



Introduction

The mission of Marine Corps Base Camp Lejeune (MCB CamLej) is to maintain combat-ready units for expeditionary deployment. To help prepare warfighters for combat and humanitarian missions abroad, MCB CampLej takes advantage of 236 square miles (156,000 acres) including 11 miles of beach capable of supporting amphibious operations, 34 gun positions, 50 tactical landing zones, three state-of-the-art training facilities for Military Operations in Urban Terrain and 80 live fire ranges. MCB CamLej provides housing, training facilities, and logistical support for Fleet Marine Force Units and other assigned units. The land use is diverse and encompasses 26,000 acres of water, 29,000 acres of forested wetlands, 20,000 acres of non-forested wetlands, 72,000 acres of upland forests, and 7,500 acres of urban/developed land.

MCB CamLej Map



MCB CamLej is located in Jacksonville, North Carolina within Onslow County. The community is home to an active duty, dependent, retiree and civilian employee population of over 150,000 people. The Base is a major economic presence for the surrounding communities and maintains a close relationship with them to ensure quality living for both military and civilians throughout the area.

Background

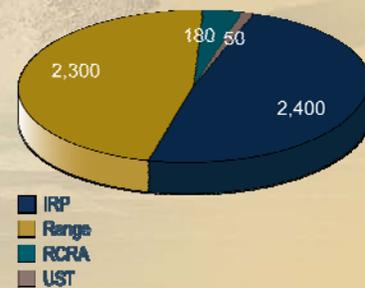
MCB CamLej is a multiple recipient of the Secretary of the Navy and Secretary of the Defense Awards for Environmental Restoration. The Base continues to be a leading Department of Defense (DoD) facility, operating at the forefront of environmental restoration programs, and maintains outstanding relationships with regulatory agencies and the local community. Particular environmental challenges encountered over the past two years include responding to the increase in Marine forces and associated infrastructure needs, reducing dense non-aqueous phase liquid (DNAPL) contamination using innovative technologies, and implementing recent vapor intrusion guidance.

Organization and Management Approach

The Environmental Management Division (EMD) leads the environmental compliance and restoration programs for the Base. Their mission is:

"...to protect current and future training capabilities by respecting and maintaining the natural environment..."

Environmental Program Acreages



EMD successfully manages over 80 sites, encompassing almost 5,000 acres under four different environmental programs, including the Installation Restoration Program (IRP), the Military Munitions Response Program

(MMRP), the Solid Waste Management Unit (SWMU) Program, and the Underground Storage Tank (UST) Program, and manages to keep all of the sites moving through the various stages of the remediation process. The IRP and MMRP sites are addressed under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the SWMU and UST sites are addressed under Resource Conservation and Recovery Act of 1976 (RCRA) regulations.

Mr. Robert Lowder, the EMD Remedial Project Manager, 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, the Navy, U.S. Environmental Protection Agency (USEPA), North Carolina Department of Environment and Natural Resources (NCDENR), and environmental consulting firms.

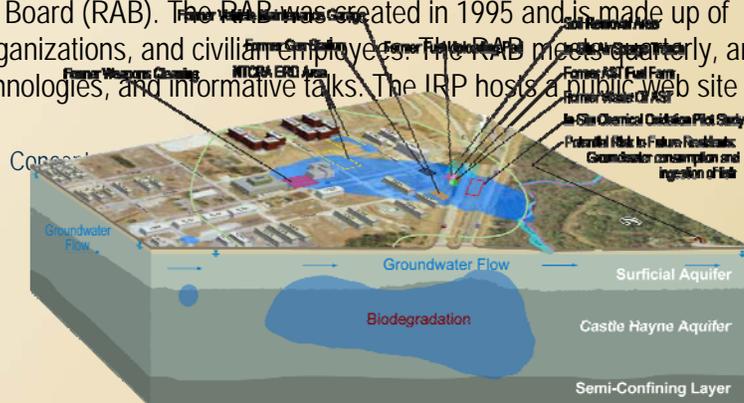
To maintain the tradition of excellence in doing day-to-day business as the Base's missions evolve, EMD exhibited forward management by proactively hiring and training additional staff and procuring multiple environmental support contractors. To ensure mission-critical milestones are achieved, EMD is proactive in communicating with Base master planners, procurement contracts staff, NAVFAC, USEPA, NCDENR, and the community to identify upcoming mission needs.

Community Involvement

The Base has taken a proactive approach to site cleanup by reaching out to regulators through partnering, and to the local community through the Restoration Advisory Board (RAB). The 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, and informative talks. The IRP hosts a public web site where information is posted for the public:

<http://public.lantops-ir.org/sites/public/lejeune/>.

As the Base's mission grew, EMD identified the need to encourage community input and solicited requests for new members. As a result, five new members have joined the RAB. The Base also planned a site tour with the RAB and is updating the Community Involvement Plan that includes interviews and requests for new members. The Base has also implemented better conceptual site model (CSM) graphic tools to communicate complicated site processes to the community and the Partnering Team.



Upon completion of a historical records review of former ranges, the Base identified several surface danger zones (SDZs) that were located outside the Base boundaries on both private and state-owned properties. The Base coordinated public outreach to the landowners and community through an open house, issuance of fact sheets, and public notifications. As a result, the landowners and community were instrumental in finalizing the investigation plan scheduled to be completed in FY 2010.

Agreements and Plans

MCB CamLej was added to the National Priorities List (NPL) in October 1989. In 1991, a Federal Facility Agreement (FFA) was signed and documents how the Marine Corps and Navy intend to implement CERCLA and meet regulatory requirements in partnership with USEPA and NCDENR at MCB CamLej. In 1999, the Base entered into a Memorandum of Agreement with representatives of the Marine Corps, Department of the Navy, USEPA, and NCDENR, that established a Land Use Control Assurance Plan to ensure protection of human health and the environment from exposure to waste sites.

MCB CamLej Action Documents

Action Documents	Achievement Period	Total
EE/CAS	3	14
Interim Measures	5	8
Pilot/Treatability Studies	4	11
RODs	4	35
Statements of Basis	4	4
LUCIPs	6	27

A Site Management Plan (SMP) is prepared and updated annually as a forward-planning management tool to identify the prioritization of IRP and MMRP activities. The SMP includes conceptual schedules and proposed deadlines for completion of deliverables and actions developed by the Partnering Team. The Base recognized that the CERCLA SMP is an effective management tool, and applied this concept toward the RCRA program.

The Partnering Team drafted two RODs in an improved format to assist the Navy in meeting their goals for streamlining 50% of RODs in FY 2009 and 100% of RODs in FY 2010. The RODs consisted of streamlined text, embedded tables and figures, and references to the Administrative Record document. The Team collaborated with Navy technical reviewers and USEPA Region 4 legal to ensure that the RODs were considered good examples for other facilities seeking to develop similar documents. The RODs are currently in the signature process and will be finalized in FY 2010. A total of four RODs were completed for IRP sites during the reporting period.



Initiatives

The Base has implemented several proactive initiatives during this award period to improve the environmental restoration program while continuing to meet mission needs. Two key initiatives included conducting a base-wide vapor intrusion evaluation and implementing streamlined human health and environmental risk screening processes.

MCB CamLej proactively planned a basewide vapor intrusion evaluation to address an emerging pathway of potential concern as identified by DoD and the regulatory community. The Base took these actions to ensure adequate protection of health for personnel working or living on the Base.

To prevent delays of critical "Grow the Force" projects, the Base implemented streamlined human health and environmental risk screening assessments for sites located within proposed military construction (MILCON) footprints. The streamlined screening process is much shorter and less costly than the traditional risk assessment process while still following risk assessment guidance, and has been accepted by regulatory agencies. To date, such risk screenings have been conducted at over 20 sites. The streamlined process has saved over \$1million during the award period and expedited the decision-making process with the Partnering Team, allowing the base to stay ahead of construction activities. The risk screening process is planned at an additional 30 sites in FY 2010.

Program Summary

The EMD and Partnering Team vision is to work towards the removal of MCB CamLej from the NPL. The objectives they identified to achieve this vision are:

- ✓ **Work together as a team with a commitment to continuous improvement.**
- ✓ **Clean up contaminated sites using innovative, high quality, and cost effective technologies.**
- ✓ **Protect human health and the environment.**
- ✓ **Implement fast-track investigation and clean-up to meet Base's mission needs.**
- ✓ **Share lessons learned.**

Teamwork and commitment serve as the foundation of all Team decisions and project executions, allowing the Base to remain true to the Marine Corps mission of military readiness. The degree of success in reaching these objectives is described in the following section.

Accomplishments

Fast Track Investigation and Cleanup

During the award period, over 20 MILCON areas have been identified on approximately 1,000 acres encompassing existing IRP, MMRP, RCRA, and UST sites. The Base implemented a decision unit sampling approach and applied streamlined risk screening assessments in collaboration with the Partnering Team. As a result, MILCON design or construction activities have been awarded at several former sites, including a public-private venture at MMRP Site UXO-5; a BEQ at a former B-12 range site; housing near IRP Site 40; a borrow pit expansion at MMRP Site UXO-6; a Marine Special Operations Command (MARSOC) facility at a former gun position; several mission support facilities within the Hadnot Point Industrial Area; and Wallace Creek Operations and Housing in an area containing several former IRP sites, MMRP sites, and an operational skeet range.

MARSOC MILCON Area – MEC Intrusive Anomaly Investigation



Borrow Pit MILCON Area – Potential MEC Identified



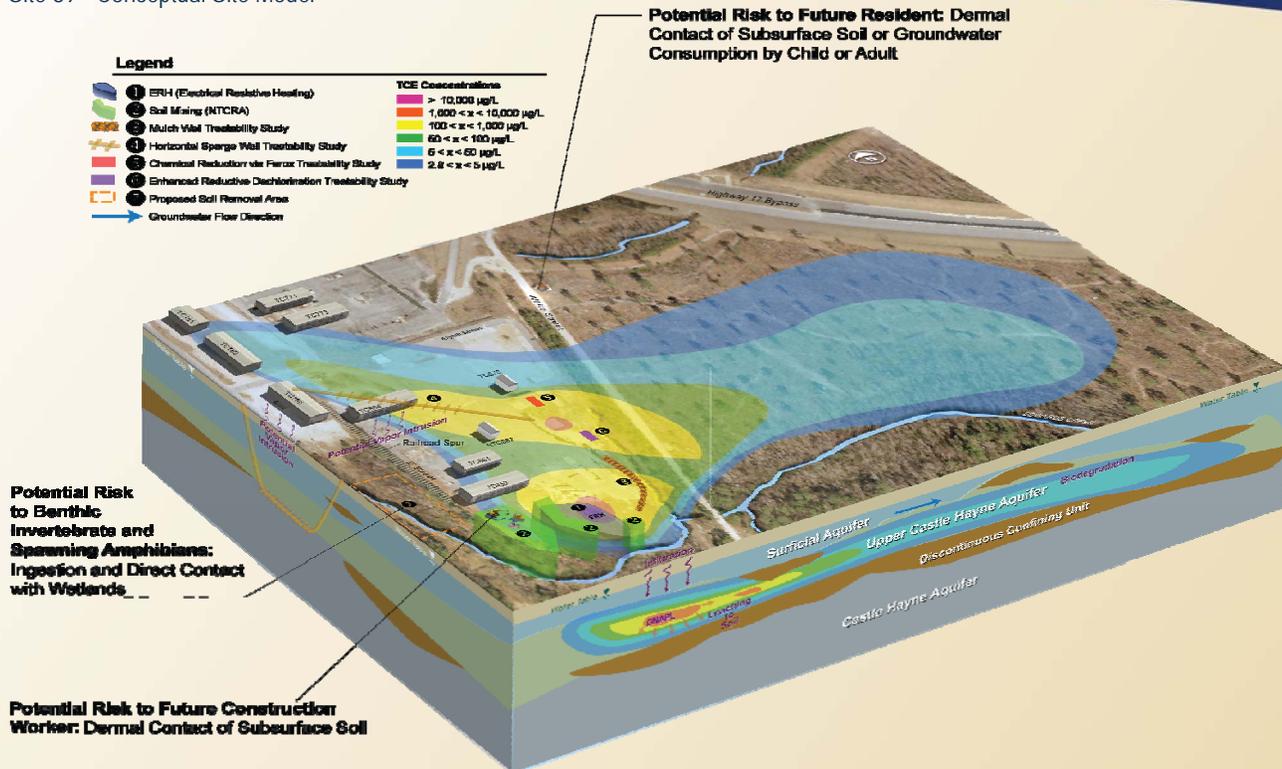
Within the French Creek Armory and MARSOC MILCON footprints, the Base conducted 100% anomaly removal where potential risks from munitions and explosives of concern (MEC) were identified. Several items were discovered including a practice rocket, colored smoke hand grenade, and hand signal flare. The Base took this proactive approach to protect future users and also provided “3R” (Recognize, Retreat, Report) training for protection of construction workers. The Base also received formal verification from Marine Corps Systems Command (MARCORSYSCOM) for completion of the 100% anomaly investigation at the MARCORSYSCOM MILCON area.

Innovative Technology Demonstration, Validation, and Implementation

Site 89, the former Defense Reutilization and Marketing Office (DRMO) location, is the most contaminated IRP site on Base where a DNAPL source area and a 10-acre dissolved-phase chlorinated volatile organic compound (VOC) plume is present. After numerous investigations and interim actions, to further reduce risks to human health and environment, the Partnering Team worked together to implement several treatability studies in the dissolved-phase plume area and a large-scale soil mixing action in the DNAPL source area under a Non-Time Critical Removal Action (NTCRA).

The treatability study approach was developed to identify the best cost effective technology for full-scale implementation. Four innovative remedial technologies were evaluated, including: enhanced reductive dechlorination (ERD) by injecting a combination of sodium lactate and emulsified vegetable oil (EVO), chemical reduction via zero-valent iron (ZVI) injection using pneumatic fracture, air sparging via a horizontal well, and a permeable reactive barrier (PRB) using mulch/compost as backfill. While air sparging and ERD reduced contaminant mass for a similar cost per volume treated, air sparging was the most practical technology for full scale implementation. The results of the studies will be used to develop a better exit strategy for the site, and to provide options for future treatment train approaches.

Site 89 - Conceptual Site Model



To address the IRP Site 89 DNAPL source area, a NTCRA was conducted to reduce risks to human health and environment from 37,000 pounds of contaminants in groundwater that had the potential to discharge to an adjacent creek over time. Five alternatives were evaluated and soil mixing with ZVI-clay addition was the selected treatment due to its successful VOC contaminant reduction at another IRP Site (Site 88) on Base, the timeframe to achieve reduction, and cost-effectiveness. Costs associated with this technology were \$3 to 5 million less expensive than the other alternatives. A public meeting was held to solicit community input on the NTCRA.

Site 89 - Treatability Studies

Air Sparging



ERD

PRB

Site 89 Soil Mixing

ZVI

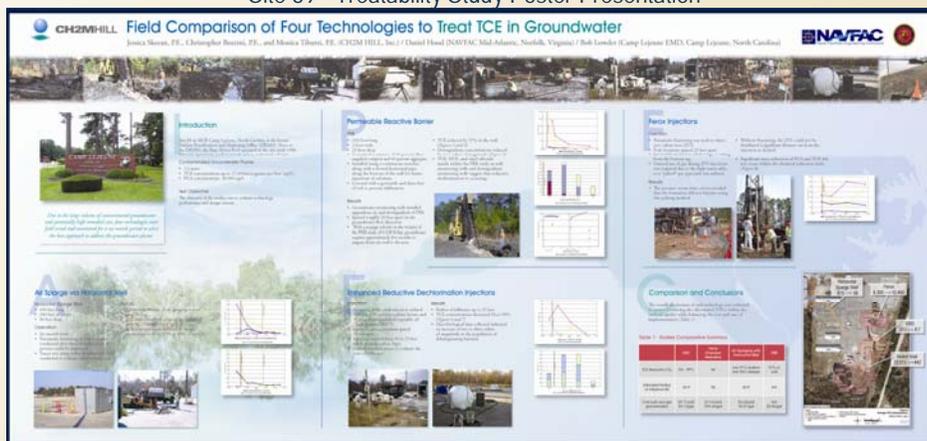


After soil mixing

A bench scale study was conducted to optimize the amount of ZVI and clay for treatment. The area treated was 32,000 square feet at a depth of 25 feet, resulting in a total treated volume of 30,000 cubic yards. From initial site mobilization to complete site restoration, the NTCRA was completed in five months. Follow-up monitoring has indicated significant reduction in VOC concentrations in the soil, groundwater, and adjacent creek. As a result, the amount of contamination to be addressed in the upcoming Feasibility Study (FS) has been significantly decreased.

The Team presented the treatability studies, the soil mixing project, and lessons learned at the Navy IRP Conference, Southeast Joint DoD-EPA Conference, Joint Services Environmental Management Conference, Battelle Remediation of Chlorinated and Recalcitrant Compounds Conference, and the University of Massachusetts Soils Sediment and Water Conference. The project also won the annual American Council of Engineering Companies of North Carolina Engineering Excellence Award that honors and recognizes engineering and surveying firms for projects that demonstrate the highest degree of achievement, value, and ingenuity.

Site 89 - Treatability Study Poster Presentation



Partnerships Addressing Environmental Cleanup Issues Between DoD and Other Entities

The Base and EMD continue to partner within DoD and with other entities for technical input and guidance in addressing challenging sites, and continue to be leaders in managing their program and delivering results.

In response to the increase in Marine forces and associated infrastructure, the Base has worked successfully with the Partnering Team, Base planning, MARCORSYSCOM, Naval Ordnance Safety and Security Activity (NOSSA), Department of Defense Explosives Safety Board (DDESB), Resident Officer In-Charge of Construction (ROICC), and the Base Natural Resource Section to implement fast track investigation and cleanup at contaminated sites to support MILCON projects.

At IRP Site 69, the Base and NAVFAC teamed with the U.S. Army Engineering Support Center (USAESC) and Edgewood Chemical and Biological Center (ECBC) to develop a safe and technically sound investigation approach at the former rifle range chemical dump. A joint meeting was held to ensure the team's goals, expectations, and schedules were communicated to all team partners.

In response to concerns raised by the community, the Base continues to work with Naval Sea Systems Command Detachment (NAVSEADET) Radiological Affairs Support Office (RASO) at the Former Naval Medical Field Research Laboratory, IRP Site 19, to confirm that no radioactive materials from previous disposal operations remain on-site.

Community Outreach

In 2008, the Base EMD sponsored an Earth Day celebration where the U.S. Secretary of Energy, Samuel W. Bodman, highlighted a new initiative to help military bases across the country increase energy efficiency, save money, and reduce carbon dioxide emissions. This new initiative will contribute to the Administration's comprehensive energy strategy of increasing the nation's energy security by reducing our reliance on foreign oil and stopping the growth of greenhouse gas emissions by 2025. The Base environmental staff and supporting contractors were on-site to discuss their roles in maintaining environmental programs at MCB CamLej.

Earth Day



The Earth Day celebration provided the public with the opportunity to learn

more about how the military manages the environment and protects the health of those living and working aboard the installation and within the surrounding community. Visitors included on-Base personnel and residents, community members, and students.

As a result of the success of past events, the Base continues to hold annual Earth Day celebrations to educate and inform the public of its environmental stewardship while continuing execution of the Base mission.

Opportunities for Small and Small Disadvantaged Businesses in Environmental Restoration

During this achievement period, the Navy CLEAN contractor continued to exceed small business goals, awarding over 75% of procurements to small businesses. The Base awarded over \$9 million to six small businesses to participate in the environmental restoration program. A Native Alaskan Joint Venture conducted the treatability studies and NTCRA at IRP Site 89, the basewide vapor intrusion evaluation, the basewide long-term monitoring (LTM) program, RCRA investigations and reporting at four SWMUs, and Preliminary Assessments/Site Investigations at eight MILCON project areas. A small woman-owned business prepared the FS, Proposed Remedial Action Plan (PRAP) and worked toward the ROD for IRP Site 84. This business also operates the IRP Site 82 treatment plant and was tasked to optimize the treatment process and work towards site closure and conduct a soil removal action at IRP Site 95. A Native American owned, woman-owned small disadvantaged business and Historically Underutilized Business (HUB) zone contractor is providing investigation and remedial action cleanup support for UST, RCRA, and IRP sites.

Reducing Risk to Human Health and the Environment

EMD has been at the forefront at evaluating the emerging environmental issue of vapor intrusion (VI) from contaminated sites into occupied buildings, which is increasingly viewed within the DoD and the regulatory community as an exposure pathway of potential concern. EMD initiated a base-wide VI evaluation to ensure the protection of human health for personnel working or living on the Base. The evaluation was conducted in six areas of the Base where groundwater contamination is known to exist: Hadnot Point Industrial Area, Mainside, Marine Corps Air Station, New River, Courthouse Bay, Camp Geiger, and the Tarawa Terrace housing area. A tiered approach following recent DoD policy and Draft USEPA VI Guidance was used for the assessment. General steps including identification of VOCs within 100 feet of buildings, risk based contaminant screening and potential groundwater, soil vapor, and/or indoor air sampling were conducted. The evaluation approach was presented to the regulatory agencies at partnering meetings and community at RAB meetings.

Based on the initial screening using existing basewide data, approximately 170 buildings of interest were identified within 100 feet of a groundwater plume. Site-specific screening was completed on each area of potential concern, which resulted in 50 of the initial 170 buildings being identified to proceed to the sampling phase of the evaluation. Groundwater, soil gas, sub-slab soil gas, and/or indoor air samples were collected at these 50 buildings to provide a baseline data set. The multiple lines of evidence evaluated indicated that vapor intrusion is not currently a significant pathway of concern.

Further investigation is planned in FY 2010 to confirm whether there is any concern based on temporal variability and preferential pathways. EMD will continue to ensure protection of marines and workers by evaluating VI pathways as building uses change and new information is obtained. The basewide VI approach was presented at the USEPA National Forum on Vapor Intrusion and will be presented at the Navy IRP Conference.

Summary

In summary, the Base continues to proactively manage the environmental restoration program to support and implement the Base's growing mission. The Base maintains outstanding relationships with regulatory agencies and the local community, uses state-of-the-art technologies, and leverages lessons learned to maintain its status as a leading DoD facility.

Indoor Air Sampling

