ENGINEER

The Professional Bulletin of Army Engineers

April-June 2005



Let US Try!

Headquarters, Department of the Army
PB 5-05-2 Approved for public release, distribution is unlimited.

ENGINEER

The Professional Bulletin of Army Engineers

April-June 2005 | Headquarters, Department of the Army | *Volume 35 PB 5-05-2*

UNITED STATES ARMY
ENGINEER SCHOOL

COMMANDANT
Major General
Randal R. Castro

MANAGING EDITOR
Shirley Bridges

CONTRIBUTING EDITORS
Cheryl Green
Susan Groth
Kathy Webber

GRAPHIC DESIGNER
Jennifer Morgan

Front Cover:
U.S. Army Engineer Soldiers

Back Cover:
Illustration by Paul McGehee - Multimedia Visual Information Service Center

FEATURES

5 **Expeditionary Engineer Mission Force**
By Lieutenant Colonel Michael P. Crall

11 **Rebuilding Baghdad: An Engineer Battalion's Contribution**
By Lieutenant Colonel Brian L. Dosa, Major Brian J. Davis, and Captain Brad A. Morgan

15 **On Top of the World: U.S. Army Corps of Engineers Supports an Arctic Mission**
By Dr. JoAnne Castagna

17 **Bridging the Gap in Homeland Security: 62d Engineer Battalion Helps Secure the Nation's Borders**
By Lieutenant Colonel Alfonso Riera and Captain Richard T. Childers

21 **Explosive Ordnance Clearance Agent—Closing the UXO Gap**
By Command Sergeant Major David M. Clark

24 **The 420th Engineer Brigade: Builders in Battle**
By Major Keith A. Dotts

28 **The 44th Engineer Battalion Deploys Again**
By Second Lieutenant Patrick J. Anderson and Second Lieutenant Jennifer Sanford-Hayes

34 **2005 Army Deployment Excellence Awards**
By Mr. Charles K. Ledebuhr

DEPARTMENTS

2 **Clear the Way**
By Major General Randal R. Castro

3 **Lead the Way**
By Command Sergeant Major Clinton J. Pearson

26 **Engineer Safety – *"The Army's New Protective Eyewear"***
By Mr. Larry T. Hasty

30 **Personal Viewpoint – *"Strengthening Army Leadership Courses by Training Adaptability"***
By Members of the First Engineer Command and Staff Course

33 **Dedication**

36 **Past in Review – *"Joint-Service Beach Obstacle Demolition in World War II"***
By Mr. James Douglas O'Dell

41 **Subscription Order Form**

Expeditionary Engineer Mission Force

By Lieutenant Colonel Michael P. Crall

On a cold day in March 2004 at Fort Bragg, North Carolina, a telephone rang in the headquarters of the 27th Engineer Battalion (Combat)(Airborne), and a voice on the other end outlined a requirement to enhance the maneuver of a joint task force (JTF) that was taking the fight to the enemy along the Afghanistan-Pakistan border. The mission was to rapidly deploy by air with a tailored battalion engineer mission force (EMF) to construct a forward operating site (FOS) in a remote area of Afghanistan. Site capabilities must include a C-17 airfield with the ability to land several C-17s simultaneously, accommodate several rotary-wing aircraft, and include a matted taxiway; an 80,000-gallon forward area arming and refueling point (FAARP); and a base camp.

"Can you do it?" asked the JTF liaison officer (LNO). "And by the way, this is a nonpermissive environment, the road network is virtually nonexistent, you must have an airstrip that allows a short takeoff and landing (STOL), and your mission force must secure itself."

"Sounds like a challenge. But why the Tiger Battalion?" asked the command representative.

"I forgot to mention that the only way to get the engineer equipment in there is by parachute," responded the JTF LNO.

"Our motto is, 'To do all things well'," replied the command representative. "When do we leave?"

And so began the short-fuse planning to establish FOS Carlson in Afghanistan, with the goal of providing the supported JTF freedom to maneuver and operate in this austere, high-altitude region; it was expeditionary engineering at its best.

Versatility

The 27th Engineer Battalion had been supporting the Global War on Terrorism on many fronts since 11 September 2001. Having provided support to the 3d Ranger Battalion, 75th Ranger Regiment, during an airborne seizure of an airfield in Iraq and an area mine-clearing mission for the Combined Joint Task Force-180 in Afghanistan, the battalion was now supporting the 82d Airborne Division in Iraq and a U.S. Southern Command mission in Honduras. To execute the new mission, an engineer force had to be organized—using the uncommitted battalion assets and JTF combat enablers/forces—to form a combined arms team that could secure the terrain and construct and sustain an FOS.



A C-17 taxiing on the ramp parking area

The multifunctional engineer capability and deployability of the corps combat airborne organization made the 27th the unit of choice to form the nucleus of the mission force. With each line company consisting of two combat engineer platoons, a light equipment platoon, a maintenance section, and a headquarters section, flexibility is a hallmark of the force structure. Additionally, the Headquarters and Headquarters Company includes a vertical construction platoon, a medical section, a support platoon, an organizational maintenance section, a direct-support maintenance section, and staff elements that add to the battalion's multifunctionality. The deployment capabilities are also critical: an ability to strategically deploy by air, conduct a parachute insertion of equipment and personnel, and tactically move personnel and equipment by rotary-wing assets.

Given the mission requirements and assets that were deployed to support other missions, an EMF using the available assets was essential. The troops that were to design



Paratroopers onboard a CH-47 en route to secure the DZ

the force began by using specified tasks, which were refined based on requests for information and intelligence, surveillance, and reconnaissance (ISR) data gathered from the task force. The EMF-specified tasks were to—

- Protect the force.
- Rapidly deploy by air to multiple intermediate staging bases (ISBs) in Germany and Afghanistan.
- Conduct a rotary-wing assault to secure a drop zone (DZ).
- Execute a parachute drop of an airfield construction package by C-17 aircraft.
- Employ a ground assault convoy (GAC).
- Construct a STOL airstrip; upgrade to C-130 assault landing zone (ALZ) capability.
- Construct a C-17 ALZ, taxiway, and cargo ramp.
- Construct a heavy landing zone taxiway with AM2 matting and staging area.
- Construct an 80,000-gallon FAARP.
- Construct a base camp with life support.
- Provide command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR); force sustainment; and JTF liaison.
- Provide engineer support to the JTF.

With the remaining uncommitted battalion assets, the EMF was formed around the battalion headquarters, Charlie Company, and Headquarters and Headquarters Company. The EMF task breakdown was evident: Charlie Company would secure the force, Headquarters and Headquarters Company would build and sustain the FOS, and the battalion headquarters would provide C4ISR and liaison to the task force.

Additionally, the task force provided combat enablers to operate as a combined arms team to include a U.S. Air Force Special Tactics Squadron for the Air Traffic Control, joint fires, tactical unmanned aerial vehicles, and an ALZ assessment; an information operations team; a civil affairs team; a FAARP team; an air liaison officer; a joint communications support element; and an embedded British Broadcasting Corporation/ public affairs team. On order, the task force would provide additional combat forces for both fire support and ground maneuver, as the threat evolved.

Deployability

With the personnel and equipment ready, plans refined, equipment rigged to airdrop, and mounted rehearsals completed on similar terrain at Fort Bragg, the EMF deployed via C-17 to the ISB at Baghram Airfield, Afghanistan, while C-17s with the airdrop engineer equipment staged at an ISB in Germany. Because of the time-sensitive nature of the mission, a battalion assault command post was sent to Baghram Airfield to refine the plan as the force closed. Since there was no time for a predeployment site survey, the task force focused ISR assets to facilitate battlefield visualization. This included not only the enemy situational template but also detailed terrain analysis along with in situ soil conditions to ensure that we could construct the FOS—specifically the ALZ. We had detailed digital terrain products of the area, which allowed us to see the battlespace and effectively array initial-entry security forces on the objective. Refinement of the EMF occurred until the wheels went up on the last aircraft to ensure package fidelity based on the ISR pull. With a limited number of deployment aircraft, all C-17s were filled to maximum capacity. This constrained airlift drove the organization of the EMF considerably, requiring the right mix of equipment and personnel to execute the mission with

the proper redundancy—especially with the airdrop of equipment.

The additional task force assets were integrated into the EMF as final troop-leading procedures took place. Reception, staging, onward movement, and integration (RSOI) and force closure at Baghram Airfield took 3 days, giving paratroopers a chance to get acclimated and perform final precombat checks and inspections and rehearsals. Refinement of the plan continued with the task force—specifically the rotary-wing assault and airdrop operation—to ensure the survivability of the platforms into the small DZ, which was surrounded by wadi complexes and 6,200-foot ridgelines. Briefbacks and rock drills of the plan were provided to the JTF commander to ensure the seamless synchronization of fires, C4ISR, and maneuverability. The evening before initial entry, paratroopers gathered around a football-field-size terrain model of the objective to view the final rock drill. The stage was set; the force, ready; the weather, ideal; and all understood the task and purpose of the mission.

The EMF deployed to the objective area by rotary-wing assault, GAC, heavy-equipment airdrop, and airland operation. Battalion personnel boarded CH-47 and MH-53 aircraft for the initial entry. Tasks of the initial-entry force were to secure the objective area, establish the DZ, and lay out the survey control points for the airstrip to facilitate construction of the ALZ. AH-64s were added to the initial-entry package to provide in-flight security, as well as to clear the objective landing zone. MH-47 aircraft were scheduled to bring in Class I and IV provisions to support the force.

Initial assault was executed unopposed. Upon landing, Charlie Company established blocking positions to secure the DZ, while the survey team established the ALZ geometry. The battalion assault command post established secure voice and data communications with the task force while controlling ISR and close air support assets to support initial-entry security operations. Heavy drop of the engineer equipment was planned for after the assault—once the DZ was established and secured, the ALZ surveyed, and the light equipment derig teams staged.

On 25 April 2004, a heavy airfield construction package was airdropped from C-17 aircraft onto a 2,000- by 800-foot DZ 6,000 feet in elevation—the largest heavy drop of engineer equipment since World War II. All platforms landed safely due to the precise planning of heavy drop points of impact by the task force airlift planners, the EMF, and the Air Force Special Tactics Squadron. One grader was nonmission-capable due to three flat tires, but all the other equipment was fully mission capable. The airdrop was supported by robust fires and an ISR package to ensure C-17 survivability and the security of the ground force. Following the airdrop, derig teams swarmed to the marked platforms, expertly removing parachutes, lashings, and rigging. Forty-three hours after the last platform was derigged, a STOL Air Force aircraft landed on a newly constructed ALZ—a credit to the detailed planning, preparation, and execution of the initial-entry force. FOS Carlson was beginning to take shape. The JTF commander now had more flexibility to operate in this remote border region.

Simultaneously with the pickup zone of the initial-entry force, a GAC departed from Baghram Airfield with several wheeled vehicles. The route was more than 300 kilometers through severely restricted terrain and areas that had strong anticoalition militant (ACM) support. Each vehicle had a crew-served weapon. More than 120 personnel were in the convoy, making it a force to contend with. It was also equipped with



ALZ construction 12 hours after the airborne operation



The ALZ evolution: left, Day 1; right, Day 90, C-17 capable

the Engineer Research and Development Center Automated Route Reconnaissance Kit to assist in navigating and documenting the route. The convoy encountered traffic ramming and attempts by local personnel to board the vehicles as they passed through downtown Kabul. Unfortunately, the international security force that was tasked to man traffic control points in Kabul was called away, responding to an improvised explosive device (IED) in another part of the city. Nonlethal force and speed ensured that the convoy's passage through Kabul was successful.

After the convoy encountered additional armed groups along the route (which required that the armed personnel be detained until a coalition force arrived to verify their legitimacy), it continued through the restricted terrain. Ambushed at a choke point, the convoy focused direct fires and called for close air support to neutralize the ACM four-point attack. Through fire, maneuver, and focused air support, the militants were destroyed with no damage or injury to the convoy, and the convoy proceeded into the objective area, linking up with the initial-entry forces.

Lethality

The EMF continued to secure the objective and expand the STOL ALZ to C-130/C-17 capability. Charlie Company established platoon battle positions and a series of observation points and traffic-control points, which allowed the light-equipment platoons to operate continuously. Sappers dug in and arrayed weapon systems to defeat a direct attack or to survive an indirect attack. Traffic-control points were established due to an unimproved road passing through the objective area. This road was used by ACMs as an infiltration route to and from Pakistan and by locals passing through the region. Traffic control on the road was essential to the security of the area. Mounted and dismounted patrols; area-of-operations presence patrols; and aggressive shows of force synchronizing direct, indirect, and aerial fires were executed to prevent ACM attacks or infiltration via the FOS. The decisive operation, however, became the expansion of the STOL ALZ to allow the task force to conduct operations from the FOS. One light-equipment platoon constructed the C-130 ALZ, while another one constructed the helicopter taxiway, landing zones, and FAARP. The S3 of the technical and survey section stayed 24 to 48 hours ahead of the constructive force to finalize site layout of the ALZ, taxiways, and base camp.

As the ALZ was being expanded, the platoons encountered numerous obstacles. No water was available within 10 kilometers, and the extremely large rocks in the silt/sand material made soil strength readings difficult. Although the STOL airstrip was constructed without water, achieving the required C-130 and C-17 soil strength and surface functionality required several thousand gallons of construction water per day. A recon of an area 3 kilometers south of the site yielded a potential water source in a wadi under a lime rock outcropping. After digging a 6-foot-deep hole with a small emplacement excavator, water pooled, which allowed a water distributor to upload and deliver water to the site. The cycle time was one hour per 2,500 gallons, requiring this equipment to initially run continuously, with a mounted security force protecting the route and upload site.

Because of the large rocks that were 2 to 6 feet below the surface, dynamic cone penetrometer (DCP) readings used to determine the soil bearing capacity of the ALZ became a concern. Engineer Technical Letter 01-6 (published jointly by

the Army and Air Force) defines the standards for which small austere airfields (SAAFs) are built.[1] These standards include not only dimensional requirements but also soil strength requirements. High, potentially inaccurate DCP readings became a concern of the Air Force Special Tactics Squadron, who believed that the strength of the soil between these large rocks would not support C-130 loading. Although the EMF was experienced in ALZ construction and deemed it ready for landing, a consultation was required to determine the way ahead. Using a TeleEngineering Kit to conduct a video teleconference with the Engineer Research and Development Center in Vicksburg, Mississippi; the Air Force Civil Engineering Support Agency at Tyndall Air Force Base, Florida; and FOS Carlson, it was determined—based on analyzed data—that the ALZ was suitable for both C-130 and C-17 landings. The EMF continued construction, culminating with the assault landing of a C-130 after 2 weeks on the ground.

Simultaneous to the construction of the ALZ, the base camp began to take shape. More than 100 truck loads of a joint operational set (JOS) base camp—which included inflatable shower facilities, cots, and tents (to be used as a mess hall, a gym, an aid station, and for command and control)—and essential classes of supply were scheduled to arrive beginning on Day 3 and continue throughout the buildup. Unfortunately, the first trucks did not arrive until Day 14, requiring the sustainment of the FOS by a combination of containerized delivery system C-130 parachute drops, CH-47, and airland aircraft to bring in water, food, and fuel daily. The vertical construction platoon initially served as the assault command post security force, but with the arrival of the JOS by truck, began the construction of the base camp. With the completion of force-protection berms, initial guard towers, and bunkers, the EMF moved from foxholes to environmentally controlled Alaskan tents by Day 24—a major improvement to force protection and quality of life, especially since the temperature at the FOS reached 120 degrees Fahrenheit daily.

By Day 30, the JTF could project combat power from an expeditionary FOS to conduct operations in Afghanistan. The site was now capable of landing C-130 aircraft, parking rotary-wing aircraft on an AM2 matted taxiway, fueling rotary-wing aircraft from a 40,000-gallon FAARP, and sustaining additional personnel with quality-of-life enhancements.

Sustainability

The bottom line was that the EMF had to support (fuel, fix, feed, and sustain) itself and additional forces. This was achieved with the flexible design of the EMF and the push of logistics from the liaison team at Baghram Airfield. Due to the remoteness of the area, the maintenance platoon and the support platoon were essential to the mission success. Combining the two company organizational maintenance sections and the battalion direct-support maintenance section into one platoon, the maintenance platoon was able to sustain the equipment under harsh conditions—even with the supply hub hours away by air or days away by ground through ACM country.

The support platoon was split between the FOS and Baghram Airfield to push and receive essential supplies. The liaison team gathered the necessary supplies and pushed them via air or ground to the FOS. Due to the uniqueness of the airborne engineer equipment, reachback to Fort Bragg became essential for Class IX supplies not available in Afghanistan; just-in-time logistics took on a new meaning. Initially, a tailored Class II/III/V/IX package was airdropped during entry operations that sustained the force until linkup with the GAC. Long lead times became the norm, but the innovation of the sustainers ensured that the operation continued with no significant shortfalls. After Day 30, the base camp provided bare-bones beddown for personnel with the erection of the JOS. As trucks continuously arrived—bringing additional equipment, construction materials, and supplies—the vertical construction platoon upgraded facilities to increase quality of life and force protection.

Due to the location, finding contractors to provide basic services became impossible. Most contractors were located in Kabul, Baghram, or Kandahar and wanted nothing to do with this region. Engagement with local elders led to the hiring of laborers, water tankers, and farm tractors with trailers to augment the EMF equipment. Laborers performed tasks such as filling sandbags, burning excrement, emplacing AM2 matting, erecting tents, and removing rocks from the ALZ surface during grading operations.

Farm tractors with trailers hauled clay material to sites on the ALZ to augment the fill effort and hauled gravel from local dry riverbeds to use in the base camp and between the rotary-wing parking areas for dust control. Water trucks topped off multiple 20,000-gallon storage bags, providing the daily construction water and nonpotable water requirements. At the height of the operation, the FOS employed more than 100 local nationals, 60 tractors, 10 water trucks, and 10 pickup trucks; this economic boost to the local economy had a secondary impact—force protection. Because of this, an assistant S3 officer and noncommissioned officer were dedicated full time to orchestrate the local labor, equipment support, and contracting. The FOS became the "employment factory" for the area.

Flexibility

The area of operation was relatively small, nestled in the middle of an east-west ACM infiltration route in the porous border region of Afghanistan. Multiple dismounted ACM recon patrols, attempting to assess force disposition, approached the FOS through the wadi complexes but were defeated after brief exchanges of direct fire and airborne fires. Although the primary tasks were to build, sustain, and secure the FOS, the ability to increase security in the entire area was essential to force protection. The plan was to engage the local government and tribal elders by establishing



Soldiers examine captured enemy weapons and ammunition

weekly council meetings to discuss issues and promote coalition information operations themes, demonstrate military resolve through shows of force and presence, and economically tie our force protection with local prosperity.

This engagement plan required an engineer staff to function as a combined arms battlestaff, integrating all Battlefield Operating Systems to develop executable combat plans and orders. Raids, village cordon and searches, civil affairs village assessments, the Medical Civic Action Program (MEDCAP), mobile traffic-control points, and weapon and ammunition cache seizure/destruction were the typical operations conducted by the EMF outside the FOS. The destruction of captured enemy ammunition became a weekly task for Charlie Company, who destroyed a total of more than six tons of rockets, mines, mortars, artillery rounds, demolitions, and small arms ammunition. Nightly, FOS security battle drills (integrating direct fire from guard towers, observation points, and the quick-response force with the mortar team and aerial fires) not only kept skills sharp but also sent an audible message to the local populace not to come near the FOS.

Although not a specified task for the EMF, polling-site security for the Afghanistan presidential elections became an implied task turned essential, due to our engagement in the area. Another coalition force was tasked for election security, but local elders and voting officials turned to the EMF to secure the polling sites. In conjunction with additional coalition forces, the EMF successfully secured twelve polling sites without incident. Flexibility became the hallmark of the operation: combat engineers executing infantry tasks or destroying enemy ammunition; equipment operators using bucket loaders with forks to download C-130s; supporters refueling MC-130s or MH-53s; mechanics welding fortified post gates; or tactical operations center noncommissioned officers synchronizing JTF ISR assets to see battlespace in real time—adaptive, innovative leaders and Soldiers thinking in three-dimension and making it happen.

Conclusion

By Day 120, the FOS was built to the master-plan standard, and the 27th Engineer Battalion facilitated the assault landing of a C-17. The battalion had successfully shaped terrain to enhance the maneuver of the JTF, and the FOS enabled JTF combat operations in this remote region of Afghanistan at a time and place of their choosing. The success of this operation was due to three factors: the Warrior Ethos of the airborne engineer Soldiers, the versatile organizational structure of a corps airborne engineer battalion, and aggressive engagement in the area of operations. The paratroopers of this task force overcame seemingly insurmountable odds to execute this operation. Their drive, spirit, and tenacity shaped this piece of terrain into a force projection platform, enabling the JTF to take the fight to the enemy. The future expeditionary engineer force—it's here, it's now, it works.

Lieutenant Colonel Crall is the Commander of the 27th Engineer Battalion (Combat) (Airborne) at Fort Bragg, North Carolina.

Endnote

[1]Engineer Technical Letter 01-6, *Contingency Airfield Pavement Specifications*, 12 June 2001.

Rebuilding Baghdad: An Engineer Battalion's Contribution

By Lieutenant Colonel Brian L. Dosa, Major Brian J. Davis, and Captain Brad A. Morgan

The 8th Engineer Battalion deployed to Baghdad for Operation Iraqi Freedom from March 2004 to March 2005. Although the unit performed a wide range of combat engineer and security tasks, its primary mission was to rebuild the infrastructure and restore essential services in the two districts covered by its brigade combat team (BCT). The reconstruction contributed to 1st Cavalry Division's objective of creating a stable and secure environment in Iraq. During its deployment, the battalion completed more than $15 million in projects and turned over another $35 million of ongoing work to the 3d Infantry Division.

Goals

Rebuild the Infrastructure

Focusing on sewer, water, electrical, and trash (SWET) projects, the battalion worked to restore essential services in its area of Baghdad. The existing systems had suffered from years of neglect and were seriously degraded or non-operational. Many neighborhoods were without functioning sewer systems, reliable electricity, clean drinking water, or trash collection services.

Empower Iraqis to Rebuild

The battalion quickly learned that Baghdad's engineers and officials knew the problems—and the solutions—but lacked the resources and organizational structure to fix them. The goal was to work with the Iraqis to rebuild their country—not impose American solutions to their problems. After all, the Iraqis would have to maintain the projects long after the battalion left the country.

Provide Work for Iraqis

An important part of creating stability was reducing unemployment. These infrastructure projects created numerous local employment opportunities, stimulated the economy, and reduced the ability of anti-Iraqi forces to recruit.

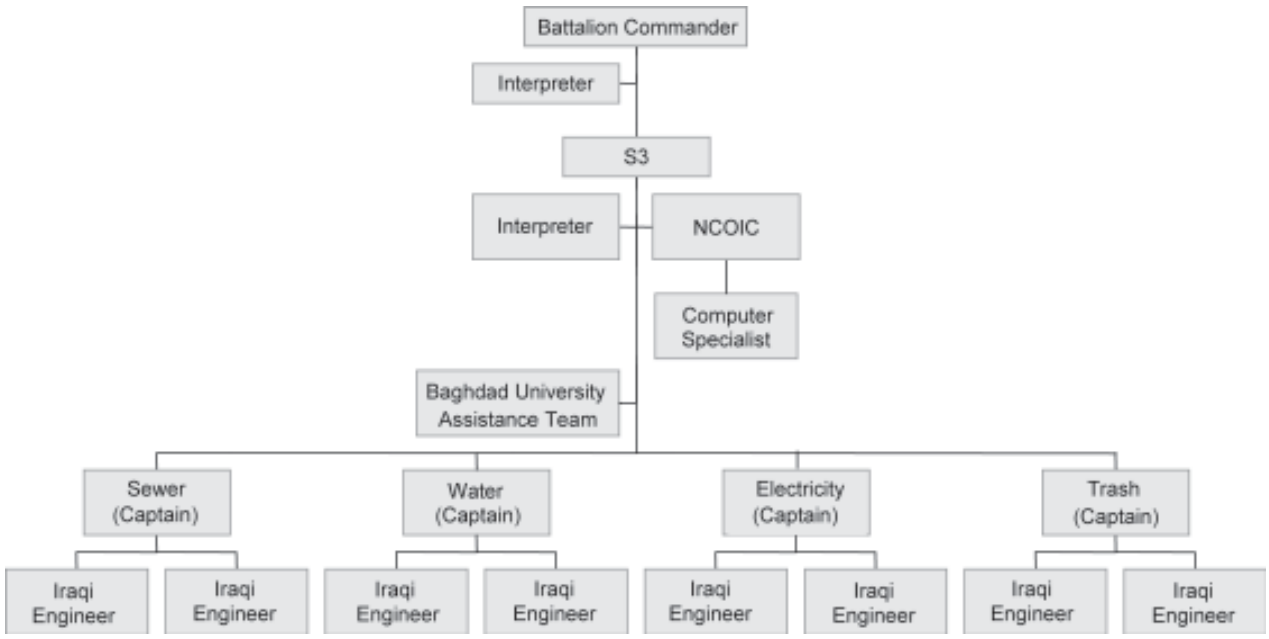
Show Immediate Progress

Since the rebuilding of Iraq's infrastructure would be a long endeavor, it was critical to demonstrate the battalion's plan and show its commitment to the task. As the project progressed, the Iraqi people were able to see their quality of life improving. This also built confidence in the interim Iraqi government and reduced support for the insurgency among the general populace.



Iraqi contractors construct a new high-tension line in Baghdad.

Infrastructure Coordination Element Organization



Organization

The battalion established an infrastructure coordination element (ICE) (see the figure above) from within its S3 section that was composed of four engineer captains (each responsible for one SWET focus area), a non-commissioned officer in charge (NCOIC), and a computer operations specialist. The battalion also employed a staff of ten local Iraqi engineers and interpreters. The battalion commander and his personal security detachment conducted most of the coordination with city and district leaders. Baghdad has an organized system of public works. Each of the nine city districts has a public works director general who has sewer, water, and solid waste superintendents and a staff. In addition, there are established departments at Amanat Baghdad (city government) for SWET. Although most of these departments are staffed with capable engineers and staff, sometimes they are not able to make significant progress on their own.

Contributions

The battalion's biggest contribution was its mission focus and project management skills. The ICE officers fully embraced the reconstruction mission and worked with Iraqi engineers and local leaders to establish priorities and organize efforts. The battalion leadership, drive, and project management skills proved invaluable throughout its tenure in Baghdad. The battalion was able to access all levels of the ministry and city government directly with the help of the 1st Cavalry Division's Governance Support Team.

The battalion played a critical role in securing funds required to start reconstruction. Amanat Baghdad did not have the resources to conduct routine maintenance and repairs, let alone start large improvement projects. Although the interim Iraqi government received funds from international donors, the funds were not available at local levels. The battalion was able to obtain the necessary funding from a variety of sources, including the Commander's Emergency Relief Program, appropriated funds, and donated international funds. While money was available to perform this critical work, time and effort were required to communicate the needs and commit the funds.

The battalion worked to ensure that projects were not based on political or personal gain. It targeted projects for the parts of Baghdad that posed the biggest security challenges. Not surprisingly, these areas had some of the worst services, and the residents lived in substandard conditions. As a result, a greater percentage of funds was applied directly to actual construction.

Project Management

Development

Because the battalion's focus was on SWET, most projects were identified by district and city engineers. The battalion commander interfaced directly with the district councils in weekly meetings and received input on the required work and priority areas. Landowning task forces worked with neighborhood councils on non-SWET projects such as school and hospital renovations. Iraqi engineers at the city and



A new sewer main line in southern Baghdad improves the Iraqi quality of life.

ministry completed designs and plans, thus ensuring continuity, synchronization, and adherence to Iraqi standards and specifications. The battalion's BCT deliberately focused resources on the areas where the insurgency was most active. The commander's intent was to bring kinetic and nonkinetic operations to the enemy simultaneously, in order to defeat anti-Iraqi forces and eliminate enemy support from the local population.

Contractor Selection

Reconstruction projects were completed by Iraqi contractors who employed Iraqi workers. The ICE held regular bidding conferences to announce and distribute bid packages for upcoming work. The battalion found that simple and standardized packets, in both Arabic and English, were essential to solicit clear and accurate bid proposals. Contractors also appreciated the use of compact disks and e-mail, which helped them increase their computer skills. After receiving the bids, the battalion formed selection committees to choose the best contractor for the job. The committees consisted of a city engineer, a district engineer, a local council member, and officers from the corresponding task force and the battalion. Selections were based on the contractor's previous experience and his local labor and security plans—not just the lowest bidder. Since many of the projects were located in dangerous parts of the city, the contractor's security plan and commitment to use local labor were often the difference between success and failure.

Quality Control

Quality control was an Iraqi responsibility. This was normally accomplished by a team responsible for day-to-day project oversight. The team consisted of engineers appointed by Amanat Baghdad and district and Iraqi engineers. The battalion and the director generals were responsible for quality assurance. A team of engineers from Baghdad University also conducted quality assurance inspections. In some areas, project visits were not always possible due to security concerns. Since most of the contractors worked under the pretext of Amanat Baghdad, regular site visits would have jeopardized their safety. Reports from the contractors and the quality control teams were submitted at weekly project coordination meetings. These meetings were invaluable in coordinating for local labor and security and interfacing with neighborhood residents.

Visibility

The battalion ensured that the local populace was informed about the ongoing reconstruction in their neighborhood. The battalion Public Affairs Officer coordinated for media coverage, which ranged from local to international media. Regular coverage included contract-signing, groundbreaking, and ribbon-cutting ceremonies. District and neighborhood council members, along with Amanat Baghdad and district engineers, were encouraged to attend these events and interface with the media. Although the ceremonies were occasionally bumped, there was very positive media coverage in Iraqi newspapers, television, and radio.

The battalion also presented regular project status reports at the weekly district council meetings. This kept council members informed, helped develop local ownership of ongoing construction, and furthered the goal of getting the word out to the people about the reconstruction.

Lessons Learned

- Involve stakeholders in the entire project process. Iraqis want to rebuild their country, and giving them ownership—from project identification to contractor selection to construction oversight—furthers the goal of creating stability and security.
- Work reconstruction operations simultaneously with combat operations. Applying both kinetic and nonkinetic operations improved both security and quality of life in two of the worst neighborhoods.
- Ensure that project designs are synchronized with the city plans. In most cases, the Amanat Baghdad prepared the SWET designs; however, in some cases the contractor completed the design and received city approval before execution.
- Bureaucracy with local government and ministries is unavoidable, but including them in the beginning helped gain their support. Government officials can help or hinder—depending on how and when they are included—so identify the "power brokers" early.
- The ministries and Amanat Baghdad have capable engineers, but it is important to check the designs and bills of material before putting a contract out for bid. Specifically, review the scopes of work and define contractor and city responsibilities.

Sheikh Maruf Project

One of the most difficult neighborhoods was Sheikh Maruf—located about two miles north of the International Zone and plagued by gangs, criminals, and terrorists. Haifa Street, the main road through the area, was the scene of numerous attacks and assassinations. Sheikh Maruf contained approximately 250,000 people. The citizens were extremely poor, often living in buildings that should have been condemned. The area, known as the "Old City," was built in the early 1900s.

The battalion learned of the poor living conditions during its first visit to Sheikh Maruf. Escorted by a local sheikh, the unit trudged through ankle-deep sewage that flooded entire neighborhoods. Since there was no sewer system in place, household sewage flowed down the middle of the street. The battalion decided that this area needed its attention right away, so it requested designs and bills of material from the Amanat Sewer Department and began fighting for funds for the project.

The battalion secured more than $11 million from donated and appropriated funds to execute new sewer collection networks for the four worst neighborhoods in the Sheik Maruf area. As part of the new sewer construction, the battalion also rehabilitated the major sewer lift station. Committees selected contractors who were willing and able to complete the work, using the maximum number of local workers.

Because of the frequent attacks in the area, the battalion's ability to visit the area was limited. A quality control team composed of Amanat Baghdad and battalion-hired Iraqi engineers handled the oversight of day-to-day operations. The battalion conducted weekly progress meetings, which helped identify and solve problems. Neighborhood representatives were invaluable to contractor security, local labor coordination, and communication with the other residents.

Construction began in early August 2004 and was completed at the end of March 2005. The Iraqi contractors worked through numerous raids and other combat operations that were conducted in the area. In total, these projects employed more than 1,000 Iraqis, most of them from the very same neighborhoods. The residents realized several benefits: improved services, greater employment opportunities, and improved security.

Conclusion

The 8th Engineer Battalion's reconstruction efforts restored essential services to more than a million people in two districts of the city. The battalion saw Iraqis take ownership of the rebuilding process, which will pay dividends in the years to come. Showing immediate and visible progress garnered the support of the new government and encouraged patience among the people as major infrastructure work continues. Thousands of Iraqis contributed to the economy, also reducing the insurgency base of support. Although much work remains, reconstruction and restoration of essential services are well on their way.

Lieutenant Colonel Dosa commands the 8th Engineer Battalion, 1st Cavalry Division. His past assignments include Commander, B Company, 8th Engineer Battalion; S3, 937th Engineer Group; and executive officer, 70th Engineer Battalion, 1st Armored Division. He is a graduate of the United States Military Academy, Cornell University, and the Command and General Staff College.

Major Davis is the S3 of the 8th Engineer Battalion. His past assignments include Commander, Headquarters and Headquarters Company, 588th Engineer Battalion, and platoon leader and executive officer assignments in the 1st and 70th Engineer Battalions. He is a graduate of Virginia Tech, the University of Missouri-Rolla, and the Command and General Staff College.

Captain Morgan is the construction officer of the 8th Engineer Battalion. His past assignments include platoon leader and executive officer of Alpha Company, 8th Engineer Battalion. He is a graduate of the United States Military Academy.



U.S. Army Corps of Engineers Supports an Arctic Mission

By Dr. JoAnne Castagna

Up north near the Arctic Circle is Greenland, a province of Denmark. Greenland is the world's largest island, slightly three times larger than Texas. It sits 900 miles south of the North Pole, between northeastern Canada and Europe. More than 80 percent of the sparsely populated island is covered with flat, sloping ice caps and small glaciers. In the northwestern corner of Greenland, in a coastal valley nestled between two mountains and surrounded by miles of icebergs and glaciers, is Thule Air Base, the northernmost U.S. military installation. *Thule* (pronounced "Two Lee") is Latin for "northernmost part of the inhabitable world." The air base is home to hundreds of personnel, including active duty Air Force members, U.S. contractors, and Danish and Greenlandic personnel.

In this remote area of the world, you will also find personnel from the U.S. Army Corps of Engineers® (USACE). They volunteer to stay at the base, for months at a time, to supervise new construction and renovation projects that keep the installation fully operational and mission-ready. Some USACE projects have included an aircraft runway and taxiway, new living quarters, a firefighting training facility and, most recently, a new medical center.

Earlier this winter, Thule Air Base unveiled its new state-of-the-art structure—a single-story, 1,900-square-meter medical center. The medical center was built by a Denmark-based firm under a design/build contract and supervised and quality assured by the USACE New York District. The previous medical center, which was built 50 years ago, was becoming too expensive to operate and was located far from the current housing facilities of the main base population. Besides saving the U.S. Air Force money on costly utility services, the base personnel—as well as residents of local West Greenland communities—benefit from the services of the new facility. Some of the new services the medical center provides are outpatient and inpatient care, surgical services, and mortuary facilities. An additional service is digital X-rays that supply a quicker product to doctors and have lower radiation dosages and no adverse effects on the environment.



Thule Air Base, Greenland, the northernmost U.S. military installation.

Overseas projects, like the new medical center at Thule Air Base, can prove to be very challenging, but also rewarding. For USACE personnel, working on overseas projects allows them to experience different cultures, visit various parts of the world and, most importantly, broaden their construction skills and experiences. The construction of the new medical center was a project that did just that.

The severe weather at Thule Air Base can create a lot of logistical challenges and result in construction that is very



Photo courtesy Resident Office, USACE

The new medical center at Thule Air Base

unique and fast-paced. There is a limited exterior construction season because Thule is above the Arctic Circle. There are 24 hours of sunlight from June to August and 24 hours of darkness from November to February. During the summer season, high temperatures are in the mid-50s. It was during these warmer months that the USACE team was able to receive its construction materials because the island is locked in by ice the other 9 months of the year. But in the summer, Greenland's frozen shipping lanes can be broken up to allow supply ships in. During the winter, the weather is too severe to work outdoors, so construction of the medical center took place during the summer and fall months between May 2003 and October 2004.

Due to the harsh arctic environment, the medical center had to be constructed differently than a typical building. Two-thirds of the northern portion of Greenland, where Thule Air Base is located, is covered by 6 to12 feet of permafrost—permanently frozen ground at variable depths below the earth's surface. Most structures in Thule, including the medical center, are elevated because of the presence of permafrost. Buildings must be constructed off the ground or have air corridors separating the buildings from the ground, because the heat from inside the buildings can melt the permafrost, causing the buildings to sink. Materials used to build the new elevated facility included preinsulated metal panels for the underside of the flooring, walls, and roof; composite gypsum; and a metal decking system for the interior floors.

Construction on the medical center was performed in collaboration with teams from various agencies, to include engineers from both the USACE New York and Europe Districts. The on-site manager for the new medical center, who was from the USACE New York District, was familiar with the working conditions at Thule Air Base, because he has worked on various construction projects at the base, both as a military officer and civilian employee, for the last 20 years. Because of the strong working relationship between all the agencies, they were able to resolve issues that arose due to the many challenges Thule's limited logistics, severe weather, unique construction activities, and short construction season brought to the project. The collaboration between the agencies produced a great finished product that both Thule Air Base and the engineers involved are proud of. Completing a project under severe climatic conditions in such a remote area of the world is a dream come true.



Photo courtesy Resident Office, USACE

Preparing and insulating the medical center's foundation

For additional information about Thule Air Base, visit its Web site at <*www.thule.af.mil*>; for information on the USACE military construction program, contact the author at <*joanne.castagna @usace.army.mil*>.

Dr. Castagna is a technical writer with the U.S. Army Corps of Engineers, New York District.



BRIDGING THE GAP IN HOMELAND SECURITY:

62D ENGINEER BATTALION HELPS SECURE THE NATION'S BORDERS

By Lieutenant Colonel Alfonso Riera and Captain Richard T. Childers

The terrorist attacks of 11 September 2001 pushed the patrol of U.S. borders to the front line of national security. And today, security efforts along the southwest and northern borders continue to expand. The U.S. Border Patrol's heightened presence along the southwest border has burdened narcotic traffickers, alien smugglers, and other transnational threats to our country. In fiscal year 2004, border patrol agents seized more than 20,000 pounds of cocaine and more than 1.5 million pounds of marijuana—a street value of more than $1.9 billion.

Request for Assistance

In late summer of 2003, the U.S. Border Patrol, Del Rio (Texas) Sector Headquarters, requested assistance from Joint Task Force-North (formerly known as Joint Task Force-Six) to have a military engineer unit construct a bridge over Cuevas Creek on the U.S.-Mexican border near El Indio, Texas. The bridge would reduce the response time between two border patrol stations, increasing the capability to apprehend illegal immigrants of many nationalities and to interdict drug traffic.

The U.S. Border Patrol frequently requests military support from Joint Task Force-North, which detects, monitors, and supports the interdiction of suspected transnational threats within and along the approaches to the continental United States. The task force fuses and disseminates intelligence, contributes to the common operating picture, coordinates support to lead federal agencies, and supports security cooperation initiatives to secure the homeland and enhance regional security.

The 62d Engineer Battalion (Combat) (Heavy) accepted the construction challenge and assigned the mission to its heavy-construction company (Alpha Company). The battalion, a III Corps Army engineer asset, is one of few active-duty heavy-construction battalions; therefore, it is a highly sought-after resource.

Mission

In addition to erecting a three-span, nonstandard fixed Bailey bridge, the construction mission would include upgrading two access roads, operating a quarry pit, performing excavation and filling operations, complying with environmental requirements, placing hundreds of cubic yards of concrete, and constructing approach roads.

Project Planning

The project was a joint venture between the U.S. Army Corps of Engineers® (USACE) Fort Worth District, Joint Task Force-North, and the U.S. Border Patrol. USACE contracted a project management firm to coordinate the efforts of the project delivery team. Alpha Company developed the construction schedule, bill of materials (BOM), and equipment requirements. Due to logistics and time constraints, much of the required equipment was contracted from rental vendors. Construction materials were procured through USACE, using U.S. Border Patrol funding programmed specifically for border infrastructure.

Force Providers

On 14 July 2004, Joint Task Force-North and unit leaders coordinated the arrival of the advance party at the site, as well as all of the earthmoving equipment (both organic and rental). These force providers—made up of U.S. Army Reserve Soldiers from New York, Pennsylvania, Texas, and Minnesota—set up the base camp and prepared the ground work for the main body of Soldiers, cycling personnel on their annual training periods throughout the duration of the project. The Soldiers hit the ground running and organized into construction groups based on specific tasks. They erected and maintained all tents, shower and laundry facilities, and power and water systems. While the force providers maintained the camp and quality of life, the 62d Engineer Battalion concentrated on the construction mission.

Earthwork

The banks of Cuevas Creek were extremely steep, unstable, and covered in dense vegetation due to the unseasonable amount of rain the area had received during the 3-month project—more than is typically expected in a 5-year period. The earthmoving platoon created a borrow pit 6 miles away to provide material for the patrol road base and nonstructural areas of the project. Each pier and abutment location was overexcavated and built back with engineered fill, distributing the load of the shallow spread or "floating" footers. The engineered fill, which had to conform to Texas Department of Transportation standards, was delivered from a certified quarry. To minimize the excavation required along the banks, the Pro-Tec™ shoring system was used as an alternative to a standard trench box due to its ability to be advanced to greater depths and provide an open excavation, which was necessary to place the bridge piers.

Soldiers from the equipment platoon of the 62d's Headquarters and Support Company improved the existing trails on either side of the bridge into suitable all-weather patrol roads. More than 45,000 cubic yards of borrow pit, select fill, and native material was displaced and stockpiled during the initial earthwork phase. This material was used to restore the site's finished grade to its natural state at the end of the project.

Foundation System

The substructure design of the bridge was identical to a commercial-grade highway overpass—designed and built according to Texas Department of Transportation standards. The piers and abutments on either side of the gap were constructed roughly in the same phases. Accuracy was paramount during this period; any error made on the ground would be magnified as the structures went vertical. A maximum deviance was allowed (1/8-inch horizontal and 2-inch vertical) to ensure that the bridge would match the support points. The reinforced concrete substructure used more than 1,000 cubic yards of concrete and 22 tons of steel reinforcement.

The bridge abutments were built on a shallow spread foundation bearing on 4 feet of engineered fill, compacted to 100 percent maximum dry density according to worldwide



Aerial view of scour apron preparation

standards. Standing 15 feet tall, they were topped by a cap and corbel that allowed the finished bridge deck to sit even with a reinforced concrete approach slab. The abutments were finished by placing multitier wingwalls to confine the base of the approach road.

The two bridge piers also used shallow spread foundations resting on 5-foot subfooters of engineered backfill. The reinforcing steel for each pier stem was preassembled into six 7- by 30-foot rigid mats, which were placed using a 40-ton crane. The 33-foot piers had to be placed in four phases—footers, lower pier stem, upper pier stem, and pier cap—according to the limits of the Symons™ forms rented for the project.

Erosion Control

The project site was located in a flood plain at the lowest point in the watershed. The height of the bridge's superstructure was designed to be above the flood elevation level of the 50-year storm (equivalent to receiving 2.7 inches of rain in 3 hours). Erosion control was particularly important, especially with the shallow spread foundations of the piers and abutments. The risk, as with any bridge over a water feature, is that moving water will erode the engineered fill from under the piers or abutments, undermining the footings and causing the bridge to fail. To ensure that this would not occur, a 50- by 150-foot scour apron was constructed on either bank, 6 feet under the finished grade. The most important feature of this scour apron was the 6-foot cutoff walls that bordered the perimeter of the apron below the maximum calculated scour depth. To further protect the integrity of the finished slope, the unit anchored Pyramat® (a geosynthetic lining material) over the finished grade to prevent erosion while the slope becomes revegetated.

Bridge Launch

The bridge came directly from the company, with some tailor-made components to match the substructure. The rocking rollers on the abutment seats and the pier caps had to be raised on nearly 3 feet of cribbing to meet the elevation of the abutment corbel and approach slabs. Two John Deere™ 410 tractors were used to position the panel trusses during assembly; however, the tried and true "lay-hold-heave" method was used for all other components. Once the bridge had spanned the gap and was jacked down onto the bridge shoes, the company placed the stringers, decking, and curbs.

Lessons Learned

During this project many quality-control lessons were learned. Unlike most missions, many external civilian and military quality assurance/quality control (QA/QC) personnel were on hand to bridge the gap between the Soldiers' skill level going into the project and the civilian industry standard. When many parties are involved in oversight of a project, all QA/QC personnel have to agree on the standards before the work is completed. One way to ensure that this happens is to have Soldiers build a mock-up, or test section, before full-scale construction begins. This ensures that everyone knows exactly what is required and prevents undue frustration and needless work. Other considerations include the following:

- Keep a daily QA/QC log; use it to identify trends and stop potential problems.
- Get approved modifications *in writing*; keep them on hand.

On any project of this magnitude, proper BOM management is critical. Material should flow in and out of a centralized



An engineer flag flying high during the launch



Finished bridge launch

point where it is accounted for and protected from the elements. Important considerations include the following:

- Assign a BOM manager who is responsible for accepting, inventorying, and safeguarding materials.
- Develop a material-tracking matrix that incorporates fabrication and/or shipping lead times.
- Beware of the temptation to use the material for purposes other than what it is specified for.

Using prefabricated, hand-set panel forms has its pluses and minuses. On the plus side, their cost effectiveness, light weight, and strength allow large-scale projects to be constructed quickly using fewer man-hours than standard timber forms. Panel forms can be used as "slip" forms; the bottom sections can be stripped off, then reused to place sections above as soon as the concrete achieves a specified strength. The risk with using panel forms is that they will "float" up when concrete is being placed, primarily due to their light weight. A solid connection with the base or footer is critical. Other considerations include the following:

- Check all pinned panel connections before placement.
- Do not overvibrate concrete during placement.

Project Completion

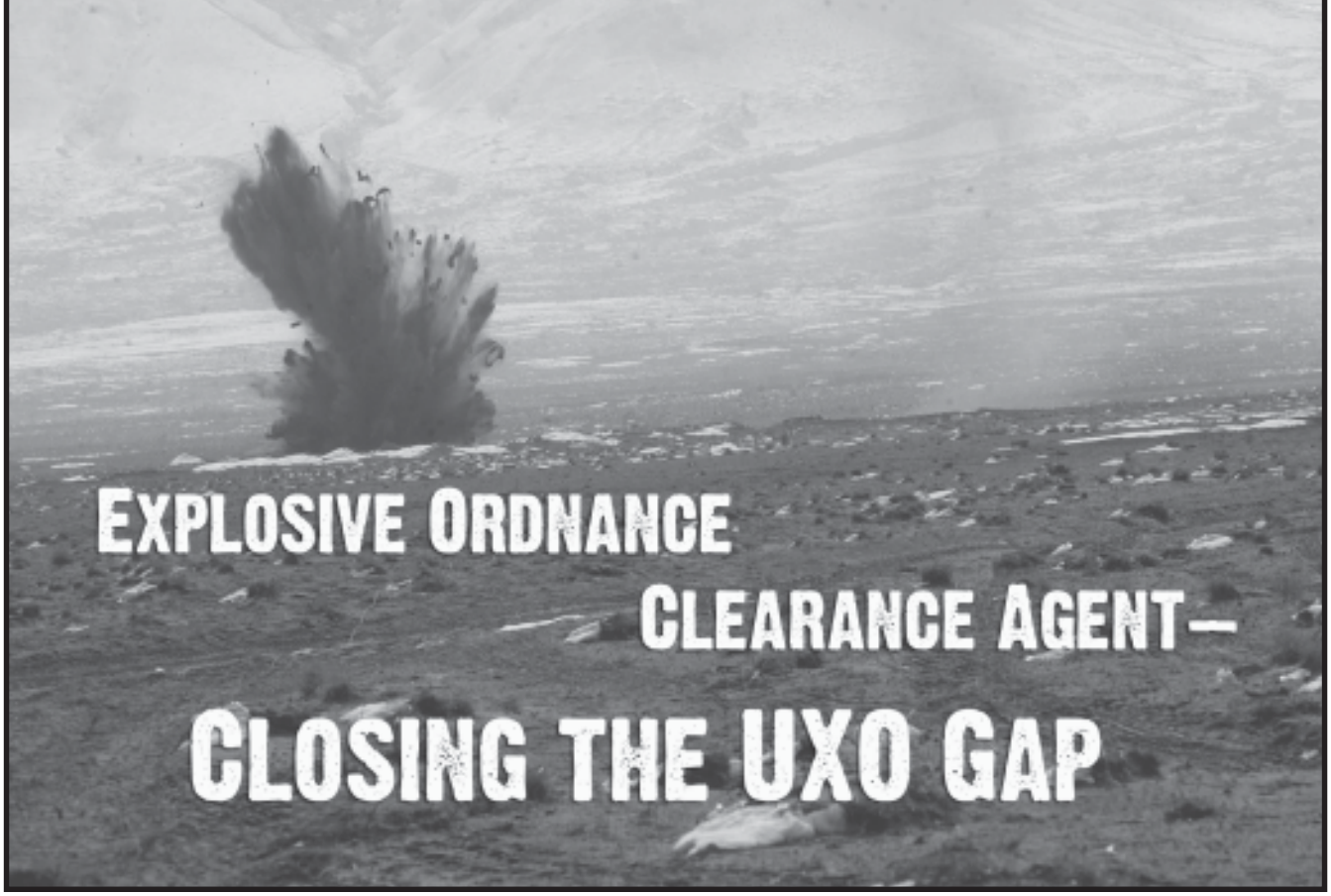
Although project completion was originally planned for 2 months, heavy rains and technical problems added another month to the schedule. But the project provided a training and leadership opportunity that would be difficult to duplicate within the military training environment. The Soldiers were able to greatly increase their survey, design, and horizontal and vertical construction skills. The result is a highly confident group of engineer Soldiers who will take these experiences and use them during future military missions.

The mission incorporated specialists from other military services and agencies to make it a true joint and interagency operation. Joint Task Force-North Marines provided logistical planning and construction support, while Army planners assisted with base camp setup and teardown.

A great partnership developed among Joint Task Force-North, the 62d Engineer Battalion, the U.S. Border Patrol, and the members of the project delivery team. The mission—a win-win situation for all involved—was a complete success. Thanks to the great efforts of our brave men and women in uniform and the professionals of our civilian workforce, one more gap at our nation's borders has been bridged.

Lieutenant Colonel Riera is the Joint Task Force-North Engineer Division Chief in Fort Bliss, Texas. He served as the Texas-New Mexico engineer mission planner for the task force during construction of the bridge. He was previously the S3 of the 82d Engineer Battalion, 1st Infantry Division, Bamberg, Germany, and the Director of Public Works for the Mannheim military community, Germany. He is a graduate of the University of Toledo and Troy State University.

Captain Childers is the civil engineer for the 62d Engineer Battalion. He served as the construction officer, Alpha Company, 62d Engineer Battalion, during the construction of the bridge. Previous assignments include platoon leader, Bravo Company, 1st Battalion, 121st Infantry, Georgia Army National Guard, and assistant S3 of the 62d Engineer Battalion. He holds a bachelor's in environmental engineering from Mercer University.



EXPLOSIVE ORDNANCE CLEARANCE AGENT— CLOSING THE UXO GAP

By Command Sergeant Major David M. Clark

The Global War on Terrorism and the contemporary operating environment continue to demonstrate an increased need for the destruction of unexploded ordnance (UXO) on the battlefield. UXO is found throughout the operational area, often in theaters with poor infrastructure and severely restricted terrain, which limits movement. Moving explosive ordnance disposal (EOD) teams on the battlefield may require dedication from rotary-wing assets, because the lack of roads prevents rapid movement by ground. Also, maneuver commanders need an increased capability to destroy in-place UXO that endangers the mission or personnel.

EOCA Course Creation

To close the gap between EOD personnel and combat engineers, the EOD Integration Working Group, consisting of members from both the engineer and EOD communities, recommended the creation of an Explosive Ordnance Clearance Agent (EOCA) Course to train engineers and increase the force's ability to deal with UXO on the battlefield.

Explosive ordnance clearance is defined as the investigation, detection, location, marking, reporting, and preparation of protective works for UXO. It also includes the in-place disposal of UXO identified in the EOCA Identification Guide and theater-specific UXO handbook. EOCA training does not authorize or qualify engineers to clear or dispose of caches and captured enemy ammunition without EOD clearance and direction, nor does it qualify or authorize engineers to deal with improvised explosive devices (IEDs). The role of EOCA-qualified engineers is to dispose of in-place, selected UXO that is positively identified in their EOCA handbook, while performing combat engineer missions. EOCA-trained personnel are not responders—this mission remains with EOD-qualified personnel.

EOCA Course Purpose

The purpose of the EOCA Course is to teach skill levels 10 and 20 (from promotable specialists to staff sergeants) combat engineers and selected engineer officers (from second lieutenants to captains) the basic skills and knowledge required to perform as EOCAs. The course is challenging and demanding because it requires students to learn and retain a vast amount of information in a short amount of time. Requirements for attendance at the EOCA resident course—now offered at Redstone Arsenal, Alabama—are a qualified combat engineer military occupational specialty; an Armed Services Vocational Aptitude Battery (ASVAB) test score of 105 or above; a grade of specialist (promotable) or sergeant, or company grade officer; an interim secret or secret security clearance; and normal color vision. The intent of the course is to train two EOCAs per combat engineer squad, preferably one being a squad leader, team leader, or specialist (promotable) from the same squad with 1 year of retainability. A minimum of one qualified engineer officer in the company should be trained as well.

Upon approval by the Department of the Army and the Army Training Requirements and Resourcing System (ATRRS), EOCA graduates receive training qualification and an additional skill identifier. The EOCA certification will be valid for one year from graduation, and graduates will be required to be recertified by qualified EOD and EOCA instructors. The Army Safety Policy for Captured Enemy Ammunition, approved by the Office of the Assistant Secretary of the Army, Installations and Environment (28 June 2004), should be updated to include EOCA capabilities and authority to deal with selected UXO. Check your local command policy to determine the authorized level for dealing with UXO by EOCA-qualified engineers in the combat zone or area of operations.

EOCA Course Description

Working with the United States Army Engineer School; the Ordnance Munitions and Electronics Maintenance School; the Explosive Ordnance Disposal Training Department at Redstone Arsenal; and the Combined Forces Land Component Command (CFLCC) Engineer Section (C7), the Combined Joint Task Force (CJTF)-76 requested and received approval to conduct the pilot EOCA Course in Afghanistan. The CJTF-76 engineer staff (CJ7) identified combat engineers throughout the combined and joint operational area to attend the first two EOCA Courses. This training enabled Soldiers in theater to share their experience with the instructors about UXO they encountered on patrols, route and area clearance operations, and other combat missions throughout Afghanistan. The first course was conducted from 29 December 2004 to 1 February 2005, and graduates included engineers from the Active Army and Reserve Component and the U.S. Marine Corps. A second course was conducted in March 2005 with more engineers completing the rigorous course. The courses consisted of four phases:

Phase 1, Annex A. The first phase included an EOCA ammunition terminology examination (a closed-book examination concerning EOCA general safety precautions with UXO), a block of instruction on safety, ordnance color codes and markings, explosives and explosive effects, and basic demolition procedures. The ordnance color codes and markings block of instruction covered how to properly identify ordnance, type, filler, and markings of both U.S. and foreign ordnance, using information learned from the color code/markings charts. The block on explosives and explosive effects covered the characteristics, properties, and explosive effects and principles, including basic explosive firing training, properties, and components. There was also an examination on basic demolition procedures in which students had to properly identify explosive electric, nonelectric, and modernized demolition initiator firing systems; demolition equipment; and procedures for preparing a demolition firing system, to include various firing system components, equipment, and setups. The end-of-block examination for Annex A was a closed-book,



EOCA students going over protective measures



Instructors with students of the EOCA course at the range

comprehensive written examination encompassing all subject matter learned in this annex.

Phase 2, Annex B. This phase was known as the Identification of Munitions (Ordnance Identification). This block of instruction covered thrown, projected, dropped, and placed ordnance. Students also learned about protective measures after identifying the different types of munitions. After receiving the EOCA Identification Guide, the students were engaged in daily practical exercises (eight ordnance items per day) to reinforce the contents of the guide.

Phase 3, Annex C. This phase was a hands-on, performance-based test that required students to conduct EOCA reconnaissance of UXO in a safe and proper manner. There was also a block of instruction where the students determined disposition of ordnance items while conducting EOCA operations. Positive identification of ordnance items and EOCA reporting was also reinforced during this lesson.

Phase 4, Annex D. The last phase of the course encompassed a combined practical exercise on the demolitions range, destroying live enemy munitions in theater.

EOCA Course Results

General feedback from the students was very positive. When the course began, nearly all the students rated their training level on UXO a low 1 out of a possible 5, but after the training the rating improved to a 5. Many combat engineers recommended the addition of more threat mine information to the EOCA handbook and that the Engineer School consider adding more threat mine training or familiarization to Advanced Individual Training (AIT) and Basic Noncommissioned Officer Courses (BNCOC).

The EOCA Course definitely increased the proficiency of our combat engineers on explosives and increased their capabilities in dealing with selected UXO in a tactical environment. Based on the training received, these engineers are now a more effective combat multiplier and viable force protection asset available to their commanders. They have an enhanced ability to positively identify UXO, recommend protective measures to on-site commanders, report more accurately, and construct protective works if necessary. The training completed by these engineers will enable them to perform safer and more effective route and area clearance operations.

Command Sergeant Major Clark is the command sergeant major of the 65th Engineer Battalion, 25th Infantry Division (Light), Schofield Barracks, Hawaii. He is a Sapper Leader Course graduate and has served in both Operation Enduring Freedom and Operation Iraqi Freedom.



Soldiers from the 285th Engineer Company (CSE) construct a forward operating base.

- Completion of the unpaved section of Highway 1
- Emplacement of 12 military-type bridge structures
- Emplacement of wells
- Construction of force protection facilities
- Construction of enduring base camp facilities
- Construction of schools, clinics, airfields, and roadways
- Support to the captured enemy ammunition (CEA) missions that destroyed more than 6,000 tons of enemy caches of explosives and weapons



The 420th Engineer Brigade destroys enemy ammunition.

- Support to combat operations in Fallujah
- Conduct of combat convoy operations
- Conduct of dive team recovery operations
- Completion of domestic action projects
- Training on Interim Vehicle-Mounted Mine Detection (IVMMD) Systems
- Training of the Iraqi Civil Defense Corps (now the Iraqi National Guard)
- Conduct of Task Force Right-of-Way
- Conduct of Task Force Pathfinder
- Support to Jordan's Task Force Haul
- Development and maintainance responsibility for reception, staging, onward movement, and integration (RSOI) of engineer units

The 420th Engineer Brigade redeployed in December 2004 and, after completing its demobilization requirements on 22 December, was released from active duty. No matter what the mission, the 420th is always ready and willing to complete all assigned combat operations. The brigade truly epitomizes the engineer motto of *Essayons*, "Let us try."

Major Dotts is the Active Army S3 Chief of Operations of the 420th Engineer Brigade, III Corps. He served as the C7 Operations Officer for Combined Joint Task Force-180 in Afghanistan in support of Operation Enduring Freedom and then deployed with the 420th Engineer Brigade as the S3 Chief of Operations in support of Operation Iraqi Freedom. Other assignments include command of Bravo Company, 841st Engineer Battalion (Corps) (Wheeled). He holds a bachelor's in history and is working on a master's in strategic leadership from Mountain State University.

THE 44TH ENGINEER BATTALION DEPLOYS AGAIN

By Second Lieutenant Patrick J. Anderson and Second Lieutenant Jennifer Sanford-Hayes

The 44th Engineer Battalion deployed from Korea in August 2004 to serve in Iraq under the 2d Brigade Combat Team, 2d Infantry Division. The deployment of the 44th marked the first time that any unit serving in a deployed environment was redeployed to another theater of operation. This deployment set historic precedents not experienced by any other Army unit during the Global War on Terrorism—or any other conflict.

The 44th Engineer Battalion—also known as the "Broken Heart" Battalion—deployed to Korea from Fort Bragg, North Carolina, and landed with the historic invasion force at Inchon, in September 1950. The 44th served on the Korean Peninsula for more than 50 years, making it the longest continuously serving battalion in Korea. With the battalion's departure, it has left behind a great legacy that will be remembered for years to come.

The Soldiers of the 44th and the rest of the 2d Brigade Combat Team prepared for departure with only a few months notice—a monumental achievement. Getting the Soldiers ready for Operation Iraqi Freedom required not only the efforts of the leaders and the troops deploying but also the support and tireless efforts of those staying behind.

In an effort to recreate the conditions the troops would face in Iraq, the 2d Infantry Division set up contemporary operational environments throughout the western corridor of Korea. The Korean Training Center was the site of a mass conglomeration of units, including infantry, artillery, aviation, and engineers. Contractors posing as Iraqi civilians moved all through the camp, testing the defenses and readiness of forward operating bases (FOBs). A military operations on urbanized terrain (MOUT) village was constructed with the help of the Korean Service Corps to augment the already formidable MOUT training site on the Korean Training Center.

Soldiers getting ready to deploy to Iraq were sent through as much realistic training as possible. They had to react to ambushes; identify and clear improvised explosive devices (IEDs), mines, and booby traps; and conduct MOUT training. Patrolling and handling crowds of inquisitive civilians—any of which could be potential enemies—were heavily emphasized.

Once the 44th Engineer Battalion set foot on the ground in the Middle East, its immediate priority became terrain familiarization and acclimatization at Camp Buehring, Kuwait. Major tasks it performed included receiving its vehicles and equipment, as well as new equipment that would allow it to operate in the harsh desert environment. The main focus in Kuwait was combat preparations. There were numerous live-fire exercises, combat loading of all equipment, and rehearsals for the tactical movement into Iraq. Upon completion of these preparations, the 44th conducted a tactical convoy to its FOB in Ar Ramadi, the provincial capital of Al Anbar Province, located west of Fallujah and Baghdad along the Euphrates River.

Army engineers were engaged in a variety of diverse missions during the course of the Global War on Terrorism that encompassed the full spectrum of military engineering. The 44th was also prepared for a variety of missions. These missions included managing, maintaining, and repairing all facilities for two FOBs; performing enemy cache searches throughout the brigade area of operations; performing route clearance missions and IED searches and neutralization; building barriers to protect local government facilities;



Iraqi weapons in front of the battalion headquarters

supporting infantry task forces with engineer support and demolition missions; and performing traditional infantry-type tasks.

As the days became weeks, the 44th developed a better understanding of what their time in Iraq would be like. In September 2004, the 2d Brigade Combat Team of the 2d Infantry Division was given responsibility for Ar Ramadi and the surrounding areas. The 44th contributed significantly to providing a safe and secure environment for the freedom-seeking Iraqi people.



Detonation of an IED discovered by members of the 44th Engineer Battalion

An unexpected task was preparing the Ar Ramadi area for the Iraqi elections held in January 2005. The successful implementation of the democratic process in Iraq stands as a testament to the Soldiers of the 44th. Their efforts in Ar Ramadi helped ensure that the citizens of Iraq were afforded the opportunity to vote. The Soldiers put in long, stressful days constructing fortifications around polling centers, as well as providing security on the day of the elections. Thanks in part to their tireless efforts, no Ar Ramadi citizens were injured by enemy activity while casting their ballet on election day. The Soldiers of the 44th also trained members of the new Iraqi security forces to support the elected government of Iraq and assume responsibility for ensuring a safe and secure environment for the citizens of Iraq. This historic work was critical to our nation's efforts in the Global War on Terrorism.

The missions of the 44th Engineer Battalion gave its Soldiers an opportunity to work with a variety of other military organizations. Members of the Iraqi security forces served beside the Broken Heart Soldiers during the elections. These Iraqi soldiers were integral in providing security to the Iraqi people and demonstrating to them that they are on their way to self-reliance. Members of Bravo Company, 44th Engineer Battalion were also able to work beside engineers from the U.S. Marine Corps, who fought right by their side on many missions.

The mission of the 44th Engineer Battalion continues. Recently, the Soldiers received news of their reassignment. Instead of returning to Korea, the 44th will be reassigned to Fort Carson, Colorado. This will mark the first time the 44th has returned to the United States since it departed from Fort Bragg in 1948.

Second Lieutenant Anderson is the construction officer of the 2d Infantry Division Engineer Brigade. He received his commission into the U.S. Army in May 2003. He holds a bachelor's in history from the University of Delaware.

Second Lieutenant Sanford-Hayes is the chemical officer of the 2d Infantry Division Engineer Brigade. She entered the Army Officer Candidate School after college. She holds a bachelor's in agricultural science from California Polytechnic State University.

This article is dedicated to seven Soldiers from the 44th Engineer Battalion who lost their lives while defending freedom from the threat of terrorism. They are Private First Class Mark A. Barbret, Private First Class Aaron J. Rusin, Private First Class Andrew M. Ward, Specialist Robert O. Unruh, Sergeant Bennie J. Washington, Staff Sergeant Omer T. Hawkins, and Staff Sergeant Arthur C. Williams.



Soldiers receiving a convoy brief before departing Camp Buehring, Kuwait

2005 Army Deployment Excellence Awards



By Mr. Charles K. Ledebuhr

The Army's Deployment Excellence Award (DEA) program witnessed a year of firsts in 2005. The program, established by the Army Chief of Staff in 2001 to recognize Active, Reserve, and National Guard Army units and installations for deployment excellence, has grown in participation every year since then. The Army's operational tempo, coupled with growing unit awareness of the DEA program, made it a banner year with the largest level of participation ever—fifty-eight units and installations—competing in the following categories:

- Large unit (battalion and above)
- Small unit (company and below)
- Supporting unit
- Installation (all Army)
- Operational deployment

For the first time, the Army Supply, Maintenance, and Deployment Award programs were combined into one ceremony—the Combined Logistics Excellence Award ceremony. Held on 19 May 2005 at the Marriott Wardman Park Hotel in Washington, D.C., the ceremony was part of the Association of the United States Army Logistics Symposium and Exhibition. The Army Vice Chief of Staff, General Richard A. Cody, presented the DEAs to the honored units. He was assisted by the Army Deputy Chief of Staff for Logistics, G4, Lieutenant General Claude V. Christianson, and the Army Chief of Transportation, Major General Brian I. Geehan. The awards banquet was highlighted with a speech by the Sergeant Major of the Army, Kenneth O. Preston.

Also for the first time, the program recognized a division as the winner of the Active Army large-unit category. This year, the 10th Mountain Division—from Fort Drum, New York—competed and won as the Army's best large deploying unit, based on a nomination package prepared by the Division Transportation Officer. This groundbreaking action by the 10th opens the way for other divisions to compete as large deploying units. Another first was that a single state—Oregon— swept the National Guard large and small deploying categories. Oregon entered and placed two units in each category. The Joint Forces Headquarters–Oregon deserves a hearty congratulation for this exceptional achievement and presents a challenge for other states to showcase the deployment success of their units.

The combination of an installation winner and a supporting unit winner with a common mission was another first for the DEA program. This honor was shared by Fort Hood, Texas, and the 4003d Garrison Support Unit. Fort Hood won in the all Army installation category, while the 4003d won the Reserve supporting unit category for its support of deployment operations at Fort Hood, Texas.

In the operational deployment category—which is open to all Army units that deploy on missions such as the Global War on Terrorism, peacekeeping, humanitarian relief, and other operational deployments—units can contend for either the large- or small-unit category. This year the first unit from overseas won in the operational deployment category. In fact, the 1st Battalion, 38th Field Artillery Regiment, is the first unit from Korea to win any DEA. And although 2005 was a year of many firsts, representatives from combat, combat support, and combat service support units were in the winner's circle again. Command emphasis on deployment training, both collective and individual, was common to the winning units. Additionally, winning units treated deployment and deployment support as an operation, rather than as a logistics function.

Key dates for the 2006 DEA competition are as follows:

- Competition period: 1 December 2005–30 November 2006
- DEA operational on-site visits: 1 December 2005–1 February 2006
- Nomination packet due to unit's major command (MACOM): 1 January 2006
- MACOM nominations due to DEA board: 31 January 2006
- DEA board convenes: 6–17 February 2006
- Department of the Army (DA) releases message announcing semifinalists: 26 February 2006
- DEA validation teams visit: 1–25 March 2006
- DA releases message announcing winners: 1 April 2006

2005 Deployment Excellence Award Recipients		
Category	**Winner**	**Runner-Up**
Active Large Unit	10th Mountain Division Fort Drum, New York	84th Engineer Battalion Schofield Barracks, Hawaii
Active Small Unit	96th Transportation Company Fort Hood, Texas	Headquarters and Headquarters Company 89th Military Police Brigade Fort Hood, Texas
Active Support Unit	842d Transportation Battalion Beaumont, Texas	39th Transportation Battalion Kaiserslautern, Germany
National Guard Large Unit	2d Battalion 162d Infantry Regiment Eugene, Oregon	3d Battalion 116th Armored Cavalry Regiment LaGrande, Oregon
National Guard Small Unit	G Troop 82d Cavalry Regiment Redmond, Orgeon	1186th Military Police Company Salem, Oregon
National Guard Support Unit	Camp Atterbury Edinburgh, Indiana	Joint Forces Headquarters—Illinois Springfield, Illinois
Army Reserve Large Unit	1179th Transportation Brigade Fort Hamilton, New York	1190th Deployment Support Brigade Baton Rouge, Louisiana
Army Reserve Small Unit	319th Transportation Detachment Dover, Delaware	281st Transportation Company Las Cruces, New Mexico
Army Reserve Support Unit	4003d Garrison Support Unit Fort Hood, Texas	139th Deployment Support Brigade Oceanside, California
All Army Installation	Fort Hood, Texas	Fort Drum, New York
Operational Deployment Large Unit	1st Battalion 38th Field Artillery Regiment 2d Infantry Division Camp Stanley, Uijeongbu, Korea	NA
Operational Deployment Small Unit	F Company 3d Battalion 69th Armored Regiment 3d Infantry Division Fort Stewart, Georgia	NA

DEA program guidance and evaluation criteria are available on the DEA Web site at <*http://www.deploy.eustis.army.mil/DEA/default.htm*>. For additional information, call your MACOM DEA point of contact or the DEA Program Manager, Mr. Henry H. Johnson, at DSN 927-1833 or commercial (757) 878-1833.



Mr. Ledebuhr is Chief of the Operations and Training Branch of the Deployment Process Modernization Office at Fort Eustis, Virginia. Retired from the Army, his service as a Transportation Corps officer included assignments with the 3d Armored Division, III Corps, Training With Industry, and 1st Armored Division.

The Army's New Protective Eyewear

By Mr. Larry T. Hasty

During the past few years, the U.S. Army has adopted several new types of commercial protective eyewear to help minimize the number of eye injuries during combat missions and training. Until recently, the choices were limited to the old sun, wind, and dust goggles (SWDG); the ballistic laser protective spectacles (BLPS); and the special protective eyewear, cylindrical system (SPECS). The new types of eyewear are commercial, off-the-shelf items that have passed the U.S. Army's testing criteria and are currently being issued to deploying Soldiers through the Army's rapid-fielding initiative. Units can order the authorized commercial eyewear using the national stock number. Funded military standard requisitioning and issue procedure (MILSTRIP) requisitions need to be submitted through normal supply channels to the Defense Supply Center, Philadelphia, General and Industrial.

The new eyewear is categorized as either spectacles or goggles, according to the test criteria each must pass to be authorized for use by Soldiers:

- **Spectacles** are required to stop a 5.8-grain fragment simulating projectile moving at a speed of 640 feet per second.
- **Goggles** are required to stop a 17-grain fragment simulating projectile moving at a speed of 550 feet per second (approximately twice the energy impact of spectacles).

Although some of the approved spectacles may meet the testing requirements of goggles, combat-vehicle crewmen should choose from the list of approved goggles in order to receive the appropriate level of fragmentation protection, as well as added sun, wind, and dust protection.

Although these new commercial items provide excellent ballistic protection, none of them protect the eyes from lasers. If an operation or a training mission requires laser eye protection, the SWDG, BLPS, or SPECS with laser lens must be worn. For Soldiers who require prescription lenses, the Uvex XC™ spectacle with prescription lens carrier (PLC), the eye safety system (ESS) Interchangeable Component Eyeshield (ICE) 2™ spectacle with PLC, and the Revision II Sawfly™ with PLC are authorized alternatives to the BLPS.

An updated authorized protective eyewear list, published by the Program Manager-Clothing and Individual Equipment (PM-CIE), provides information for ordering the new eyewear. The list can be found on the Program Executive Office Soldier Web site at *<http://www.peosoldier.army.mil/index.php?section=product>*. The list can be accessed by opening the "Commercial Eyewear Fact Sheet" link located on the right-hand side of the page, directly below the graphic of the new "Army Combat Uniform."

Following is a detailed description of the authorized commercial goggle kits. All of the goggles are one size fits all, and all the kits include two ballistic protective lenses, one clear and one tinted. These lenses are made with antiscratch and antifogging coatings and provide protection from ultraviolet rays. Each kit has an antireflective sleeve that reduces glint when the goggles are not in use.

- **ESS Land Ops™** goggles can be worn by Soldiers who wear prescription lenses and those who do not. These goggles fit over the standard Army-issued eyeglasses. The kit includes a rubber frame with a foam backing that wicks away moisture and increases comfort for long periods of use. Foam-covered holes allow ventilation and help eliminate fogging, while keeping out dust.



ESS Land Ops Goggles

- **ESS Profile NVG™** (night vision goggles) are strictly for Soldiers who do not require prescription lenses. These goggles fit closer to the face (because of their rubber backing) and are more compatible with night vision goggles. A thin fleece backing, which may improve comfort when wearing the goggles in very cold weather, is being evaluated at Fort Knox, Kentucky. Outrigger clips on the strap allow optimal helmet compatibility without breaking the face seal. Like the ESS land operations goggles, foam-covered holes in the frame allow ventilation, while keeping out dust. The kit can be ordered in one of three frame colors—black, olive drab, or desert tan.



ESS Profile NVG

- **ESS Vehicle Ops™** goggles are used for vehicle operations involving excessive dust. The high-density, restricted-perimeter filtration provides protection against airborne debris while traveling at high speeds. These goggles fit over most eyeglasses, and the frame has a foam backing that wicks away moisture.



ESS Vehicle Ops Goggles

- **Arena Flakjak™** goggles are designed for Soldiers who do not wear eyeglasses. These goggles consist of a molded frame with a ventilation screen, which allows air to flow through to minimize lens fogging. The frame has a foam backing that fits to the face and wicks away moisture.



Arena Flakjak Goggles

Soldiers in combat and training run a high risk of losing their eyesight. Sixteen percent of the casualties of the coalition forces are attributed to eye injuries. Several reports from these Soldiers indicate that the Army's new protective eyewear has protected their eyes from shrapnel numerous times. Although flying shrapnel from an enemy weapon blast is the most dangerous threat to a Soldier's eyes, many other hazards—such as flying sand, dust and debris from helicopters, high winds or overpressure, flash fires, and lasers—threaten eye safety as well. The new types of commercial protective eyewear are the ideal solution for minimizing those hazards.

For additional information about any of the protective eyewear, contact Mr. Larry T. Hasty at DSN 464-3662, commercial (502) 624-3662, or e-mail <*larry.hasty@knox.army.mil*>; Mr. Myron Pross, PM-CIE, at DSN 444-2510, commercial (215) 737-2510, or e-mail <*MyronPross@dla.mil*>; or Mr. Frank Cole at DSN 645-9907, commercial (256) 955-9907, or e-mail <*frank.cole@logsa.redstone.army.mil*>.

Mr. Hasty is the Soldier Project Officer assigned to the Science and Technology Division of the Unit of Action Maneuver Battle Lab at the U.S. Army Armor Center, Fort Knox, Kentucky.

Strengthening Army Leadership Courses by Training Adaptability

By Members of the First Engineer Command and Staff Course[1]

Recently, Dr. Leonard Wong published a monograph examining the adaptability of deployed junior officers. "Developing Adaptive Leaders: The Crucible Experience of Operation Iraqi Freedom" provides an insightful look into the minds of today's young leaders. In his monograph, Dr. Wong challenges the Army to "acknowledge and encourage this newly developed adaptability in our junior officers or risk stifling the innovation critically needed in the Army's future leaders."[2] His work is significant because it confronts the Army's senior leadership with a problem that may greatly affect the force during future deployments. This article uses the framework from Dr. Wong's monograph to provide recommendations for improvement to officer leadership courses. In order to prepare future leaders for the conventional battlefield, leadership courses should train on nontraditional leadership roles (for example, civil affairs, project management, and fund management), provide a compilation of after-action reviews (AARs) and lessons learned from deployments, and establish a more in-depth mentor program.

Dealing With Complexity

Analysis

Structured training does not foster adaptive leadership. Current missions in Operations Enduring Freedom and Iraqi Freedom, in many cases, are not mission-essential tasks. Over the last few years, junior officers have grown accustomed to executing missions with only a task and purpose. This change in mission structure has created a new breed of creative, adaptable leaders.

Company grade officers will serve as a catalyst for change because of the full spectrum of operations encountered in Operations Enduring Freedom and Iraqi Freedom. It is critical that senior leaders recognize the method by which their junior officers accomplished real-world missions. Further, it is essential for senior leaders to support the ideas of their junior officers in the garrison and training environment.

Dr. Wong describes four major areas that necessitate adaptable leaders:

- *Complex Roles*. Deployed company grade officers operate in a dynamic environment. As well, they have additional duties in which they have little formal training. In the span of a day, these officers are required to be leaders, warriors, peacekeepers, and nation builders.
- *Cultural Complexity*. Deployed company grade officers become increasingly aware of the cultural impacts on their mission. Neglecting to train Soldiers on the effects of culture can have large-scale implications for today's military.
- *Complex Warfare*. Today's battlefield presents complex situations. Junior officers have to balance between restrictive rules of engagement (ROE), civilians on the battlefield, and a need to accomplish the mission.
- *Complexity Through Change*. Contemporary enemy forces are adaptive and innovative. They seek to create instability and havoc at the tactical level. To maintain situational control and gain tactical surprise, coalition forces engage in high-payoff, short-notice missions.

Recommendations

Complex Roles. The overarching situation is how to produce adaptive leaders in the Army. The first step starts in the U.S. Army Engineer School by teaching our junior leaders roles other than traditional engineer leadership (for example, squad leaders, platoon leaders, and company commanders). For the second step, we must understand that regardless of our military occupational specialty (MOS), we are Soldiers first. The third step is to allow all Soldiers involvement in and access to AARs.

- The most notable areas currently neglected by the Army's Junior Officer Development Program relate to civil affairs operations and funds management (outside of the company's budget). Civil affairs serves a wide spectrum of operations, which many junior leaders face daily during a deployment. Likewise, funds management deals with pay agent issues such as workforce management of local nationals. Junior leaders must have, at a minimum, baseline information (involving money from higher echelons) to allow adaptation to any situation.

  As leaders, our experiences are valuable to junior leaders. We should share these experiences with future leaders. Near- and long-term solutions are mentoring programs, small-group meetings, and training exercises without troops (TEWTs). In addition, captains in the Engineer Command and Staff Course (ECSC) can write professional papers on lessons learned during deployment or in garrison, with the opportunity for publishing.[3]
- In the second step, Soldiers must understand that they are Soldiers first, regardless of the MOS. While deployed, the



Speedway forward arming and refueling point

operating environment is dynamic; one minute you may be handing out pencils to school children and the next minute be caught in a firefight. Company-level training must reflect this element and be supported two levels higher, unlike the traditional "trickle-down" training driven by higher echelons. The training must excite Soldiers. Soldiers are not set up for success when every field exercise is identical. During a deployment, Soldiers are functioning outside the job description of their MOS. Junior leaders must be prepared for this and should implement the diversions and real-world application into training.

- The third way to get all Soldiers involved is by allowing participation in and examination of AARs. When higher echelons withhold lessons learned, company grade leaders are forced to "reinvent the wheel" by designing tactics, techniques, and procedures that already exist. Leaders of all levels need access to AARs, which—by definition—are for future training through implementation of specific problem-solving methods.

Junior leaders need flexibility. Given the tools, they should be allowed to "wander off of the reservation" during training. They must train in garrison without excessive influence from higher headquarters, which prepares them for the real-world theater of operations.

Cultural Complexity. When deploying outside of the United States, almost every facet of life is drastically different from life in America. Many U.S. Soldiers have never been outside of the country, let alone had to deal with people who are often scared of or hate Americans. Junior leaders must set the example for how to act toward local nationals. Consequently, cultural training for junior leaders is crucial to the success of a deployment.

It is unrealistic to expect that training will completely prepare a Soldier for a deployment. However, it is important for junior leaders to have training to "know what they don't know." A possible fix is for Soldiers who have deployed to the theater of operations—within the recent past—to brief units preparing to deploy. In addition, the Soldiers could include simple issues such as eating, greeting, working with men/women, and controlling crowds.

An immediate addition to ECSC should be a class during the leadership foundations module to discuss cultural awareness. It is likely our generation of officers will continue to face conflicts at the company level in the Middle East. There is sufficient experience to teach such a class among students who have recently deployed. A possible long-term solution is for students to compile cultural lessons learned, complete with scenarios. These scenarios will challenge junior officers during the tactics phase of ECSC. They will force captains to learn how to apply doctrinal thinking while thinking creatively, based on a region's customs and courtesies.

Complex Warfare. ROE take on many forms and vary from mission to mission. The problem for leaders becomes how to enforce and abide by the ROE. The critical component of establishing and enforcing the ROE is communicating a higher

echelon's intent. Too often on the nonlinear battlefield, the situation changes quickly from nation building to tactical engagement and back again. The Soldier must quickly determine who is the enemy. Improperly crossing this delicate line will disrupt months of work and effort spent on fostering a positive relationship with the local nationals. It is essential for leaders to war-game scenarios, which provides guidance on potential situations.

The immediate and near-term action at the U.S. Army Engineer School should be to place a greater importance on discussing the ROE while conducting the military decision-making process (MDMP). Although time is limited in the training environment, any increase in incorporating the ROE into the scenarios will help leaders. The long-term solution involves collecting and compiling lessons learned from the AARs of Operations Enduring Freedom and Iraqi Freedom. A collection of real situations, the actions taken, and the lessons learned from those actions would be a valuable tool that company grade officers could take away. It would facilitate in-depth discussions and provide leaders with a practical training tool for various ROE scenarios.

Complexity Through Change. A near- and long-term response to this issue could be the implementation of a leadership mentor program for ECSC. Throughout each module, (common core, leadership fundamentals, tactics, and construction) captains need direct input to the MDMP—formal and informal, mundane and exciting. The end state is for field grade officers (focusing on the battalion commander) to take a team under their "mentorship wing." Mentors could focus discussions on tactical and garrison topics and provide vital input on what they think is important for success as a company commander and as a future leader in today's (and tomorrow's) Army.

During the common-core module, mentors could come in—at least once—and meet with smaller groups (divide the class in half or thirds) in a seminar format. The mentors could lead the discussion, focusing strictly on topics of recent discussion in class. This would require that the small-group leaders send read-ahead packets to the mentors, ensuring that both the captains and the mentors were discussing the same topics.

The leadership fundamentals module mimics the previous process. However, the focus would shift to garrison-type scenarios, which the mentor would discuss with the captains. As with the first module, small-group leaders would ensure that the mentors received read-ahead packets and would coordinate for time available to conduct the mentor sessions.

During the tactics module, the mentors (divided into teams, which would require four or five mentors) could spot-check the planning, as the captains learned the MDMP. The class would receive the mission and begin to plan, with input from the team's assigned mentor. The input would pertain to the mission and planning (teacher/trainer). The first mission analysis brief should be a walk-through with the mentor to ensure that the captains are heading in the right direction. There would be times established for when the mentor would be available to assist in the MDMP with the captains, for either the current or the next mission. The mentor would receive at least one brief (mission analysis, course of action analysis/approval, or operation order [OPORD]), and for each mission during the phase, would assist with refining the team's planning process. Additionally, with the availability of a mentor, the team would be able to plan the more complex/full-spectrum operations that the Army is facing worldwide. The mentor would assist the small-group leader by providing input on potential missions and training conducted with the captains. The capstone for this portion of training would be an OPORD brief to the mentor from the captains on the final task force mission.

Mentorship during the construction module could focus again on the more mundane, yet time-consuming activities of company command. The mentors would again meet with the captains, at least twice during the module, to discuss the issues of taking command and making that command successful—through topics at the discretion of the mentor. The last sessions with the mentor would allow the captains to ask questions not conceived of earlier in the course, helping to send the captains forward with confidence. The captains would also have a point of contact that they feel comfortable with after they leave the ECSC—should issues arise.

In addition, the ECSC student would establish a command relationship with the battalion commander or a senior leader of the student's follow-on unit. The receiving commander should send the student the command philosophy, top five training focus areas, and additional information to help the student. This commander could also be involved in the incoming captain's command philosophy developed during the common core module. Instead of a "check-the-block" memo, there would now be a document, approved by the captain's future commander.

The mentoring process needs to extend throughout the ECSC, from the first weeks of common core and leadership fundamentals, through tactics, and then finish with construction. It would ensure that captains understood their battalion commanders' intent and philosophies before conducting those first crucial inventories upon assuming command.

To maximize the opportunities created by the captain mentorship program, all captains must be involved in mentoring lieutenants attending the Officer Basic Course. Captains should discuss personal lessons learned, as well as secondhand experiences from their mentors and future commanders. Lieutenants now have a point of contact to ask questions and gain useful insights into their future jobs. The class schedule should allot time for the mentorship program. In addition, captains and lieutenants should get together at functions such as leader lunches and right-arm nights (where everyone meets at the officers club). The program would be a success if school leaders made it a priority.

Summary

A new breed of creative, adaptable leaders exists in the Army's junior officer ranks. It is vital that senior leaders recognize and support the methodology by which their junior officers accomplish real-world missions. Further, it is essential for Army leadership courses to encourage adaptable thinking and to prepare young officers for nontraditional leadership roles. In order to better train leaders on adaptability, leadership courses should train on irregular leadership roles, provide a compilation of AARs and lessons learned from deployments, and establish a more in-depth mentor program.

Captain Dickey serves as battalion S4 for the 30th Engineer Battalion. His previous assignments include platoon leader, assault and obstacle platoon leader, S2, S4, and executive officer. He holds a bachelor's in construction management from East Carolina University and a master's in engineer management from the University of Missouri-Rolla.

Captain Evans serves as the engineer reconstruction cell liaison officer to the International Zone. His previous assignments include Sapper platoon leader, light-equipment platoon leader, battalion S1, and work in the Battalion Assistant Division Engineer Cell. He holds a bachelor's in psychology and criminal justice from the University of Georgia and a master's in public administration from Webster University.

Captain K. Lewison serves as the S1 for 164th Air Traffic Services Group in Korea. Previous assignments include aviation line company platoon leader and battalion S4. She holds a master's in public policy administration from the University of Missouri-St. Louis.

Captain T. Lewison serves as an aviation operations officer for the Eighth U.S. Army in Korea. Previous assignments include aviation line company platoon leader and executive officer. He holds a master's in public policy administration from the University of Missouri-St. Louis.

Captain Miletich serves as an observer-controller/trainer team chief in a training support battalion. Previous assignments include platoon leader, task force engineer, and executive officer for the 3d Infantry Division. He holds a bachelor's in business administration from Presbyterian College and a master's in public administration from Webster University.

Captain Nye serves as a small-group instructor for the Engineer Officer Basic Course. Previous assignments include line platoon leader and assault and obstacle platoon leader. He holds a bachelor's in biology from Baker University.

Captain Rose is a training, assessment, and counseling officer for Bravo Company, 3-11 Infantry Regiment (OCS) at Fort Benning, Georgia. Previous assignments include line platoon leader and assistant S3. He holds a bachelor's in English literature from Washington University and a master's in public policy from Webster University.

Captain Russell is a planner in the Future Plans G3, Eighth U.S. Army Korea. Previous assignments include task force engineer in Kosovo. He holds a master's in public administration from Webster University.

Endnote

[1] The authors are members of ECSC 03-04: Captain Jason Dickey, Captain David Evans, Captain Katrina Gier Lewison, Captain Tyler Lewison, Captain Matthew Miletich, Captain William Nye, Captain Tim Rose, and Captain Timothy Russell.

[2] Leonard Wong, "Developing Adaptive Leaders: The Crucible Experience of Operation Iraqi Freedom," Carlisle Barracks, Pennsylvania: Strategic Studies Institute, 2004, p. v.

[3] *Engineer* encourages submission of articles. Check the Web site at <*http://www.wood.army.mil/engrmag/submit%20article.htm*> for the Engineer Writers Guide, which gives more information on article requirements.



Dedication

The following members of the Engineer Regiment have been lost in the Global War on Terrorism since the last issue of *Engineer*. We dedicate this issue to them.

Staff Sergeant Christopher W. Dill	1st Brigade, 98th Division	Pennsauken, New Jersey
First Sergeant Timothy J. Millsap	70th Engineer Battalion	Fort Riley, Kansas
Corporal John W. Miller	224th Engineer Battalion	Burlington, Iowa
Sergeant Timothy C. Kiser	340th Forward Support Battalion	Red Bluff, California
Specialist Derrick J. Lutters	891st Engineer Battalion	Pittsburg, Kansas
Sergeant Gary A. Eckert, Jr.	983d Engineer Battalion	Monclova, Ohio

Joint-Service Beach Obstacle Demolition in World War II

By Mr. James Douglas O'Dell

Combined into *gap assault teams* to clear beach and underwater obstacles in the landings at Normandy in June 1944, Army combat engineers and naval combat demolition units (NCDUs) experienced D-Day like everyone else—terrified beyond measure. What they have yet to receive is full recognition for their joint accomplishment. Some accounts say that the engineers were augmented by NCDUs, while others say that the naval units were augmented by engineers. Both accounts are correct—it was a team performance.

A gap assault team consisted of twenty-eight Army engineers and an NCDU made up of a Navy officer and twelve enlisted men—seven Navy and five Army. Also called *boat teams*, the NCDUs went into action with engineer combat battalions, assigned to regimental combat teams (RCTs). As part of Assault Force "O," the 299th Engineer Combat Battalion was attached to the 16th RCT and the 146th Engineer Combat Battalion to the 116th RCT. Assault Force "U," operating from VII Corps, was organized along the same lines.

Before World War II, no one had experimented with the demolition of massed obstacles in amphibious assault. Tasked with developing the use of obstacles in defense between the World Wars, the Corps of Engineers had a grasp of practical problems by the end of 1942. They had been experimenting with underwater demolition for two months at an amphibious training base in Florida, when in May 1943 the Navy announced the creation of its own combat demolition program.



Photo in This is JANET, October 1945

Captain Alfred G. Hoel Jr., Corp of Engineers was instrumental in the establishment of the Joint Army-Navy Experimental and Testing Board (JANET).

Striving to develop a joint amphibious doctrine, the Army and the Navy joined forces, each surrendering some of its traditional autonomy, but never unconditionally. To the dismay of political leaders intent on controlling the cost of the war, the two services continued to inaugurate duplicate programs. Wherever the Army went, the Navy was sure to follow, straining to take the lead in all things amphibious.

The Navy's ascendancy in landing operations put the future of the Engineer Amphibian Command in doubt. Acquiescing to the transfer of authority, one engineer expressed optimism, seeing it as a challenge for the Navy not to undo previous achievements, but to build on them. In a memo dated 25 February 1943, Lieutenant Colonel Paul W. Thompson stressed the need for trained personnel who were fully aware of American amphibian doctrine at assault training centers in England. Seeking to promote continuity, he noted that the Engineer Amphibian Command had developed "a workable doctrine." His understanding of the impending change was that the Navy would "simply absorb the personnel and facilities of the Engineer Amphibian Command," basically adhering to the established doctrine and

technique. In sum, he anticipated "a change in form rather than in substance."[1]

With respect to the demolition of beach and underwater obstacles, the Navy elected to start from scratch, disregarding what the engineers had previously accomplished. The engineers made significant contributions, beginning with obstacle experiments predating the amphibious exercises that nurtured the Fleet Marine Force in the 1930s. Beginning in 1923, the Corps of Engineers developed beach and underwater obstacles for island defense in the Philippines and Hawaii—starting with steel *chevaux-de-frise*, barbed wire, and small mines. Coral formations off Oahu and Corregidor made it difficult to install heavy steel obstacles, but by August 1933—with the armed forces of various nations using heavier equipment—the engineers were forced to reconsider heavier obstacles.

While keeping tabs on German and Japanese amphibious operations, the engineers accumulated useful data on tactics and equipment. In February 1941, the Engineer Board started a project to investigate general demolitions. On 8 May 1941, the Chief of Engineers proposed that the board find a location for experiments in beach and underwater obstacle techniques. In late August and early September 1942, to guide research, the board composed a list of the military characteristics of effective underwater obstacles. A study of a working classification of existing types resulted and convinced the Chief of Engineers to authorize Project DM 361, *Underwater Obstacles*, on 22 September.

Beginning in late 1942, experiments were conducted at a temporary site at Camp Bradford, five miles northeast of Norfolk, facing the Chesapeake Bay. Over the winter of 1942–43, a variety of obstacles were tested, including horned scullies.[2] Based on work at Camp Bradford, the board made preparations for establishing a test site at Fort Pierce, Florida, authorizing a survey of North Island (now known as *Hutchinson*), conducted on 25–26 February 1943. A newly established naval amphibious training base on South Island (also known as *Hutchinson*), combined with excellent beach and surf conditions, made North Island ideal for a joint-service program—where the Army began a demolition school.



Photo courtesy Kenneth B. Reynolds

Engineers launch into the surf with a nitrostarch charge, preparing to blast a sandbar, 1 March 1943. Amphibious Force, Atlantic Fleet Photo AFAF-X 735.

On 8 March, the Chief of Engineers specified that the test area be located close to the naval base, directing the board to coordinate work with a similar project in the United Kingdom. On that same day, Report 740, Project DM 361, *Underwater Obstacles* (covering the work at Camp Bradford), was completed, and the board opened Project DM 361E, *Demolition Equipment for Removing Beach and Underwater Obstacles*. At Fort Pierce, engineers experimented with ways of blasting channels through sandbars—at that juncture, the only underwater obstacles known to exist at potential landing beaches in Axis (Germany, Italy, and Japan) territory.

Since offshore bars were obstacles to boat traffic, the Navy argued for jurisdiction. Heavily engaged in the development of their own landing craft, the engineers sought a compromise based on joint responsibility. The elimination of obstacles, extending to natural features, was a logical adjunct to combat engineering, Army or Navy. Both services coveted the capability and the freedom to operate according to their respective doctrines. Acquiring responsibility for all amphibious training and landing craft production, the Navy sought total control over landing operations. Essentially, the Navy was responsible for getting troops and supplies on the beaches, while the Army was responsible for getting them off the beaches. From that perspective, the elimination of all obstacles to navigation was a logical extension of naval activity. In the sense that a landing beach could develop into a makeshift port, the clearance of underwater obstacles fell under an existing interservice arrangement, but there was a problem.

In the spring of 1943, the Navy had nothing comparable to the obstacle research base compiled by the engineers over the previous two decades—or a demolition school. Responsible for port clearance—principally, the removal of mines, torpedoes, and wrecked vehicles—the Navy did have training facilities for ordnance disposal. In addition to the Mine Disposal School, as of late 1941, there was the Bomb Disposal School—established and headed by Lieutenant Commander Draper Laurence Kauffman, U.S. Navy Reserve (USNR). He knew something about demolition specific to ordnance disposal, but he was not a demolitions expert. For expertise on demolitions,



Photo courtsy Albert J. Stankie

This experimental beach and underwater obstacle course was constructed at North Island, Fort Pierce, Florida, in April 1943.

planners could look to the Naval Construction Battalions, or Seabees, skilled in the use of explosives for building purposes.

Neither bomb disposal technicians nor Seabee builders were classed as combat troops trained for assault. The Marines were, but the Navy wanted to confine them to the seizure of ports, their traditional assignment. In the Pacific, that came to include entire islands, such as the Solomon Islands where Marine engineers experimented with combat demolition. Given their assignment to secure ports, and considering that landing beaches could serve as ports, Marines were logical candidates for demolition training. Nevertheless, Navy planners thought of Marines as an inert force until they actually hit the beach. In that sense, the only active units in the surf zone were landing crafts, which included amphibious tractors, able to surmount a coral reef but having a limited capacity to deal with artificial obstacles.

In the wake of the landings in North Africa in November 1942, the Allies gave some thought to the possibility that the Axis might make greater use of artificial barriers extended into the surf zone. Examining the results of beach marking by amphibious scouts in Operation Torch, Admiral H. Kent Hewitt decided to expand their capabilities to include onshore reconnaissance. In a memorandum to the Commanding General of the Army Ground Forces, dated 18 February 1943, he requested a specially organized company of engineers (including a demolition platoon) to assist in the development of particular projects in amphibious technique. He wanted the unit to be available by 1 March at the latest. At the top of the list was "the training of Scouts and Raiders in the technique of investigating and destroying beach and underwater obstacles."[3]

Established in September 1942 at Little Creek, Virginia, and moved to Fort Pierce in January 1943, the joint-service Amphibious Scout and Raider School was not designed to train raiders in the usual sense, but as reconnaissance specialists, skilled at gathering intelligence behind enemy lines without revealing their presence. The fact that Admiral Hewitt directed his request to the Army, and not the Navy, is significant. Clearly, he saw the need for a combat demolition capability with respect to underwater obstacles, recognizing that the Navy, as yet, did not have one.

On 17 March 1943, the Engineer Board informed the Chief of Engineers that Captain Clarence C. Gulbranson—U.S. Navy Commandant of the Amphibious Training Base, Fort Pierce—had submitted a request for "the immediate construction of a sample underwater obstacle course" for use in the preliminary training of combat personnel in the Amphibious Force, Atlantic Fleet (AFAF). Supervised by the district engineer, civilian contractors completed the course by the end of April.

By early spring, the Army and the Navy had begun to discuss joint responsibility for the passage of beach and underwater obstacles in the assault. In a memo to Army Ground Forces, dated 17 April 1943, an officer of the General Staff, Army Service Forces, wrote, "Steps to obtain a joint decision on the delineation of responsibilities have been

initiated by the Navy, and a decision is expected in the near future."[4]

On 1 May, the engineers recommended the immediate construction of an obstacle course, and by 1 July, it was ready for experimental testing. Colonel James H. Stratton, head of the Engineering Division, on 29 June wrote that the course would not be used to train troops. The Chief of Engineers requested a revised plan for Project DM 361E, with emphasis on the passage of beach obstacles and continued cooperation with the AFAF, in developing techniques in the passage of underwater obstacles. Submitted on 7 July, the revised plan was approved within twelve days.

The emphasis on beach obstacles did not herald a total shift away from underwater obstacles, although another critical development in early May 1943 applied pressure in that direction. Admiral Ernest J. King, Chief of Naval Operations (CNO), formally announced a plan to establish a program to train NCDUs. With no reference to the Army's efforts, the CNO said simply that it made sense to prepare for the eventuality of having to achieve passage through underwater obstacles on enemy beaches—basically, the Navy thought it was a good idea.

Citing an "urgent" requirement, the CNO tasked Lieutenant Commander Kauffman to find a suitable location and commence training. Kauffman organized a training cadre and established the NCDU Project at the Amphibious Training Base, Fort Pierce, in early June. The engineers appeared to take the situation calmly. Speaking to an assembly at the Assault Training Center, European Theater of Operations, on 31 May 1943, Lieutenant Colonel Edwin P. Lock, Corps of Engineers said, "I understand that this task is assigned to units of naval demolition engineers." He assured his colleagues in the United Kingdom that "the program for the development and means of passing underwater obstacles is being undertaken jointly by the Army engineers and the Navy." In reference to the long-standing arrangement, Lock explained, "The Army engineers are responsible for the technique of underwater obstacles in the defense, hence their interest in the project."[5]

The Army did not want to transfer all responsibility for removing underwater obstacles to the Navy. As Colonel Lock explained, "In an operation of this nature, it is wrong to assume that one or the other service is assigned full responsibility, since the planning and training are joint responsibilities." More pointedly, "Planning must designate the removal of specific obstacles by specifically designated units."[6] At this point, a problem arose in the negotiations over the division of labor. Depending on the state of the tide, obstacles on the foreshore rested upon dry land. The Navy wanted jurisdiction over anything that, by definition, was an obstacle to navigation. Basically, that included everything below the high-water mark. The Army thought it made more sense for the Navy to tackle obstacles that were submerged at the time of the landing. According to the engineers' definition, those were truly *underwater* obstacles.

Eventually, Admiral King had to concede that shifting tides made it difficult to referee responsibility for removing underwater obstacles: "The Commander in Chief, U.S. Fleet, agrees that underwater obstacles may, under certain conditions, be above water and also may not be technically separable from other obstacles in the landing

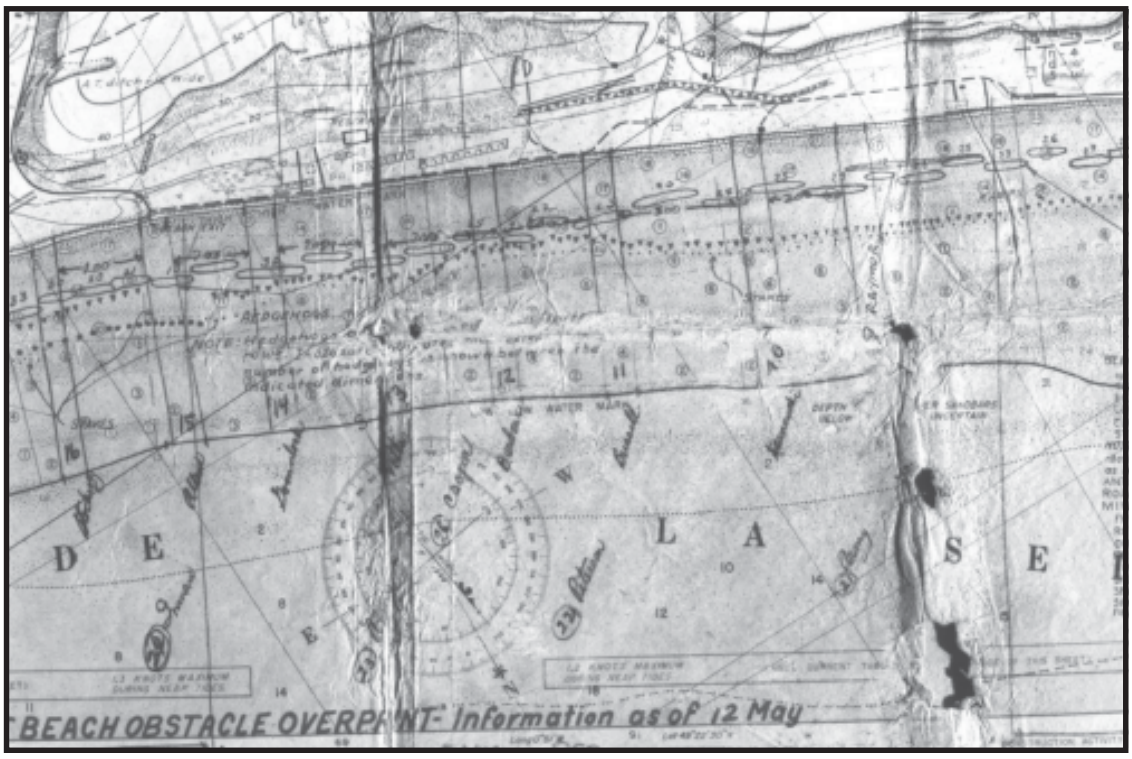


Photo courtesy Mr. James Douglas O'Dell

This is a portion of an actual chart used by a naval combat demolition unit officer in the assault on Omaha Beach, 6 June 1944.

area."[7] The engineers sought to avoid duplication of effort, either with respect to cooperation with the Navy or their own demolition research projects. The prime directive was to maintain close coordination of all amphibious preparations.

As stated on 21 January 1941, Admiral King's philosophy of command embraced the concept of individual initiative within the framework of an effort coordinated with other components of the fleet. Echelon commanders were to be told what to do, but not how to do it, unless circumstances warranted otherwise. Clarifying this position three months later, he said, "When told 'what' to do—make sure that 'how' you do it is effective, not only in itself but as an *intelligent, essential, and correlated part of a comprehensive and connected whole."*[8] On the surface, this would seem to have placed the Army and the Navy on the same page, but beneath the tacit agreement to cooperate in amphibious preparations lay the determination to continue separate efforts at separate, if also contiguous, sites. Duplication was the order of the day, but so was interdependence. In a letter dated 3 August 1943, Brigadier General C. L. Sturdevant noted, "The passage of beach and underwater obstacles is a subject about which little is known." Emphasizing the importance of the experimental work at Fort Pierce, he wrote, "The Navy, for the time being, is largely dependent upon the Chief of Engineers for such development."[9]

At Fort Pierce, the 299th learned techniques from the NCDUs, demonstrated there in February 1944. Otherwise, the Army and the Navy maintained separate training regimes and sites on North Island. It was nearly the eleventh hour before Army engineers and Navy demolition units participated in joint exercises on a realistic scale in the United Kingdom.

According to the final draft of the operational plan for Normandy, Navy personnel were "entirely responsible" for removing obstacles that were *submerged at the time of the landing*—as the engineers had wanted from the start. Army personnel were not expected to disengage from work on obstacles that were being engulfed by the tide. The arrangement proved satisfactory. A Navy observer rated the cooperation between Army and Navy demolition units on D-Day as "virtually perfect."[10]



Mr. O'Dell is a freelance writer and former editor of FIRE IN THE HOLE!, the newsletter of the UDT-SEAL Museum Association, Inc. He holds a bachelor's in anthropology and a master's in history.

Endnotes

[1]Lieutenant Colonel Paul W. Thompson, Corps of Engineers, Memo No. 8 to General Barker, 25 February 1943, p. 1 (National Archives, Textual Reference Division, Military Reference Branch, Suitland, Maryland.).

[2]Report 740, Project DM 361, *Underwater Obstacles*, Engineer Board Study No. DM 361, 8 March 1943, submitted to the Engineer Board, Fort Belvoir, Virginia. File AD-B957 600, records of U.S. Army Engineer School, Fort Leonard Wood, Missouri.

[3]Rear Admiral Henry Kent Hewitt, U.S. Navy, Commander, Amphibious Force, U.S. Atlantic Fleet, to Commanding General, Army Ground Forces, Army War College, Washington, D.C., 18 February 1943. Records of U.S. Army Engineer School, Fort Leonard Wood, Missouri.

[4]Memorandum for the Commanding General, Army Ground Forces: Subject: Beach Assault Training, 17 April 1943. Records of U.S. Army Engineer School, Fort Leonard Wood, Missouri.

[5]Lieutenant Colonel Edwin P. Lock, Corps of Engineers, U.S. Army, Discussion of address of 31 May 1943, Assault Training Center, European Theater of Operations, U.S. Army (National Archives, Textual Reference Division, Military Reference Branch, Suitland, Maryland.), pp. 3-4.

[6]Ibid., 3.

[7]Commander in Chief, U.S. Atlantic Fleet, "A History of the Amphibious Force," p. 81.

[8]Commander Walter Muir Whitehill, USNR, "A history of the organization and administration of Headquarters, Commander in Chief, U.S. Fleet, December 1941 to October 1945." *Headquarters* (Operational Archives, Naval Historical Center, Washington, D.C., 1946, microfiche, pp. 7-12).

[9]Brigadier General Clarence L. Sturdevant, Corps of Engineers, to Commanding General, Fort Belvoir, 3 August 1943. Records of U.S. Army Engineer School, Fort Leonard Wood, Missouri.

[10]Operational Order No. 3-44, 15 May 1944, p. 1; Lieutenant (jg) H.L. Blackwell Jr., Report on Naval Combat Demolition Units in Operation Overlord, July 1944 (Operational Archives, Naval Historical Center, Washington, D.C.), p.16; Lieutenant Commander Herbert A. Peterson, D-V(G), USNR, Commander, Task Group 125.2.3, to Naval Commander, Western Task Force, Report of Operations (Operational Archives, Naval Historical Center, Washington, D.C.), p. 3.

Note: This article is condensed from *The Water Is Never Cold: The Origins of the U.S. Navy's Combat Demolition Units, UDTs, and SEALs* by James Douglas O'Dell (Brassey's, Inc., 2000, 2001), and unpublished data from a work in progress.





Engineer Regimental Symbols
Castle, Colors, and Streamers

PIN: 082491-000