

Secretary of Defense Secretary of the Navy

FY 2004 Environmental Award

Environmental Restoration Installation

Marine Corps Base Camp Lejeune

INTRODUCTION

Marine Corps Base (MCB), Camp Lejeune, NC is home to the largest single concentration of Marines in the world and supports the most complete amphibious training program on the East Coast. Camp Lejeune was established in 1941 and named in honor of Lieutenant General John A. Lejeune, the 13th Commandant of the Marine Corps.

Location/Population

Located within Onslow County, Camp Lejeune occupies approximately 153,000 acres of land as follows:

Land Cover	Acres
Surface Waters	24,000
Forested Wetlands	29,000
Non-forested Wetlands	20,000
Upland forests	72,000
Urban/Developed	7,500

The town of Jacksonville, North Carolina is located immediately northwest of MCB Camp Lejeune. The majority of the surrounding land is used for agricultural purposes. Three large publicly owned forests are located within 15 miles of the facility and the marine

estuarine environment along the coast supports commercial fishing and residential resort areas.

Camp Lejeune supports a large population of active duty, retiree, family members and civilian employees.



42,448 Active Duty
52,678 Family of Active Duty
25,467 Retiree Population
22,153 Family of Retirees
4,631 Civilian Employees
147,377 Total Population

Base Operations

MCB Camp Lejeune's mission is to provide housing, training facilities, and logistical support for Fleet Marine Force Units and other assigned units. The Base conducts specialized training for approximately 42,000 Marines, Sailors and other military personnel, which includes over 50 courses ranging from entry-level skill to professional and technical training. The Installation provides housing, training facilities, and logistical support for active and reserve Marine Expeditionary Force commands, as well as mobilization and deployment support to the units during exercises and contingencies.

BACKGROUND

Environmental Restoration Challenges
Camp Lejeune is one of the leading DoD facilities in restoration of natural resources affected by past waste disposal practices, environmental leaks and spills.

Camp Lejeune treats and distributes potable water from the Castle Hayne aquifer, which is the sole water supply source for the Installation. The aquifer lies beneath the sandy soils of the Coastal Plains allowing contaminants to infiltrate the aquifer. Therefore, cleanup of contamination is essential for protecting the health of Base residents and employees.

Organization/Staffing

The Installation Restoration (IR) and Underground Storage Tank (UST) Sections fall under the Environmental Quality Branch (EQB), Environmental Management Division, Installations and Environment Department. The IR Section oversees the remediation and restoration of past and present hazardous waste sites and leaking USTs. The IR Section focuses on remedial actions under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Resource Conservation and Recovery Act of 1976 (RCRA). The UST Section manages the remediation of soil and groundwater regulated under Subtitle I of RCRA. EQB participates in the Base Environmental Impact Review process performed under the National Environmental Policy Act (NEPA) to ensure that training and construction proposals do not affect, or are affected by, contaminated sites aboard the Installation.

Community Involvement

Camp Lejeune hosts a successful Restoration Advisory Board (RAB) that meets quarterly. The Camp Lejeune RAB was created in 1995 and is made up of members of the local community, local civic and businesses organizations, and civilian employees. The RAB provides tours, on-site demonstrations of new technologies, and informative talks in the local community. The RAB provides additional information and posts quarterly meeting minutes on the EMD/RAB website.

Restoration Agreements

Camp Lejeune entered into a Memorandum of Agreement on May 24, 1999, that established a Land Use Control Assurance Plan (LUCAP). Camp Lejeune has developed 15 Land Use Control Implementation Plans (LUCIPs) that stipulate controls to minimize or eliminate the potential for exposure. Controls include restrictions such as: industrial land use only, no intrusive activities or use of groundwater beneath the site, etc. EQB personnel perform quarterly inspections of LUCIP sites to ensure adherence to land use controls and provide plat maps of contaminated properties with State guidelines to the local county register of deeds. Camp Lejeune leads DoD facilities with signatures on 22 RODs and two Interim RODs (IRODs).

PROGRAM SUMMARY

The DON and the Marine Corps have several goals for the IR Program to accomplish its mission, including:

- Fully comply with Federal, State, and local requirements;
- Act immediately to eliminate human exposures to contamination that pose imminent threats;
- First cleanup those sites that pose the greatest relative risk to human health and the environment;
- Develop partnerships with Federal, State, and local regulatory agencies;
- Involve local communities in the IR Program through the establishment of RABs. Encourage stakeholders participation, make information available in a timely manner, encourage public input, and consider all comments in the decision-making process;

- Expedite the cleanup process and demonstrate a preference for action; and,
- Consider current planned land use in developing cleanup strategies.

Examples of how Camp Lejeune is meeting these goals follows:

Fully comply with Federal, State, and local requirements...

Camp Lejeune complies with regulatory requirements while continuing the progress of environmental restoration programs demonstrated through the completion of more signed RODs than any other DoD installation.

Act immediately to eliminate human exposures to contamination that poses imminent threats and, cleanup those sites that pose the greatest relative risk to human health or the environment...

Due to a national debate between the USEPA and DoD in 2002 and 2003, the ROD process was delayed at all facilities nationwide, which impacted the completion of remedial actions. Three sites at Camp Lejeune had RODs pending that required the completion of soil removal actions to eliminate potential site risks. By taking an innovative approach through completing expedited engineering cost/engineering evaluations (EE/CAs) and Action Memorandums at these sites, Camp Lejeune was able to complete these fast track cleanups, thus eliminating potential exposure threats.

Develop partnerships with Federal, State, and local regulatory agencies...

The Camp Lejeune Partnering Team, with representatives from the Navy, Marine Corps, USEPA, NCDENR, and contractors, has a formal established process for ensuring that environmental programs are conducted in full compliance with these requirements. The Team works closely to resolve complex issues

that may impede the progress of the Installation's environmental programs while expediting the restoration process by reducing the process from 65 to 39 months. The Team has been able to reduce the cost of remediation through the use of the Pilot Expedited Environmental Cleanup Program allowing for the evaluation of innovative technologies to determine which remedial system or combination of systems will effectively remediate the site and prove economically feasible. An excellent example of collaborative partnership between the Base and regulators is the development of a streamlined and effective Long Term Monitoring (LTM) program. Fifteen sites are currently included in the LTM program of which nine have signed RODs or IRODs. LTM is being performed at other non-ROD sites to collect post-RI data in support of the final remedy.

Involve local communities in the IR Program through the establishment of RABs...

Camp Lejeune actively engages their local community through the Restoration Advisory Board (RAB). The Base has worked to retain the RAB's stability while undergoing major changes in personnel and the community co-chair. RAB meetings are conducted on a quarterly basis to inform the community of progress and issues with the IR and UST Programs. In addition to meetings, the Base conducts site visits providing "hands on" experience through live demonstrations helping members gain knowledge of the IR Program.

Expedite the cleanup process and demonstrate a preference for action...

Numerous chlorinated solvent and petroleum hydrocarbon groundwater plumes exist at Camp Lejeune. The plumes range in size from four (4) to seventy (70) acres and are further complicated by complex geologic and hydrogeologic conditions, as well as

challenging physical site constraints within active operational areas. To address these sites, the Camp Lejeune Partnering Team developed a strategy which detailed the descriptions of site contaminants and their physical conditions at all IR sites. Innovative technology evaluations for the highest priority sites were performed to determine potential remedial options. By using a comprehensive approach, the Team can assess a variety of technologies and their effectiveness within a one-year time frame, enabling future remedial actions at other Installations, IR sites or contaminated sites (e.g., UST) to benefit from the Team's experiences.

ACCOMPLISHMENTS

Camp Lejeune's IR Program continues to be at the forefront of DoD's environmental restoration programs. In addition to successfully managing over 160 active contaminated sites at Camp Lejeune and inventing new approaches to solve problems, an emphasis is placed on the sharing of information. The Base proactively manages to keep all of the sites moving through the various stages of the remediation process while maintaining outstanding relationships with other government entities, regulators, members of the partnering team and the local community.

The EQB at Camp Lejeune has attained success in site characterization and remedial efforts. Significant undertakings include the following:

Investigations:

- Site 35 pilot study: Modified Fentons and pneumatic fracturing with permanganate injection
- Site 73 pilot study: Horizontal well with Hydrogen pulsing
- Site 86 pilot study: Horizontal well with continuous Ozone sparging

- Site 88 pilot study: Soil Mixing with Zero Valent Iron (ZVI)
- Conducted RIs at Sites 88, 89, & 94
- Delineation of POL for Site 35
- Technical Evaluation for Site 6 & Site 82
- Initiated FS for Site 93
- Groundwater plume investigation for Camp Geiger
- Preliminary Assessments for 5 sites
- RCRA facility investigation

Remedial Actions:

- Site 89 pilot study: ERH to remediate Dense Non-Aqueous Phase Liquid (DNAPL)
- Interim soil removal action at Site 84
- Interim soil removals at SWMU sites 254, 258, 293, 314, 303, 318 and 299

Program Support:

- Public Meeting for Site 88 EE/CA
- CERCLA Five Year Review Report
- Long Term Monitoring
- RAB meetings and Site tour
- Prepared Community Involvement Plan
- Groundwater plume matrices, 10 sites
- Technology evaluations at Sites 35, 73, 78, 86, 93

Support of Military Readiness

As military range cleanup initiatives become increasingly more important, Camp Lejeune investigated new technologies to eliminate lead from accumulating at high volume firing areas such as pistol and small arms ranges. The IR Section took the lead in 2004 by constructing two (2) additional bullet traps at small arms ranges to capture lead projectiles and residual dust. To date, the IR Program has installed eight (8) bullet trap systems totaling one hundred and sixty one (161) individual traps.



**Bullet Trap at
B-12 Pistol
Range**



Overcoming Development Constraints

Camp Lejeune is continually looking for areas to develop. Contaminated sites were once excluded from development regardless of the contaminant levels. The LUCAP Program allows for site evaluation to determine the type of operation that can exist without placing the occupants at risk. The former DRMO disposal area (Site 6) is undergoing active groundwater remediation. Under the LUCAP, institutional controls on Site 6 preclude subsurface intrusion, use of the aquifers, and residential development of the area. In support of mission readiness, Site 6 is being reused as a storage area for DRMO, as the Base's landfill diversion treatment and processing facility, and for the Base's mobilization effort. Site 89 is being reused as a Battalion staging area in support of troop deployments and Site 28 is being reused as a contractor equipment laydown area.

Fast Track Cleanup

Soil Removal Action – Site 84 (Building 45)

Building 45 is a former electric substation, where transformers containing PCBs were used and possibly stored. An RI/FS was

completed in 2002 and indicated widespread PCB and POL soil contamination at the site that required immediate action.

The pending ROD for Site 84 required the completion of soil removal actions to eliminate potential site risks. By taking an innovative approach through completing expedited engineering cost/engineering evaluation (EE/CA) and Action Memorandum at this site, Camp Lejeune was able to complete these fast track cleanups and thus eliminate potential exposure threats.

A railroad right-of-way borders Site 84 to the north. The railroad is no longer used and the Base plans to transfer a portion of the railroad right-of-way to the City of Jacksonville for development of a pedestrian/bicycle trail. A portion of this trail will be developed along the northern border of Site 84. Accordingly, an expedited site assessment and cleanup of the contaminated soils was imperative to allow the property to be reused by the local community.

RCRA Interim Measures

Interim measures (IMs) under the Base's RCRA program lead to accelerated removal actions at several Solid Waste Management Unit (SWMU) sites on Base. The sites were impacted by a variety of mixed wastes including POL and metals from disposal areas, tanks, and oil/water separators. IMs were completed under an expedited schedule and resulted in significant cost savings by eliminating the need to complete further RCRA investigations. These removals have reduced potential exposure risks from contaminated surface soils and have enabled the Base to reuse these properties for military operations.

Innovative Technology Demonstration/Validation and Implementation

Camp Lejeune, one of the leading DoD facilities in cleanup, strives for advancement in innovative assessment and remedial technologies. Due to the large number of sites and the different types of contamination present aboard Camp Lejeune, the Installation Restoration Program (IRP) encounters situations where existing technologies will not remediate effectively. In order to test new remedial techniques, Camp Lejeune has implemented several innovative technologies and pilot studies in 2004 to include: 1) Electric Resistive Heating; 2) Hydrogen Releasing Compounds (HRC); 3) Ozone Sparging; 4) Oxygen Releasing Compounds (ORC); 5) Modified Fenton's Reagent and Permanganate Injections; 6) Hydrogen Injections; and 7) In-situ air Sparging. In addition to evaluating the effectiveness of the different technologies, these pilot tests are evaluating the application of reducing source level contamination so that the overall site can be remediated with natural bioremediation thereby reducing overall remedial costs, time and the impacts to the Installation mission, but still being protective of human health and the environment.

Reducing Risk to Human Health and the Environment

Camp Lejeune is one of the first installations nationwide to have a formal LUCAP signed between representatives of the Marine Corps, DON, USEPA Region IV, and NCDENR. To ensure compliance with the LUCAP, the Base has implemented a comprehensive Intrusive Training Program to prevent construction, maintenance, and training activities from impacting or being impacted by contaminated sites within the Installation.

In an effort to reduce the risk to human health, a number of Public Works personnel have received the 40 Hour HAZWOPER training

and are certified. This process has reduced construction delays and associated costs often experienced by contractors who inadvertently work in contaminated areas. The Installation has a formal process by which current and future contaminated properties are managed through the Base Master Planning Process, incorporating geographical information systems (GIS) to facilitate mapping and other essential information. Personnel responsible for planning projects are informed if the work to be done is within impacted areas so the required NEPA documentation can be prepared in advance. The combination of Camp Lejeune's LUCIP and ITP serve as a model for other DoD Installations to effectively manage contaminated properties.