Secretary of Defense
Environmental Award Fiscal Year 2013

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

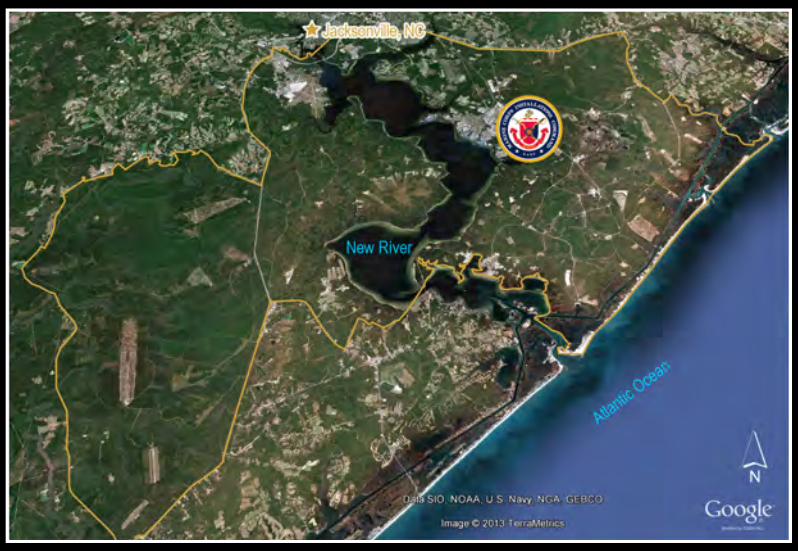
ENVIRONMENTAL SETTING: The Base comprises 72,000 acres of upland forests, 49,000 acres of wetlands, 26,000 acres of water, and 7,500 acres of urban/developed land.

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 adjacent to 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.

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

ECONOMIC SETTING: Marine Corps Installations East-Marine Corps Base Camp Lejeune (MCIEAST-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: MCIEAST-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.



Environmental Restoration – Installation

Marine Corps Installations East – Marine Corps Base Camp Lejeune

Camp Lejeune, North Carolina

ENVIRONMENTAL RESTORATION PROGRAM BACKGROUND

Historical training operations, storage, and disposal practices at MCIEAST-MCB CAMLEJ have resulted in environmental impacts to soil and groundwater across the Base. MCIEAST-MCB CAMLEJ was added to the National Priorities List (NPL) in October 1989. Currently, the environmental restoration team currently manages over 80 active sites for investigation and cleanup, encompassing over 4,600 acres, under different environmental programs; including Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) that covers the Installation Restoration Program (IRP) and Military Munitions Response Program (MMRP), Resource Conservation, and Recovery Act (RCRA), and the Underground Storage Tank (UST) program.

KEY CHALLENGES: Investigating and remediating environmental contamination at the largest, most technically challenging, and complex sites on a densely populated and extremely active training Base with ongoing military construction (MILCON) projects for infrastructure improvements and operational facilities with a goal to ensure continued protection of those living and working aboard MCIEAST-MCB CAMLEJ.

ORGANIZATION, STAFFING, AND MANAGEMENT APPROACH: The Base Environmental Management Division (EMD) leads the environmental compliance and restoration programs. The CERCLA and RCRA programs are led by Ms. Charity Delaney with support from Ms. Patti Vanture and the UST program is led by Ms. Jenni Reed with support from Mr. Carl Fowler. The Base is supported by technical, acquisition, and legal professionals across the Naval Facilities Engineering Command (NAVFAC) organization, including Mr. Dave Cleland as the Remedial Project Manager (RPM) for CERCLA, Mr. Bryan Beck as the RPM for RCRA and Base support projects who was awarded NAVFAC Mid-Atlantic RPM of the year for 2013, and Mr. José Parra as the RPM for UST projects. Experienced Partnering Teams for the CERCLA (formed in the 1990s) and for the UST program consist of representatives of the Base, Navy, North Carolina Department of Environment and Natural Resources (NCDENR), and/or U.S. Environmental Protection Agency (USEPA). The teams meet quarterly and are supported by multiple environmental consulting firms.

COMMUNITY INVOLVEMENT: The Base's CERCLA 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, MCIEAST-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.

ENVIRONMENTAL RESTORATION AGREEMENTS AND RELEVANT DOCUMENTS:

Agreements	Last Revision
CERCLA Federal Facility Agreement	February 1991
CERCLA Community Involvement Plan	February 2011
CERCLA Five-Year Review	August 2010
CERCLA Site Management Plan	September 2013
RCRA Site Management Plan	March 2013
UST Site Management Plan	June 2009

Action Documents	Achievement Period	Total
CERCLA Engineering Evaluation/ Cost Estimates	1	18
CERCLA Pilot/Treatability Studies	4	16
CERCLA RODs	2	37
CERCLA ESDs	3	4
CERCLA NFA Decision Documents	22	36
RCRA Interim Measures	1	12
RCRA Statements of Basis	1	5
IRP and RCRA LUCIPs	5	34
UST NFA Documentation	65	302
Total	104	464

INITIATIVES: Some of the key initiatives undertaken during this award period were to:

- Plan forward to meet the Navy's goals for remedy in-place in Fiscal Year (FY) 2014 by expediting the Proposed Remedial Action Plans (PRAPs), Records of Decision (RODs), Remedial Designs, and initiating Remedial Actions at Sites 69 and 89, two of the most challenging IRP sites at MCIEAST-MCB CAMLEJ

- Address recommendations and milestones from the last CERCLA Five-Year Review by developing a tracking sheet with defined schedules that was utilized as an example for the Navy's Five-Year Review Toolkit and has been implemented at other installations
- Facilitate best management techniques for property reuse by implementing due-diligence sampling ahead of MILCON, presenting environmental awareness briefs on proper waste disposal and handling practices, and creating new geographical information system (GIS) layers, a monitoring well database, and a Basewide Land Use Control (LUC) Summary document
- Inform the public of the efforts the Base is taking to investigate and remediate hazardous waste sites by providing an informational site tour for RAB members


RAB Site Tour

- Share lessons learned by presenting two topics and two poster sessions at the 2012 Battelle Conference

SUMMARY OF ACCOMPLISHMENTS

The objective of the Environmental Restoration Program is to evaluate and remediate sites that pose unacceptable risk to human health and the environment with an ultimate goal of delisting MCIEAST-MCB CAMLEJ from the NPL. To-date, the Team has completed environmental response activities at over 900 sites and investigation and cleanup is underway at over 80 sites, many of which are the most technically challenging and complex. This progress is due to the Base and Navy working together to maintain collaborative relationships with regulatory agencies and the local community to facilitate site investigation and cleanup. Some of the key accomplishments during the achievement period are detailed below.

Accelerated Environmental Cleanup

During this achievement period, the following sites and actions were the focus of accelerated environmental cleanup which equated to over 85 acres made available to support the mission or community use:

- IRP SITES 35 AND 73 - The Base worked with the Navy, USEPA, and NCDENR to reach consensus on turning off the horizontal air sparge well remedy components. Based on reduction of volatile organic compounds (VOCs) within the radius of influence, the remedies transitioned to monitored natural attenuation (MNA). The wells were projected to run for at least three to five years; however, the treatment system objectives and/or cleanup levels were achieved within two years of the ROD signature dates. By turning the wells off early, over $400,000 cost avoidance was realized.
- MMRP SITES UXO-01, 14, AND 23 - In FY 2013, the removal actions were completed to treat lead, antimony, and/or polycyclic aromatic hydrocarbon contaminated soil over 16 acres with Enviroblend®, a soil stabilization reagent. As a result, over 55,400 tons of contaminated soil was rendered non-hazardous for disposal, resulting in cost avoidance of approximately $5.5MM. The UXO-23 removal action was conducted in support of property reuse for the large 100-acre Wallace Creek complex,


UXO-14 Removal Action

consisting of barracks, support buildings, and parking areas that are under construction.

- MMRP SITE UXO-25 – This 25-acre property located along the Base boundary was investigated and closed out with no further action by the regulatory agencies. The Base is collaborating with the Verona Loop community for future land use and development.
- MMRP SITE UXO-26 – During site investigation activities, evidence of a former 2.36-inch rocket range was discovered. As a result, the Base decided to reuse the 10-acre site as a forward operating training area. Prior to reuse, to eliminate potential safety concerns from encountering live munitions items, a surface clearance was conducted. By closing out UXO-26 in conjunction with nearby previously closed MMRP sites, this enabled range operations to obtain a total of 38 acres for training.
- MMRP SITE UXO-29 - During MILCON activities for the Marine Corps Air Station New River approach and take-off safety zone for the runways, practice bazooka rounds were discovered, which halted construction. Based on the safety concerns and to reduce the potential for encountering munitions during MILCON activities, the


UXO-26 Former Rocket Range

Base worked with USEPA and NCDENR to develop an investigation and clearance approach of the nine-acre area to minimize downtime. The regulatory agencies provided quick turn-around review to expedite work planning and field activities that will be completed in the first quarter of FY 2014.

Innovative Technology Demonstration/Validation and Implementation

The following innovative technologies have been implemented and validated during this achievement period to potentially reduce future environmental restoration costs by over $1MM:

- RCRA SWMU 350 - An Interim Measure (IM) and Treatability Study (TS) are being conducted at SWMU 350 to evaluate potential groundwater treatment alternatives prior to selection of final remedy. SWMU 350 consists of two separate groundwater plumes; a benzene, toluene, ethylbenzene, and total xylenes (BTEX) plume likely originating from an upgradient off-Base release of leaded gasoline; and a naphthalene plume where former above ground waste oil storage tanks were identified as the potential source. The IM, consisting of in situ chemical oxidation (ISCO) with RegenOx™ and enhanced aerobic bioremediation Oxygen Release Compound (ORC)


SWMU 350 Treatability Study

Advanced®, is being conducted to evaluate treatment of BTEX. The TS, consisting of biosparging, is being conducted to evaluate enhanced in situ biodegradation of naphthalene. Remediation equipment from a closed IRP site on-Base was reutilized, thereby reducing capital costs and the carbon-footprint relative to transporting leased or new equipment to the site. The resulting cost avoidance was $40,000. Thus far, the IM has been effective in reducing concentrations 50% to 90% and the TS resulted in a reduction of concentrations to below detection limits within one month. Based on the results, additional injections and rebound studies are currently ongoing to further evaluate the effectiveness. Due to the close proximity to a Base housing area, fact sheets were provided to nearby residents on multiple occasions to inform them of investigative activities and path forward.

- IRP SITE 78 – The 2010 Five-Year Review indicated that VOC concentration trends had asymptotically leveled

over time demonstrating a decrease in the pump and treat system's effectiveness to remove contaminant mass from the impacted groundwater and recommended evaluation of alternative treatment technologies. As a result, a target treatment area with total chlorinated VOC concentrations over 10,000 parts per billion (ppb) was identified for a series of bench scale studies to evaluate the effectiveness of in situ treatment as a potential method to accelerate site closure. Several bench scale studies were completed over the course of a year, including persulfate, sulfate, enhanced reductive dechlorination (ERD), and/or bioaugmentation prior to full scale field implementation. Through conducting these studies in a phased approach, the Partnering Team was able to rule out which in situ remedies would not be effective based on site conditions and validated that ERD supplemented by bioaugmentation may result in up to 100% reduction of total chlorinated VOC concentrations. Field implementation was initiated in the first quarter of FY 2014.

Site 78 Bench Scale Studies

- UST RAPID REFUELER - An innovative and low intensity characterization tool, Laser Induced Florescence (LIF) technology was implemented for high resolution digital profiling of residual petroleum and light non-aqueous phase liquid (LNAPL). The Rapid Refueler consists of aircraft refueling hydrants at fuel pits in the center of the airfield where releases from underground piping have occurred. Due to the feasible nature of the LIF technology, the team was able to perform the investigation with no impact to flight operations. The results of the LIF provided detailed horizontal and vertical delineation and thickness of the LNAPL, and identified jet fuel as the predominant source. Other sources identified included creosote, aviation gas, mixtures of jet fuel/aviation gas, used motor oil, gear oil, and weathered gasoline. Based on the success of the LIF and results, additional investigation using LIF will be conducted to complete the delineation to the north along with LNAPL recovery tests to aid in evaluation of free product recovery.

Partnerships Addressing Environmental Restoration Issues Between DoD and Other Entities

Base EMD works closely with multiple on-Base departments and several Federal, State, and local agencies to improve environmental restoration effectiveness, reduce or avoid costs, and accelerate cleanup. The following results were reached with stakeholders during this achievement period:

- RCRA MEETING – Based on investigation results and planned cleanup to conservative screening levels, the Base initiated a meeting with NCDENR to develop a path forward for establishing risk-based cleanup levels under the RCRA program. As a result of this meeting, an agreement was made to allow for quantitative risk assessments as a decision tool in developing cleanup levels under RCRA, saving hundreds of thousands of dollars in cleanup costs. Specifically, the Interim Measure planned at SWMU 575 will result in a cost savings of over $200,000.
- OFF-BASE SURFACE DANGER ZONES – Applying lessons learned from the initial investigation and in preparation for a subsequent munitions investigation over approximately 1,632 acres located between the Atlantic Intracoastal Waterway and the Atlantic Ocean, a meeting and coordination with the Onslow County Fire Department and the United States Coast Guard was conducted to plan responses to any potential health and safety emergencies during the field effort. Additionally, a Consistency Determination was submitted to the State to evaluate and ensure compliance with the Coastal Area Management Act to protect natural and cultural

Off-Base Surface Danger Zone Munitions Investigation

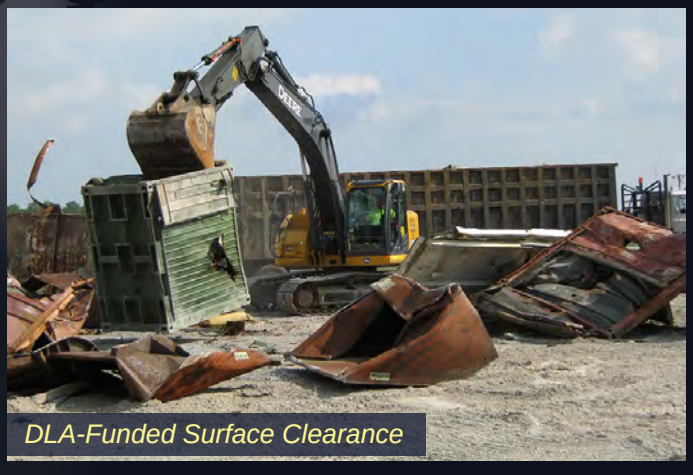
resources.

- RCRA SWMUS 574 AND 615 – Due to these sites proximity within existing CERCLA sites and similar chemicals of concern, the Base, NCDENR, and USEPA collaborated and agreed to transfer the sites to the CERCLA program. By addressing the sites in conjunction with the ongoing CERCLA activities, the timeframe for cleanup is accelerated by three to five years.
- MMRP SITE UXO-22 – Due to the former Defense Reutilization and Marketing Office (DRMO) operations within the site, surface debris and munitions items remained on-site after the DRMO relocated. In conjunction with the planned expanded site investigation, the Base and Navy worked with the Defense Logistics Agency (DLA) to provide funding for surface clearance of a 20-acre area and soil sifting of a three-acre area to minimize explosive risks from unintentional detonations. Additionally, these activities improved the effectiveness of the site investigation by reducing interference from surface metallic debris during the digital geophysical mapping. This resulted in over $500,000 cost avoidance to the Environmental Restoration, Navy program.

Reducing Risk to Human Health and the Environment

During this achievement period, the Base reduced the risk to human health and the environment through the following remedial actions and improvements to site management and characterization techniques:

- BASE ENVIRONMENTAL PLANNING - To mitigate potential MILCON work stoppages, EMD established a due-diligence process for preliminary environmental sampling to identify and address any potential risks within MILCON footprints prior to construction. In addition, EMD presented environmental awareness briefs to Marines on proper waste disposal and handling practices. Lastly, EMD facilitated better land use planning, management techniques, and coordination among Base personnel through creation of several new GIS layers; including remediation systems, areas under explosive safety submissions, and a monitoring well database; and completion of a Basewide LUC Summary document.


DLA-Funded Surface Clearance

- UST PROGRAM – Removed over 70 USTs and over 14,000 tons of petroleum-impacted soil.
- VAPOR INTRUSION – Applied the Basewide vapor intrusion evaluation approach from the CERCLA program to the UST and RCRA programs. The approach was updated to incorporate research and new regulations regarding vapor intrusion at petroleum-impacted sites versus chlorinated solvent sites. This resulted in the evaluation and investigation of 35 buildings to ensure protection of Base workers. Additionally, over 56 no further action UST sites will be re-evaluated in FY 2014 using this approach.

UST Removal

- IRP SITES 6 AND 82 – Per recommendations from the 2010 Five-Year Review, additional site-wide investigations were completed through a phased approach using improved techniques (e.g., gridded passive soil gas sampling and pore water sampling) versus the traditional investigation methods to identify other potential source areas within the 200-acre site. A significant VOC hot spot of tetrachloroethylene with concentrations of 57,880 ppb was identified in deep groundwater. As a result, an

additional recovery well is planned within the hot spot in FY 2014 to promulgate cleanup.

Green Remediation

MCIEAST-MCB CAMLEJ continues to implement its strategy of utilizing innovative and green technologies to result in a lower environmental footprint for the life of the project. The team incorporates the fundamentals of Leadership in Energy & Environmental Design (LEED) by using Green Associates for ensuring solutions are environmentally responsible and use resources efficiently. Some of the successes of green and sustainable approaches during this achievement period include:

- IRP SITE 89 - Selected and implemented passive, sustainable, and in situ remedies where both a dense non-aqueous phase liquid (DNAPL) source area and 25-acre dissolved-phase chlorinated solvent plume are present. The remedy includes air sparging using horizontal and vertical wells to treat the DNAPL source area; permeable reactive barrier (PRB) mulch walls to treat groundwater and protect Edwards Creek; surface water aeration system in Edwards Creek to promote reduction of VOCs prior to discharge to the New River; MNA to monitor plume stability and natural attenuation processes; and LUCs to prevent aquifer use, intrusive activities, and potential vapor intrusion. Air sparging and mulch wall technologies were selected based on proven effectiveness from previous pilot studies conducted on-site, opposed to potentially expensive alternatives (e.g., in situ chemical oxidation). As a result, the cheaper and more passive remedies were selected. These remedy components are also permanent solutions that can be reactivated as needed, at significantly less cost, to ensure future protectiveness and success.


Site 89 Mulch Wall Installation


Site 89 Horizontal Well Installation

- SELECTED REMEDIES - Passive and in situ remedies were selected at IRP Sites 49, 69, and 86 including MNA, soil cover, and LUCs.
- LTM OPTIMIZATION - Migrated successful, greener concepts from the CERCLA LTM optimization to the RCRA LTM program to identify areas for sustainable approaches and cost avoidance. The evaluation resulted in reducing the sampling frequency; and planning for in situ treatment to potentially remove sites from the LTM program.
- RECYCLING – Over 58,000 pounds of metal was recycled during surface debris clearance activities at UXO-22.

SUMMARY

In this achievement period, MCIEAST-MCB CAM LEJ made significant contributions to environmental restoration, while honoring the Base mission, through implementing forward-thinking management programs, utilizing sustainable technologies to enhance investigation and cleanup, and maximizing cost avoidance of potentially over $7MM. Several new management initiatives were implemented to facilitate better land use planning and coordination among Base personnel to ensure protection of workers, residents, and the local community. These initiatives include a due-diligence process for identifying and addressing potential risks within MILCON footprints prior to construction, environmental awareness briefs, creation of new GIS layers, and evaluation of vapor intrusion pathways at petroleum-impacted sites. Passive and sustainable remedy components were applied; including mulch walls, MNA, soil cover, air sparging, in situ soil stabilization, and LUCs; that are permanent solutions and can be reused or reactivated as needed, at significantly less cost. By instituting strategic initiatives and sustainable solutions, the Base's accomplishments from this achievement period will persevere to ensure protection of human health and the environment in support of the warfighter.