Secretary of Defense
Environmental Award Fiscal Year 2011
Environmental Restoration – Installation
Marine Corps Base Camp Lejeune, Jacksonville, North Carolina

INTRODUCTION

Commissioned: 1941

Mission: Maintain combat-ready warfighters for deployment and humanitarian missions abroad.

Population: More than 180,000 people including active duty, dependent, retiree, and civilian employees (including over 63,000 active duty and 11,000 civilians).

Acreage: 156,000 acres

Environmental Setting: The Base comprises 72,000 acres of upland forests, 49,000 acres of wetlands, 26,000 acres of water, and 7,500 acres of urban/developed land.

Geographical Setting: Located along the coastal plain of southeastern North Carolina. The Base encompasses a 92 mile perimeter, including approximately 14 miles along the Atlantic Ocean in the City of Jacksonville within Onslow County. Elevation ranges from sea level to 70 feet above mean sea level, with much of the topography traversed by swales, wetlands, streams, and creeks that drain into the New River that bisects the Base.

Marine Corps Base Camp Lejeune (MCB CamLej) Map

Political Setting: The City of Jacksonville is the county seat of Onslow County in North Carolina, largely a conservative state.

Economic Setting: MCB CamLej is the engine that drives the economies of the surrounding North Carolina communities generating nearly $3 billion in commerce each year. Jacksonville's primary industry is retail sales and services.

Community Setting: MCB CamLej enjoys a close relationship with neighboring civilian communities. The Base and Onslow County work together to ensure quality living for both military and civilians throughout the area.

INTRODUCTION

Environmental Restoration Challenges

Historical operations, storage, and disposal practices at MCB CamLej have resulted in environmental impacts to soil and groundwater across the Base. MCB CamLej was added to the National Priorities List (NPL) in October 1989. Currently, the environmental restoration team manages over 140 active sites, encompassing over 4,500 acres, under different environmental programs; including Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation, and Recovery Act (RCRA), and the Underground Storage Tank (UST) Program. The key challenge during this achievement period has been to keep all the sites moving through various stages of the investigation and cleanup process to ensure meeting the Navy's goals, while responding to immediate Base infrastructure and military construction (MILCON) requests to ensure mission-critical milestones are achieved.

Organization and Management Approach

MCB CamLej is a leading Department of Defense (DoD) facility, operating at the forefront of environmental restoration programs by maintaining collaborative relationships with regulatory agencies and the supportive local community. The Environmental Management Division

Navy's Goals

- ✓ **Complete Preliminary Assessment/Site Investigation (PA/SI) phase at Military Munitions Response Program (MMRP) sites by Fiscal Year 2010**
- ✓ **Achieve remedy in place (RIP) at Installation Restoration Program (IRP) sites by Fiscal Year 2014**

(EMD) leads the environmental compliance and restoration programs for the Base. The Base's IRP is led by Ms. Charity Rychak, the EMD Remedial Project Manager, with support from Project Managers, Mr. Nick Schultz and Mr. David Lundquist, who continue the program's legacy for quality and expediency in addressing environmental issues during this achievement period.

MCB CamLej Partnering Team

The Base IRP is supported by technical, acquisition, and legal professionals across the Naval Facilities Engineering Command (NAVFAC) organization, including Remedial Project Managers, Mr. Dave Cleland and Mr. Bryan Beck, and an experienced Partnering Team. Formed in the early 1990s, the Partnering Team consists of representatives of the Base, Navy, U.S. Environmental Protection Agency (USEPA), North Carolina Department of Environment and Natural Resources (NCDENR), and four environmental consulting firms. The Partnering Team holds quarterly in-person meetings to facilitate site investigation and cleanup with an ultimate goal of delisting MCB CamLej from the NPL.

Community Involvement Programs

The Base's community involvement program includes the Restoration Advisory Board (RAB), created in 1995, that meets quarterly to provide an information exchange among community members, the Navy, MCB CamLej, USEPA, and NCDENR. In addition, the Base reaches out to the community through site tours, public meetings, two public web sites, Information Repositories at local libraries, sponsoring annual Earth Day events, issuing fact sheets, and announcements published in local and Base newspapers.

MCB CamLej RAB Meeting

MCB CamLej Earth Day 2011

Environmental Restoration Agreements and Plans

The environmental response program has multiple agreements and plans to guide the management of the CERCLA, RCRA, and UST programs. Below is a list of the most recent updates.

Agreements and Plans	Last Revision
CERCLA Federal Facility Agreement	February 1991
CERCLA Community Involvement Plan	February 2011
CERCLA Five-Year Review	August 2010
CERCLA Site Management Plan	October 2011
RCRA Site Management Plan	December 2011
UST Site Management Plan	June 2009

The following action documents were completed during the achievement period to either address potential risks to human health and the environment or document where no action was warranted.

Action Documents	Achievement Period	Total
CERCLA Engineering Evaluation/ Cost Estimates	3	17
CERCLA Pilot/Treatability Studies	2	12
CERCLA Records of Decisions	0	35
CERCLA No Further Action Decision Documents	20	20
RCRA Interim Measures	3	11
RCRA Statements of Basis	0	4
CERCLA and RCRA Land Use Control Implementation Plans	4	29
UST No Further Action Documentation	11	237
Total	43	365

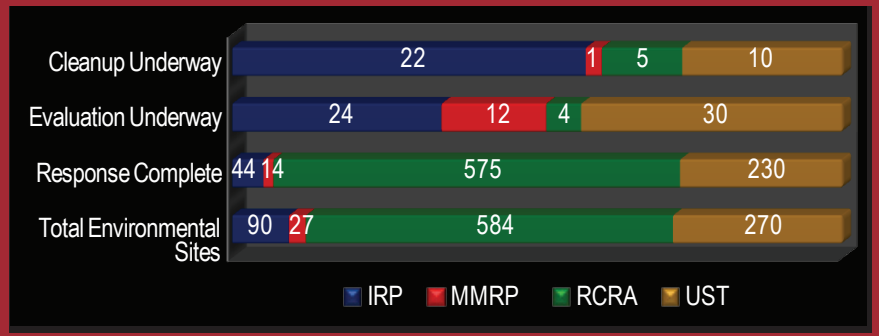
Initiatives

The key initiatives to improve the environmental restoration program during this award period were to:

- Conduct Expanded Site Investigations (SIs) to collect additional data to obtain closure of Military Munitions Response Program (MMRP) sites in lieu of more costly Remedial Investigations/Feasibility Studies/Proposed Remedial Action Plans/Records of Decision (RI/FS/PRAP/ROD)
- Begin re-evaluation of sites with costly and asymptotic remedies in place to identify better treatment alternatives in the future
- Evaluate green remedial alternatives in Feasibility Studies which are more sustainable in the long run when compared to energy or land intensive approaches
- Communicate with the NCDENR regarding off-Base sites with potential contamination migrating on-Base
- Develop various fact sheets to better communicate site activities with Base workers and residents
- Improve and update the Navy and Base public web sites as communication tools with the public and RAB

PROGRAM SUMMARY

The objective of the environmental restoration program is to evaluate and cleanup sites that pose unacceptable risk to human health and the environment. The chart below depicts the program's overall progress in addressing sites. During the achievement period, over 40 action documents were completed resulting in closure of over 30 sites. To date, we have completed environmental response activities at over 850 sites and investigation and cleanup is underway at over 100 sites. The remaining sites are the most technically challenging and complex. Innovative and green technologies are being evaluated to achieve faster remediation times and cost effectiveness in the long-term while keeping the Base's mission in focus.



Environmental Restoration Site Status

Throughout implementation of the environmental restoration program, the Base and Grow the Force initiatives to support MILCON and train warfighters have been critical components in expediting sites through the investigation and cleanup processes. The Team strives to streamline processes while protecting human health and the environment and to maintain exemplary leadership that can be utilized as a model for other environmental programs. Some of the key accomplishments during the achievement period are detailed below.

Fiscal Year 2010 Award – Environmental Restoration-Installation

ACCOMPLISHMENTS

Accelerated Environmental Cleanup

The overall Environmental Restoration Program is working at an accelerated pace to meet MILCON schedules and the Navy's goals for addressing sites. MILCON projects are underway for land reuse and development at the former Skeet Range for the Wallace Creek development, expansion of the permitted Borrow Pit, Phase IV of the Base landfill expansion, Camp Devil Dog Marine Combat Training School of Infantry, and the Henderson Pond recreation area. These projects were planned within former range areas or waste disposal areas that need clearance prior to MILCON. Over

Property Reuse at Wallace Creek

Borrow Pit Expansion

Devil Dog Controlled Detonation Set-Up

Devil Dog Munitions Debris

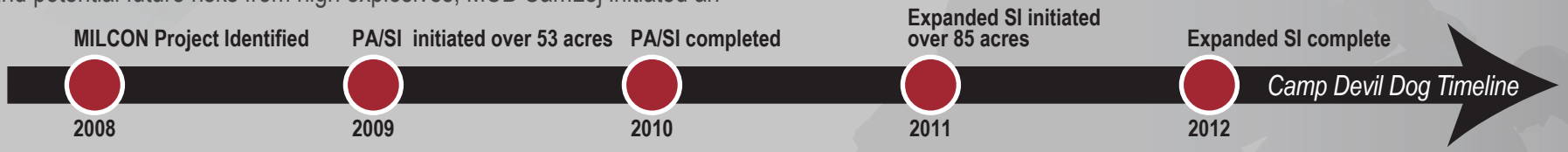
Devil Dog Controlled Detonation Set-Up

500 acres of IRP and MMRP sites were cleared and released for MILCON during this achievement period. When comparing to other Department of Defense (DoD) facilities, Camp Lejeune is a leading Base in the percentage of sites and acres cleaned up to date.

A project that highlights accelerated cleanup at MCB CamLej is the Camp Devil Dog project. Each year, roughly 21,000 Marines pass through Camp Devil Dog, receiving training including land navigation, first aid, defensive combat, offensive combat, and night maneuvers. The training facility was identified for an upgrade in late 2008. All or portions of eight former ranges lie within the training area and were added to the MMRP as UXO-19. A PA/SI was initiated in early 2009 within 53 acres that overlapped the former ranges to identify whether munitions and explosives of concern (MEC) were an issue. Digital geophysical mapping (DGM) was conducted over 10% of the range areas and 100% of the MILCON footprint for the Applied Instruction Facility. A total of 4,645 anomalies were identified as representing potential subsurface MEC. The PA/SI was completed and documentation was finalized in 2010. Forty-two MEC items were discovered, all of which were demilitarized onsite via seven controlled detonations. Three of these items were located within the MILCON footprint. Based on these findings and potential future risks from high explosives, MCB CamLej initiated an Expanded SI to conduct 100% intrusive investigation and clear the 85-acre training facility for the safety of construction workers and Marines. In 2011, a large team of up to 40 unexploded ordnance (UXO) technicians was mobilized to clear the active Camp Devil Dog training area. The clearance was conducted in a phased approach to accommodate Marine training activities and ongoing MILCON. Almost 50,000 geophysical anomalies were identified, over 360 MEC items have been discovered, and 74 have been demilitarized using blow-in-place or controlled detonation procedures. The clearance is scheduled to be completed in early 2012, in less than a year. Typically, this type of investigation may take up to 3 years.

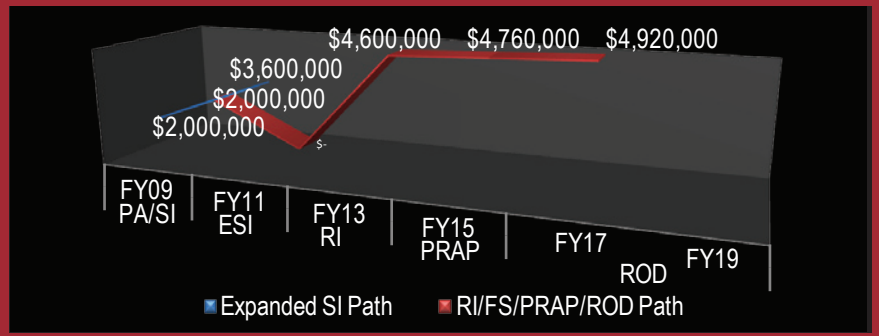
Innovative Technology Demonstration/Validation and Implementation

For MMRP sites at MCB CamLej, if geophysical anomalies representing potential subsurface MEC or low-level munitions-related constituents were identified during the PA/SI, an Expanded SI phase was initiated. Expanded SIs were conducted at 8 sites to confirm whether there was site-specific contamination or hazards prior to moving forward with a Remedial Investigation (RI). So far, this approach resulted in closure of 6 sites with no further action, a non-time critical removal action at 1 site, and 1 site moving forward to the RI phase. The Expanded SIs were conducted on an expedited sched-



MMRP Expanded SI Approach

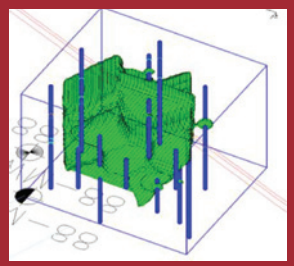
ule to be completed by the end of Fiscal Year (FY) 2011 for rescoring in the Munitions Response Site Prioritization Protocol. Conducting these Expanded SIs in lieu of more costly RI/FS/PRAP/ROD resulted in cost avoidance of over $1MM.

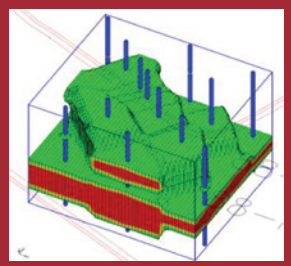


Cumulative Cost Avoidance for MMRP Sites

At MMRP sites to date, over 65,000 anomalies have been identified resulting in over 330 MEC items found, over 50 blow-in-place events performed, over 10,000 material potentially presenting an explosive hazard (MPPEH) were found, and more than 26,000 pounds of material documented as safe (MDAS) were recycled.

During this achievement period, our Team supported and validated an innovative technology to enhance scientific advancements in treating dense-non aqueous phase liquid (DNAPL). Environmental Security Technology Certification Program (ESTCP), a DoD environmental research program, conducted a project at Site 88, the largest and most complex chlorinated solvent plume on-Base due to the depth of contamination and location at Mainside. ESTCP evaluated the effectiveness of enhancing permanganate distribution with xantham gum. Their test had successful results and doubled the influence of permanganate in DNAPL treatment.





Left: Control Plot

Right: Test Plot with Xanthum Gum

Site 88 ESTCP Project

Partnerships Addressing Environmental Restoration Issues Between DoD and Other Entities

During this achievement period, the NCDENR UST program requested proper documentation for UST sites located within IRP and RCRA sites. The Base worked with NCDENR and identified 17 UST sites requiring further action per UST regulations. Record searches and data reviews were conducted to determine whether sufficient UST data was collected at each site. The data reviews resulted in further investigation at six sites. Reports were submitted to NCDENR for each of the 17 sites to document actions to-date. No further action was requested and/or approved by NCDENR at 10 sites and land use restrictions are being put in-place at seven sites. This process accelerated closure of the UST sites versus awaiting IRP or RCRA site closeout.

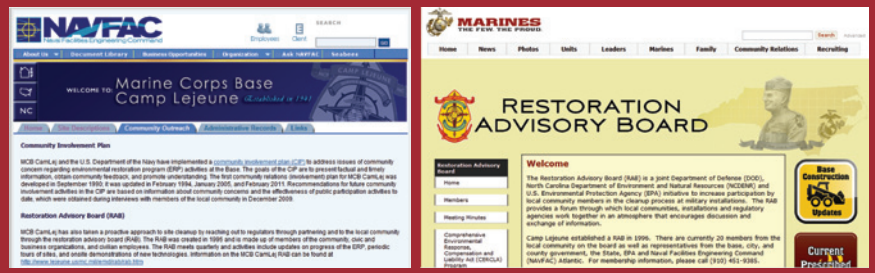
UST at IRP Site Investigation

Base Boundary Investigation

MCB CamLej conducted an evaluation to identify potential environmental risks posed to the Base by current and historical land use practices at properties adjacent to the Base boundary. Based on the results, potential on-Base groundwater impacts were identified at four areas where volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) were detected at concentrations above regulatory standards. The compounds detected are likely associated with off-Base historical dry cleaners or petroleum releases. Letters were submitted to NCDENR and USEPA regarding the four areas of concern to request further assessment of potential off-Base sources. Two of the four areas have been approved for further assessment by the State and/or USEPA. This topic has been discussed with the community at recent RAB meetings.

RABs

The MCB CamLej Restoration Advisory Board (RAB) was created in 1995 and is made up of members of the community, civic and business organizations, and civilian employees. The RAB meets quarterly, and provides tours, on-site demonstrations of new technologies, informative discussions, and shares lessons learned. Because the community is very active in the RAB and the cleanup program at MCB CamLej, the Base and Navy improved and updated their public web sites during this achievement period to provide better communication tools. At a recent RAB meeting, real-time demonstrations were provided to walk through the websites layout and content. The Navy and Base provided handouts with the website addresses and contact information to solicit feedback. The websites were well-received by the RAB and found to be a useful tool for two-way communication.



Navy and Marine Corps Public Websites

Opportunities for Small and Small Disadvantaged Businesses in Environmental Restoration

During this achievement period, the Navy and Base increased opportunities to four small businesses by awarding 79 contract actions for CERCLA, RCRA, and UST sites totaling $15.3MM. This is a 15-fold increase from the last achievement period, when only $1MM was awarded to small businesses. The complexity of the projects awarded to small businesses were also increased based on proven past performance. To gain technical support and regulatory acceptance, small businesses have often reached out to the large businesses on the Team to share lessons learned and provide technical expertise and guidance. The small business project opportunities during this achievement period included investigations, spill response, Remedial Designs, Removal Actions, operation and maintenance of Base treatment systems, investigation-derived waste management, land use control management, and long-term monitoring.

Small Business Opportunities FY2010-FY2011

Removal Action by Osage of Virginia

Reducing Risk to Human Health and the Environment

Over recent rounds of long-term groundwater monitoring at IRP Site 6, chlorobenzene has been detected and was not originally identified as a chemical of concern. The Team initiated an investigation to identify the source of chlorobenzene based on the location within a waste disposal area. During the investigation, two drums were uncovered in a test pit resulting in elevated breathing zone measurements. Soil samples were collected from the test pit and the results indicated chlorobenzene concentrations in soil at 70 million parts per billion. A Time-Critical Removal Action was initiated to address the continuing source of contamination to groundwater and to the distal Wallace Creek, posing a potential risk to human health and the environment. Approximately 42 cubic yards of hazardous soil and buried debris were removed. The Time-Critical Removal Action was completed within three months of receiving the sample results. Three intact drums and one partial drum, all containing liquid, were uncovered during the excavation activities. Ongoing chlorobenzene investigations at Site 6 include further evaluation of the nature and extent in soil and groundwater. Based on these results, the remedy in place at Site 6 will also be reevaluated to ensure continued protectiveness of human health and the environment.

MCB CamLej re-evaluated 20 former waste disposal sites that were closed during the 1983 Initial Assessment Study without environmental sampling. Historical records searches and environmental sampling were conducted to confirm whether potential risks to human health or the environment were

Site 6 Drum Discovery

Site 6 Time-Critical Removal Action

present. Based on the results, 5 sites were identified for an additional round of sampling and only 2 sites (Sites 15 and 49) were recommended for re-opening under the environmental restoration program. Potential unacceptable human health and ecological risks were identified from VOCs in groundwater at Site 49 and a RI/FS will be completed in FY2012 to meet the Navy's goal for remedy in place by FY2014.

Green Remediation

At MCB CamLej, green and sustainable remediation (GSR) doesn't just start at the remediation phase, but begins early in the regulatory process. The IRP's strategy for implementing GSR revolves around thoroughly characterizing sites to minimize the volume of media to remediate and seeking out sustainable remediation alternatives, such as passive or in situ approaches. For the remediation evaluations, the Team looks to passive and in situ approaches which are more sustainable in the long run when compared to energy or land intensive approaches such as pump and treat or excavation and offsite disposal. Low intensity characterization tools such as passive diffusion bags, passive soil gas sampling and direct push technology are successfully implemented. These tools result in a lower environmental footprint for the life of the project. The green approaches during this achievement period include:

- During the technology evaluation phase, each approach is evaluated using SiteWise™, a life cycle analysis tool developed by the Navy and Army, to identify the environmental impacts for each remedial technology evaluated. The IRP actively looks to passive approaches to remediate their sites.

Site 86 Permanganate Candles

- Currently, an innovative approach of slow release permanganate candles is being evaluated in the field at Site 86. This is a passive use of permanganate to treat a dilute VOC groundwater plume. The candles are installed once using direct push technology and the permanganate slowly diffuses into the groundwater over time to treat the surrounding groundwater and groundwater that flows into the treatment area.
- A permeable reactive barrier using mulch as the substrate has been approved by the Team and will be implemented during the upcoming remedial action at Site 89.
- At Site 49, solar air sparging is being evaluated during the Feasibility Study phase.
- During MMRP site investigations and clearance, more than 250,000 pounds of metal and concrete debris have been uncovered and recycled on-Base.

As MCB CamLej keeps GSR thinking integrated throughout the projects, we are finding sustainable solutions that are protective to human health and the environment, cost effective, and prove to have lower environmental impacts during the life of the project.

Metal Debris for Recycling

SUMMARY

MCB CamLej continues to make tremendous progress in cleaning up sites. During this achievement period, the environmental restoration program cleared and released over 500 acres of IRP and MMRP sites for MILCON and reuse, avoided costs of over $1MM through a streamlined approach to addressing MMRP sites, and supported scientific advancements in DNAPL treatment. MCB CamLej continues to look towards the future by remaining committed to the Base's mission of training warfighters while restoring sites to protect human health and the environment.