

FISCAL YEAR 2006

SECRETARY OF THE ARMY
ENVIRONMENTAL AWARDS WINNERS
U.S. ARMY BEST PRACTICES FOR THE ENVIRONMENT



SUSTAINING THE ENVIRONMENT FOR A SECURE FUTURE

FISCAL YEAR 2006

SECRETARY OF THE ARMY ENVIRONMENTAL AWARD WINNERS: U.S. ARMY BEST PRACTICES FOR THE ENVIRONMENT

TABLE OF CONTENTS

FORT RILEY, KANSAS

ENVIRONMENTAL RESTORATION, INSTALLATION

FORT LEWIS, WASHINGTON

POLLUTION PREVENTION, NON-INDUSTRIAL INSTALLATION

RADFORD ARMY AMMUNITION PLANT POLLUTION PREVENTION TEAM, VIRGINIA

POLLUTION PREVENTION, TEAM

U.S. ARMY GARRISON GRAFENWOEHR, GERMANY

ENVIRONMENTAL QUALITY, OVERSEAS INSTALLATION

LETTERKENNY ARMY DEPOT, PENNSYLVANIA

ENVIRONMENTAL QUALITY, INDUSTRIAL INSTALLATION

FORT DRUM, NEW YORK

CULTURAL RESOURCES MANAGEMENT, INSTALLATION

KARSTIN CARMANY-GEORGE, INDIANA ARMY NATIONAL GUARD

CULTURAL RESOURCES MANAGEMENT, INDIVIDUAL

CAMP EDWARDS TRAINING SITE MASSACHUSETTS ARMY NATIONAL GUARD

NATURAL RESOURCES CONSERVATION, LARGE INSTALLATION

SUSTAINING THE ENVIRONMENT FOR A SECURE FUTURE

FISCAL YEAR 2006
SECRETARY OF DEFENSE ENVIRONMENTAL AWARDS
U.S. ARMY NOMINATION

FORT RILEY, KS

ENVIRONMENTAL RESTORATION, INSTALLATION



SUSTAINING THE ENVIRONMENT FOR A SECURE FUTURE

INTRODUCTION

Originally a fort named "Camp Center" that provided protection and safe trade for the Oregon and Santa Fe Trails, Fort Riley officially received its name on 27 June 1853 in honor of Major General Bennett C. Riley. Today Fort Riley's mission, as an Installation of Excellence, is to provide trained and ready forces to meet Joint Force requirements across the full spectrum of current and future operations; transform and manage unit readiness as directed by the Army Campaign Plan; execute unit re-stationing as directed by the U.S. Army Forces Command; execute garrison operations as directed by the Installation Management Command; conduct homeland defense operations and support civil authorities.

In close partnership with surrounding communities, Fort Riley provides housing and services that enhance readiness, retention and quality of life for America's finest Soldiers, families and civilian employees. Fort Riley's population is 16,000, composed of 6,000 civilians and 10,000 military personnel.

Fort Riley sits on just over 100,000 acres in the Flint Hills region of the high plains of northeast Kansas about one hour west of the capital of Topeka. The installation is bounded on the west by the Republican River and Milford Lake, the largest lake in Kansas. The Kansas River forms from the confluence of the Republican River and the Smoky Hill River and runs along and through the south portion of the installation. Surrounding the installation are the cities of Manhattan (where Kansas State University is located), Junction City, Ogden, Riley, Milford and Wakefield. Fort Riley provides an economic benefit of over \$938 million annually to the state of Kansas.

BACKGROUND

Organization and Staffing

Fort Riley's Installation Restoration Program (IRP) resides in the Conservation and Restoration Branch of the Environmental Division of Public Works. The IRP consists of an experienced, multidisciplinary team with over 50 years' combined experience in government and industry. Team members include a Restoration Program Manager who is

also the Conservation and Restoration Branch Chief, three program managers, a geologist, an environmental scientist, an engineer and a biologist. The team has public sector experience with National Environmental Policy Act (NEPA), cultural resources management, hazardous waste and natural resources management. In addition, one team member has experience as a state regulator. This combined background provides the IRP team the ability to analyze and solve complicated environmental problems, and the skills to successfully implement multi-year projects through the planning, budgeting and acquisition process.

Management Approach

The IRP team has a fourfold management approach. First, strive to perform the necessary work to the quality standards set in the installation's mission statement. Second, provide a safe and healthy work environment for military, dependent and civilian personnel. Third, identify and implement efficiencies for both the program and project in order to reduce costs and time to the lowest denominator. Fourth, include the regulatory community, installation personnel, the general public and interested stakeholders to achieve the clean-up goals in the most expedient and efficient manner possible.

Challenges

New missions and changes in the current Fort Riley mission, along with in-coming base realignment and closure and integrated global presence and basing strategy (IGPBS) personnel, have resulted in rapid development including training areas, housing and recreation facilities. This development has created challenges for the IRP to align its efforts with the installation's mission.

One such challenge for the team is the characterization and remediation of large soil and groundwater contamination areas in the rapidly developing

"Fort Riley considered the entire environment as they cleaned up the environment to ensure that they were not creating problems elsewhere through the cleanup work."

-Kristine Kingery, ACSIM

Camp Funston area. Additionally, regulatory acceptance and approval to close 49 sites that were improperly placed in a response complete category is an ongoing concern. The team is also challenged to complete the Pilot Study and develop a Record of Decision (ROD) for the last Operable Unit (OU), the Dry Cleaning Facilities Area (DCFA), also known as OU 003.

Community Involvement

Due to significant program milestones and events in the IRP, the 1992 Community Relations Plan was replaced with a Community Involvement Plan in FY 2006. The revised plan provides the public with a description of how information regarding Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)/ Superfund investigations and remediation at Fort Riley can be accessed and the influence community members can make on the installation’s restoration decisions. The U.S. Environmental Protection Agency (EPA) Region VII described the document as being “excellent” and posted the document to their Web site as an exemplary plan.

Fort Riley has a Restoration Advisory Board (RAB), which was established in 1997. The RAB previously met quarterly to

provide public feedback into the IRP; however, due to the overall positive working relationship with the regulatory partners, the RAB members and regulators unanimously voted during FY 2006 to hold the meetings only for the required public comment documents, or at least annually.

The restoration section on the Fort Riley Web site is regularly updated to educate

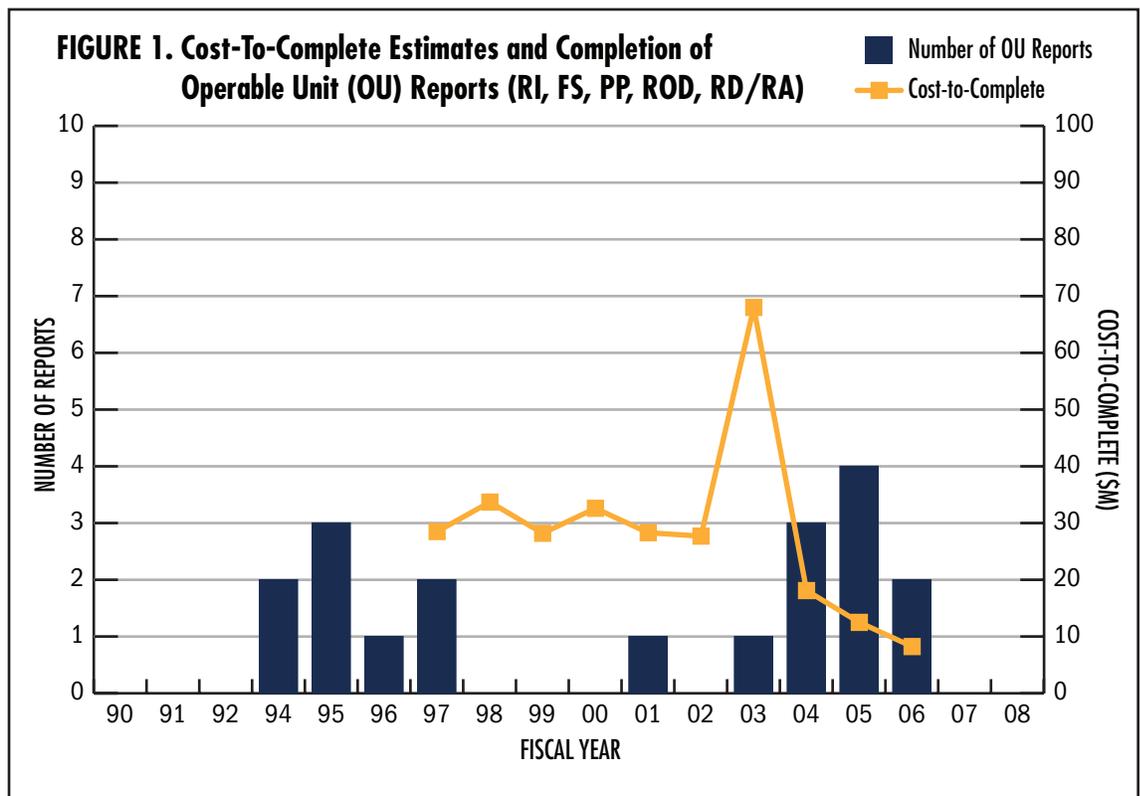
the community and the RAB about the IRP environmental initiatives to restore the environment at Fort Riley and to protect human health.

PROGRAM SUMMARY

The IRP works towards achieving several objectives in support of the installation’s mission while protecting human health and the environment:

- Finalized ROD and the remedial design/ remedial action plan (RD/RAP) for the Former Fire Training Area Marshall Army Airfield (FFTA-MAAF)
- Finalized ROD for the 354 Area Solvent Detection (354)
- Finalize RD/RAP for 354 in 2007
- Establish a proposed plan (PP) for DCFA in 2007
- Obtain the signed ROD and approved RD/RAP for DCFA in 2008

In 2007, Fort Riley’s IRP is anticipating receiving regulatory close out on 49 sites improperly placed in the response complete category, completing site characterization and beginning remediation of the Camp Funston areas. The IRP has performance-based incentives in contracts to encourage



The graph shows Fort Riley’s accomplishments in producing OU reports while dramatically decreasing cost-to-complete estimates.

contractors to produce the required documents earlier than anticipated.

The team generated six primary documents: feasibility studies, PPs, and RODs in FY 2005 and FY 2006. This continues a trend of producing primary documents with 10 completed in the last five years, compared to nine in the preceding 10 years. The graph on page two shows Fort Riley's accomplishments in producing OU reports while dramatically decreasing cost-to-complete estimates. The peak in the 2003 cost-to-complete was due to budgeting for a permeable reactive barrier, which was dropped the following year. Specific cost-saving measures are discussed in the next section.

ACCOMPLISHMENTS

Providing Cost Savings

Prior to CERCLA, hazardous substances were inappropriately disposed of or released on Fort Riley. The results were contaminants seeping into the soil and groundwater. The IRP team conducted a suite of samples at three OUs that covered volatile organic solvents and other contaminants. The IRP team negotiated the following reductions with the EPA and the Kansas Department of Health & Environment (KDHE).

- Sample intervals reduced from semi-annual to annual
- Reduced the length of time monitoring will be required to three years, if the contaminants remain below regulatory standards
- Reduced the number of wells to be sampled from 157 wells to 59 wells at FFTA-MAAF, 354, and DCFA, for a 62% reduction
- Reduced the number of analytes to the contaminants of concern at the sites

"Fort Riley exemplifies the mission of sustainability by restoring the environment while promoting its current and future use."

-Mark Smith, Branch Chief, Georgia Department of Natural Resources



The team uses fire as an ecological management tool on the Southwest Funston Landfill evapotranspirative cover's native grasses.

These remedial process optimizations yielded a reduction in frequency and required analytes that provided a cost-to-complete savings of \$1.4 million.

The Fort Riley IRP ecological reuse efforts also provided cost savings by leasing out the now closed Southwest Funston Landfill, an OU with a ROD, for hay production. This provides a local farmer with a source of income and animal feed while helping to maintain the native grass evapotranspirative cover. By leasing the area, Fort Riley avoids maintenance costs of over \$4,000 (estimated at \$12 per acre per year) to mow the grass and keep the area maintained. Instead, Fort Riley receives approximately three dollars per acre in annual rent for a net gain of over \$1,000.

Dry Cleaning Facilities Groundwater Remediation

In FY 2006, the DCFA underwent a pilot study to investigate and remediate hot spots using two innovative techniques for treatment of chlorinated solvents in soil and groundwater. An eastern plume of tetrachloroethylene (PCE) contaminated groundwater was known to originate from a broken, plugged sanitary sewer line. When Fort Riley sought a clean background well, a seemingly

disconnected, up-gradient, western plume was discovered (see Figure 2). It presented a challenge as it did not have an apparent source. After a records review and examination of the site utilities, it was determined that PCE-contaminated water from the plugged sewer line had moved, under pressure, preferentially through a utility corridor from the eastern side of the site to the western side. This is an extremely unusual occurrence of a contaminant having moved through utility corridors and slightly uphill, resulting in the new area of contamination.

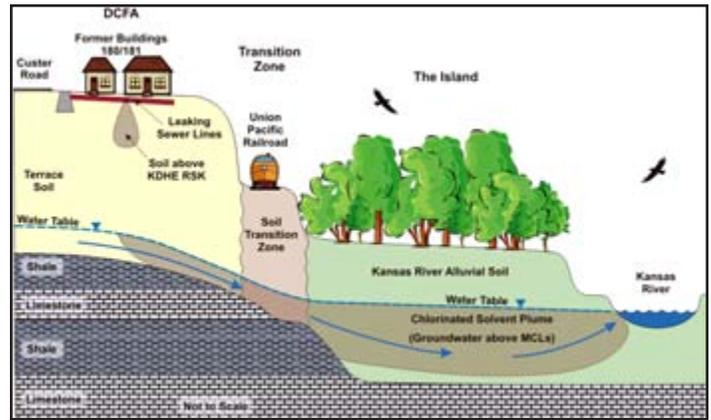


Figure 2. The conceptual model of the Dry Cleaning Facilities Area shows the hot spots and the plumes.

Fort Riley evaluated remediation technologies that would be both effective and economical. The team chose a high-pressure injection system to emplace potassium permanganate. This strong oxidizer was used to treat the groundwater in sandy alluvium deposits to mitigate the western plume. This is the first time a high-pressure (10,000 psi) injection system had been used to inject potassium permanganate.

A unique challenge arose while addressing the groundwater contamination at the DCFA; a portion of the site known as “the island” was designated as bald eagle habitat. In order to minimize habitat disturbance and tree clearing, Fort Riley obtained a permit from the Union Pacific Railroad to access “the island” through a boring drilled under the adjacent railroad tracks. This allowed the high-pressure injection equipment to remain outside the “island” proper, but still allowed the treatment of the contaminated groundwater.

The team worked with the natural resources management staff to conduct activities in and near the bald eagle habitat without impacting the birds or the habitat. This contributed to Fort Riley winning the U.S. Fish and Wildlife Service Military Installation Conservation Partnership Award in FY 2006.



The IRP team used high-pressure permanganate injection equipment to treat the groundwater of the Dry Cleaning Facilities Area.



A geoprobe and small pump were used during the CAP-18 soybean oil injection.

The eastern groundwater plume had evidence that PCE biodegradation was occurring. The limiting factor was determined to be the existing aerobic environment. To enhance biodegradation, a proprietary refined soybean oil product known as CAP-18 was injected into the plume to serve as a source of energy for microbes and to force the groundwater into an aerobic state. The eastern plume's lower PCE concentration made this approach the most economical. These two techniques are expected to accelerate the cleanup of the site by potentially many years.

The IRP team developed an expedited low-cost sampling plan to evaluate the extent and level of potential lead contamination at the former site of the National Rifle Range. The objective was to establish whether a problem existed that would impede the turnover of the property to the Residential Communities Initiative partner. The results cleared the area for unrestricted use.

Tactical Unmanned Aerial System Operational Area

The Army identified the need for a Tactical Unmanned Aerial System (TUAS) operational area. For approximately five months, the IRP team worked with installation planners, unit personnel and the installation headquarters to establish a viable location for this vital asset. Through intense and proactive coordination with all parties, a closed landfill monitored and managed by the IRP program was selected as the most appropriate site. The IRP team and installation personnel worked with the KDHE to secure approval for the TUAS runway and operational facilities in order to meet the July 2006 time-critical completion date. Working as an integrated team, the installation and regulatory personnel were able to get the mission essential asset placed and enhance the installation's capability to meet its mission requirements. The IRP team's knowledge of the boundaries of the landfill and requirements of the landfill's post-closure management plan protected the landfill cover and minimized exposure to wastes during construction of the TUAS runway and their future operations.

"Fort Riley should be commended for their innovative use of a high pressure injection system that allowed for treatment of contaminated groundwater while minimizing the impact on sensitive Bald Eagle habitat."

-Joanne Walser, Senior Project Manager, O'Brien & Gere

Marshall Army Airfield Well Reengineering

Global restoration actions resulted in the stationing of a Combat Aviation Brigade at Fort Riley. This necessitated a change in mission requirements at the Marshall Army Airfield. A safety review mandated that a monitoring well within an aircraft approach zone be made frangible. The IRP team researched the concept and developed a course of action. A data collection platform and the concrete-filled protective bollards were removed, the steel well casing was cut and a flexible rubber collar and a solar-powered obstruction light were installed. The well structure was made to be frangible, and the well was not compromised. The IRP's in-house solution saved an estimated \$20,000 that would have been required to replace the well.

CONCLUSION

The IRP team at Fort Riley has utilized ingenuity, team work and a wide range of skills to achieve its cleanup objectives. The use of remedial process optimization, incentivized contracting efforts, and thoughtful planning for future actions has led to reductions in long-term management costs; cooperative placement of mission essential assets; implementation of innovative techniques for cleanup; and a positive attitude working to support the installation mission while sustaining the environment. These endeavors by the IRP team improve the quality of life for Soldiers, civilians, and the neighboring cities while enhancing Fort Riley's ability to remain a vital command and meet its mission requirements.

On the cover: U.S. Army Private First Class Christopher V. Rosal, C Company, 1st Engineer Battalion, Brigade Combat Team 1, 1st Infantry Division, Fort Riley, KS, mans the turret of an Armored Personnel Carrier in Ar Ramadi, Iraq. (DoD photo by: PFC Brandon E. Loveless, USMC)

FISCAL YEAR 2006
SECRETARY OF DEFENSE ENVIRONMENTAL AWARDS
U.S. ARMY NOMINATION

FORT LEWIS, WA

POLLUTION PREVENTION, NON-INDUSTRIAL INSTALLATION



SUSTAINING THE ENVIRONMENT FOR A SECURE FUTURE

INTRODUCTION

Fort Lewis is home to I Corps and offers an unmatched spectrum of military capabilities. The installation mission has four components: 1) Operate a state-of-the-art power generation and sustainment platform for war fighters by providing them with superior training support and Infrastructure; 2) Support the transformation of I Corps and Fort Lewis; 3) Transform the well being of our Soldiers, civilians, retirees and their families; and 4) Remain a committed Pacific Northwest neighbor.

Among the units and activities that call Fort Lewis home are the 1st Special Forces Group (Airborne), 2nd Battalion, 75th Ranger Regiment, three Stryker Brigade Combat teams, the Western Reserve Officer Training Corps (ROTC) Region Brigade and Army Madigan Medical Center. Fort Lewis is a "city" ranking fifth in the state in size, serving 31,000 military, 11,000 civilians, 125,000 retirees and 80,000 family members. As the only Power Projection Platform in the Pacific Rim, more than 33,000 active, reserve and National Guard Soldiers have deployed/mobilized at Fort Lewis in support of Operation Enduring Freedom and Iraqi Freedom in the past year. Fort Lewis' 86,000 acres encompasses 32 maneuver areas, four impact areas, 67 live fire ranges, 50 artillery firing points and many state-of-the-art training facilities, all of which reside in a natural environment that consists of forests, prairies/grasslands, Oregon white oak woodlands, wetlands and open water.

Fort Lewis is situated approximately 35 miles south of Seattle, Wash. and seven miles northeast of Olympia. Interstate 5 (I-5), which is the main transportation corridor in the Puget Sound region, runs through the installation. Fort Lewis is bordered on the north by McChord Air Force Base (AFB) and suburban and commercial development; on the east and south by rural areas, forest land, and several small communities; and on the west by the Puget Sound and the Nisqually Indian Reservation. As the second largest employer in the state, Fort Lewis plays an important role in the financial health of the community. This economic benefit has translated into development and tremendous growth around the installation boundaries.



Fort Lewis, the Army's Gateway to the Pacific Rim.

BACKGROUND

The military units at Fort Lewis maintain a high training tempo, presenting a potentially large environmental impact. Additionally, the thousands of Soldiers, civilians and family members that call Fort Lewis home put a significant strain on the local and regional environment. Commuting, water use, energy use, waste generation and air emissions factor into Fort Lewis' overall environmental footprint. In order to proactively address the total environmental impact of these activities, Fort Lewis has established one of the most comprehensive and aggressive environmental programs in the Department of Defense (DoD).

Environmental Program Description

The Fort Lewis environmental program encompasses the full spectrum of environmental disciplines, from conservation to range management to traditional air, water and waste compliance programs to more holistic environmental management systems (EMS) and sustainability programs. In the 15 years since the Army first began seriously addressing pollution prevention (P2), the Fort Lewis P2 program has matured to the point where it has truly begun to address the root causes of waste generation and has expanded to become the Installation Sustainability Program (ISP). Fort Lewis began the shift to the ISP in early 2002, with the development and adoption of 12 aggressive goals to maintain the installation's status as an effective military

training base, as well as a valued member of the community and a proactive leader in conserving the environment. Senior leadership support has been in place from the beginning and continues through monitoring and guidance of the Installation Sustainability Board (ISB), which is chaired by the installation's Deputy Commanding General. Achievement of the 12 goals is accomplished through the Fort Lewis EMS and the cooperation of the major organizations on the installation. The 12 strategic goals are as follows:

1. Reduce traffic congestion and air emissions by 85 percent by 2025.
2. Reduce air pollutants from training without a reduction in training activity.
3. Reduce stationary source air emissions by 85 percent by 2025.
4. Sustain all activities on post using renewable energy sources and generate all electricity on post by 2025.
5. All facilities adhere to the LEED Platinum standard for sustainable facilities by 2025.
6. Cycle all material use to achieve zero net waste by 2025.
7. Attain healthy, resilient Fort Lewis and regional lands that support training, ecosystem, cultural and economic values by 2025.
8. Recover all listed and candidate federal species in South Puget Sound Region.
9. Zero discharge of wastewaters to Puget Sound by 2025.
10. Reduce Fort Lewis potable water consumption by 75 percent by 2025.
11. Fort Lewis contributes no pollutants to groundwater and has remediated all contaminated groundwater by 2025.
12. Develop an effective regional aquifer and watershed management program by 2012.

Environmental Management System

The Fort Lewis EMS provides the framework to facilitate the achievement of the aforementioned 12 ISP 25-year goals. Strategic goal six, "Cycle all material use to achieve zero net waste by 2025," relates to sustainable waste management practices, which is a part of the installation's overall P2 program. In FY 2005, Fort Lewis addressed several of its EMS objectives and targets by applying new and innovative strategies to resource conservation

and waste reduction through reuse, composting and other preventive measures.

The Fort Lewis Directorate of Public Works (DPW) recently obtained third party ISO 14001 recertification of their EMS, validating the first and longest continually certified EMS in the Army. To date, Fort Lewis has achieved all of the DoD EMS goals and metrics and the P2 team is integrally involved in expanding and implementing EMS across the entire installation in order to meet the Army goal of a fully conformant ISO 14001 EMS by September 2009. In doing so, they work closely with the Garrison Commander, mission commanders and the civilian workforce to train personnel, promote issue awareness and clearly convey the roles and responsibilities that everyone has regarding the environment and the impact that their actions can have.

Because EMS awareness is considered a major factor in achieving full conformance with ISO 14001 standards, Fort Lewis leaders and supervisors are making EMS a part of normal operations beginning with the Garrison Commander's environmental policy (posted on organizational bulletin boards and on Web sites) and continuing with 16 EMS awareness training classes conducted for senior leaders as well as various stakeholders and process owners. Between FY 2005 and FY 2006, 2,115 Soldiers received training in Environmental Operations Management to maintain hazardous materials/hazardous waste (HM/HW) compliance with federal, state and other regulatory agencies. Fort Lewis is also implementing an innovative Environmental Operating Permit (EOP) program intended to educate individual units on the specific scope of their environmental responsibilities and how to properly manage their activities to ensure total compliance.

Green Procurement

Fort Lewis promotes the Green Procurement policy through awareness and education for all Soldiers and more directed training for procurement personnel. As part of this overall initiative, Fort Lewis staff created the Army's first Sustainable Interiors Showroom (SIS), partnering with GSA vendors to convert an existing administrative area

into a working model furnished with sustainable furniture and flooring materials in a variety of configurations and cost options. They also implemented an informational campaign including weekly tours to educate buyers on sustainable options to meet Green Procurement requirements, all while streamlining the requisition process. In FY 2005, one of the SIS vendors was awarded the first major contract to furnish the new Soldiers Readiness Processing Site, which supports 500-600 Soldiers per day. The \$180,000 contract included a lifetime warranty, eliminating the estimated five-year, \$50,000 replacement cost for non-sustainable furnishing. This effort will result in lower costs, reduced resource requirements and reduced volume and toxicity of the waste stream over the entire lifecycle of the project. Between 2005 and 2006 more than \$2 million in sustainable furnishing and flooring was installed in 50 buildings on Fort Lewis.

The team had several achievements and milestones regarding Green Procurement in FY 2006:

- Fort Lewis celebrated Earth Day by hosting its first "Green Procurement Vendor Day," featuring the first anniversary of the SIS. Twenty-five vendors hosted display areas showcasing green products – office furniture made with recyclable materials, eco-friendly office products, and preferred hazardous waste disposal products. This event facilitated an increase in post-wide procurement of environmentally preferable products and services.
- A SIS vendor was awarded a \$659,000 contract to install 23,000 sq. yards of carpet tile in six barracks serving 1,800 Soldiers. All existing carpeting will be recycled.
- A SIS vendor furnished a 3,150 sq. foot office consisting of 15 workstations and two private offices at the Army Field Support Brigade, Army Sustainment Command.

PROGRAM SUMMARY

With the goal of reducing net waste generation to zero by 2025, the Fort Lewis Solid Waste Program, with the assistance of the Corps of Engineers-Seattle District, has focused much of

its effort within the award period on reducing the amount of waste, both municipal solid waste (MSW) and construction and demolition (C&D) waste, generated by the installation. Like many installations, Fort Lewis is undergoing significant changes as a result of and in response to base realignment and closure (BRAC), global defense posture realignment and Army transformation. The scale of the increase in mission requirements, combined with aging buildings and infrastructure, has called for the demolition of many older buildings and the

"Team Lewis has worked hard to create an environment in which sustainability practices are the norm throughout our daily routine, and we hope this will have a lasting impact on the post and also beyond the walls of Fort Lewis. With the support of our many federal, state and local partners, we will continue to push the envelope."

- COL Cynthia Murphy, Fort Lewis Garrison
Commander

construction of many new ones. By FY 2008, all new construction on Fort Lewis seeks to adhere to the LEED Silver standard, a mandate that the Army is beginning to aggressively pursue. The demolition of older structures represents the greatest source of solid waste on Fort Lewis – the Solid Waste program's efforts to minimize the waste generated have been highly effective, resulting in a total solid waste diversion rate of 56.8 percent in 2005.

ACCOMPLISHMENTS

Deconstruction Program to Mitigate Solid Waste Generation

In FY 2005, Fort Lewis began the first phase of a multi-year Military Construction (MILCON) redevelopment in its North Fort Lewis area. To make room for the redevelopment, 100-200 World War II era wood framed buildings are scheduled for removal. In an effort to reduce the amount of solid waste disposed at local landfills, Fort Lewis and the Seattle District U.S. Army Corps of Engineers (USACE) partnered to pursue sustainable waste management practices. In FY 2005, Fort Lewis hosted its first "Alternatives to Demolition"

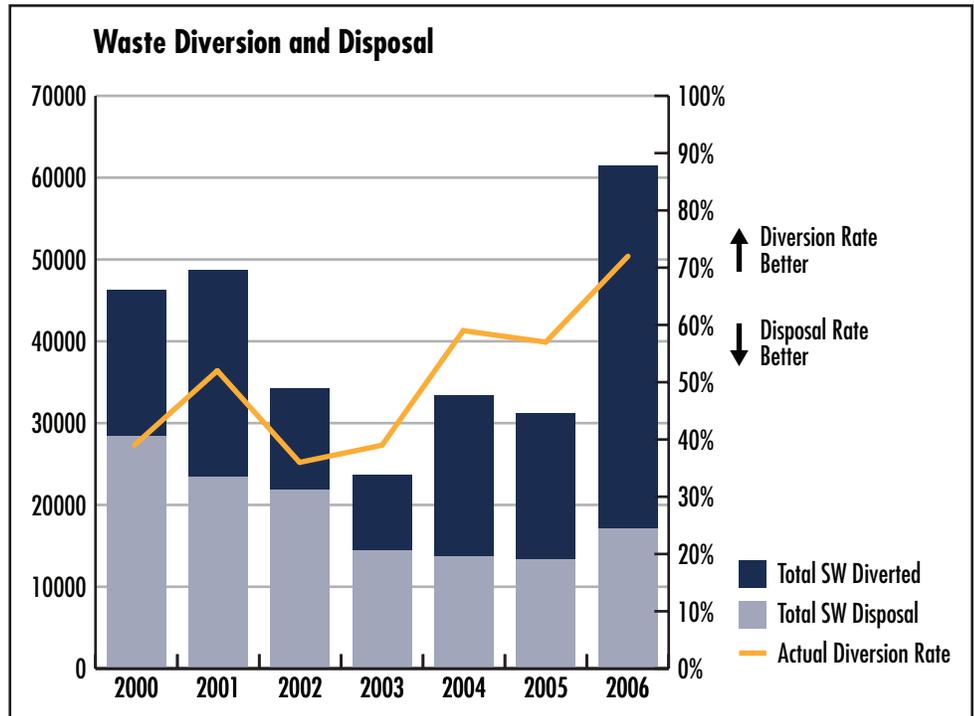
workshop, with the goal of educating contractors and local reuse/recycling companies on the new diversion requirements. The workshop facilitated communication between contractors and reuse resources and helped set the conditions for success as the Fort Lewis program moved forward.

Reuse of Building Materials

In FY 2006, in accordance with the Assistant Chief of Staff for Installation Management (ACSIM) Policy Memo "Sustainable Management of Waste in Military Construction, Renovation and Demolition Activities," a contract requiring a minimum 50 percent waste diversion rate, with penalties and incentives for increased performance built in, was awarded for the removal of 12 buildings covering a combined total of 48,000 sq. feet. To attain the highest diversion possible, the contractor devised an innovative "panelization" deconstruction technique that was both cost effective and efficient. The majority of reusable lumber, plywood, flooring materials, electrical power boxes and other miscellaneous materials were sold to the relatively robust local material reuse and recycling market, generating revenue for the project. Additionally a portion of the materials were donated to several repair and upgrade projects on Fort Lewis, including the mock-up training facility. These efforts, combined with other aggressive material recovery initiatives, resulted in a remarkable 100 percent diversion rate of all non-hazardous solid waste at project completion. Being the first of its kind to be executed at Fort Lewis, this project was monitored very closely and the results were recorded for use in future building removal projects.

Innovative Recovery of Materials

Fort Lewis was the first installation to test and demonstrate a new technology to salvage wood coated with lead-based paint (LBP). The



The chart depicts progress in decreasing total waste disposal and increasing total waste diverted from the Fort Lewis waste stream.

"These materials positioned us to better meet training objectives and provided expensive materials that cut our request for funding by one quarter."
 - MAJ Michael Christiansen, Team Chief, 191st Infantry Brigade

demonstration project used a total of 16,000 linear feet of lumber from the World War II era buildings, which was planed using a vacuum process to remove and fully contain the sawdust and LBP. The remaining wood was then reused in various construction projects and sold in local secondary markets. The sawdust and LBP were then introduced into an innovative thermal treatment process, producing a concentrated lead-rich ash material, which was sent to a secondary smelter for elemental lead recovery and eventual use in other products. The added benefit of this new process is that the previously LBP coated wood was made available to local markets rather than depositing it into a hazardous waste landfill. The USACE Construction Engineering Research Laboratory (CERL), U.S. Environmental Protection Agency and USACE-Seattle District partnered on this project to develop a sustainable process that allows for the recovery of valuable resources while removing dangerous lead from the environment.

Recycling of Construction and Demolition Debris

Building materials that cannot be reused or recovered for equivalent applications are recycled to the greatest extent possible. During FY 2006, C&D projects on



Workers remove the building in partitions to maximize recovery during the deconstruction project at Fort Lewis.

Fort Lewis yielded 9,138 tons of recycled asphalt and concrete. This recycled material, which would otherwise have been disposed of in a C&D landfill, was instead used as a natural aggregate replacement product across the installation. Fort Lewis Forestry used 5,000 tons of recycled concrete for road restoration, repair and access improvement to timber sales and the remaining material was used for road maintenance and future modularity project parking lots. In FY 2006 alone this new business practice achieved a cost avoidance of \$82,000 for disposal costs and \$73,000 for new product procurement.

Organics Composting and Recycling

Another major source of solid waste is waste wood and other organic material. Waste wood consists of pallets, packaging material, blocking and bracing, mill work/construction waste, tree trimmings from grounds maintenance and tree debris from storm damage. The primary sources of organic material are biosolids from the wastewater treatment plant; leaf and grass clippings from post-wide yard maintenance; manure from the horse stables, mulch and wood chips; and destructed paper. Full-scale composting began in FY 2005 and has resulted in more than 725 tons of organic material and 1,400 tons of waste wood diverted from the solid waste stream, resulting in approximately \$174,000 in disposal cost avoidance for FY 2005 and FY 2006.

Community Involvement and Outreach

Owing to the generally well-informed and environmentally conscious local population, Fort Lewis has many allies and supporters for its

environmental programs. Between 2005 and 2006, numerous briefings and tours of the P2 and Sustainability Program were conducted for local, state and federal political leaders including Washington State Governor Christine Gregoire and her Executive Policy Advisor for Sustainable Washington. Fort Lewis also actively maintains strong connections to the local community and regularly holds educational and promotional events. Some recent examples include:

- Conducted educational activities at “Kids Fest 2006” where 3,000 Fort Lewis youths participated. Hosted booths with children’s activities related to the theme “Oceans Away” including an interactive watershed model focused on P2 in homes and communities.
- Participated in the Pierce County Livable Communities. More than 6,000 visitors from the Puget Sound Region attended the event where Fort Lewis showcased its ability to support the Army’s mission while fulfilling its commitment as a proactive community partner and environmental steward.
- Hosted an Environmental Council of States (ECOS), a DoD Sustainability Working Group tour of several sustainability and P2 initiatives to include: the Sustainable Interiors Showcase (SIS); the Model Motor Pool/Stryker-GDLS facility; new barracks (LEED construction); and the Sequalitchew Creek EcoPark.

CONCLUSION

Fort Lewis has been and will continue to be a strong advocate for the environment, a tireless supporter of the military mission of the U.S. Army and a leader in innovation. Always willing to take the lead, Fort Lewis has pioneered the adoption of ISO 14001 as the DoD EMS, as well as the establishment of the ISP. Fort Lewis made significant progress in waste reduction during FY 2005 and FY 2006 and continues to seek out new challenges and answers to environmental issues. The bold sustainability goals that the installation has set will continue to guide their efforts far into the future and spur the continued development of innovative and well-crafted programs.

On the cover: U.S. Army Soldiers with 2nd Squadron, 14th Cavalry Regiment, Fort Lewis, WA, in their M1126 Stryker Infantry Carrier Vehicle. (DoD photo by: SSG Kyle Davis)

FISCAL YEAR 2006

SECRETARY OF DEFENSE ENVIRONMENTAL AWARDS
U.S. ARMY NOMINATION

RADFORD ARMY AMMUNITION PLANT
POLLUTION PREVENTION TEAM
POLLUTION PREVENTION, TEAM



SUSTAINING THE ENVIRONMENT FOR A SECURE FUTURE

INTRODUCTION

Located in the mountains of the New River Valley in southwest Virginia, Radford Army Ammunition Plant (Radford Main Plant) is situated in Pulaski and Montgomery counties and covers 4,080 acres. The area surrounding the installation is mostly agricultural and rural residential. As the third-largest employer in the New River Valley, Radford plays a key role in the local economy.



Radford Army Ammunition Plant is the largest facility of its type in the United States.

Radford is the largest active facility of its type in the United States. The installation is capable of manufacturing a wide variety of products for national defense. Radford is owned by the U.S. Army and operated by Alliant Techsystems, Inc. (ATK) for the Joint Munitions Command. To achieve effective, long-term pollution prevention (P2), government staff members work closely with the Alliant staff and representatives of the United Steel Workers Union as "Team Radford."

Since the facility's inception in the closing months of 1940, propellant and explosives produced at Radford have been a mainstay in every U.S. combat operation through the present day. The Department of Defense (DoD) depends on Radford to efficiently use its resources to provide all Services with the firepower needed to be ready and effective on the battlefield.

BACKGROUND

The production of 2,4,6-Trinitrotoluene (TNT), the Army's most widely used military explosive, is one of the plant's primary areas of expertise. TNT has numerous military uses and the demand for this product has grown due to the ongoing Global War on Terrorism.

The original Radford TNT manufacturing facility began operation in 1968, supporting the Vietnam War effort. It was the first continuous TNT manufacturing process in the world. The TNT facility was shut down in 1974 after an accident, resumed production again in 1983 and had been idle since 1986 when an inventory surplus was obtained.

A consequence to the prior production methods of TNT was the generation of K047/D003 hazardous waste in the form of "red water." The former process produced TNT at a rate of 50-55 tons per day. Toluene, a highly toxic and environmentally hazardous chemical, was used as the base feedstock material in the manufacturing process. Red water, the primary environmental concern and also the most costly to manage, was generated at a rate of 0.1 gallons per pound of TNT manufactured. Up to 60,000 lbs. of red water was generated per day. Additionally, significant quantities of air contaminants were emitted from various sources within the nitration/purification processes including nitrogen oxides (NO_x), carbon dioxide (CO), trinitromethane (TNM) and volatile organic compounds (VOCs). Finally, considerable quantities of various byproduct wastes were generated from TNT production, which degraded the purity of TNT and required costly off-site hazardous waste disposal. If generated today, the cost for treating and disposing of the K047/D003 hazardous waste is estimated to be \$1 million annually.

Since the cessation of TNT production at Radford in 1986, environmental regulations became increasingly more stringent. When a new requirement for U.S.-produced TNT emerged, it became apparent that the former Radford TNT process would need to be modified. The Radford P2 Team was formed to work with the TNT process designers to attack the challenges ahead and design a more modern production method with the intent of producing high quality, low cost TNT with greatly reduced environmental impacts and risks.

Radford's P2 Team consisted of:

- Dick Rentfrow - Technical Director, ATK
- Earl Lemon - Program Manager, TNT, ATK
- Andrew Sanderson, Ph.D. - Chief Scientist, TNT, ATK
- Pete Wesson - Chief Engineer, TNT, ATK
- Paige Holt, Ph.D. - Environmental Manager, ATK
- Jerry Redder - TNT Environmental Engineer, ATK
- Jeff Pack - P2 Program Coordinator, ATK
- Brad Jennings - Environmental Coordinator, U.S. Army, Civilian



Significant input provided by the Radford P2 team contributed to the reduced environmental impact and risk of the new TNT process.

POSITION DESCRIPTION

Radford began proactively planning for P2 at the project inception. Members of Radford's P2 Team were engaged early in the planning process to identify environmental media permitting and overall process compliance issues. The team worked effectively in a collaborative effort to modify the existing TNT production process, and also contributed as individuals by providing their expertise in the following areas:

- Mr. Rentfrow served as the TNT technical director and was responsible for the specification, design, procurement, construction and check-out functions of the TNT project – including ensuring all technical, scheduling and cost goals, and safety and environmental requirements were met.

- Mr. Lemon served as the TNT program manager and was responsible for the general administration and management program including cost, scheduling and ensuring quality conformance.
- Dr. Sanderson served as chief scientist overseeing all TNT process design functions including coordinating the process chemical development activities throughout the design and startup effort.
- Mr. Wesson served as the deputy program manager/chief engineer, managing all of the facility engineering design and construction.
- Dr. Holt served as the environmental manager on the project and was responsible for ensuring that the myriad of environmental compliance requirements were met from design through construction and operation of the facility.
- Mr. Redder served as the assigned environmental engineer working with members of the TNT process team to identify environmental requirements. He was also responsible for coordinating the P2/waste minimization efforts.
- Mr. Pack served as the facility P2 and waste minimization program coordinator, initiating P2/waste minimization opportunity assessments and integrating the appropriate departments into the effort to accomplish the reduction goals.
- Mr. Jennings served as the U.S. Army's environmental coordinator at Radford and was responsible for the general oversight of environmental compliance and coordination between ATK and the Department of the Army.

The Radford P2 Team has had two technical papers published on the new TNT manufacturing process since the beginning of the project. These papers were presented at the 2004 National Defense Industrial Association Insensitive Munitions/Energetic Materials (NDIA IM/EM) Technical Symposium in San Francisco, Calif. and the 2006 NDIA IM/EM Technical Symposium in Brigham City, Utah.

ACCOMPLISHMENTS

ATK invested approximately \$20 million into the design, renovation and construction of the new TNT production facility. As part of Team Radford the P2 team played a key role in taking an outdated, costly and environmentally challenged process and completely transformed U.S. TNT production with true green design. The combination of base material substitution, nitric acid crystallization and the installation of new fume abatement and acid recycling facilities created the potential for complete elimination of costly hazardous waste streams and air emissions, while producing ultra pure TNT. This new design has opened the door for transferability opportunities among other munitions plants and TNT manufacturers.

PROCESS MODIFICATION

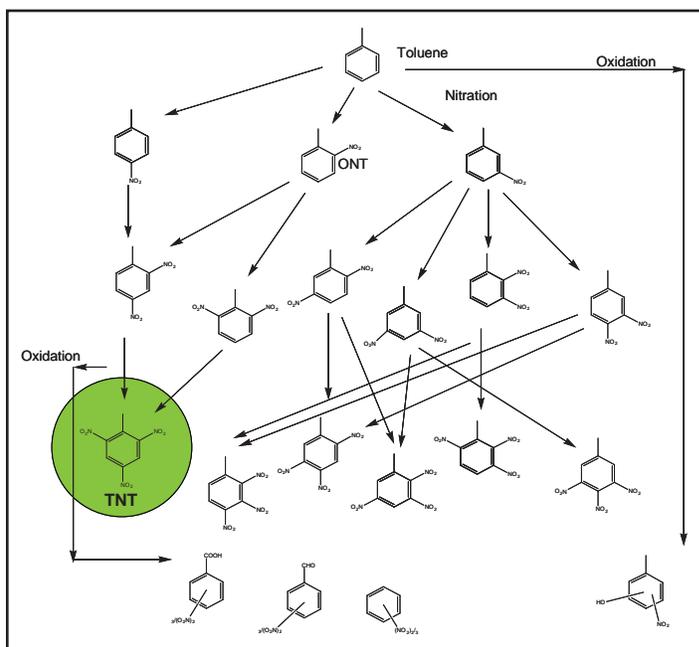
The Radford P2 Team implemented a modified TNT production process that was downsized to a facility capable of producing TNT at a rate of 27 tons per day, considerably less than the previous 50-55 tons per day. The team substituted ortho-nitrotoluene (ONT), a much less hazardous and less stringently regulated chemical, for toluene, the original hazardous base feedstock material. This substitution reduced localized environmental hazards immensely and allowed TNT to be produced at a purity of 99.5-100 percent. The new TNT process using ONT generates virtually 100 percent pure TNT.

Graphic 1 illustrates the old TNT process using toluene, which generated many byproducts and off-isomers, as well as the new TNT manufacturing process using ONT, which generates virtually 100 percent pure TNT with no waste products or off-isomers.

The largest benefit of the new TNT process resides in a major purification process change. The former process that generated the red water has been replaced with a highly robust weak nitric acid crystallization process. The new process captures all air emissions (NO_x, CO, TNM and VOCs) that were formerly released into the air, sending them through a new fume abatement tower and CO



The TNT Fume Abatement System is part of a larger system that almost completely eliminates hazardous waste streams and air emissions.



Graphic 1: Synthetic TNT Nitration

oxidizer. A maintenance tank was also installed to collect nitrator vessel dumps. This eliminated the former procedure, which required dumping to a drowning tank. Use of the drowning tank generated significant quantities of NO_x emissions that were emitted during the previously frequent drowns.

REDUCING WASTES AND RECYCLING CHEMICALS

Radford's P2 Team focused its efforts on incorporating waste reduction and recycling opportunities into the new TNT production process. The elimination of the sizeable quantities of hazardous K047/D003 red water is by far the most important benefit, saving an estimated \$1 million annually. Along with the high quality TNT that is produced, the new process generates a byproduct called isotrioil. Isotrioil, a mixture consisting of approximately 70-90 percent TNT and 10-30 percent 2,4-Dinitrotoluene (DNT), has the potential to be marketed to buyers in the mining industry. An estimated 650,000 lbs. of isotrioil is expected to be generated per year, providing the potential to bring in an estimated \$650,000 annually.

The installation of a new denitration tower also increased waste reduction and created another recycling opportunity. The tower removes the hazardous nitric acid content from the spent sulfuric acid stream, allowing the spent acid to be recovered as a sellable product to off-site explosives manufacturers or recycled back into the process. It is expected that production will generate six to 10 million lbs. of spent acid, with



TNT weak nitric acid crystallizer vessels eliminate the generation of hazardous red water.



Recycling the byproduct isotrioil by selling it to the mining industry where it is needed could provide a significant reduction in hazardous waste and bring in an estimated \$650,000 annually.

the potential to reduce costs by up to \$200,000 annually. Table 1 compares the environmental benefits and cost savings realized through the Radford P2 Team's process improvement and waste reduction efforts.

PARTNERSHIP AND OUTREACH EFFORTS WITH THE SURROUNDING COMMUNITY

The Radford P2 Team consulted with various local agencies and entities throughout all phases of the modernization of the TNT production process. The team partnered with the state and federal environmental regulatory community, as well as with many other key parties, during project planning and implementation.

During the design phase of the process, a National Environmental Policy Act (NEPA) evaluation was conducted to study community impact. The evaluation concluded that the new operations (as designed) would significantly lessen the environmental impacts to the surrounding community vs. the former Radford process. The facility's Risk Management Plan was revised to incorporate the changes brought about by the modernization of the TNT manufacturing process.

Further support was obtained from the Virginia Polytechnic Institute and State University Chemical Engineering Department to assist in the new TNT process infrastructure design. The university, located in close proximity to the Radford Army Ammunition Plant, provided academic and technical resources to assist in the design of the new TNT process.

In a show of Congressional support, Senator John Warner and Congressman Rick Boucher made visits to tour the TNT facility to see first hand how the new process was capable of providing an important element in support of the mission of the nation's Armed Forces.

CONCLUSION

Radford's new TNT manufacturing process is a model of how legacy weapons and munitions systems can be redesigned in a socioeconomic and environmentally responsible manner while creating a safer working environment. Radford's TNT is now produced much more economically with the potential for recurring savings of

Table 1. Environmental Benefits Comparison of the Old and New TNT Production Process

	Old Process	New Process
Base Material:	Toluene: a highly toxic, flammable, and hazardous chemical. Regulated as a hazardous air pollutant (HAP) and Superfund Amendments and Reauthorization Act (SARA) Title III listed chemical.	Ortho-Nitrotoluene (ONT): non-toxic, less flammable, and less hazardous chemical. Not regulated as a HAP or SARA Title III listed chemical.
Purification Process:	Sodium Sulphite (Sellite)	Weak Nitric Acid Crystallization
Hazardous Waste Generated:	<ul style="list-style-type: none"> • K047/D003 red water: 0.1 gal/lb TNT produced • Off-Isomers of TNT: Significant quantities of material that reduced purity of TNT 	<ul style="list-style-type: none"> • None generated • Eliminated K047/D003 red water: savings of \$1 million annually • Alternative Use - Potential sales of isotriol byproduct: \$650,000 annually • Alternative Use - Potential sales of spent acid: \$120,000-\$200,000 annually
Air Emissions Generated:	<ul style="list-style-type: none"> • NOx: 239 Tons Per Year (TPY) • CO: 157 TPY • TNM: 15 TPY • VOCs: Significant, but not quantified 	<ul style="list-style-type: none"> • NOx: Reduced from 239 to 0.9 TPY • CO: Reduced from 157 to 8 TPY • TNM: Reduced from 15 TPY to 1.0 TPY • VOCs: Reduced to 3.4 TPY
Cost of Hazardous Waste Generation/Savings:	<p>Cost of disposal at today's rates:</p> <ul style="list-style-type: none"> • red water: \$1 million annually • Off-Spec Waste/Loss of Product: \$500,000 annually 	<p>Cost Savings:</p> <ul style="list-style-type: none"> • \$1 million (annual): Eliminated red water • \$650,000 (annual): Potential isotriol sales alternate use • \$200,000 (annual): Potential spent acid sales alternate use • \$1 million (one time): No PSD Permit/ No OLD MACT requirements

\$3 million annually, primarily as a result of the elimination of environmental risk, pollution and waste. The dedication and hard work of the Radford P2 Team resulted in benefits to the surrounding community and environment while producing a TNT manufacturing process that can be replicated in other military munitions plants and by private TNT manufacturers. Due to the innovations of the Radford P2 Team, TNT production at the Radford Army Ammunition Plant has virtually eliminated hazards to the environment while opening the door for potential cost savings. Radford Army Ammunition Plant is now able to continue its important role of contributing to the nation's defense in the most environmentally safe manner possible.

On the cover: Soldiers fire an M109A6 Paladin howitzer during a section certification and live-fire exercise near Baghdad, Iraq. The Soldiers are assigned to Battery C, 4th Battalion, 1st Field Artillery Regiment. (DoD photo)

FISCAL YEAR 2006
SECRETARY OF DEFENSE ENVIRONMENTAL AWARDS
U.S. ARMY NOMINATION

U.S. ARMY GARRISON GRAFENWOEHR

ENVIRONMENTAL QUALITY, OVERSEAS INSTALLATION



SUSTAINING THE ENVIRONMENT FOR A SECURE FUTURE

INTRODUCTION

The U.S. Army Garrison (USAG) at Grafenwoehr, Germany, commands, controls and operates the installations of Grafenwoehr, Hohenfels and Vilseck, and has the mission of supporting and enabling the readiness of its tenants, including the 7th Army Joint Multinational Training Command, the 2nd Stryker Cavalry Regiment (SCR) and NATO units, to facilitate deployment operations, and assist staging operations. This includes power projection, force protection and Conventional Forces Europe (CFE) training and support, including live-fire training, engineering operations, air-drop exercises, helicopter gunnery and aircraft operations, and maneuvering. The garrison provides the highest quality training environment for the Army's European theater of operations.

The USAG Grafenwoehr is located in a scenic area of Germany approximately 60 miles east of Nuremberg in Bavaria. The city of Grafenwoehr lies right outside the gates of the garrison and, due to a lack of industry in this rural area, the community owes much of its prosperity to the Army's presence. Approximately 2,750 local nationals are employed at USAG Grafenwoehr. The garrison population also includes 6,550 military personnel; 5,098 training troops – U.S., and NATO members (daily average); 810 Department of the Army civilian employees; 1,650 contractors; and 11,000 family members.

BACKGROUND

The responsibility for managing the environmental program at USAG Grafenwoehr lies with the Department of Public Works' (DPW) Environmental Division under the leadership of division chief Manfred Rieck. His goal, and that of his environmental team, is to prevent and correct negative impacts to the environment resulting from training and other mission-related activities in compliance with U.S. and host nation environmental laws and regulations. Due to the proximity of the training areas to the host nation communities, and limited training space (52,000 acres) available to support the various training operations, the biggest impacts to the environment at USAG Grafenwoehr are soil erosion, storm water runoff, water pollution and natural resources conservation.

The Environmental Division was established with just one environmental engineer in 1979 and has since then grown to 15 professionals who are specialists in hazardous waste and substances management, technical environmental protection, chemical matters and natural resource management and protection. The extended team members include a garrison public affairs specialist, the chief of range operations, a member of the directorate of logistics and other members of the Directorate of Public Works.

The key to the garrison's environmental management approach is its Environmental Management System (EMS), which was initiated, on time and in accordance with DoD policy and guidance, in 2003. USAG Grafenwoehr's EMS covers all aspects of environmental management, with emphasis on the health protection of community members and the protection of valuable natural resources in conformity with training requirements. All environmental programs initiated by the USAG Grafenwoehr Environmental Division are conducted in accordance with significant environmental plans and agreements listed below.

Figure 1. Plans and Agreements

Name of Plan/Agreement	Date Established/ Date of Last Revision
Spill Prevention Control and Countermeasure Plan	Revised October 2006
Hazardous Waste Management Plan	Revised May 2005
Asbestos Management Plan	Revised June 2005
Storm Water Pollution Prevention Plan	Established October 2004
Tenant Unit Environmental SOP	Revised June 2006
Training Unit Environmental SOP	Revised January 2006
Hazardous Waste Disposal Guide	Revised August 2006
Noise Management Plan	Established May 2006
Lead Based Paint Management Plan	Established October 2005
Joint site surveys on environmental issues with German Authorities (e.g., Water Board, Federal Assets Office and County Office)	Surveys have been conducted every three years since the early 1980s.
German-American Advisory Council meetings on critical environmental issues	Meetings have been conducted twice yearly since the early 1990s.
Agreement between Host Nation Forestry Office and USAG Grafenwoehr to support the common Reforestation and Rehabilitation Program for the Training Area	Established in the late 1970s and is updated every six years, last update 2004
MOA Bavarian State Office for Environment & IMCOM-E to jointly solve critical issues at USAG Grafenwoehr	Established 22 June 2006

PROGRAM SUMMARY

The USAG Grafenwoehr has a well-established, comprehensive environmental program known for meeting its challenges. In FY 2006 these challenges were expanded to include environmental impacts mitigation due to stationing the 2nd SCR Stryker Brigade from Fort Lewis at USAG Grafenwoehr and making many training area enhancements, including expanding the Grafenwoehr military installation to station 3,800 additional Soldiers by CY 2009 under its Efficient Basing – Grafenwoehr (EB-G) initiative. USAG Grafenwoehr has met these challenges and maintained the integrity of its environmental program through sound environmental management practice, innovations, and community partnerships. As a result, the following goals were accomplished:

- Accommodated the approx. 3,800 2nd SCR Stryker Brigade in an environmentally friendly manner.
- Increased acreage available for training operations and maneuvering.
- Completed erosion reduction initiatives.
- Preserved and rehabilitated threatened and endangered species habitats.
- Saved \$1.2 million in FY 2005 and FY 2006 due to the installation of a Hazardous Material Control Center in early FY 2005.
- Reused slightly contaminated material under sealed surfaces to accomplish cost savings of \$1.2 million in FY 2006.
- Signed a six-year agreement with the Host Nation Forestry Office to accomplish training area rehabilitation, erosion protection, biotope maintenance, and other environmental projects resulting in \$1.8 million cost savings to the Army.
- Met the goal of “making environmental protection easy” for Soldiers.

All of these accomplishments contributed to the achievement of the garrison’s environmental objectives, and not just those objectives that are aspects of the ongoing environmental program, but also those that are part of USAG Grafenwoehr’s expanded mission under USAREUR transformation.

ACCOMPLISHMENTS

Environmental Management System

Since the implementation of its EMS, the USAG Grafenwoehr has been successful in integrating it into the day-to-day business of the installation, according to an external EPAS audit in 2005. Credit for this success is founded on leadership support for the initiative and the resulting environmental management culture that it fosters. The EMS Environmental Quality Control Council (EQCC), which monitors the success of environmental initiatives, includes the garrison leadership, DPW environmental experts, and representatives from all garrison directorates and tenant units, including a representative of the new 2nd SCR Stryker Brigade. These leaders have taken a “divide and conquer” approach to identifying and meeting environmental challenges by creating five special boards for asbestos, hazardous waste, ozone depleting substances, lead based paint and noise management. In addition, the Training Area Maintenance Process Actions Team (PAT) – with representatives from the DPW, Range Operations, Integrated Training Area Management team, and the Host Nation Forestry Office – help to meet goals and targets of significant environmental aspects. The result of this management approach is that USAG Grafenwoehr’s EMS is being applied and incorporated into all aspects of the environmental program and the training mission.

Mission Enhancement

Soil erosion due to prolonged training and continual vehicle movement has diminished the environmental quality of some training areas at USAG Grafenwoehr. These conditions made the ability of training a Stryker unit at the garrison questionable. Despite that, the 2nd SCR Stryker Brigade arrived at Vilseck in the summer of 2006 as the first Stryker unit in Europe. This happened because the environmental division ensured the regiment’s ability to train at the garrison long before it arrived. The first task the environmental division undertook was to study the effect of the Stryker vehicles on soil, vegetation and surface water runoff. After conducting extensive tests and field trials, results from the survey indicated that the soil condition on training land previously restricted

for tracked vehicles was suitable for Stryker training with decreased negative impact to the environment.



Soldiers from the 2nd SCR Stryker Brigade conduct training exercises at USAG Grafenwoehr.

Next, the environmental division installed and respectively upgraded a network of 250 environmental facilities throughout the training area, including 24 maintenance pads and 24 refueling pads, HM/HW sheds and used oil tanks. These facilities make it easier for Soldiers in the field to maintain safe environmental practices, and contribute in a meaningful way to the accomplishment of the garrison's environmental mission even as they train for their war fighting mission. This helps to meet the environmental division's goal to "make environmental protection easy" for Soldiers, and also provides them with more time for training.

Erosion Mitigation

After extensive testing, the second task the environmental division undertook was to implement several projects to manage the biggest problems – erosion and soil compaction. To keep the soil from washing away during rainstorms, or blowing away on windy days, the environmental division, with support from the operations and maintenance (O&M) division and in close cooperation with the trainers, relocated and opened berms that eliminated erosion bottle necks and contained stormwater runoff. While they were at it, the strategic placement of the berms added the benefit of increasing maneuver space.

The environmental and O&M divisions, with the support and flexibility of the training community,

also re-seeded 4,000 acres of training land with a selected native grass seed mixture that not only anchored the soil, but also provided better physical resistance, faster root development and greater horizontal expansion. Collaboration on this major task resulted in its completion within two months.

In places where the soil was so compacted that grass developed only sporadically, special equipment that loosened the soil without destroying existing protective vegetation cover and mixing the different soil layers had to be devised. The device consists of a roller with special hardened steel teeth attached to it and is pulled by a tractor. Approximately 2,000 acres of land were recovered with a 50 percent reduction of closure time because of this method, which ensures that top soil with a high nutrient content stays in place to support growth for the new grass seed.



Native grass seed restores eroded training areas.

Forest Management

Limited to only 52,000 acres, training land at USAG Grafenwoehr is at a premium, and since much of this area is wooded, 80 percent of the compensation measures during the period of performance were accomplished through forestry management. Approximately 110 acres of native deciduous trees, shrubs and bushes were planted, increasing both suitability for infantry training and the ecological quality and biodiversity of the environment. Improvement of forest stands along the training area border compensated for construction-related tree cutting without reducing maneuver space. These forest stands will also

reduce dust problems and noise impact on neighboring communities. Opening and thinning of forest stands also created four hectares of additional training land for maneuvering. In more open lands, environmental health was improved by thinning out tree stands that had overgrown high value grass lands and heather. Together these improvements also enhanced threatened and endangered species (TES) habitats by providing a more native environment.

Pollution Prevention

Pollution not only affects the installation, but has a major impact on the communities surrounding the base. USAG Grafenwoehr has met the challenge to prevent pollution with an extensive water monitoring program. The installation has established an environmental surveillance system that monitors water protection and erosion control measures, and to provides defensible water quality data. There are currently seven monitoring stations at all creeks draining from the Grafenwoehr Training Area. The stations monitor water flow, suspended solids, pH value and other parameters.

Annual sampling includes the analysis of 230 groundwater monitoring wells, 30 fishing ponds including fish sampling, and the operation of 7 water monitoring stations. The sampling and analyses are used to determine potential negative impacts from training activities, and prevent contamination on 10 off-post water protection areas from potential on-post contamination sources. Furthermore, this program, in close cooperation with the MWR hunting and fishing section and the host nation water board, protects the health of community members fishing in training area lakes and creeks.

The cost of such an extensive program can be prohibitive. But Grafenwoehr has taken a partnership approach to keeping costs down. While more than \$30,000 is spent annually for ground/surface water and fish sampling programs, the costs are halved by the support received by host nation authorities. That support comes in the form of sampling equipment and laboratory analysis, and provides Grafenwoehr residents and communities with the peace of mind that the stream and lakes remain free from contaminants.

TES Initiatives

A threatened and endangered species survey for the Training Area revealed 764 different types of endangered species, which is thought to be the highest density in Germany. In negotiations with host nation authorities, a "big picture" agreement was achieved that allows certain impacts on some threatened and endangered species, as long as the TES affected exist in sufficient numbers at different parts of the training area. When impacts on the species are made, compensations can be performed to ensure survival of low number species.

Another result of negotiation with host nation authorities was the establishment of a mitigation account. Increase in forest cover and other positive natural resources impacts after 1998 were put into this account. This was the first mitigation account established in Bavaria and within the entire U.S. Army in Europe. Presently the credit side of the account shows 100 acres of open land compensation and 250 acres of forest compensation. It enables USAG Grafenwoehr to compensate for training area construction measures without an additional financial burden and construction delay.

A former drainage channel in the Grafenwoehr training area was restored to a natural water flow at a total length of 1,000 meters. The unnatural straight water body was reshaped and rounded to imitate a meandering creek bed. Steep slopes were flattened to encourage natural riparian vegetation development, which is a very rare biotope type throughout Europe and therefore a priority habitat of the European Flora, Fauna, Habitat (FFH) Directive. Shallow water zones and little islands were created to provide habitats for threatened and endangered species adapted to temporary wet soil areas with little or no vegetation. Many endangered plant and animal species benefit from this restoration project, which is also nominated on the internal mitigation account to compensate for environmental impacts of Garrison construction. This new wildlife will host a variety of rare indigenous species, such as the Black Stork, May Fly, Brown Trout, etc. In addition, the existing active beaver population will find

new creative opportunities with improved dynamic landscaping already in progress. A beaver management plan is presently under development that helps to eliminate negative impacts on training facilities without a time consuming coordination process with host nation authorities.



*Top: Rehabilitated former contaminated site.
Below: Restoration of a wetland area filled in by heavy vehicle traffic recreated an area where endangered species can recover and thrive.*



Community Partnerships

USAG Grafenwoehr has established partnerships with host nation and local authorities to preserve the beautiful environment surrounding the garrison. A partnership with the University of Bayreuth produced the development of native, "training resistant" seed mixtures to be used for the training area re-seeding program. Another working partnership with the University of Freiberg helped the environmental division to modify their erosion model to meet specific requirements.

USAG Grafenwoehr also worked with the local forestry office for the preparation of a GIS layer to manage ecologically highly valuable orchard meadows. This project called for the establishment of a historic fruit tree species conservation site. Other partnerships resulted in the following outreach accomplishments during the period of performance:

- Projects coordinated with the local German Water Protection Office resulted in the installation of five retaining/sludge settling basins and two fish passes to eliminate water runoff problems.

- A press conference with representatives of three TV stations, four radio stations and five newspaper publishers resulted in newspaper articles like "CLEAN US ARMY."
- Several briefing and training area tours to military and press representatives of Czechoslovakia Republic, Bulgaria and Albania about the smooth integration of the environmental program into military training resulted in increased acceptance of U.S. military with these countries.
- The environmental division provided a briefing and training area tour to over 200 members of the Bavarian Society for Contaminated Sites Cleanup resulting in a statement from the State Secretary of the Bavarian Ministry for Environmental Affairs saying that the USAG Grafenwoehr environmental program is outstanding in Europe and exemplary for Bavaria.
- On June 22, 2006, the Bavarian State Secretary for Environment and the IMCOM-Europe Regional Director signed a Memorandum of Agreement to jointly solve critical environmental issues at USAG Grafenwoehr that have the potential to negatively impact military training before they become political problems.

CONCLUSION

In Germany, 14 major Army communities will be reduced to four, one of which is USAG Grafenwoehr. The key features of the garrison – its world class facilities and infrastructure of the Army's Joint and Combined Expeditionary Training Center – are critical to transformation success and the effectiveness of the Stryker Brigade Combat Team strategically based at Grafenwoehr. The environmental division is successfully fulfilling its commitment to provide the same level of excellence in environmental programs it has always provided, and meeting applicable Overseas Environmental Baseline Guidance Document requirements, even with the increased demands that have been placed upon it.

On the cover: U.S. Army Capt. David Gohlich, the commander of Iron Company, gives his Soldiers a quick briefing on their performance following the unit's training at the Grafenwoehr training area in Germany. (U.S. Army photo by Arthur McQueen)

FISCAL YEAR 2006
SECRETARY OF DEFENSE ENVIRONMENTAL AWARDS
U.S. ARMY NOMINATION

LETTERKENNY ARMY DEPOT, PA

ENVIRONMENTAL QUALITY, INDUSTRIAL INSTALLATION



SUSTAINING THE ENVIRONMENT FOR A SECURE FUTURE

INTRODUCTION

Letterkenny Army Depot is located in the Cumberland Valley in south-central Franklin County, Pa., five miles north of Chambersburg. Comprising 18,864 acres, a large land portion of the depot is used to conduct maintenance, modification, storage and demilitarization operations on tactical missiles and ammunition. On occasion, the depot partners with industry, allowing the advantage of unique capabilities and skills. Letterkenny has a civilian population of approximately 1,342, including 31 military personnel. Tenants and contractor support at the depot employ an additional 1,577 people. The depot remains among the top three employers in Franklin County, fueling an economic engine that propels over one quarter billion dollars annually into the region through payroll, contracts and retiree annuities. The primary mission is to provide the U.S. Army and other armed forces with worldwide, reliable, responsive and cost-effective depot-level maintenance, field support, systems integration and product support integration for weapon systems, components and ancillary equipment to ensure the readiness, sustainability and safety of these forces during the full spectrum of operational environments.

As the Center of Industrial and Technical Excellence for Air Defense and Tactical Missile Systems, Letterkenny continues a tradition of supporting our Soldiers and our Army for more than 60 years. The depot has unique tactical missile repair capabilities for a variety of Defense Department missile systems, including the Phased Array Tracking Radar Intercept On Target (PATRIOT) Missile and its ground support and radar equipment, as well as the Hawk, Tube-launched Optically-tracked Wire-guided (TOW), Hellfire and Javelin systems. Most recently, Letterkenny has expanded its product line to include the overhaul of tactical wheeled vehicles, namely high-mobility multipurpose wheeled vehicles (HMMWVs), material handling equipment (7.5 ton cranes) and mobile kitchen trailers.

As the Center of Industrial and Technical Excellence for Mobile Electric Power Systems, Letterkenny repairs and remanufactures power

generation sets in sizes from 5kW to 150kW. The depot's highly skilled personnel provide rapid response by sending mobile teams to units preparing to deploy. Using a triage approach to assessing unit assets, Letterkenny personnel offer technical inspection, on-site maintenance and identification of assets requiring evacuation for depot level repairs. The depot can provide enhanced maintenance training to Soldiers for improved sustainment of power generation equipment. In addition to repair of generators, Letterkenny has expanded its capabilities to include aviation ground power units. Other vital Defense Department products Letterkenny supports include the Force Provider, mobile power generators and the Biological Integrated Detection System (BIDS).

BACKGROUND

Letterkenny has an award-winning environmental program geared to meeting the installation's environmental

challenges in a way that supports Soldier readiness.

Letterkenny became the only two-time winner of the Shingo Prize for Excellence in Manufacturing for Lean Manufacturing Excellence in 2005 and

2006 because of two major weapons system programs: the PATRIOT Missile Air Defense System and the HMMWV recapitalization program for tactical wheeled vehicles. The depot also received the 2005 DoD Continuous Process Improvement Special Recognition Award.

Letterkenny strives to consistently provide products that meet or exceed customer and regulatory requirements, improve customer satisfaction, and continually improve processes using Lean Six Sigma as the core method. All Directorates within Letterkenny are responsible to support, participate

Lean Highlights

- Reduced solid waste disposal through recycling by 58%
- Significantly reduced targeted hazardous chemicals
- 70,838 sq.ft. floor space saved
 - Avoided new construction costs of over \$700,000
- Improved Work Environment
 - Reduced annual lost work hours from 3,386 to 2,131
- Certified in ISO 14001:2004
- Certified in ISO 9001:2001

in and sustain Lean Six Sigma to improve their internal process. The Lean core team, under the Chief of Staff, facilitates Lean Six Sigma activities across the depot. The Lean core team utilizes the Lean tools (kaizen and value stream analysis) to work with cross-functional teams to discover and eliminate waste. Over 80 percent of the workforce has participated in at least one "Rapid Improvement Event." Lean activities enable broader enterprise productivity changes while considering both the supplier and customer needs of the process. Follow-up meetings are used in order to finalize any changes. Lean Six Sigma has demonstrated the ability to eliminate waste by reducing floor space, reducing flow time, reducing distance traveled and increasing productivity.

Lean Manufacturing has revolutionized pollution prevention at the depot. Iterative improvements to Lean initiatives that build on their initial implementation have vastly improved waste reduction and eliminated sources of pollution at the depot, improving environmental quality and saving millions of dollars in production and waste disposal costs.

"Letterkenny's environmental initiatives are a model of environmental stewardship in the Department of the Army and the federal government as well."

- Juan Lopez, Senior Program Analyst, Office of the Federal Environmental Executive

During FYs 2005 and 2006, Letterkenny saved an additional \$725,000, as waste elimination and manufacturing became more cost effective. Repair time for HMMWVs was decreased by 40 percent, which will realize an annual cost avoidance of \$14 million. Because of these lean improvements, Letterkenny has been able to provide 27 free HMMWVs per month to the war fighter since August 2006.

PROGRAM SUMMARY

Lean Manufacturing succeeds because efficiencies are introduced wherever feasible. The depot did not build new production facilities, and still production hummed along at a rate two times



Because of these lean improvements, Letterkenny has been able to provide 27 free HMMWVs per month to the war fighter since August 2006.

better than before lean initiatives were adopted. Because of better utilization of manufacturing space, the depot avoided the need for new construction and was able to bring in additional workload. Production yields increased dramatically while preserving raw materials, energy and labor by decreasing redundant, wasteful work.

The improvements at Letterkenny have produced vital real world results. Operations Enduring Freedom and Iraqi Freedom forced the depot to adjust to the new and urgent needs of our Soldiers. To address the significant threat of improvised explosive devices (IEDs), Letterkenny fabricated almost 900 reinforced armor door kits for upgrading HMMWVs deployed in Iraq; the last of the kits was produced in April 2005, two weeks ahead of schedule. The efforts of depot employees saved lives and prevented countless injuries.

Armor kits for the M969 5,000-gallon tanker provided a new challenge because the tanker had undergone a variety of design changes. The letter of intent to build the 150 kits was received on 19 November 2004, and the last kit was completed on 21 January 2005, four weeks ahead of schedule and \$1 million under budget.

Additionally, Letterkenny began with a modest production rate of 5 kits a week in January 2005 for armor cabs for the M939 5-ton truck. By using Lean processes, production was steadily increased to 25 kits a week without increasing the amount of floorspace needed. Based on the accelerated production rate, the depot was asked to produce

70 percent more kits than called for in the original program. The 400th cab was completed in early July 2005.

Lean Manufacturing not only put Letterkenny in a better position to save the lives of Soldiers, it also improved the work environment of employees themselves. There has been a 37 percent decrease in the number of lost work hours (from 3,386 in FY 2004 to 2,131 in FY 2006) even though labor hours have increased by 66 percent over the same period.

ACCOMPLISHMENTS

EMS

ISO 14001:2004 Certified Depot

The Letterkenny Environmental Management System (EMS), administered by the Directorate of Public Works with oversight by the Directorate of Product Assurance, is third-party registered with NSF-ISR, Ltd. to the newest ISO 14001:2004 standard. On-site ISO EMS training has been conducted for all levels of the organization to include senior management, quality assurance specialist staff and the general depot population and is available in the depot intranet for continued reference and training. Directorate of Product Assurance personnel conducted ISO 9001:2000 training from the senior management level to the employee level to include contractor support personnel, and provided an additional overview of ISO 9001:2000 to all new employees during the new employee orientation. ISO 14001:2004 awareness training is also provided during new employee orientation.

The Letterkenny EMS involves reviewing facility operations and making choices to reduce negative and improve positive environmental impacts, looking beyond environmental compliance to improve all aspects of the depot including waste generation and chemical use. By aligning to this standard, the depot is promoting consistent environmental practices that should improve quality and productivity, lower costs and enhance environmental stewardship. The EMS becomes a tool that provides a structured approach to analyzing and managing the environmental impacts of day-to-day operations.

Exceeded EMS Goal for Chemical Toxicity Reduction

Where two or more products are being used to perform the same function, the Letterkenny goal is to eliminate all but the most environmentally friendly. Where products are being used that contain chemicals targeted for elimination, the depot attempts to find substitutes with less toxic ingredients that meet the performance requirements. Since the beginning of FY 2005, the depot has prevented the introduction of any new chemical formulations containing methylene chloride, trichloroethylene and other hazardous chemicals, and met the EMS goal of reduction of their use in existing products by 75 percent by the end of FY 2005.



HMMWV's are disassembled upon arrival at Letterkenny to prepare them for repair and maintenance prior to repainting.

Environmental Compliance Assessment and Management Program

The success of the Lean process represents what is unique about Letterkenny's management program, namely that it is well established, encompassing, technically meritorious, well managed and cost effective. In all cases, environmental program initiatives, guided in part by depot-wide Lean efforts, meet statutory and regulatory requirements, and in many cases they exceed them.

Pollution Prevention and Waste Reduction Efforts

Surpassed Solid Waste Measure of Merit by 18 Percent

The HMMWV program is an inspect and repair program so most of the waste is part of the operation as parts are replaced as necessary and the removed parts are scrapped. As of September

2006, the depot reported a 58 percent solid waste diversion rate for the year, or 4,756 tons, by promoting reduction in the amount of solid waste sent to landfills by implementing reuse, recycling and reclamation programs.

Reduced Hazardous Waste Disposal Costs for Blast Media by 77 Percent

Instead of using 55-gallon drums, most spent blast media is now collected in supersacks and large roll-off containers for disposal. This initiative saves the depot over \$500,000 annually in handling and disposal costs.

Recycling and Reuse of Waste Fuel and Oil

Diesel fuel drained from vehicles being overhauled at the depot is now collected for reuse in the main heating plant, saving both on disposal costs and on the purchase of new fuel oil. Additionally, the depot has set up a program where used motor oil is sold through the Qualified Recycling Program instead of being disposed.

Sustainability Through Alternative Fuel Vehicles

The depot has also acquired dual-fuel vehicles in the past two years allowing for use of either unleaded gasoline or E85 ethanol (85 percent ethanol and just 15 percent gasoline). In FY 2006, the installation completed a feasibility study on the use of hybrid vehicles and bio-diesel as an alternative to diesel fuel.

Effective Use of Funds

Avoidance of New Construction

The original goal of the HMMWV Recap program was 5 vehicles per day in January 2005, and subsequently surged to 15 vehicles per day in July 2005. Currently the HMMWV process is producing 19 vehicles per day. The original setup was bay type and this process was performed with the body and chassis combined. This process was improved and it was converted to separating the body from the frame into different processes in July 2005. The Lean team conducted mini-kaizens, or rapid improvement events, for each workstation to accomplish the change. Also, the Lean team was involved with the subassembly area expanding to reduce flow time. These efficiencies provided the needed production capability above the initial goal. This allowed 70,838 square feet of floor space to be saved, thereby avoiding the need for

additional manufacturing space. This resulted in a savings of over \$700,000 in new construction costs.



Repeated Lean events were conducted in the greatest maintenance, repair and overhaul bottlenecks. Through a continuing series, the processes were streamlined so more parts or vehicles per month are processed. During the second event in the final paint area, the walking distance was decreased and the productivity was increased.

Cost Savings

Letterkenny embraced the private sector commercial enterprise philosophy of giving back tangible savings to the customer, and in the process developed a cutting-edge, innovative process that allows savings to be realized in a tangible way. Savings are returned based upon whether the Lean project achieved a productivity gain by a reduction in manpower and/or materials, including material savings based upon actual cost of goods not purchased. Savings "Lean Checks" are based upon guidance from the Commanding General, U.S. Army Materiel Command, in that 60 percent of savings are to be returned to customers and 40 percent can be retained at the depot level for reinvestment into improving depot processes.

Decreased Lost Work Hours

The depot has significantly reduced noise from the blast booths, added guarding to targeted equipment and provided lift-assisting devices, such as adjustable work benches/tables and magnetic/suctions lifts. Additionally, employees are encouraged to report safety deficiencies and opportunities at all times and are trained to use composite risk management considerations in their activities (i.e., think of what could go wrong, plan

before you act, and evaluate results). The depot has seen a reduced number of lost production days by 37 percent and workers compensation-claims drop by over \$220,000 since FY 2004.

Community Relations

Public/private Partnerships Support National Research Efforts

Letterkenny has strengthened its technological development by initiating partnerships with Pennsylvania State University's Applied Research Laboratory and the Applied Technology Center at Hagerstown Junior College. The depot has also collaborated on a number of natural resource research and education efforts with the Shippensburg University, West Virginia University, the Pennsylvania Game Commission and the U.S. Forest Service.

Citizen Volunteers Donate 15,000 Hours

Letterkenny sustains an active natural resources management program. Over the past year, the depot completed a 50-acre harvest program aimed at controlling invasive species. Fish and Wildlife Habitat Improvement Projects efforts are greatly aided by the Letterkenny Rod & Gun Club and other local citizen volunteers who contributed over 15,000 hours in FY 2006.

Community Outreach

Letterkenny staff devote time to the local community by judging the Chambersburg School District science competition and presenting talks at

local schools regarding wildlife management. Additionally, school groups are invited to participate in select activities at the depot.

Public/Private Partnerships Save Dollars and Lower Environmental Impacts

Depot Lean efforts would not have been successful without partnerships such as AM General on the HMMWV, General Dynamics Robotic Systems on Stryker or Lockheed Martin/Raytheon on the Javelin Joint Venture. A public-private partnership between Letterkenny and Lockheed Martin began in 2006 in which Lockheed Martin performs modifications at the depot, working in coordination with depot staff toward product improvement. To focus the best from the military and industry, they have joined forces to create repair centers for both Javelin and Target Acquisition, Designation Sight/Pilot's Night Vision Sensor (TADS/PNVS) Reset operations.

Community Leadership Sustains Growth

Letterkenny supports the growth and development of the local community through its active participation in community planning. Local community planning groups include: The Chambersburg Area Development Corporation, Franklin County Area Development Corporation, Chambersburg 2000 Partnership and The Local Reuse Authority. The depot ranked by *Expansion Management* magazine in the 2006 Top 10 Military Communities of Excellence for Metro areas with small military populations.

CONCLUSION

Letterkenny remains on the forefront of integrating Lean Manufacturing and EMS into its management programs. Every year the depot realizes successes that have received recognition from military and industry organizations. FY 2006 was especially productive for Letterkenny's environmental program, evidenced by successful reduction in chemical toxicity, substantial savings and avoidances in pollution prevention measures, extensive training and employee participation and more. Letterkenny personnel are proud of the role they play in the nation's defense.



Depot staff give a Natural Resource presentation to a local cub scout group about local flora and fauna.

On the cover: Sgt. Aubrey Caplinger, left, and Spc. Gabriel Vega maintain security atop an Avenger air defense system in Ghazni, Afghanistan. (U.S. Army photo by Sgt. Christopher Kaufmann)

FISCAL YEAR 2006
SECRETARY OF DEFENSE ENVIRONMENTAL AWARDS
U.S. ARMY NOMINATION

FORT DRUM, NY

CULTURAL RESOURCES MANAGEMENT, INSTALLATION



SUSTAINING THE ENVIRONMENT FOR A SECURE FUTURE

INTRODUCTION

Fort Drum is home to the Army's 10th Mountain Division, which has played important roles in U.S. military operations in Iraq and Afghanistan and is currently the most deployed division in the Army. Fort Drum's population includes 15,000 Soldiers and 2,500 civilians. Fort Drum also supports approximately 20,000 reservists and 9,000 active duty from all services for training purposes.

Fort Drum Military Reservation is located 10 miles northeast of Watertown, N.Y. and encompasses a single contiguous property totaling 107,265 acres. Fort Drum is located in the North Country region of New York, on the banks of the Black River just east of Lake Ontario. The installation's landscape is a mix of glacial deltaic sand plains, grasslands of the glacial lake plain, northern hardwood forests of the Adirondack lowlands and a small portion of Black River alluvial flood plain.

Fort Drum's mission is to "provide equitable, efficient and effective management of Fort Drum resources to support readiness and mission execution of combat-ready forces, while providing for the well-being and security of Soldiers, civilians and family members; improving infrastructure and preserving the environment."

Cultural History

Today, the Fort Drum cultural resources management (CRM) team manages the entire installation, which encompasses over 200 prehistoric and 700 historic archaeological



Fort Drum is home to the Army's 10th Mountain Division.

sites, with 151 currently potentially eligible, five National Register of Historic Places (NRHP) listed archaeological districts and one NRHP listed historic district.

The earliest human occupation of Fort Drum appears to be associated with the shoreline and fossil islands of Glacial Lake Iroquois, whose beaches remain as the sands of the Pine Plains delta. Stone tools discovered at Fort Drum from the Paleo time period include a Clovis Point, two prismatic blades and a tool kit that matches the Paleo boat building assemblage discovered at the U.S. Navy training area on San Clemente Island, Calif.

Prehistoric occupation of the area was continuous from the Paleo time period to the present. An archaeological inventory survey at Fort Drum has identified over 200 Native American ancestral places. The Fort Drum archaeology program is a resource for archaeologists and the wider public to gain a better understanding of the origins of the St. Lawrence Iroquoians, ancestral people to Fort Drum's Native American consultation partners, the Oneida Indian Nation, the Onondaga Nation and the St. Regis Mohawk Tribe.

Intermittent encounters in the Fort Drum region between Native American governments, societies, residents and European explorers, missionaries and settlers began in the mid-16th century and continued until the treaty of Canandaigua opened



Fort Drum Soldiers conduct squad maneuver training in and around hardened cultural resource sites.

the area for Euro-American land speculation and settlement after 1797. Fort Drum was part of the northeast land development after the War of Independence. Several tracts of land were sold to wealthy French emigrants and James LeRay de Chaumont, a friend of Benjamin Franklin, purchased the acreage that included Fort Drum. By 1807, James LeRay de Chaumont and his children moved to the site of the LeRay Mansion where they entertained distinguished guests including President James Monroe and Joseph Bonaparte – brother of Napoleon.

The Army first expressed interest in the Fort Drum region when it leased large sections of the area for a series of training exercises beginning in 1907. At the commencement of World War II, Pine Camp, as it was then called, underwent a huge expansion in which 75,000 acres of land was purchased by the federal government.

BACKGROUND

The CRM team is charged with identifying and protecting all of the ancestral places and historic archaeological sites potentially eligible for the NRHP that occur on Fort Drum. The CRM team has fully embraced the mission of Fort Drum and has gone beyond the first goal in the Integrated Cultural Resources Management Plan (ICRMP) of minimizing cultural resources disruption to military land use by offering pro-active support to Soldier training. The program staff have concluded that the objectives of the mission commanders and those of the cultural resources program are not mutually exclusive and are in fact very often aligned. Likewise, in the last two years Fort Drum has planned for nearly \$1 billion in new construction and experienced no delays due to conflicts with cultural resources and incurred no damage to any cultural properties.

The primary management tool for accomplishing the goals and objectives of the Fort Drum CRM program is the ICRMP, first signed at the end of 2001. The draft of the updated plan is complete



Significant archaeological sites on Fort Drum include the original brick clamp where the bricks for the LeRay Mansion were made.

and is currently being reviewed by the various stakeholders. The CRM staff use the plan and its policies and guidelines on a daily basis for the management of the program.

The Fort Drum CRM team, which is part of the Environmental Division within the Directorate of Public Works (DPW), consists of a cultural resources manager, the archaeological survey coordinator and a curator/outreach specialist. The CRM team relies heavily on cooperation from the Integrated Training Area Management (ITAM) Land Rehabilitation and Maintenance (LRAM) program. The CRM team also draws on the skills of two geographic information system (GIS) analysts and the Fort Drum forester.

Major Resource Features

To date, over 80 percent of the land on Fort Drum has been inventoried. Among the most notable of Fort Drum's many cultural resources are:

- The LeRay Mansion and Historic District, which features five original historic structures that are listed on the NRHP.
- Five former villages assimilated by Fort Drum in 1941, currently registered and protected as National Register listed historic archaeological districts.
- A 30-acre lithic scatter with over 400 hearth features dating to the Early Woodland period.

- A St. Lawrence Iroquoian Village including six long houses dating to the mid 16th century.
- Paleo sites from the glacial lake shorelines and fossil islands including one with a possible boat building tool kit.



The LeRay Mansion is one of the six Fort Drum historic and archaeological districts listed on the National Register of Historic Places.

Collaborative Partnerships

Fort Drum CRM staff have invested heavily in developing cooperative relationships with various colleges and universities, as well as with their counterparts at other Department of Defense (DoD) installations and federal agencies. The Cultural Resources program has used a system of creative partnerships to strengthen the scientific excellence of the program at no cost to the government. Currently three Ph.D. theses are focused on Fort Drum sites. This research not only provides site evaluation, but brings the expertise of the dissertation committees to the installation. The Fort Drum CRM program has continued to set and fulfill high standards of scientific excellence including annual presentations at the Society for American Archeology meetings.

CRM staff also coordinate consultation between Fort Drum and federally recognized tribes with ancestral ties to Fort Drum properties. Their programmatic emphasis on stakeholder involvement and inter-agency cooperation has resulted in a number of formal agreements and numerous informal collaborations that leverage support and increase program accomplishments.

These partnerships include:

- Site visits and ongoing consultation addressing collections issues and site interpretation with the St. Regis Mohawk Tribe, Oneida Indian Nation and Onondaga Nation.
- Geo-archaeology and earthworks research with the New York State Museum.
- Paleomaritime partnerships with Bard and Hamilton Colleges, Colorado State University and the Buffalo Museum of Science.
- The Predictive Modeling Working Group with the U.S. Air Force and SRI Foundation.
- The Soldier Training for Cultural Preservation Project with Dartmouth College.
- Faunal analysis and electron microscopy with students from St. Lawrence University.
- College credit for students who work on Fort Drum archaeological survey crews through the State University of New York (SUNY), Potsdam.

PROGRAM SUMMARY

All ongoing administrative and programmatic objectives of the ICRMP are actively managed, and each goal has been met or exceeded in the last two years. The current revisions to the ICRMP will raise the bar even higher. Current ICRMP goals and objectives are outlined below:

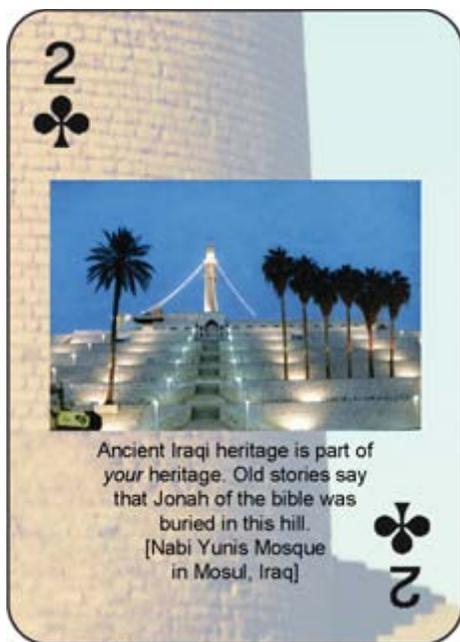
- Comply with federal and state laws and regulations governing the treatment of cultural resources while causing the least disturbance to the military mission.
- Review Fort Drum actions in accordance with the National Historic Preservation Act of 1966 and National Environmental Policy Act to ensure minimal impacts to significant cultural resources.
- Protect and monitor NRHP eligible archaeological sites.
- Curate cultural resources collections in accordance with federal and state regulations.
- Consult with partners in cultural resources management, including the New York State Historic Preservation Office (SHPO), the Advisory Council and federally recognized Native American tribes.

ACCOMPLISHMENTS

In addition to the traditional cultural resource preservation program, Fort Drum CRM staff have made significant and often innovative gains through mission enhancement, awareness training, inter-office coordination and application of innovative technologies.

Cultural Resource Preservation In Theater Soldier Training Project

This program relies on a two-pronged approach of educational outreach and resource avoidance training. The CRM staff have developed various training aids including playing cards and Army Combat Uniform (ACU) pocket cards with key cultural resources messages.



Example of a "playing card," which is designed to educate and promote awareness of sacred cultural treasures in theater.

The cards promote identification of and respect for sensitive cultural resources when Soldiers are deployed, which can go a long way towards winning the hearts and minds of the local population. The training aides are intended for distribution DoD-wide with 40,000 decks of playing cards and 50,000 ACU cards in the first printing.

"Dr. Rush [Fort Drum cultural resources manager] has assembled an excellent team of specialists and technicians to facilitate the [Training for In Theater Cultural Resources Protection] project, and her success is to be commended."

- Curtis A. Bowling, Director, Environmental Readiness and Safety (DUSD -ATL)



Fort Drum archaeology and LRAM crews worked together to build a replica stone cone mosaic tower and Middle Eastern style cemetery as avoidance targets for Fort Drum's Adirondack Range 48.

The second prong is resource avoidance. In partnership with ITAM, the Fort Drum cultural resources team has constructed two mock Middle Eastern archaeological sites and two Middle Eastern style cemeteries for realistic Soldier training. They also supported the Air National Guard by designing and constructing avoidance targetry at the Adirondack Range.

Site Hardening Techniques

In order to support mission training requirements, CRM staff members have aggressively applied site hardening techniques to protect valuable cultural resources while reutilizing them for training purposes. The alternative, to restrict access to potential sites and limit the scope of activities in surrounding areas, imposes an unacceptable restraint on light infantry maneuver training that is critical to the development of Soldiers' skills. The Fort Drum CRM staff members have done an excellent job in balancing these priorities to the maximum benefit of the Army and the cultural heritage of the installation and larger regional area. Among the projects they have completed or are currently developing are:

- Successfully hardened a NRHP Archaeological District and transformed it into a historic area training opportunity.
- Secured Office of the Secretary of Defense Legacy funding to demonstrate that similar site hardening techniques can be implemented at a wide range of installations.

- Developed a site hardening handbook and video for DoD-wide distribution.
- Presented site hardening methods at 2006 ITAM conference.
- Prepared two National Register eligible sites at U.S. Marine Base Quantico for transformation into training assets and are guiding an adaptive reuse effort for listed World War I trenches at Fort Lee, Va.

Legacy Funded Paleo-Maritime Project

As part of their ongoing research into improved site location and management, the Fort Drum CRM staff developed the first ever context-specific prehistoric site location predictive model that applies to the entire continental United States. They have partnered with four installations and four universities, generating specific, predictive maps for Fort Drum, Hill Air Force Base (AFB) Ranges, Dugway Proving Ground, West Point and Wright Patterson AFB. In order to publicize and share the innovative research that has been conducted, they have established a Web site to serve as a clearing house for all paleo-maritime research and were successful in generating Associated Press coverage of exciting archaeological discoveries on DoD lands. This ongoing effort is continuing to expand, with a goal of encouraging collaborative research on this topic across the United States.

Remote Sensing

The Fort Drum CRM program currently runs the only installation-based remote sensing program in the Department of Defense, frequently partnering with other DoD agencies and installations on various efforts. Among the collaborative projects Fort Drum has participated in are:

- Provided an emergency radar survey at Fort Story in order to open a possible 17th century occupation area as a landing zone for Navy Seal training.
- Supported remote sensing survey of a 19th century plantation for the Huntington District Corps to help with community involvement issues.
- Supported Picatinny Arsenal Hessian Cemetery Perimeter Survey, July 2005.

SRI Predictive Modeling Project

In order to streamline compliance, Fort Drum was selected by the SRI foundation to participate in their Legacy and Strategic Environmental Research and Development Program (SERDP) funded DoD predictive modeling compliance project. Fort Drum routinely uses archaeological predictive models when making management decisions. Therefore, SRI felt that the installation was an excellent example for their pilot study. SRI is developing a programmatic agreement with the SHPO where there will be legal recognition for using Fort Drum's scientific models as a management tool. Not only does this project leverage valuable Programmatic Agreement assistance for Fort Drum from one of the nation's leaders in cultural resources compliance, but it also offers the possibility for increasingly cost effective, efficient and informed management for other installations. These various predictive modeling efforts have saved Fort Drum over \$100,000 per year in survey costs over the last five years. Applied DoD-wide they have the potential to save millions.

CONCLUSION

The Fort Drum CRM team has been very successful integrating their efforts to support the mission of Fort Drum. They continually strive to develop innovative ways to accomplish the goals and objectives of their program more effectively while avoiding unintended conflicts with critical training and Soldier support activities.

The Fort Drum staff feel that cultural resource management is too important for DoD installations to be reinventing the wheel. With that in mind, Fort Drum has used the Legacy Resource Management to actively disseminate ideas and accomplishments, effectively networking with all branches of DoD to collaborate and share information with other installations. The site hardening project and the work at Quantico has demonstrated that Fort Drum methods can be implemented at different installations in different environments with equally successful results.

On the cover: U.S. Army Soldiers from the 10th Mountain Division (Light Infantry), Forward Support Battalion Fort Drum, NY, survey the area for any possible threats at Kandahar Army Airfield, Afghanistan. (DoD photo by SPC Gul A. Alisan)

FISCAL YEAR 2006
SECRETARY OF DEFENSE ENVIRONMENTAL AWARDS
U.S. ARMY NOMINATION

KARSTIN CARMANY-GEORGE,
INDIANA ARMY NATIONAL GUARD
CULTURAL RESOURCES MANAGEMENT, INDIVIDUAL



SUSTAINING THE ENVIRONMENT FOR A SECURE FUTURE

BACKGROUND

Karstin Carmany-George has served as cultural resources manager for the Indiana Army National Guard (INARNG) since 2004.

POSITION DESCRIPTION

Carmany-George has established a comprehensive cultural resources program that has received national attention. Based at Camp Atterbury in Edinburgh, Ind., she is responsible for managing cultural resources on all lands leased or managed by the INARNG. With approximately 33,000 acres and more than 400 archaeological sites, Camp Atterbury is the largest INARNG-managed property. INARNG recently acquired the Muscatatuck Urban Training Center (MUTC), a 979-acre property with over 50 archaeological sites and a historic district comprised of 34 structures and six features. Camp Atterbury and MUTC account for about 90 percent of Carmany-George's workload; she spends the rest of her time managing the 17 INARNG properties that have been identified across the state as eligible for listing on the National Register of Historic Places.

ACCOMPLISHMENTS

Overall Cultural Resources Management

Carmany-George is responsible for both cultural resources and compliance, which gives her a wide knowledge base from which to enforce all

"Before Kari came on board, we weren't doing a good job communicating with our internal and external stakeholders. There were growing pains at first, but Kari has really brought them into the CRM process and developed a comprehensive program. Her biggest impact was with our new Muscatatuck Urban Training Center. She worked with the SHPO, local and state historic preservation groups and Native American tribes to streamline the process so that we could start building the site to meet the ARNG's vision. We wouldn't have the program or be where we are today with the Muscatatuck Urban Training Center without her."

-LTC Rick Jones, Supervisory Environmental Specialist for INARNG



This welcome sign greets visitors to Muscatatuck Urban Training Center.

rules and regulations. She significantly rewrote and updated the Integrated Cultural Resources Management Plan (ICRMP) to clarify processes and improve the overall document use. The plan was approved at the completion of its first five-year review. The ICRMP also includes Carmany-George's processes for follow-up and oversight, which ensure that all steps are completed to satisfy Section 106 of the National Historic Preservation Act and any other compliance rules when new projects are undertaken.

She has also written a memorandum of understanding (MOU), memorandum of agreement (MOA), and is in the process of writing programmatic agreements with the State Historic Preservation Office (SHPO), which will streamline work at the historic sites on installations throughout the state.

The cultural resources program budget has increased significantly since Carmany-George was hired. In prior years, no funding was budgeted for Section 106 or 110 compliance, site monitoring or programmatic agreements with the SHPO. Only \$50,000 was programmed every five years for the ICRMP. Carmany-George's FY 2008 budget is approximately \$190,000. She conducts the fieldwork and writes Section 106 archaeological reports for over 95 percent of all new construction projects at Camp Atterbury. She has written more than 140 Section 106 consultative letters to the SHPO and conducted over 140 cultural resource investigations during the past two years. By

completing this work in-house, she has realized cost savings of approximately \$500,000 to the National Guard Bureau (NGB) and INARNG.

Carmany-George's goals as cultural resources manager are detailed below in Figure 1.

Figure 1. INARNG Cultural Resources Program Goals	
•	Maintain compliance even under mobilization. Camp Atterbury has 20 miles of tactical trails – much more than any other National Guard training installation.
•	Develop a good native compliance program.
•	Develop a programmatic agreement for archaeological sites at Muscatatuck.
•	Develop a programmatic agreement to streamline the Section 106 process for Camp Atterbury and other INARNG properties.

Historic Buildings and Structures

Carmany-George has overseen projects to evaluate all Indiana National Guard structures over 50 years old for National Register eligibility. She maintains these sites and structures, including a rail car at Camp Atterbury, an Italian POW chapel and a rock into which Italian POWs carved the camp's name.



Carmany-George has overseen projects to evaluate all Indiana National Guard structures over 50 years old for National Register eligibility. The POW Chapel pictured above is a historic structure.

Muscatatuck Urban Training Center

In 2005, the INARNG acquired the 979-acre, secluded, self-contained community once home to the Muscatatuck State Developmental Center and turned the site into the Muscatatuck Urban Training Center, a continually evolving contemporary urban training environment. The site includes a hospital building and 67 other structures such as a power plant, sewer plant and school. While preparing to convert the site to the training center,

Carmany-George developed a mitigation plan for the Muscatatuck buildings that was agreeable to all consulting parties, including the SHPO and Native American Tribes. The mitigation plan opened immediate lines of communication so all parties were kept informed and the project stayed on schedule. She coordinated with and educated partners early, at the time of the SHPO consultation. To more effectively use resources, the initial evaluation did not focus on each individual building; instead, the survey letter was written for the site as a whole. The facility went from never having been surveyed to executing an MOA in 16 months.



The Muscatatuck site has its own power plant, pictured above.

Currently, Carmany-George has nearly completed the Level II Historic American Buildings Survey documentation of 34 buildings and 6 features, a process that began in October 2006. She has overseen the inventory and evaluation of all buildings and the archaeological survey of 505 acres of the 979-acre property. She served as the technical reviewer for the archaeological and architectural reports that resulted from the inventories. She also directed the development and writing of an MOA with NGB, SHPO, and several local historic groups to guide mitigation of the structures at Muscatatuck. This agreement allows unrestricted use of the buildings for training purposes. Carmany-George worked with the SHPO and six other stakeholders in expediting the Section 106 process, which was key to the acquisition of the property and the INARNG's continuing efforts to convert the property into the urban training center.



The school located on Muscatatuck is complete with a bowling alley and gymnasium.

Expediting the acquisition process was important because the site's training capacity is valuable to the Army and Departments of Defense and Homeland Security. The training mission is to create a city-like environment to train troops, first responders, police and other individuals in both foreign and domestic scenarios. In its first year of operation, the facilities at Muscatatuck have been used by more than 16,000 people from military, government and private agencies.

Archaeological Resources

Carmany-George has drafted in-house a statewide programmatic agreement with the SHPO to streamline the Section 106 process for all INARNG properties. She has also implemented a statewide building inventory and evaluation schedule.



Carmany-George directed the development of an MOA for the conversion of the Muscatatuck hospital to the training center.

During the inventory, she identified 12 new archaeological sites and revisited 30 known sites, resulting in the determination that two of the new and one of the known sites require further

investigation for Register eligibility. In the past two years, Carmany-George has cleared the way for 392 acres worth of new construction or ground disturbance at Camp Atterbury. Camp Atterbury has also installed 57 miles of new or rehabilitated trails. Before a new trail can be constructed, an archaeological survey is conducted to ensure that the trail will not cut through any archaeological sites or cultural resources.

Camp Atterbury's 33,000 acres contain over 400 recorded archaeological deposits that require monitoring and management. Carmany-George developed and implemented a site-monitoring program, utilizing GIS, to assess site status and develop more accurate GIS data layers for protection and planning purposes.



Carmany-George conducts an archaeological survey.

Native American Program

Carmany-George's outreach work is focused on Native American tribal consultation. Several federal laws mandate that federal agencies conduct government-to-government consultation with American Indians regarding traditional, sacred and religious properties located on federal lands or land that will be affected by a federal undertaking. The INARNG did not have an active program to accomplish this before Carmany-George was hired. Carmany-George is building on a consultation workshop held in Indiana in May 2004 to begin formalizing consultation procedures and requirements. The first consultation meeting, to which all 16 tribes affiliated with Indiana have been invited, will be held this April 2007.

She is also currently planning a consultation meeting in Indianapolis that will be a move toward developing a programmatic agreement to manage the potentially significant archaeological sites at Muscatatuck. This outreach is creating a positive

working relationship between the INARNG and the tribes. INARNG properties currently do not have any identified sacred sites or artifacts, and the INARNG has had no Native American Graves Protection Repatriation Act issues.

Curation

Carmany-George made the case to the SHPO that representative artifact curation, rather than 100 percent collection, should be conducted on most post-contact sites. Along with an increase in time and money, 100 percent collection can be difficult because of the space constraints within curation facilities. A representative curation saves a tremendous amount of field time during an investigation. At \$175 per cubic foot of space at the state museum, the strategy of not collecting every brick or concrete block on an archaeological site saves the government hundreds, sometimes thousands, of dollars for each site with curated archaeological material.

Carmany-George is in the process of determining preservation measures for uncovered artifacts. These may be preserved in situ, particularly if the area is likely to remain largely undisturbed. In the event that the area will be compromised by new construction or other activities, she works with the Indiana State Museum to curate the artifacts and is developing a curation agreement with the Indiana State Museum. Carmany-George developed an MOU and coordinated with Jennings County Historical Society to facilitate the transfer of any items from the Muscatatuck buildings that are historically significant and that document the site as it was in the 1930s to the society for display and educational purposes.

Cultural Resources Awareness and Education

Carmany-George has presented at the NGB conservation workshop, SHPO, other local historical societies and worked with other guard cultural resource managers to share challenges and success stories of the Muscatatuck site.

Part of Carmany-George's success can be attributed to her training internal offices in proper cultural resources management protocols for new construction, digging, maintenance and other ground disturbing activities. These protocols

encourage the offices to communicate at the onset of a project, which allows Carmany-George to complete the cultural resources management related surveys, documentation and mitigation in a timely manner so project schedules are not impacted. Since 2004, Carmany-George has written cultural resource investigative reports and consulted with the Indiana SHPO for over 140 separate projects. She is in the process of developing cultural resources videos to be shown to new employees coming into Camp Atterbury. She conducts two annual training programs: 1) to educate equipment operators on the procedures for breaking ground; and 2) to train program managers and Department of Public Works personnel in the benefits of internal cooperation. She also delivers training packages to Armory managers across the state.



Carmany-George is shown above conducting a training class.

Community Relations

Carmany-George has provided information and educational opportunities for neighboring communities. She participated in open houses at the Muscatatuck site to present the history of the facility and the cultural resources management issues associated with INARNG's use of the facility. She partners with Purdue University, which will be using Muscatatuck as a lab facility for its Homeland Security courses. Purdue and Carmany-George are collaborating to develop a virtual tour of Muscatatuck. Other ways that Carmany-George is involved with the community are detailed in Figure 2.

Environmental Enhancement

Carmany-George is developing a cemetery restoration workshop that will also act as a community outreach program. The workshop will focus on maintenance, restoration and recordation of headstones at 10 known historic cemeteries located on INARNG-managed

Figure 2. Community Involvement

- Provides tours of 8 cemeteries on Camp Atterbury and 2 on Muscatatuck
- Reaches out to involve more local conservation groups, like Jennings County Historical Society, the Historic Landmarks Foundation of Indiana, and other interested citizens
- Volunteers at Indiana University/Purdue University Fort Wayne during Archaeology Month
- Member of the Indiana Archaeology Council
- Member of the Indiana Division of the National Association of Environmental Professionals

properties. Working with the SHPO and local preservation groups, she will give preference to citizens of the communities surrounding Camp Atterbury and Muscatatuck. The workshop serves several purposes that include giving back to the communities near INARNG properties and creating an educated volunteer force that can help with cemetery preservation. Carmany-George’s cultural resource briefings to troops helps raise awareness of federal and state cultural resources laws thereby reducing Archaeological Resources Protection Act violations. The briefings serve to raise the awareness of troops to the presence of resources to reduce site damage and increase training area safety.

Mission Enhancement

Carmany-George works hard to maintain training and increase efficiency. By working closely with the SHPO, she is able to streamline the entire cultural resources management operation and ensure INARNG activities are not threatened by problems with cultural resources. Surveys and

evaluations clear training lands and buildings for use, for example, the 57 miles of new and rehabilitated tactical trails and 392 acres of range and facility development already mentioned. Her work to mitigate the effects to the Muscatatuck urban training site, a \$50 million project, will provide troops with invaluable training opportunities in urban fighting, which the troops need to be successful in Iraq and Afghanistan. Carmany-George is also ensuring that the INARNG cultural resources program can continue without her. The revisions to the ICRMP and her focus on training across internal offices have built a strong foundation for the program.



Aerial photograph of some of the buildings on the Muscatatuck Urban Training Center.

Cultural Resources Compliance

Before Carmany-George arrived, the INARNG had little contact with the SHPO and they were not meeting all of their legal requirements to satisfy Section 106. Now that they have conducted consultations, they are currently at 100 percent compliance with the law.

CONCLUSION

With expertise in archaeology and knowledge of architecture; a streamlined, efficient administrative approach; and extensive technical skills, Carmany-George is building a cultural resources program at INARNG that has become indispensable to the INARNG environmental program and proven the value of a comprehensive program.



Troops train at the Muscatatuck Urban Training Center.

On the cover: U.S. Army Sgt. 1st Class Michael Fields, center, with the 396th Combat Support Hospital (Forward), listens to a class on improvised explosive devices located at Camp Atterbury, IN. (U.S. Army photo by Staff Sgt. Russell Llee Klika)

FISCAL YEAR 2006

SECRETARY OF DEFENSE ENVIRONMENTAL AWARDS
U.S. ARMY NOMINATION

CAMP EDWARDS TRAINING SITE
MASSACHUSETTS ARMY NATIONAL GUARD
NATURAL RESOURCES CONSERVATION, LARGE INSTALLATION



SUSTAINING THE ENVIRONMENT FOR A SECURE FUTURE

INTRODUCTION

Camp Edwards is a critical year-round training area in the Northeast United States for Army air assault, war fighting simulation and engineering training. It is home to the Massachusetts Army National Guard (MAARNG) and host to other armed forces components, law enforcement agencies and civilian organizations. The Camp Edwards Training Site, located on the upper western portion of Cape Cod in Barnstable County, Mass., is a 15,500-acre area that makes up the lion's share of the 22,000-acre Massachusetts Military Reservation (MMR). The camp is subdivided into 23 designated training areas and 20 firing ranges dedicated to realistic multi-echelon combat training and lanes training. The camp supports a permanent military and civilian population of 320; however, more than 36,600 Soldiers and 17,200 civilians participated in training events at Camp Edwards over the past year.

Camp Edwards has the single largest tract of open space on Cape Cod. Since much of the Cape has been developed, the area provides the only habitat for many rare plant and animal species.



The spotted salamander thrives in Camp Edwards' pine barren ecosystem, as do many Massachusetts threatened or endangered species, including the Chain-dotted Geometer, one of 20 rare Lepidopterans found in the area.



The Camp Edwards Training Site, located on the upper western portion of Cape Cod in Barnstable County, Mass., is a 15,500-acre area that makes up the lion's share of the 22,000-acre Massachusetts Military Reservation.

While only one of these species is found on the federal list, there are 39 state-listed species at Camp Edwards identified by the Commonwealth of Massachusetts as threatened, endangered or of special concern. They occur in a rare pine barren ecosystem that is unique to Southeastern Massachusetts and Cape Cod.

Management of the natural resources on Camp Edwards is balanced, documented, implemented and coordinated through the Integrated Natural Resource Management Plan (INRMP) developed by the Environmental and Readiness Center. The INRMP covers 15,500 total acres, of which ~200 is improved, ~300 is semi-improved and the remainder is unimproved. These acres include 15,000 acres of managed pitch pine scrub-oak forest, the largest in New England.

BACKGROUND

The natural resource office at Camp Edwards has the considerable challenge of managing seven natural communities while supporting its training mission. The INRMP at Camp Edwards has been in place as the foundation of the Environmental and Readiness Center's management efforts since October 2001. The INRMP is currently in its five-year revision and is going through the National Environmental Policy Act (NEPA) process. It will be complete by April 2007. Cooperative agreements

that support the INRMP and their dates of preparation and revision are listed in Table 1.

Table 1. Cooperative Agreements		
Agreements	Prepared	Revised
MA Department of Conservation and Recreation	November 2006	N/A
MA Chapter of The Nature Conservancy	January 2004	N/A
Cape and Islands Senior Environment Corps	September 2003	N/A
State of MA and the MMR MOA	March 2002	Codified into law, Chapter 47 of the Acts of 2002
State of MA and the DoA MOA	October 2001	N/A

The hands and feet of the INRMP is a natural resource office that is staffed by a natural and cultural resources manager, a natural resources planner, a Geographic Information Systems (GIS) manager, a GIS technician and seasonal field crews. This staff works closely, during regular meetings, with Camp Edwards facilities engineers, the Integrated Training Area Management (ITAM) team, range control personnel and the command staff as a means of truly integrating the environmental efforts on post. Collocation of the natural resources staff and facilities engineers fosters open communication and coordination of environmental activities with training needs.

The natural resource office of the Environmental and Readiness Center at Camp Edwards executes the goals of its INRMP in cooperation with a commission established by legislation in 2002 enacted to ensure the permanent protection of the drinking water supply and wildlife habitats at the MMR while allowing compatible military training. This Environmental Management Commission (EMC) is made up of the commissioners of the MA Department of Fish Wildlife and Environmental Law Enforcement, the MA Department of Environmental Protection, and the Department of Conservation and Recreation.

The EMC oversees compliance with and enforcement of specified Environmental Performance Standards and coordinates the actions of environmental agencies in the enforcement of environmental laws and regulations within Camp Edwards. The EMC is also supported by two advisory councils that assist the EMC by

providing advice on issues related to the protection of water and wildlife within Camp Edwards. These councils are the Community Advisory Council (CAC) and the Science Advisory Council (SAC). The Camp Edwards Environmental and Readiness Center works with EMC’s Environmental Officer to ensure the EMC and council members are up to date on environmental management programs and actions.

PROGRAM SUMMARY

The importance of Camp Edwards as a significant northeast United States training area is carefully balanced by the MAARNG and the Camp Edwards natural resource office with its importance as an area of critical habitat for many state-listed rare species. The goals of the Camp Edwards INRMP are to aid in improving the training lands while benefiting the natural resources through reduced soil erosion; improvement to the flora, fauna and their habitats; protection of wetland ecosystems; and conservation of rare species. In FY 2006 the Camp Edwards natural resource office met these goals through the following successes:

- Completed Integrated Wildfire Management Plan and Wildfire Response Plan.
- Coordinated six environmental and training initiatives through improved communications between the natural resource office and training directorates.
- Placed an engineering equipment training area and upgraded small arms ranges through extensive use of GIS as a management tool.
- Completed an Eastern box turtle study and a floral survey that show training may actually benefit endangered species.
- Recovered and restored 175 acres of training area and biodiverse habitat due to prescribed burning.
- Removed approximately 6,000 invasive plants to aid in the recovery of usable training area.
- Received funding for and coordinated the purchase of 10 new pieces of land management equipment to aid the Camp in cost effectively (in house) maintaining training lands.
- Restored 18 miles of protective firebreaks.

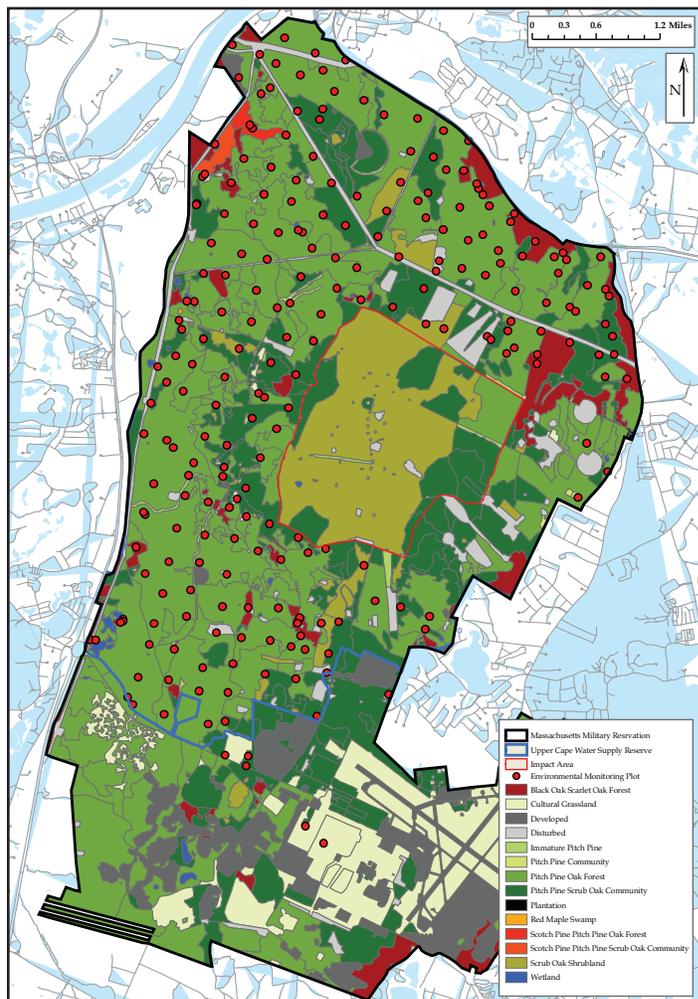
- Completed 20-acre wetland restoration.
- Repaired permanently one quarter mile of a chronically eroding combat trail.
- Aided Air National Guard in restoring 160-acre grassland by providing restoration advice and a prescribed burn team.
- Aiding in restoring the firing of lead by informing planners of natural resource concerns early in the process.
- Presented natural resource work in several public venues to instill public confidence in the use of the facilities land mass as a viable training site.

ACCOMPLISHMENTS

Overall Conservation Management

The amount of coordination among external and internal program partners it takes to execute and report on environmental successes at Camp Edwards places communication high on the list of priorities for the natural resource office. In FY 2006 the office focused its communication efforts on internal partners, particularly the range control division, the ITAM team, and facilities and engineering personnel, to ensure that environmental activities and training needs are aligned. Collocating itself in the same or near offices with these teams was a simple move that promoted integration of efforts through increased information sharing and planning, and resulted in greater coordination between trainers and environmental specialists.

Low-tech verbal communication and collaboration is matched on the opposite end of the spectrum with extensive use of a high-tech GIS to manage conservation and training activities at Camp Edwards. GIS is used in all directorates for environmental planning, spatial analysis of wildlife and creating a wildfire hazard model on the one side, and for developing land navigation and vehicle training courses, identifying restricted areas and producing Soldier cards and other map materials on the other. Making full use of this powerful management tool results in layers of data that can be used across the board to paint a comprehensive picture of what is happening and what is needed to ensure the success of Camp Edwards' environmental and training missions.



Camp Edwards uses GIS to map its many natural communities and monitoring plots.

The natural resource office at Camp Edwards relies on its collaborations to accomplish all that it needs to do. It also relies on sound financial management to preserve limited funds for costly initiatives. During the period of performance the office realized cost savings of over \$250,000 by conducting surveys, invasive species work, and the INRMP revision in house (see Figure 2, below).

Activity	Proposed Contract Cost	Actual In-House Cost	Cost Savings
INRMP Revision	\$75,000	\$5,500	\$69,500
2004 Surveys	\$115,000	\$59,000	\$56,000
2005 Surveys	\$120,000	\$58,000	\$62,000
2006 Surveys	\$120,000	\$60,000	\$55,000
Invasive Species	\$40,000	\$15,000	\$25,000
			TOTAL: \$267,500

Threatened and Endangered Species Management

One effect on the environmental program at Camp Edwards resulting from greater communication and coordination between trainers and environmental specialists is that Soldier training actually is contributing to the support of threatened and endangered species, such as the Eastern box turtle. According to a survey concluded in FY 2006, the Eastern box turtle was found to be more prevalent in areas used for training as opposed to areas that were not. Similarly, a five-year whip-poor-will survey, now in its third year, is showing that training disturbance and prescribed burns are benefiting this species by providing improved nesting and foraging areas. This species is thriving on Camp Edwards but declining elsewhere in Massachusetts and across the USA.



A whip-poor-will hen sits on a nest of chicks. Though they are declining elsewhere, these birds are thriving on Camp Edwards.

Along with the Eastern box turtle and the whip-poor-will studies, there are a total of 230 environmental monitoring plots at Camp Edwards, with 60 sites surveyed annually for wildlife and vegetation. These plots help determine community type classification, health of the training area, early detection of invasive species, military impacts and subsequent recovery times.

Monitoring data and survey work informs the internal community at Camp Edwards so that conservation and training activities can be coordinated. It also informs the external community. Results from these activities are duly provided to state and local authorities and the public in partnership with them to ensure the health of the environment at Camp Edwards. The

benefit is that interested parties can be assured precious natural resources are being cared for, and that military training is both compatible with and supportive of even the sensitive environment found at Camp Edwards.



One of Camp Edwards' 230 monitoring plots is surveyed to check its environmental health.

Land Use Management

The soil at Camp Edwards, which consists largely of sand and loam, has a high susceptibility to erosion. The natural resource office works hand-in-hand with the ITAM team to stabilize the soil and minimize negative impacts from training. Where erosion damage has occurred to tank trails and other vehicle pathways, the natural resources office staff used native soil materials to build them up and create a protective eight-foot bed. In addition, the staff used a bonded fiber matrix that naturally degrades over time to establish vegetation and prevent future erosion.

In addition to using combinations of native soil and bonded fiber matrix, another means employed to improve the quality of the land is fire. The pitch pine and scrub oak ecosystem at Camp Edwards is a fire adapted system that requires disturbance. The natural resources staff burns approximately 375 acres annually, with a goal of 600 acres, for forest health. Prescribed burning improves habitat and training areas by allowing for new growth and removing excessive cover that would otherwise impede training, thereby making more training land available to Soldiers.

Pest Management

Natural methods are also employed by the natural resources staff to pest management challenges. The staff tested non-synthetic herbicides, such as vinegar and salt mixtures, and applied them



Prescribed burns promote healthy grassland eco-communities.

with great success to invasive plants including the spotted knapweed. Where herbicides are necessary, the staff has decreased the amount of chemical needed effectively to kill invasive plants by cutting it down and simply painting the “stump” with the herbicide. By using the stump and paint approach, chemical herbicide use has been reduced to less than a gallon per year. Even so, in FY 2006 these methods resulted in an overall reduction of nearly 2,000 invasive plants.

Community Relations

The natural resource office prides itself on its efforts to reach out to stakeholders in the community interested in understanding the environmental initiatives at Camp Edwards. At the state level, it is conscientious to work within and be responsive to a public oversight structure established by state law, and annually publishes a report with regard to its activities with the goal of providing an extremely high degree of interaction and transparency. At the community level, the staff participates in many activities designed both to inform members of initiatives and share the rich environmental heritage of Camp Edwards:

- Publish annual updates and reports on training and environmental activities.
- Provide tours of Camp Edwards for interested community groups.
- Visit local towns to give natural resources program presentations.
- Teach students about the environment at local schools, K-12.

- Present special training at the local vocational technical school.
- Give annual presentations at the Cape Cod Natural History Conference and the Cape Cod Museum of Natural History.

TRANSFERABILITY

Camp Edwards’ natural resources staff actively shares its research and management experience with the military and the greater environmental community. Camp Edwards’ natural resources staff shares its work within the military, presenting at the National Guard Bureau conservation workshop, Range and Training Land Program, and ITAM conferences. The natural resources and GIS managers also serve on the National Guard Bureau Conservation and GIS Committees. Data is shared with local, state and federal agencies, and has been used in state wildlife management plans.

CONCLUSION

The Camp Edwards natural resources office has the considerable challenge of managing a globally threatened habitat while supporting an important training mission – all under the watchful eye of the community. This has resulted in a standard of excellence for Camp Edwards’ natural resources conservation program based on environmentally sound and innovative management practices, collaboration, training and awareness, and intentional community outreach. Proof of the program’s effectiveness is in the exceptional biological diversity at Camp Edwards – more rare state-listed species occur on Camp Edwards than on any other land mass in the state. Camp Edwards’ natural resources staff actively shares its research and management experience with the military and the greater environmental community; its data is shared with local, state and federal agencies, and has been used in state wildlife management plans. Camp Edwards works to maintain transparency to the community and regulators, and promote understanding of its efforts on behalf of the community and the nation.

On the cover: A Soldier assigned to Company C, 1st Battalion, 181st Infantry Regiment, 29th Infantry Division, Massachusetts Army National Guard scans the Caribbean Sea while on patrol in Guantanamo Bay, Cuba. (DoD photo)



FOR MORE INFORMATION ABOUT THE SECRETARY OF THE ARMY ENVIRONMENTAL AWARDS PROGRAM, GO TO [HTTP://AEC.ARMY.MIL/USAEC/PUBLICAFFAIRS/AWARDS00.HTML](http://aec.army.mil/usaec/publicaffairs/awards00.html), OR CALL THE U.S. ARMY ENVIRONMENTAL COMMAND PUBLIC AFFAIRS OFFICE AT (410) 436-2556.

