery Corps through Officer Candidate School at Fort Benning, Georgia. He has served two assignments with the British Army, as the exchange instructor at the Royal School of Artillery, and as the U.S. Army liaison officer to the British Army Staff College.

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Articles should be concise, straightforward, and in the active voice. If they contain attributable information or quotations not referenced in the text, provide appropriate endnotes. Text length should not exceed 2,000 words (about eight double-spaced pages). Shorter after-action-type articles and reviews of books on engineer topics are also welcome.

Include photos (with captions) and/or line diagrams that illustrate information in the article. Please do not include illustrations or photos in the text; instead, send each of them as a separate file. Do not embed photos in PowerPoint. If illustrations are in PowerPoint, avoid excessive use of color and shading. Save digital images at a resolution no lower than 200 dpi. Images copied from a Web site must be accompanied by copyright permission.

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PEACEKEEPING FROM AN HHC PERSPECTIVE

By Captain Ralan Hill and Captain Kevin Stoll

The stability operations and support operations environment is a unique one that challenges engineer line companies and their supporting elements. Over the last decade, the American military has had increased involvement in nation-building and peacekeeping efforts, specifically in Bosnia and Kosovo. In Afghanistan and Iraq, the focus is on stability operations because of the continuing threats to soldiers who guard the perimeter, patrol outside the gates, and conduct sentry duties. The support soldiers most commonly found in a headquarters and headquarters company (HHC) face much different challenges. HHC commanders in stability operations and support operations environments have much greater flexibility than their maneuver or combat brethren when it comes to training, operations, and scheduling, and they should make the most of that opportunity. At issue are the female soldiers not found in line companies, the engineer reconnaissance team (ERT) normally assigned to the intelligence section, partnership possibilities with allied units, and mission-essential task list training conducted while deployed.

An HHC commander's flexibility extends beyond normal 9-to-5 working hours and varies by section and military occupational specialty (MOS). For cultural reasons, female soldiers will be in much higher demand. They will be tasked to conduct personal searches of women in the local civilian populace, both at entrances to base camps and during cordon-and-search operations outside the wire. Ironically, these female soldiers, who are not allowed in combat arms branches, will likely be exposed to greater risks and see more of the host nation than their male counterparts with whom they share an MOS. In a combat engineer battalion, the HHC is the only company with women and consequently will bear the entire burden of these taskings. The lesson learned is that when drawing up the deployment roster, it is absolutely necessary to take as many females as possible—especially from the lower enlisted ranks—since their unique qualifications will be in high demand. The mission rehearsal exercise, if conducted, must prepare the female soldiers for these tasks and the company must be prepared to backfill their normal duties through the cross-training of comparable male soldiers.

For the remaining male soldiers, the working environment will be almost like that in garrison. The battalion and company operations components will run continuous operations in shifts, but most other sections—such as maintenance, communications, and personnel—will work a more-or-less regular duty day unless their particular expertise is required outside the wire. The line companies work 24-hour operations with platoons or squads on 6-, 8-, or 12-hour shifts. While these line companies can be entirely consumed by shift work and patrols, an HHC can conduct Sergeant's Time Training and plan section-level, and even limited company-level, training. This additional training is productive for several reasons: First, the company

improves proficiency in deficient mission-essential tasks. Second, the extra downtime normally associated with peacekeeping deployments is put to a productive end.

Mandatory schooling requirements also fit into the training scheme. While it may not be the case in Afghanistan or Iraq, in Kosovo it was much easier to find slots for required schools such as the Safety Officer Course, HAZ-11 and HAZ-12 Hazardous Cargo Certification, Logistics and Maintenance Supervisor Courses, and Small Arms Maintenance School. Being in a garrison-style environment while the line companies run 24-hour operations, HHCs derive a training benefit from being deployed that line companies do not experience. When deploying to such an environment, going in with a concrete and comprehensive training plan should allow the company to redeploy with a trained (T) rating in most mission-essential tasks.

The same reasoning applies to physical training (PT), which is easy to conduct six days a week as a company and individually by most soldiers in their off time. They do so to remain in shape and also because it helps alleviate boredom. Soldiers may spend too much time lifting weights in the gym and not enough time running or doing other cardiovascular activity, especially when the weather is cold and wet. But with appropriate supervision and planning, most soldiers' scores will increase an average of 20 or 30 points. This will match the fitness goals that should be set upon arrival in the country. Working these individual goals into a broader company goal will help keep soldiers focused and the company in shape. With the additional time, there is no reason not to schedule weight-training instruction, body fat composition assessment, nutrition counseling, and dietary supplement classes into the PT program. Incorporating these topics will ensure that soldiers learn from their chain of command (rather than from reading magazines), which should help prevent injuries and illnesses.

Some combat engineer battalions have an ERT composed of three to five soldiers, a noncommissioned officer, and some basic equipment. (See *Engineer* July 2002, page 47.) This element provides an even more critical and functional role in a stability operations and support operations environment. The teams conduct all the standard reconnaissance functions, especially route and bridge reconnaissance, which are often a critical aspect of the mission. Classifying and reclassifying bridges in the area will very likely become their primary mission. All the new infrastructure development that accompanies American military involvement in nation building makes this task ever-present. Invariably, each rotation wants to reconfirm the work of its predecessors and identify recently constructed or upgraded structures. The ERT represents the most effective and efficient tool for accomplishing this. Because the frequency of their trips allows them to recognize changes when they occur, ERT soldiers provide critical intelligence on the surrounding atmosphere and the feelings of the local inhabitants.

Soldiers in the ERT should become experts with the Javelin antitank missile, the Precision Lightweight Global Positioning System Receiver (PLGR), the Single-Channel Ground-to-Air Radio System (SINCGARS), and all components of the engineer reconnaissance kit. Their training should include not only reconnaissance missions (bridge, road, airfield, and obstacle) but also infantry drills such as call-for-fire techniques and land navigation. The explosive ordnance disposal (EOD) company that is often attached to engineers during stability operations and support operations rotations offers an ideal opportunity to train the ERT. Sending the ERT as a second security force with responding EOD teams is a unique opportunity that benefits all involved and builds the engineer task force into a collective team. These soldiers will probably go outside the wire more often than any other team or slice element in the battalion.

This is in sharp contrast to most of the other soldiers in an HHC, who may be outside the wire only twice: for arrival and departure. The supporting elements of an engineer battalion will find themselves isolated on the base camp, and this can be a significant problem if not properly monitored. However, living and working in a host nation within a multinational task force can present myriad solutions to the problem. These solutions surface primarily in local humanitarian work and joint training with

Soldiers receive salutes from children at an elementary school in Kosovo.

other similarly deployed nations. Local humanitarian work comes in all levels of commitment and involvement that range from one-day trips to a locally sponsored school to projects that require months of cooperative planning with local professional organizations. Even in the rare instance when these missions do not produce immediate and tangible results, they are still "feel-good" missions that are a boost to soldiers' morale and welfare.

Even with very little preparation, it is great to get off post, and doing so helps put a face on the American presence. Such a face is an immeasurable benefit to the overall message the military tries to send. In the fall of 2002, one of the most successful humanitarian work projects was the construction of a fence around an elementary school in Kosovo. After coordinating the project through the appropriate Kosovo force and local authorities, 16 soldiers, local relief workers, and students constructed a 100-meter-long, 1-meter-high chain-link fence around the school grounds. Actual construction time, in sporadic rain, was several hours, and the project culminated in good will, motivated soldiers, and a safer playground.

Partnership training with deployed soldiers from other allied nations—such as Britain, Russia, Greece, or Norway—is another unique opportunity to take advantage of during stability operations and support operations. Unlike the humanitarian efforts that lack military training objectives, allied partnerships are useful as joint-operations planning and interoperability training events. We cross-trained with the Royal British Engineers based in Pristina and conducted various training events with a Russian sister unit from within the American-led multinational brigade. These events facilitated interaction between engineers of different nations and enforced the need for continued information and technology sharing.

In addition to the inherent benefits of additional engineer training, these events provide a valuable morale, welfare, and recreational benefit. Sharing stories, customs, and soldiering skills allows personnel from different nations to interact and derive the social benefits of a multinational event. Keeping these training events informal and allowing plenty of time for the soldiers to interact with one another paid huge dividends.

With all these possibilities, the HHC role in a stability operations and support operations environment is ripe with uncommon opportunities for training and operations. The stresses are different from those in a garrison environment but still parallel that environment far more closely than in the line companies. By avoiding the line company mission-dictated shift schedule, it is possible to find exciting and innovative means of training soldiers, developing leaders, and evading boredom—all while accomplishing the mission at hand.

Captain Hill is the executive officer of Headquarters and Headquarters Company, 9th Engineer Battalion, Schweinfurt, Germany. Previous assignments include platoon leader and company executive officer, 44th Engineer Battalion, and platoon leader and company executive officer, 9th Engineer Battalion. He completed Kosovo Force Rotation 4A from April to November 2002.

Captain Stoll is the commander of Headquarters and Headquarters Company, 9th Engineer Battalion. Previous assignments include platoon leader, 2d Engineer Battalion; company executive officer, 864th Engineer Battalion (Combat) (Heavy); and battalion maintenance officer, 9th Engineer Battalion. He completed Kosovo Force Rotation 4A from April to November 2002.

Soldier's Creed

I am an American Soldier.

I am a Warrior and a member of a team. I serve the people of the United States and live the Army Values.

I will always place the mission first.

I will never accept defeat.

I will never quit.

I will never leave a fallen comrade.

I am disciplined, physically and mentally tough, trained, and proficient in my Warrior tasks and drills.

I always maintain my arms, my equipment, and myself.

I am an expert, and I am a professional.

I stand ready to deploy, engage, and destroy the enemies of the United States of America in close combat.

I am a guardian of freedom and the American way of life.

I am an American Soldier.

Joint Readiness Training Center (JRTC)

Sapper Platoon Sergeant: Operating in a Lightfighter's Tactical Environment

By Sergeant First Class Anthony S. Sparks and Captain Jason D. Williams

"*NCOs, the backbone of the Army, train, lead, and take care of enlisted soldiers. They receive their authority from their oaths of office, law, rank structure, traditions, and regulations. This authority allows them to direct soldiers, take actions required to accomplish the mission, and enforce good order and discipline. NCOs represent officer leaders. They ensure their subordinates, along with their personal equipment, are prepared to function as effective unit and team members. While commissioned officers command, establish policy, and manage resources, NCOs conduct the Army's daily business*."

Field Manual (FM) 22-100, *Army Leadership*

A prevalent trend at JRTC among rotational engineer units is the platoon sergeant (PSG) not understanding his role and exercising his authority to best influence the mission and ensure its accomplishment. The bottom line is that the PSG is not getting into the fight and making a difference. In a light environment, the engineer platoon habitually associates with an infantry task force. Often, the three sapper squads are task-organized in support of company maneuver teams and operate independently from the platoon headquarters element. With the expectation of having no subordinates upon task organization, the sapper PSG is faced with a constant dilemma—knowing his organizational role and knowing where his leadership is needed most in the tactical environment. The following paragraphs address this concern and include observations and feedback from the engineer observer-controllers (O-Cs) at JRTC.

Platoon Sergeant

The PSG is the senior noncommissioned officer (NCO) at the platoon level. He is the principal advisor and mentor to the platoon leader (PL). The PSG generally has 12 to 18 years of military experience and is rightfully expected to bring that experience and mentorship to bear and influence quick, accurate decisions that are in the best interest of the mission and the soldier. The connection between the chain of command and the NCO support channel is the senior NCO. Officers issue orders through the chain of command, but the senior NCO must know and understand the orders to issue effective implementing instructions through the NCO support channel. The role of the PSG was best defined in TC 22-6 (replaced by FM 7-22.7 *The Army Noncommissioned Officer Guide*): "When the platoon leader is present, the platoon sergeant is the primary assistant and advisor, with the responsibility of training and caring for soldiers. In the absence of the platoon leader, the platoon sergeant takes charge of the platoon." This serves as a guideline for the two basic combat functions of the sapper PSG: PL/assistant platoon leader (APL) and assistant task force engineer.

Platoon Leader/Assistant Platoon Leader

As the PL executes his duties as task force engineer participating in the maneuver task force military decision-making process (MDMP), the PSG must take a proactive approach in conducting parallel mission planning and preparation with his subordinate squad leaders. This involves the active supervision and execution of platoon troop leading procedures (TLPs). With the PL's intent and the receipt of developing mission-critical information, the PSG can—

- Issue warning orders (WARNORDS) (as detailed as possible).
- Make a tentative plan; assign critical responsibilities to facilitate mission preparation, precombat checks (PCCs), and rehearsals.
- Initiate necessary movement; coordinate task organization changes or movement to a new patrol base or assembly area.
- Conduct reconnaissance (map, route, objective).
- Complete the plan; implement changes based on the results of the reconnaissance and the approved scheme of engineer operations from the MDMP.
- Issue the operation order (OPORD), if tasked by the PL.
- Supervise and assess; conduct leader precombat inspections (PCIs) and monitor rehearsals at the squad, platoon, and combined arms levels.

Under the factors of mission, enemy, terrain, troops, time available, and civilian considerations (METT-TC), the maneuver commander's guidance, and/or the PL's instructions, the PSG must be assigned a distinct role for the execution phase of the operation. This may include serving as a PL/APL in a platoon-level operation, maneuvering with an engineer main effort squad, or battletracking in the task force tactical operations center (TOC) as the assistant task force engineer. The goal is to find the combination and balance of engineer

leadership that best supports the task force and allows the engineer platoon to successfully accomplish the mission.

Assistant Task Force Engineer

The sapper PSG inherently must share the responsibility of manning the task force engineer cell (TFEC). In the absence of the PL, the PSG serves as the engineer Battlefield Operating System (BOS) representative on the task force battle staff. His duties include battletracking on current operations; maintaining communications and reporting with higher and subordinate headquarters; and managing critical engineer information—such as enemy and friendly minefields, route status within the area of responsibility, and combat power. The PSG must maintain an excellent situational awareness and possess a strong knowledge of engineer systems, their capabilities and doctrinal employment, and tactics. Ultimately, he must be confident in his ability to execute his role as an engineer BOS advisor to senior maneuver leadership.

Observer-Controller Observations

- The majority of engineer PSGs rotating through the JRTC are "fast-tracking" staff sergeants (with 8 to 12 years of military experience) who excelled as squad leaders in a tactical environment but are struggling to fulfill the responsibilities of a competent PSG. They have little to no experience in a TOC, do not possess the engineer doctrinal knowledge and understanding of task force-level operations, and lack the confidence and credibility with the maneuver community to be a senior-level advisor.
- PSGs revert back to the mentality of just managing the "beans and bullets" aspect of operations. This hinders the PL's ability to effectively manage the platoon's timeline. The PSG has little involvement in platoon TLPs; they are left to the PL to execute upon completion of the task force MDMP or pushed down to the squad leaders for decentralized execution.
- A "TOC avoidance" syndrome causes PSGs to push that entire responsibility on the PL. This has been attributed to a number of factors: there is no battle staff NCO course qualification; the TOC is an unfamiliar environment that might show the senior NCO's "true" lack of experience in the presence of his maneuver brethren; the PSG simply wants to stay forward with the soldiers and where the "real" fight is.
- The PSG rarely conducts battlefield circulation. This impacts his ability to gain the "pulse" of the platoon and implement action when needs are not being addressed. Soldier welfare and logistic concerns are often overlooked when squads are task-organized away from the platoon headquarters in various command/support relationships.
- The PSG often has a poor relationship with the PL. The PSG shows little patience in coordinating with and mentoring the junior lieutenant who has an incredible dual responsibility as PL and task force engineer (often assigned with less than 18 months of military service). This severely strains the platoon's ability to plan, prepare, and execute, and it ultimately impacts the unit's ability to support the task force and accomplish the mission.

Summary

The PSG is the key assistant and advisor to the PL—both as a task force engineer in the TOC and forward with the platoon on the battlefield. In the absence of the PL, the PSG commands the platoon and acts as the senior engineer advisor to the task force. He is the driving force behind the platoon's prebattle preparation, and he must be ready to lead from the front when called upon. The PL and PSG must work together effectively to find a balance of leadership and position themselves accordingly to fight and win on the battlefield.

The following checklist of responsibilities serves as a guide for the sapper PSG when determining where he is needed most to influence operations and impact mission accomplishment:

- Assist and coordinate with the PL. The PSG should also be prepared to assume the PL's duties, as required.
- Execute TLPs and briefing orders in the absence of the PL.
- Become involved early in the planning process to provide quality control in the execution of engineer missions and logistical operations.
- Execute duties as the assistant task force engineer has directed.
- Check on the welfare of the soldier as a second set of eyes for the PL.
- Enforce standards and the tactical standard operating procedure.
- Supervise platoon logistics, maintenance, communications, field hygiene, and medical evacuation operations.
- Lead, supervise, inspect, observe, and assess matters that the PL designates.

Sergeant First Class Sparks is a light engineer platoon senior NCO observer-controller. Previous assignments include PSG and squad leader, Charlie Company, 307th Engineer Battalion (Airborne); operations sergeant, 554th Engineer Battalion; and squad leader, 562d Engineer Company, 172d Infantry Brigade (Separate) and Alpha Company, 20th Engineer Battalion (Corps) (Wheeled).

Captain Williams is a light engineer platoon senior observer-controller. Previous assignments include commander, Bravo Company, 65th Engineer Battalion (Light); brigade engineer, 2d Brigade, 25th Infantry Division; adjutant, executive officer, and platoon leader, 588th Engineer Battalion (Mechanized), 4th Infantry Division.

National Training Center (NTC)

Simultaneous Explosive Reductions

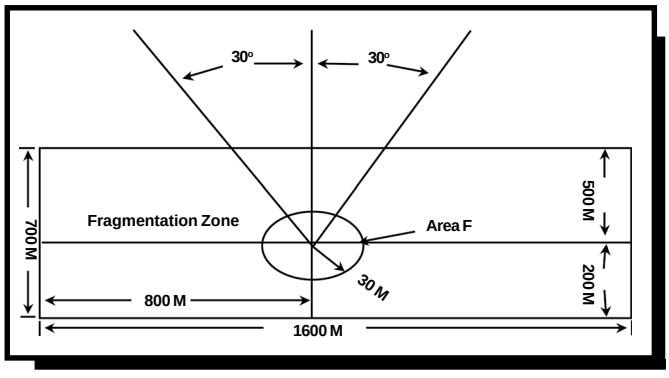
By Captain Kirk Gibbs

Live-fire operations at NTC are an excellent training opportunity for engineers. NTC is the only training environment in the continental United States where units may regularly fire the M58 high-explosive mine-clearing line charge (MICLIC). Often, reverse planning based on the overwatching enemy drives the unit to conduct a brigade-level breaching operation. This requires two lanes through a complex obstacle in order to assault a task force onto the objective. Units often choose to weight the brigade's breach force with at least two MICLICs to quickly create two lanes using explosive reduction techniques. This raises the question, "Should we reduce at two points of breach simultaneously?" The MICLIC surface danger zone (SDZ), as well as the unit's ability to conduct rehearsals, should drive this decision. The answer to the question can be "yes." However, units should consider the following points when planning and preparing for simultaneous explosive reductions:

MICLIC SDZ

The NTC-approved MICLIC SDZ (shown below) is based on Department of the Army (DA) Pamphlet (Pam) 385-63, *Range Safety,* with each distance in the fragmentation zone rounded up to the nearest 100 meters. The SDZ is divided into Area F; the 30-meter radius around the MICLIC; and the fragmentation zone of 500 meters forward, 200 meters to the rear, and 800 meters to each side of the MICLIC. DA Pam 385-63 states who can be in Area F and the fragmentation zone when the MICLIC is fired:

- Only the MICLIC, armored towing vehicle, and M1 tank with mine-clearing blade or roller (if the unit chooses to fire over a tank) may remain in Area F.
- Elements of the breach force and support force may be inside the fragmentation zone but must be behind the MICLIC firing line outside of Area F and must be "buttoned up."



Points of Breach

With these mandatory control measures, units that conduct simultaneous explosive reductions must ensure that points of breach are at least 800 meters apart. The reasons for this are twofold:

- One enemy artillery-delivered scatterable minefield (200 by 800 meters) can close two lanes if they are not at least 800 meters apart.
- In the event of a misfire on one lane, the unit can continue to create the second lane by dismounting engineers to mark the lane and sending the assault force through to the farside objective. In every type of misfire procedure for a rocket or charge, the unit must wait 30 minutes before approaching the launcher or charge, if it has been deployed. This means that within the SDZ, all vehicles must maintain a buttoned-up status, and no vehicles can move forward of the MICLIC firing line.

Summary

None of these procedures are specific to NTC and the NTC exercise operating procedures. Leaders should consider them during all phases of the operation whether it is a training or combat operation. To adequately synchronize any combined arms breaching operation, units must conduct full-force or, at the very least, reduced-force rehearsals where clearance of the SDZ and reporting procedures are adequately practiced. This is vital to successfully reducing two lanes through an enemy obstacle and maintaining the momentum of the brigade's attack.

The Sidewinder MICLIC Guide is available at <*http://www.irwin.army.mil/sidewinder/MICLIC%20WEB%20PAGE/index.htm*>. To obtain a copy of this guide in a compact disc format, e-mail <*sw04t@irwin.army.mil*> and provide a valid unit address.

POC is Captain Kirk Gibbs (SW03B), (760) 380-5151 or DSN 470-5151, or e-mail <*sw03b@irwin.army.mil*>.

Explosive Ordnance Disposal Integration

By Captain Mark R. Faria

The explosive ordnance disposal (EOD) field is quickly becoming a more visible and effective force multiplier on the battlefield. The role of EOD units is changing because doctrine now allows for a company or company (-) to support a brigade combat team (BCT) (based on unexploded ordnance [UXO] threat and saturation) instead of operating at echelons above corps. Combat commanders are seeing the importance of integrating EOD units and their capabilities into mission planning. NTC is keeping pace with these changes, and current scenarios force EOD integration into the engineer battalion and BCT operations.

The EOD company commander serves as the theater EOD staff officer, as well as a company commander, in smaller operations without an EOD battalion element in theater. Current BCT-sized operations—such as in Bosnia and Kosovo and at NTC—have an EOD company or company (-) attached to the engineer battalion. This task organization must not impede the EOD commander's ability to discuss explosive-related issues with the BCT commander. It is vital that both the engineers and the BCT fully understand EOD capabilities. Two critical integration issues have emerged: the location of the EOD company (-) command post and EOD integration into the military decision-making process (MDMP).

EOD Command Post Location

EOD doctrine does not direct that the EOD command post be colocated with the brigade tactical operations center (TOC), but there are many benefits to doing this. Trends at NTC show that when the EOD command post sets up in the engineer/brigade TOC, it can provide input into the risk management process, incorporate EOD capabilities into the BCT fight, participate in the MDMP, integrate with all supporting elements (such as civil affairs and military police), and battletrack to determine the extent of UXO contamination on the battlefield. Trends also show that EOD units operating out of the brigade support area (BSA) seldom receive a task and purpose in support of the BCT fight. These units fall into a reactive mode where they respond to UXO that are called in but remain reactive instead of proactive in incorporating EOD capabilities.

MDMP Integration

The EOD commander has two courses of action (COA) to integrate into the MDMP:

- COA 1. The EOD commander briefs mission analysis and provides visibility of UXO threat to the BCT as well as how he can mitigate these risks. The benefit to this is that no one understands EOD capabilities and limitations better than the commander. He can immediately request additional support such as security or haul assets if required. The problem with this COA is that it takes the commander away from his unit for long periods of time. EOD companies don't have an executive officer to help run the unit or participate in the MDMP.
- COA 2. The engineer battalion S3 or assistant brigade engineer (ABE) receives input from the EOD commander before each MDMP cycle and ensures that the input is brought up to BCT level. The benefit to this COA is the experience of the field grade officer who fully understands the MDMP and the big picture of the BCT mission. Both he and the ABE also have a habitual association with the BCT and thus a better working relationship with the staff. This COA also frees up a considerable amount of time for the EOD commander to focus on his company. The limitations of this COA are that the S3 is extremely busy, and his time in the MDMP is somewhat limited. The ABE must not become so overwhelmed in engineer specifics that he forgets about the EOD company. Both staff members must have a full understanding of EOD capabilities to ensure a realistic task and purpose for the EOD company.

Summary

The BCT and engineer battalion must consider EOD capabilities in support of their mission. EOD input into the MDMP ensures the anticipatory use of assets rather than the reactive use. This process is made possible by colocating the EOD command post at the engineer and BCT TOC and allows the EOD commander to accomplish his role as the theater EOD staff officer.

For additional information on EOD operations at NTC, visit the Sidewinder Web site at <*http://www.irwin.army.mil/sidewinder/index.htm*>.

POC is Captain Mark R. Faria (SW18), (760) 380-5600 or DSN 470-5600, or e-mail <*sidewinder18@irwin.army.mil*>.

Obstacle and Class IV/V Supply Point Support Teams

By Major Michael W. Rose

Typically, BCTs have 24 to 36 hours to prepare a defense at NTC. Given the time it takes to begin engagement area development, even relying primarily on scatterable mine systems and special-purpose munitions versus conventional row mining, time is clearly the limiting factor for combat engineers and the BCT. While the BCT can use brigade-directed obstacles in conjunction with a directed scheme of maneuver to jump-start the effort and train to rapidly conduct engagement area development, the best way to increase obstacle productivity is to augment the engineers.

Support Teams

The goal of augmentation is to keep as many engineers as possible executing tasks that require the most expertise instead of tasks that any soldier can execute. Units can achieve this goal by providing support at the Class IV/V supply points and emplacing minefield perimeter fence or other constructed obstacles. While many units specifically task units to provide this support in an order, adding the requirement and any additional coordinating instructions to the maneuver unit's standard operating procedures (SOP) will greatly contribute to the likelihood of getting support with the right leadership and equipment. Figures 1 and 2 on page 67 show a sample SOP for both obstacle and Class IV/V supply point support teams. These SOP cards were developed by the 8th Engineer

CARD 445 – Class IV/V Support Team

1. PURPOSE: The Class IV/V support team is a squad-sized organization of soldiers who, on order, establish the task force (TF) Class IV/V point and reorganize the combat configured loads (CCLs) (throughput from corps level) into unit/obstacle-specific packages and/or reconfigure CCLs for back haul or follow-on missions.

2. COMPOSITION: Each ground maneuver TF will resource one Class IV/V support team consisting of the following:

- 1 NCO (for command and control [C2]) and 7 soldiers
- Sleep gear and wet and cold weather gear
- 3 five-gallon water cans
- Minimum of 1 meal, ready to eat (MRE) per soldier
- Transportation and commo for the team
- 1 Engineer NCO who will provide a Class IV/V equipment package consisting of—
  - √ 10 pair of leather work gloves
  - √ 3 pair of metal strapping cutters
  - √ 2 pair of banding crimpers
  - √ 2 pair of banding rachet machines
  - √ 100 feet of 1/2-inch banding material
  - √ 50 each 1/2-inch banding clips

3. RESPONSIBILITIES:

BDE	TF	ENCO
• Identify all Class IV/V support team coordinating instructions in a published operational order (OPORD)/fragmentary order(FRAGO) to TFs. • Include the following in the coordinating instructions: - Adjustments to composition - Linkup point and time - Duration of requirement	• Provide a standard Class IV/V support team (see composition above) when specified in the brigade OPORD/ FRAGO. • Execute linkup of the Class IV/V support team as specified in the order.	• Coordinate linkup with supported TF. • Verify or adjust the linkup point and time as required. • Verify that the Class IV/V support team is properly manned and equipped. • Efficiently employ the Class IV/V support team and report release to the TF tactical operations center.

Figure 1

CARD 447 – Obstacle Support Team

1. PURPOSE: An obstacle support team (OST) is a platoon-sized organization of soldiers trained in basic obstacle construction who, on order, move forward to a designated task force (TF) engagement area to assist and augment combat engineer soldiers constructing the TF defensive plan. OSTs will construct single-strand and triple-standard concertina fences, and dig holes for mines under the direction of an engineer NCO. These fratricide fences will support the use of both conventional and scatterable munitions.

2. COMPOSITION: Each ground maneuver TF in 3d Brigade Combat Team will resource one OST. Each OST consists of the following:

- 30 soldiers (a minimum of 3 NCOs and a designated NCOIC)
- 1 OST equipment package consisting of—
  - √ 5 picket pounders
  - √ 50 pair of leather work gloves
  - √ 5 long-handled shovels
  - √ 8 long-handled picks
- 1 water trailer or 10 five-gallon water cans
- Individual weapons, night-vision devices, sleep gear, wet and cold weather gear, and 1 meal, ready to eat (MRE) per soldier
- 2 light medium tactical vehicles (LMTVs) (for transportation)
- 1 C2 vehicle with operator
- 2 company grade officer heavy expanded-mobility tactical trucks (HEMTTs) with operators

3. RESPONSIBILITIES:

BDE	TF	ENCO
• Identify all OST coordinating instructions in a published OPORD/FRAGO to TFs. • Include the following in the coordinating instructions: - Adjustments to composition - OST linkup point and time - Duration of requirement	• Provide a standard OST (see composition above) when specified in the brigade OPORD/FRAGO. • Execute linkup of OST support team as specified in the order.	• Coordinate linkup with supported TF. • Verify or adjust the designated linkup point and time as required. • Verify that the OST is properly manned and equipped. • Employ the OST based on TF priorities. • Report release of the OST to the TF tactical operations center.

Figure 2

Battalion, which habitually provides direct support to 3d Brigade, 1st Cavalry Division.

Summary

Establishing support to defensive preparation in the SOP and training to efficiently use properly led and resourced teams to increase obstacle productivity is one procedure units can adopt to help defeat the greatest enemy on the battlefield—time.

"The loss of time is irreparable in war."

—Napoleon

POC is Major Michael W. Rose (SW03), (760) 380-7005 or DSN 470-7005, or e-mail <*sidewinder03@irwin.army.mil*>.

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

Directorate of Training Development (DOTD)

Mission Training Plans (MTPs). Army leaders are responsible for training units to established doctrinal standards, and evaluations of training are a key element in this process. The Army Training and Evaluation Programs (ARTEPs)/MTPs are the documents that hold the consolidated lists of tasks associated with units. This is a consolidated reference of the tasks, conditions, and standards for each collective task that a type of unit is expected to perform.

The development process of an MTP begins with the Department of the Army (DA)-approved table of organization and equipment (TOE). This document expresses the personnel and equipment authorized for a type of unit. The DA mission statement is used, in conjunction with the TOE, to determine specified and implied mission tasks that should be reflected in the MTP. These documents form the basis for the draft MTP. Modified TOEs (MTOEs) are not used because of the frequency of changes and because MTOEs usually reflect changes in equipment and personnel, not in doctrine. Each unit is given a TOE number to distinguish it from all other units. The number is devised so that a unit's MTP will align by the type of TOE it is under. An example is that a TOE with a 335F000 aligns with MTP 5-335-60.

The Army no longer produces printed copies of MTPs, but they can be downloaded through the Reimer Digital Library Services at Army Knowledge Online. (See page 69 for details.) It is important that leaders research the information available and learn to navigate the site. There are two sections within the RDL Services that provide access to MTPs, field manuals, and many other military publications. To find your unit's MTP, enter RDL Services and select *Enter the Library* or *The Library*. You will then see the two options available: *Official Departmental Publications* and *Commandant-Approved Individual and Collective Training Support Materials*. Both sites contain MTPs. The difference is that MTPs found on the *Official Departmental Publications* site have been authenticated by the United States Army Publishing Agency (USAPA). MTPs found on the *Commandant-Approved* site are final, approved documents awaiting USAPA authentication to be loaded onto the *Official Departmental Publications* site. Your unit MTPs will be found in one, or both, of these two locations. Select one of the locations. In the *Type* column on the left, highlight *Mission Training Plans* if searching the *Official Departmental Publications* section. Highlight *Bn. Ex. Eval.* (battalion exercise evaluation) if searching *Commandant-Approved Trainin* . Scroll down the list of schools in the *School* column on the right and highlight *Engineer*. Click *Submit*. Select the ARTEP/MTP of your choice.

(Note: There is a new version of the RDL which is accessed through Army Knowledge Online. See page 69 for details.)

If there is a problem with the contents of an MTP, you can submit a request for change by telephone, e-mail, or regular mail. You will receive a reply within 24 hours of receipt of the comments. The proponent for engineer collective training is the Engineer Warfighter Division, Warfighter Department, Directorate of Training Development.

POC can be reached at (573) 563-4102; DSN 676-4102; or e-mail <*atztdtwf@wood.army.mil*>. You may also mail comments on DA Form 2028, *Recommended Changes to Publications and Blank Forms*, to the U.S. Army Maneuver Support Center, Directorate of Training Development, Warfighter Department, 320 MANSCEN Loop, Suite 203, Fort Leonard Wood, Missouri 65473-8929.

Standards in Training Commission (STRAC). DA Pamphlet (Pam) 350-38, *Standards in Weapons Training*, is a product of the STRAC Council of Colonels (COC). The STRAC Working Group (SWG)—comprised of representatives from each of the Army proponents, all major commands (MACOMs), and the DA staff members—presents issues affecting force modernization and readiness to the STRAC COC, which analyzes the issues, works possible solutions, and prepares recommendations.

The standards and strategies contained in DA Pam 350-38 are reviewed biannually by the STRAC COC to identify and correct any changes in the Army's training strategy or the amount and type of training ammunition authorized for each weapon system and training event. The results of the reviews, if approved, are reflected in DA Pam 350-38. Requests for changes or questions can be addressed through your MACOM representative or the MANSCEN STRAC manager.

POC is Mr. Bobby Skinner at (573) 596-0131, ext. 36243; DSN 676-6243; or e-mail <*atztdtwf@wood.army.mil*>.

Combined Arms Training Strategy (CATS). A CATS provides leaders with the Army's overarching concepts to develop training strategies for the Total Force at the institutional, unit, and self-instruction level. CATSs fully integrate all elements of Active and Reserve Component training that will prepare the Army to fight across the entire spectrum of military operations. It also supports the versatility required of a force projection Army. CATSs serve as the Army's format for efficiently and effectively managing training for units in the field and in the conduct of institutional training. It provides a tool for identifying, quantifying, and justifying training resources required now and in the future.

CATSs provide a standardized, structured doctrinal training strategy that will train soldiers and units to standard. It provides a means for managing and planning unit training and forecasting necessary resources. It captures the tasks that are taught in institutions, in units, and through self-development and the resources required to train those tasks to standard. A task-based, combined arms strategy also provides leaders with standardized guidance on the frequency with which a task should be trained to achieve desired levels of proficiency to ensure readiness to meet mission-essential task list requirements.

Units can access CATSs through the Standardized Automated Testing System (SATS), as well as on the Army Training Support Center's Reimer Digital Library. Access to CATSs can also be made through the CATS Web site at <*http://leav-www.army.mil/ctd/cats/faq.htm#whatiscats*>. Many TRADOC proponent schools are loading CATSs on their Web sites.

POC is Mr. Joe Toth at (573) 396-0131, ext. 37821; DSN 676-6243; or e-mail <*atztdtwf@wood.army.mil*>.

Accessing Army Training Publications Through AKO

There is a new version of the Reimer Digital Library (RDL) that can be accessed through Army Knowledge Online (AKO). If you are active Army, Army Reserve, National Guard, retired Army, or a Department of the Army civilian, you may access the new Army Training Information Architecture-Migrated (ATIA-M) RDL for Army training and doctrinal publications using your AKO User ID and Password.

1. To view documents online, go to <*http://www.train.army.mil/*>.
2. Read the disclaimer and then click on the *Click here to go to your Training Homepage* bar at the bottom.
3. Click on the *Login* button in the upper right-hand corner. (A Security Alert box will appear. Click *OK*. Another Security Alert box will appear. Click *Yes*.)
4. Type in your AKO User ID and Password and click on *Login*.
5. Your name should appear at the top of the page. Next click on the *My Account* tab.
6. If you have not yet migrated your RDL permissions, there will be a paragraph at the top of the page with a hot link to do so. Click on the link.
7. Click on the *RDL Services* tab.
8. Choose either *Official Departmental Publications* or *Commandant Approved Training*.
9. In the column on the left, highlight *Any* or one of the types of publications. Scroll down the list of schools on the right and highlight *Engineer*.
10. Click *Submit*.
11. Scroll down the list to the publication of your choice.

You only need to migrate your RDL account one time. From that time on, you will be able to use your AKO User ID and Password to download training and doctrinal publications from the new Web site.

If you do not already have an AKO account, please go to the Army homepage at <*http://www.army.mil*>. Look in the upper right-hand corner, select *Army Knowledge Online* and create an account.

PIN: 081123-000