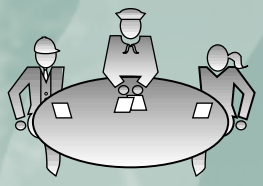
CHAPTER 3

Making SMART Cleanup Happen

The Department of the Navy carries out the Environmental Restoration Program through the Naval Facilities Engineering Command (NAVFAC) and its eight Engineering Field Divisions and Activities (EFD/As). Cleanup at each installation is supervised by one or more Remedial Project Managers (RPMs), and special assistance is provided by Remedial Technical Managers (RTMs) who typically have knowledge of specific technical areas. Regular communication between RPMS, RTMs, installations and regulators (EPA, states, etc.) makes cleanup consistent and increases efficiency. Lessons learned are transferred between personnel, leading to large-scale, money-saving cleanup opportunities.

To facilitate the SMART cleanup process, DON has implemented training programs, developed technical documentation, researched and purchased new cleanup technology, and established innovative contracting strategies to help Navy/Marine Corps personnel get the job done. This chapter showcases these efforts, summarizes new technologies, and presents cleanup success stories from the EFD/As.



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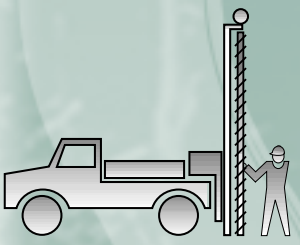

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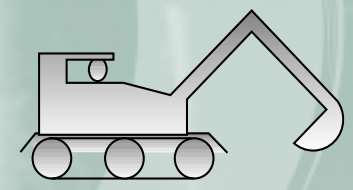

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Future Generations

SMART Training

State-of-the-art environmental training provides DON personnel, regulators and the public with the knowledge and perspective to handle cleanup projects effectively. Two primary sources of this training are the Naval School Civil Engineer Officers training school (CECOS) and the Remedial Innovative Technology Seminars (RITS).

CECOS

CECOS facility in Port Hueneme, CA

The Civil Engineer Corps Officers School (CECOS) is a Navy schoolhouse, offering training courses on diverse topics for military and civilian personnel. The Environmental Training Division within CECOS offers environmental restoration courses specifically designed to enhance the knowledge of Remedial Project Managers (RPMs), Remedial Technical Managers (RTMs) and base personnel. The courses provide environmental personnel with tools and techniques to make intelligent decisions and develop strategies to clean up their sites in a cost-effective manner while protecting human health and the environment. CECOS has been instrumental in helping to develop leading edge environmental management strategies for the Navy.

CECOS courses are developed with input from the Chief of Naval Operations (CNO), Naval Facilities Engineering Command (NAVFAC), EFD/As, Naval Facilities Engineering Service Center (NFESC), and other Navy-affiliated entities, ensuring that environmental personnel receive training that is relevant to their day-to-day needs. Computer-based training (CBT) and web-based courses are in the pipeline as well, taking advantage of modern technology to increase the consistency and accessibility of training. Interservice Environmental Education Review Board (ISEERB) courses are also being developed to meet the emerging needs of all services. CECOS is a member of ISEERB, working with the Army, Air Force, and Marine Corps to consolidate existing environmental courses with similar content. This initiative avoids duplication of effort for the military and saves money for the taxpayer.

CECOS Course Highlights

Advanced Environmental Restoration

This four-day course provides instruction to ensure that remedial actions are protective of human health and the environment, cost effective, timely and responsive to community reuse needs where applicable. This course assumes attendees have a working knowledge of the Navy's Installation Restoration and related cleanup programs.

Ecological Risk Assessment

This course provides attendees with current information on Ecological Risk Assessment (ERA) and its use in the IR program. Instruction includes the clarification of each ERA component, decision making strategies for site specific ERAs, and a description of technical oversight that should be included in the ERA. Procedures for performing ERA tasks, estimating risk, and meeting regulatory requirements are also addressed.

Environmental Risk Assessment and Management

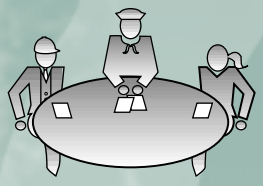
This course provides instruction on conducting and managing human health risk assessments that are scientifically tenable and defensible, and presents strategies for using this information to make risk management actions that are protective of human health and the environment. Efficient management and oversight of risk assessment in balance with contractors, regulatory and community requirements are a focus of the course.

Remedy Selection and Closure

This class will provide attendees with the necessary tools and information to make remedy selection decisions to achieve site closeout. Attendees will learn optimization of Long Term Management/Remedial Action Operation (LTM/RAO), site closeout processes and components of the Record of Decision. Factors such as contaminant and media impacts, transfer mechanisms, applicable technologies and lifecycle design considerations are emphasized.

NFESC Remedial Technology Innovation Seminars

The Remediation Innovative Technology Seminar (RITS) program was developed to facilitate transfer of new and innovative technologies, methods, and guidance for remediation topics. The Naval Facilities Engineering Command (NAVFAC), the Naval Facilities Engineering Service Center (NFESC), and the Naval Engineering Field Divisions/ Activities (EFD/As) have sponsored the RITS for the last three years. This year, approximately 230 RPMs, state and Federal Regulators, Clean and RAC contractors attended RITS. Four new topics were presented this year: Risk-Based Corrective Action (RBCA), Ecological Risk Assessments (ERAs), Bioavailability, and Contaminated Sediments. The selection of these topics was based on comments and requests received from previous RITS attendees. The seminars have proven to be a cost-effective means of training Remedial Project Managers (RPMs), saving time and money over traditional training methods. RITS is also offered to private contractors who perform remediation functions for the Navy, as well as Federal, state, and local regulatory agencies. By allowing persons from these organizations to attend RITS, the Navy effectively broadens and strengthens communication between all parties involved in Navy remediation efforts.



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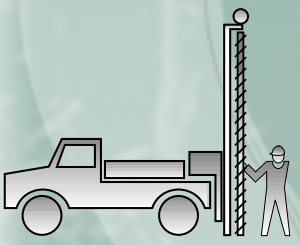

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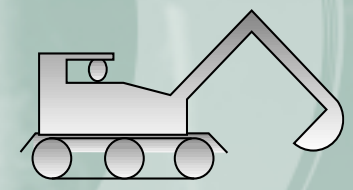

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SMART Technical Documentation

DON workgroups and EFD/As create technical documents in order to (1) guide Remedial Project Managers (RPMs) in the successful completion of their restoration projects, and (2) establish a consistent approach across all DON sites for handling these strategies as the need arises. The following paragraphs summarize the key points for completed guidance, and describe the recent progress for guidance that is still under development.

Bioavailability Technical Guidance

Bioavailability refers to the amount of a given substance that can be absorbed by living organisms. The absorption amount determines whether the substance could cause harmful effects, so the less bioavailable a substance is, the less risk it poses to humans and the environment. At cleanup sites, many circumstances can affect the bioavailability of contaminant substances: how easily the substances dissolve; whether they are chemically bonded (attached) to other substances; location (soil, sediment, water, air); substance form; acidity, and the length of time the substances have been at the site. These factors must be taken into account when determining the level of cleanup required to remediate a site. DON has developed a handbook (volume I) for Remedial Project Managers that encapsulates this information and provides details on study costs, time requirements, and information about commonly found metals at Navy/Marine Corps sites. A draft technical guide for the bioavailability of metals (volume II), including detailed methods of assessment; geochemical considerations; and a summary of previous bioavailability studies is also available for reference.

The Navy began to consider bioavailability studies as a risk assessment tool for cleanup sites following the pioneering efforts of EFA West along with other EFD/As, CNO and NFESC.

Natural Attenuation Technical Guidance

Natural attenuation (NA) is the breakdown of substances through natural means without interference from mankind. In some cases, allowing nature to take its course in eliminating contaminants through NA is less harmful to the environment, poses fewer risks to human health and ecological receptors, and is more efficient than using manmade processes that may destroy habitats. When considering NA as a site remediation option, it is vital to know the concentration of contaminants at the site; the rate and direction of groundwater flow; the properties of the site's groundwater; and the proximity between the remediation site and human/wildlife dwellings. Monitoring of NA sites ensures that the natural remediation processes are occurring as expected. NA can be used in conjunction with other remediation methods, and in some cases as a "polishing step" at the end of an active remediation process. A specific technical guide for monitored natural attenuation of hydrocarbons and chlorinated solvents in groundwater is available for reference.

Extensive research by Southwest Division, Southern Division, EFA Northwest and ARTT led the DON to consider NA as a viable site remediation method.

Background Technical Guidance

For remediation purposes, "background" refers to the concentrations of chemicals found at a site that are either (1) naturally occurring or (2) manmade but unrelated to Navy/Marine Corps operations. The DON is now conducting background statistical analyses at cleanup sites in order to make an accurate assessment of the substances the Navy/Marine Corps is responsible for remediating. Information about background conditions can help in establishing site-related human health risks, threats to the environment, requirements for regulatory compliance, and alternative site remediation strategies. In addition, background analyses help to set reasonable remediation target goals. By fostering a higher degree of accuracy in site assessment, background studies create the opportunity to save money on unnecessary cleanup measures and speed up the transfer of remediated property to the public sector. A technical guidance document on background data analysis is available for reference.

EFA West, under Southwest Division, realized the importance of determining background levels for accurate site assessment, and have spearheaded DON's use of this assessment tool.

LTM/RAO Technical Guidance

The Long Term Management/Remedial Action Operations working group is currently developing test optimization methods, and is implementing these processes on a trial basis at several DON field sites. With feedback from the sites, the work group will modify the optimization guidance and develop a practical approach to implementing it DON-wide.

SMART Contracting

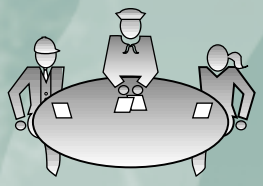
The DON depends on innovative contracting methods to make cleanup more effective and to accomplish more with fewer cleanup dollars. Below are some examples of successful innovative contracting strategies.

Broad Agency Announcement

The Broad Agency Announcement (BAA) program was developed by the environmental department of the Naval Facilities Engineering Service Center (NFESC) as a streamlined contract mechanism that gives Remedial Project Managers (RPMs) at the Engineering Fields Divisions and Activities (EFD/As) access to innovative environmental technologies and new methodologies from contractors. The technologies and contractors are pre-screened and evaluated by NFESC, allowing the EFD/As the ability to purchase the equipment or services without developing an extensive scope of work or sending out sole source/ competitive solicitations. Contractors with new technologies or cleanup methods can submit abstracts explaining the merits and objectives of their offerings. Abstracts are evaluated by technical experts, and the abstracts that meet BAA criteria are included in a manual that is distributed to the host activities and RPMs. The goal of this BAA effort is to discover more efficient methods of site remediation than currently available technologies.

Fixed Price/ Reimbursable Contracting

In some cases, the Navy can set up contract procedures in which the cleanup contractor is paid a fixed price for mobilization and startup costs, but is paid on a reimbursable basis for operational costs. For example, a RAC contractor designs and builds a remediation system for a DON cleanup site and is paid a fixed price for the design, equipment and installation. When the equipment is used to remediate the site, the contractor is then paid based on the quantity of contaminant reclaimed and/or destroyed by the cleanup system. This initiative serves the dual purpose of allowing contracts to be awarded more rapidly (often within 30 days) and providing the contractor with a vested interest in building highly effective treatment systems.



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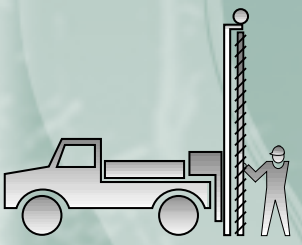

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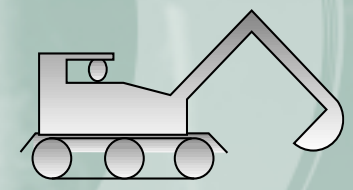

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SMART Cleanup Technologies

The DON is constantly seeking new technology that will enable site restorations to take place faster, consume less energy, and provide better results at lower cost. The Naval Facilities Engineering Service Center (NFESC), and SPAWAR (Space and Naval Warfare Center) spearhead this effort through the Engineering Field Divisions and Activities, researching and demonstrating new remediation methods that could prove useful for DON installations. Here are some recent examples.

Fenton's Reagent

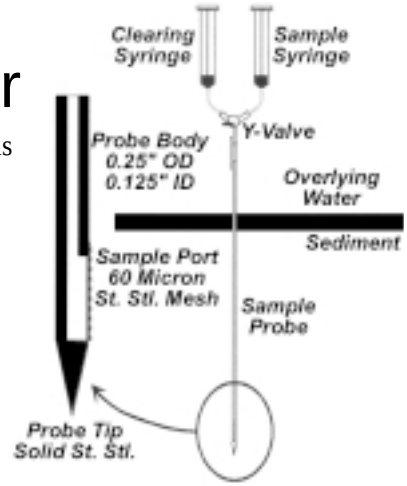
Cleanup at NAS Pensacola, Florida using Fenton's Reagent

The Navy recently refined and tested a new site remediation method based on Fenton's Reagent, an oxidation process introduced by H.J. Fenton in the 1890's. The method quickly breaks down organic compounds such as perchloroethylene (PCE), trichloroethylene (TCE) and other chlorinated hydrocarbons in water by using a solution of hydrogen peroxide, metallic salts and ferric iron to dissolve the bonds that hold the compounds together. In this way, hazardous substances are safely converted into carbon dioxide, water and chloride. The modern wastewater industry has used the method for years as a water treatment process, but the Navy's special use and varying site characteristics demanded refinements in the process as well as new technology to make it effective for site cleanup purposes. The refined process was tested at Naval Air Station Pensacola, Florida, and is currently being used to clean up PCE (Perchloroethylene) and related substances in a 25-acre site located at Naval Submarine Base (NSB) Kings Bay, Georgia. The method could reduce cleanup time for King's Bay from over 30 years, based on traditional methods, to less than two years. Due to the expected success of this project, the Navy is now exploring the possibility of implementing this treatment method at other Navy sites.

Tidal Seepage Meter

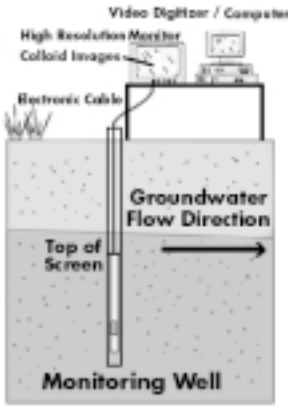
As groundwater flows outward from coastal sediments, it is possible for existing soil contaminants to be carried with the groundwater into bay waters. Particularly for coastal landfill areas and hazardous waste sites, it is crucial to verify that contaminants are not migrating in this way. Because traditional surface water testing and sediment testing methods are not designed to evaluate this sediment/surface water "transition zone," the Navy is developing conceptual models and technologies to analyze it and ensure full protection of human health and the environment. One such technology is the Tidal Seepage Meter (TSM), a diver-deployed device that monitors the rate of transport between existing contaminants in sediment and the surface waters above. The TSM consists of an open-bottomed chamber that seals a known volume of water over the sediment. Sampling bags are attached to the chamber to collect water and any contaminants. At the end of the sampling period, the TSM is retrieved and the sample bags are dried and weighed to determine seepage volumes and rates. Samples are then shipped for analysis and determination of contaminant flux rates. Potential benefits of the TSM include streamlining of the remedial investigation/ feasibility study phase, cost savings from reduction/elimination of long-term monitoring requirements based on accurate characterization of contaminant pathways, and better quantification of exposure and risk.

Vacuum Assisted Porewater Sampler



Another sediment/surface water analysis technology recently developed by the Navy is the Vacuum Assisted Porewater Sampler (VAPS). The VAPS rapidly maps out the distribution of water contaminants flowing from coastal sediments that are adjacent to hazardous waste sites. By sampling at different depths and different horizontal locations, researchers can use the VAPS to develop a detailed "snapshot" of contaminant distribution and migration pathways. The sampler consists of a small diameter tube that is screened over a short length at one end, and attaches to the vacuum system at the other end. The vacuum system may either be a syringe operated by diver, or a surface vacuum pump with a subsurface collection vessel. A diver first inserts the VAPS into the sediment to the required depth. The sample is then purged and drawn off into a syringe or in-line sampling vessel. Once the sample is collected, it is returned to the surface for processing and analysis. The VAPS system has the potential to streamline the remedial investigation/feasibility study phase by gathering accurate data about contamination levels at various depths, as well as providing cost-savings opportunities through precise characterization of contaminant pathways, potential exposure and risk.

Colloidal Borescope



The Navy recently demonstrated the colloidal borescope, a new technology that provides direct, in situ field measurement of groundwater velocity in monitoring wells. The device consists of two video cameras, a ball compass, an optical magnification lens, an illumination source, and stainless steel housing. Once inserted into a well, the device transmits video still shots (frames) of natural particles in the well. Integrated software is used to compare the video frames and record the average particle size, number of particles, speed, and direction. Benefits of the colloidal borescope include the ability to use existing monitoring wells for assessment (avoiding the cost of additional well installation), collect more data in a shorter period of time, validate groundwater modeling by conducting several measurements at the site, and evaluate multiple intervals within a well to identify zones of maximum groundwater flow. The latter is critical in remedial design and restoration.

Diffusion Multi-Layer Groundwater Sampler

The Navy demonstrated the Diffusion Multi-Layer Sampler (DMLS) as part of a groundwater remediation effort. The DMLS is a passive multi-layer sampling device based on dialysis cell technology. The device consists of a rod with openings at specific intervals to accommodate dialysis cells. Each dialysis cell is an independent sampling unit, essentially a polypropylene vial filled with distilled water and covered by permeable membranes at both ends. When a dialysis cell is exposed to groundwater with concentrations of substances different from that inside the cell, a natural process of diffusion from higher concentrations to lower concentrations occurs. After approximately 2 weeks of being exposed to the natural groundwater passing through a well, the sample rod is removed and the separate DMLS units are recovered. The groundwater captured through diffusion at various levels within the well is then prepared for laboratory analysis. Advantages of this technology include reduction in investigation-derived waste, the ability to conduct sampling at multiple discrete and precise levels within a well without cross-contamination, and elimination of the need for well purging. The DMLS is also portable and can easily moved from well to well.

Permeable Reactive Barrier

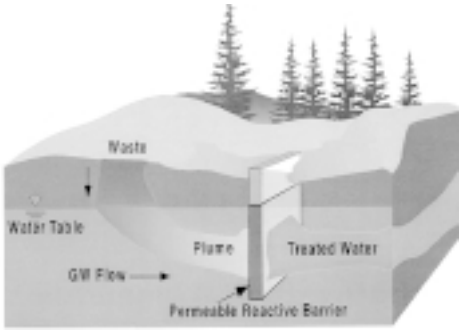


Illustration of PRB remediation

The Navy recently demonstrated the effectiveness of a new groundwater cleanup technology known as a permeable reactive barrier (PRB). PRBs are being tested as an alternative solution for conventional pump and treat remediation of chlorinated solvent compounds in groundwater, because pump and treat methods can be costly and often less efficient. Pump and treat methods depend on powered machinery to actively extract and treat contaminated groundwater, and typically require extensive operation and maintenance. In contrast, PRBs are basically underground permeable walls that are installed in the path of the contaminated groundwater flow. The PRB can be filled with a treatment material such as zero-valent granular iron, which changes contaminants into non-toxic and biodegradable compounds as the groundwater passively moves through the wall. Impermeable wall sections (funnels) can be installed as necessary to direct the groundwater flow through the treatment areas (gates), and pea gravel can be placed bordering the gates to maintain a uniform flow. PRBs can also be installed as a continuous wall without using funnels in many instances. Groundwater samples are taken throughout the PRB remediation process to ensure that the remedy is working as planned. The ability to (1) remediate groundwater contamination without using an external energy source, and (2) return the ground surface to its original land use are among the many advantages of this treatment method.

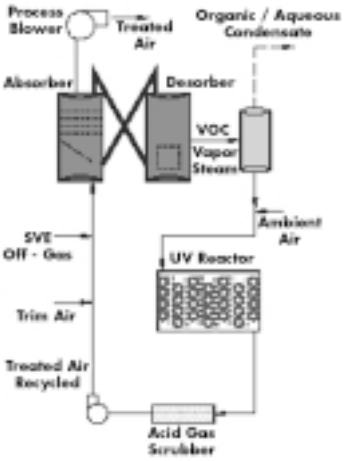
Benthic Flux Sampling Device

The benthic flux sampling device (BFSD) is a prototype monitoring and assessment tool that measures changes in the quantity of contaminants released from sediments in bays, harbors and coastal areas. The device is a tripod-shaped instrument that is deployed from a ship, and uses numerous sensors and sampling tools to gather sediment data from the ocean floor over a two to four day period. Once the BFSD is retrieved, samples are analyzed to determine whether contaminant concentrations are increasing or decreasing in the sampling location. Increasing concentrations indicate that contaminants are flowing out of the sediment into the water, while decreasing concentrations suggest the opposite. This information is useful in evaluating the human health and ecological risks posed by contaminated sediments, establishing sources of new contamination, and choosing effective remediation strategies for those sites.

QWIKLITE-QWIKSED Toxicity Tests

The QWIKLITE-QWIKSED is a new test system that utilizes single-celled marine plankton called dinoflagellates to quickly detect toxins in water and sediments. The system uses the natural light-producing properties (bioluminescence) of the plankton to determine the concentration of contaminants. The plankton and the potentially contaminated water or sediment are agitated in a test tube, and a PMT (photomultiplier) sensor is used to gauge the amount of light emitted by the plankton. Measurable reductions in bioluminescence suggest increased concentrations of toxins. The system is proving to be a valuable asset for detecting metals and other contaminants from storm drain discharges, ship hull coatings, and marine sediments. The advantages of this technology include ease of use, short test setup time (2-3 hours), fast results (24 hours), and sensitivity to a wide range of contaminants. Initial screening of suspect media with QWIKLITE-QWIKSED is a fraction of the cost of conventional toxicity tests.

Photolytic Oxidation



Photolytic oxidation was recently demonstrated as an effective means of eliminating airborne contaminants (offgases) that are sometimes released during soil vapor extraction processes (SVE). Typically, SVE systems pull volatile organic compounds (VOCs) to the surface as vapor using vacuum, adsorb the vapor with an activated carbon filter, and send the filtered air out through an exhaust system. In some cases, the exhaust stream still retains small amounts of contaminants. With photolytic oxidation, the SVE exhaust stream is drawn into an adsorption/desorption system, where the organic compounds are consolidated and then sent through an ultraviolet lamp unit (photolytic reactor), where high-energy photons destroy the bonds that hold the compounds together. Byproducts of the reaction are treated with a calcium hydroxide-based reagent, creating calcium chloride and other safe, stable salts. In this way, photolytic oxidation reduces VOC emissions and increases the efficiency of another SMART technology. The projected cost avoidance over carbon adsorption at NAS North Island is about $760K/year. For more information about SVE, refer to page 3-16 of the February 1999 Environmental Restoration report.

SMART Cleanup Success Stories

Restoration Paves the Way for Base Reuse

NAS Patuxent River, EFA CHES

Naval Air Station (NAS) Patuxent River is located at the mouth of the Patuxent River in Maryland. The base overlooks the Chesapeake Bay, occupying approximately 7,950 acres on Cedar Point. Since its inception in 1942, the base has been one of the primary centers for testing aircraft and equipment for the Navy. The station operates 140 aircraft, representing all types and models currently used by the Navy. Engineering Field Activity Chesapeake (EFA CHES) is the Installation Restoration (IR) Program Manager for this installation.

Improving Refueling Operations

The base's aircraft refueling tanks are centrally located near the runway and taxiways, but limited space requires fuel trucks to be parked two miles away. In October of 1998, the base began working with the Navy's IR program on strategies to reuse IR site 6/6a (the Bohneyard, a former drum storage yard) to relocate the fueling truck parking lot. This would meet the base's long-term needs by centralizing all elements of the base's refueling operations and allowing the base to redevelop approximately 23 acres currently used to park the fuel trucks.

"The refueling center needs about $200,000 in repair work," said Bailey Smith, IR program manager for NAS Patuxent River. "Even after the repairs, it would still be out of compliance. It made more sense to built a new lot and consolidate the fuel in one location."

Partnering Team

The Patuxent Installation Restoration Action partnering team took on the challenge of streamlining the cleanup process to make the site available for reuse within a short time frame. This meant completing the Feasibility Study, preparing a Proposed Plan, holding a Public Hearing, completing a signed Record of Decision (ROD), designing an acceptable solution, and awarding a construction contract within 12 months. The team consists of EFA CHES, NAS Patuxent River, EPA, the Maryland Department of the Environment (MDE), and the CLEAN and remedial action contractors.

"IR sites can take up a lot of space on a facility, so we wanted to look at reuse that supports base missions," said Donna Jordan, EFACHES Remedial Project Manager for NAS Patuxent River.

Navy's Project Team reviewing NAS Patuxent River IR program status of sites.

The Remedy

"We approached the design of the project from a performance specification standpoint," said Ms. Jordan. "We were confident we could achieve what we wanted, and it allowed us to complete the design much faster."

The team was already considering an asphalt cover for the area. However, after looking at the base reuse more closely, the team decided that constructing a concrete parking lot over about 50% of Site 6 and a cover comprised of soil over gravel over the remaining area would be the most effective strategy. At Site 6A, an asphalt cover would be constructed to allow for storage/staging of equipment. The construction project is being paid for with Navy Environmental Restoration Account funds, Defense Fuels, and Defense Base Operating funds. Institutional controls will be implemented as part of the remedy, consisting of access restrictions to prevent trespassing at the Bohneyard, Land Use Controls (LUCs) to control site development and access to groundwater, and monitoring to assess whether contaminants are migrating to the environment. These measures will allow for protection of human health and the environment and reuse of the facility as well.

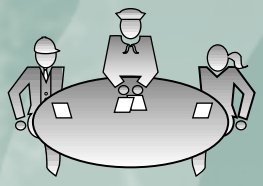
Fast Track Schedule

In order to meet the base's schedule, the conceptual design started while the study, Proposed Plan and ROD were being completed. EPA and MDE were instrumental in working through the regulatory hoops necessary to get things done. Despite the tight schedules that had to be met, actual construction began in the fall of 1999. The new refueling lot will be ready for reuse by the spring of 2000.

"Everyone has been very cooperative. . .we all wanted to see this happen. We want to thank the regulators for their special effort in helping us to keep this project on schedule," said Ms. Jordan.

Remediation was handled as follows:

- Tasks were performed concurrently whenever possible. For example, groundwater sampling and monitoring, UST removal, and soil excavation at the skeet range all took place simultaneously.
- On-site analytical labs provided data within 24 hours, allowing field personnel to quickly select new sampling locations. Real-time field analysis was also used.
- Instead of performing detailed analysis of remedial alternatives, the remediation contractor performed rapid source removals to a Class I landfill. Sampling was used to confirm that contaminants were actually removed. These steps eliminated the need for a lengthy CERCLA and corrective action options evaluation.



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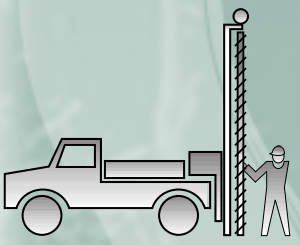

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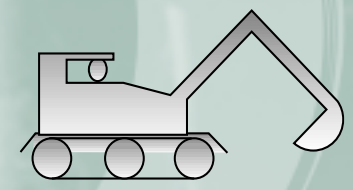

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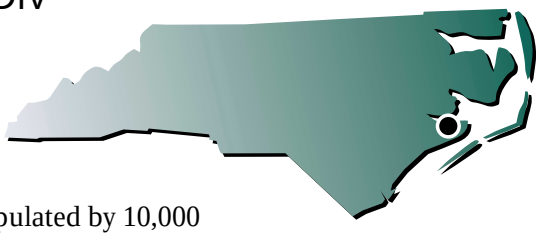
Document Management Technology Improves Productivity

Marine Corps Air Station Cherry Point, LANTDIV



Marine Corps Air Station (MCAS) Cherry Point is the world's second largest Marine Corps Air Station and is home to 2nd Marine Aircraft Wing, Naval Aviation Depot (NAVAVNDEPOT), and Naval Hospital. Located within the city limits of Havelock, North Carolina, the Air Station is populated by 10,000 Marines and Sailors, their dependents and more than 6,500 civilian employees. MCAS Cherry Point and the NAVAVNDEPOT, the Air Station's largest tenant command, have been in operation for more than half a century. Atlantic Division (LANTDIV) is the Installation Restoration (IR) Program Manager for this installation.

Background

Environmental concerns at the air station stem primarily from activities at the station's industrial center. Past practices related to the handling and disposal of industrial chemicals and wastes in past years have resulted in an extensive area of contamination that extends beneath a large portion of the industrial center. This area, which includes CERCLA site Operable Unit 1 (OU1) and several underground storage tank sites, covers more than 500 acres and contains more than 100 potential contaminant source areas. For this operable unit alone, there are approximately 50,000 groundwater; 46,500 soil; 5,500 sediment; and 4,300 surface water analytical data records. "The amount of data we have in hard copy would fill a room!" said Dale McFarland, Remedial Project Manager for LANTDIV.

MCAS Cherry Point website

Innovative Solutions

To cope with this "information overload," the partnering team turned to the latest information technologies:

- Use of an environmental geographic information system (GIS) to quickly and easily examine current site conditions, investigate historical activity, and analyze trends.
- Use of the World Wide Web (WWW) to increase partnering team efficiency and public participation by providing searchable access to data through an online library of documents currently under review.
- Use of Netmeeting, a free software package, to conduct virtual meetings. Participants in diverse locations can view the same image on their screens and make edits. This greatly increases the productivity of the team's teleconferences by ensuring that everyone is literally 'on the same page' of the complex, data intensive documents.
- Use of Adobe Portable Document Format (PDF) site documents to transfer documents electronically. Hot links to supporting data, tables, and figures are included. PDFs save time by reducing the 'flipping back and forth' that typically occurs when reviewing hard copy documents.
- These technologies are key factors that help to increase the team's productivity. Since most of the less controversial issues can be dealt with in this way, this ultimately increases the effectiveness of the team's face-to-face meetings.

Partnering Team/Community Involvement

Representatives from LANTDIV, the LANTDIV CLEAN and RAC contractors, the North Carolina Department of Environment and Natural Resources, EPA Region IV, and MCAS Cherry Point comprise the partnering team. A community Restoration Advisory Board (RAB) provides input on the project and is kept informed through meetings and access to the online MCAS Cherry Point installation restoration library. "Our team gathers every six or seven weeks to work on the major decisions. It's a consensus-building process," said McFarland.

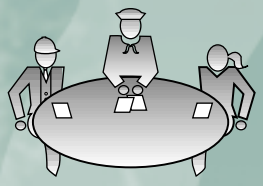
Cleanup in Progress

The Navy is using diverse cleanup methods to reduce contaminant concentrations and prevent ongoing risk to human health and the environment at MCAS Cherry Point. Soil vapor extraction (SVE), air sparging, pump and treat are currently in wide use. Enhanced bioremediation, in which a substrate is injected into contaminated soil areas to speed up organic breakdown of contaminants, is also being tested. With a combination of these methods and monitored natural attenuation, remediation of OU1 is proceeding on schedule.

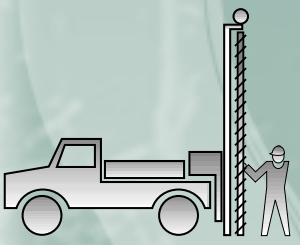
LUC Agreement Signed

Because OU1 is an active industrial area, the Navy proposed to clean up the sites to meet industrial standards and then establish Land Use Controls (LUCs) to ensure that the use remains industrial. In fall of 1999, the Navy succeeded in negotiating the Land Use Controls Assurance Plan with the state of North Carolina. "Our agreement made it clear to the state that our current use (industrial) was the projected use," said McFarland. "That was the big success."

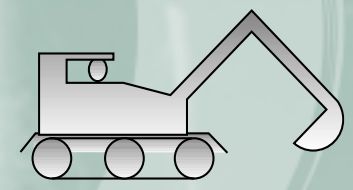
MCAS Cherry Point is the largest employer in eastern North Carolina, and enjoys a cooperative relationship with nearby city and county governments.



Site Planning



Investigation



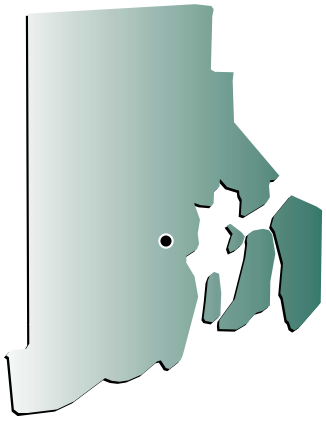
Cleanup

Site Closeout

Future Generations

Landfill Closure Creates Future Recreation Space

Naval Construction Battalion Center, NORTHDIV



At the former Naval Construction Battalion Center (NCBC) in Davisville, Rhode Island, a 15-acre landfill was created and used from 1942 until 1972 for disposal of household waste, as well as waste generated during maintenance / construction activities. Naval operations at NCBC ceased in 1991 under the Base Realignment and Closure Act (BRAC II). Some of the substances deposited in the landfill include Volatile Organic Compounds (VOCs), waste oil, metals and Polychlorinated Biphenyls (PCBs). The landfill is adjacent to Allen Harbor, a recreational area within Narragansett Bay. Northern Division (NORTHDIV) is the Installation Restoration (IR) Program Manager for this BRAC installation.

The Base Closure Team

The Navy worked with EPA Region I, Rhode Island Department of Environmental Management (RIDEM), the United States Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration (NOAA), Coastal Resources and Management Zone (CRMZ), the Rhode Island Economic Development Corporation (RIEDC), the town of North Kingstown, the RAC contractor, the Restoration Advisory Board (RAB) and other interested community members to develop a remediation strategy. "We had regular meetings with the base closure team, bimonthly or more depending on the level of activity," said John Mayhew, Remedial Technical Manager for NORTHDIV. "We kept everyone informed through daily phone calls, emails, faxes, etc. Whenever someone had a major concern, we'd hold a meeting to address it."

Coastal Considerations

Impermeable liner construction

Since the landfill was close to the shore, the team had to consider the impact of a 100-year storm when planning the remedy. If the landfill cap was extended downward around the landfill edges, studies determined that pressure from high water levels could eventually cause the liner to fail. The impermeable liner was constructed over 85% of the landfill surface to minimize rainwater infiltration, and the wetlands area was integrated into the plan as an erosion buffer and filtration measure. Regulatory requirements generally specify a 3/1 slope for a landfill face, but experience with another coastal landfill project led the Navy to pursue approval of a maximum 2/1 slope to avoid undermining the landfill material and excessive encroachment into the harbor. Taking the stone barrier and wetlands plan into account, the regulators approved the plan.

Cooperative Efforts

The local community wanted to improve access to the harbor to allow more recreational and economic development opportunities. With cooperation from state and local regulators, the Navy used dredged material from the harbor channel for the creation of the wetlands area. "Combining the two projects saved time and money for the Navy and the community," said Mayhew.

Silt curtains in use

Future Plans

The capped landfill will eventually become a recreational area with hiking trails and wildlife habitats. The Navy is currently reseeding and monitoring the establishment of vegetation on the landfill surface due to recent drought conditions, and a long-term site management plan is under development.

The strategy agreed upon was as follows:

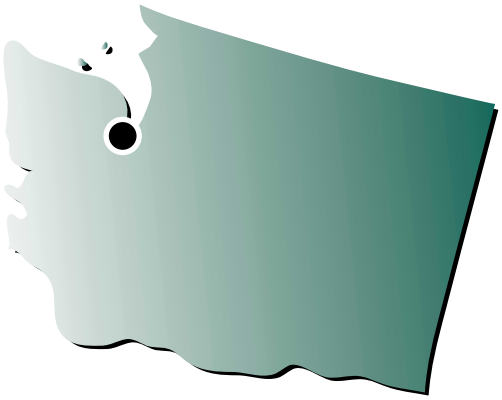
- Stabilize the landfill's edge and grade it to form a more gradual slope
- Stop erosion of the landfill material by building a stone barrier on the seaward side
- Use silt curtains to prevent siltation of harbor areas during the process
- Install an impermeable cap over the majority of the landfill surface
- Create area for wetlands using clean dredged material from the Harbor entrance channel
- Plant indigenous grasses (Spartina-alternaflora) to establish wetlands environment
- Monitor the site to ensure that the remedy stays effective

Original landfill face

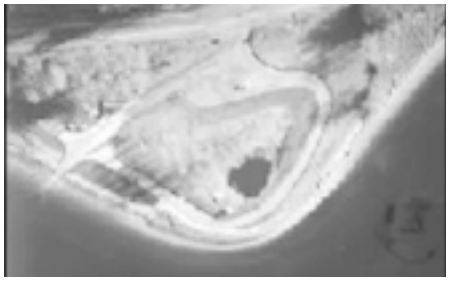
Wetlands creation area

Vegetative Cap Protects Shoreline, Helps Wildlife

NSB Bangor, EFA Northwest



Located along the northern shoreline of Naval Submarine Base (SUBASE) Bangor (Washington), Floral Point was built up gradually from 1950 to 1968 by filling in the area between the original sand spit and the mainland. During this period, the site was used for ordnance testing. Between 1967 and 1972, Floral Point was used for solid waste disposal from the Naval Undersea Warfare Engineering Station (NUWES). Floral Point (site B) was included on the National Priorities List (NPL) on August 31, 1990. Engineering Field Activity Northwest (EFA NORTHWEST) is the Installation Restoration (IR) Program Manager for this installation.



Floral Point shoreline

Remedial activities at Floral Point involved installation of a vegetated soil cap to prevent direct contact with/ingestion of soil contaminants. To preserve the remedy, EFA Northwest worked closely with Washington State Department of Fish and Wildlife to choose an effective erosion prevention system that would reduce beach erosion while preserving the beach gravel as a spawning area for sand lance, surf smelt and candlefish. A 15-member Restoration Advisory Board (RAB) at SUBASE Bangor met monthly and was briefed on all stages of the project.

Construction Challenges

Since the site was a former disposal area, precautions were taken in case unexploded ordnance items were found. Drainage ditches and silt fencing were also used to ensure that two saltwater marshes with drainage to Hood Canal were not affected by sedimentation. Boat ramp construction and repair was expedited by working at night and taking advantage of low tides. Pre-cast concrete sections were used at the lowest end of the ramp, eliminating the need to place wet concrete into Hood Canal. Due to the spawning periods of sand lance and surf smelt, in-water work was only permitted from June 15 through Oct 15.

Clearing of the site was done mechanically, using no chemicals, in support of a RAB request.

Created freshwater pond

Cost Avoidance Measures

Remediated shoreline

Clean soil excavated during another SUBASE cleanup project was "reused" to construct the soil cap, saving up to $200,000 by eliminating disposal costs and reducing soil purchase costs. Brig internees were employed to place rip-rap as an interim erosion protection measure, saving additional money and preventing erosion during the winter storm season before the remedy could be placed.

Project Successes

In addition to continued use of the beach by sand lance and surf smelt, candlefish have now been found spawning on the restored beach. In addition, there has been increased use of the upland portion of the site by migratory birds and deer.

"We've had a dramatic increase in the number of sand lance nests since the remediation took place," said Tom James, wildlife biologist for SUBASE Bangor.

Project Summary

- Cleared large rocks and concrete barriers from the beach to avoid focusing erosion
- Performed wind and wave analysis to properly design shoreline erosion control
- Placed 2-foot-thick layer of cobble on beach for habitat enhancement
- Extended beach slope to prevent overtopping of the beach by waves
- Planted dune grass and placed timbers to stabilize beach and provide additional habitat
- Placed 1-foot cap of imported and reused soil from SUBASE Bangor
- Modified road, concrete turnaround, and boat ramp to meet height of cap
- Placed 5,100 plants selected from 38 native species
- Created freshwater pond and wetland area for habitat enhancement

Rapid Response Stops Fuel Oil Plume

Pearl Harbor Naval Shipyard, PACDIV

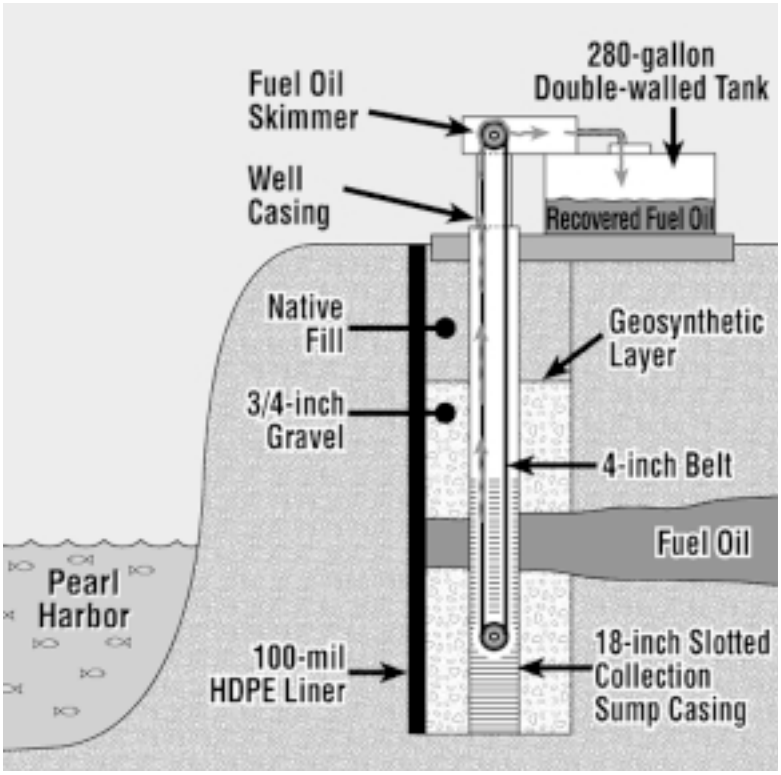
Pearl Harbor Naval Shipyard's Oscar-2 Pier is adjacent to the former site of a Navy power plant servicing the facility on the southern portion of Oahu, Hawaii. In the 1970s, base personnel noticed a discharge of oil seeping from rocks at the harbor's edge near an old, inactive pier. Investigations showed that, over time, approximately 200,000 gallons of Navy Special Fuel Oil (NSFO) had been released from the former plant's underground storage tanks. In order to prevent further fuel migration into the harbor, a Navy cleanup team took a series of aggressive steps to capture the plume. The team was comprised of the Pacific Division, Naval Facilities Engineering Command (PACDIV), the base, the Hawaii State Department of Health, EPA Region IX, and PACDIV's CLEAN and RAC contractors. Pacific Division (PACDIV) is the Installation Restoration (IR) Program Manager for this installation.

Study, Feedback, Go!

The team developed a draft engineering evaluation/cost analysis and provided it to the regulatory groups and the community Restoration Advisory Board (RAB) for comments. After integrating changes, the team proceeded with the remediation strategy.

Construction Challenges

"The original design was just a trench and barrier, but the irregular shoreline made it difficult to build the trench between the shoreline and a large, active transformer. Our solution was to build a short seawall in this area and integrate the barrier into it," said Liane Rosen, Remedial Project Manager for PACDIV. For durability, the seawall had to be constructed of epoxy-coated steel sheetpiles. Used sheetpiles were purchased for the wall and then sandblasted and coated by a local contractor, but had to be recoated due to inconsistency in the coating application. "It's important to recycle materials whenever you can," said Rosen.



Trench, liner and recovery system cross section

HDPE liners in place

Cost Avoidance

The Navy team saved approximately $900,000 by installing the liner into a predominantly unshored trench and eliminating the need for dewatering and trench entry during installation. Regulator-approved onsite reuse of low-PCB impacted soil allowed additional savings of approximately $250,000. The wall and trench were completed and operational by March of 1998, effectively blocking the subsurface fuel oil upgradient of the trench from further migration into Pearl Harbor.

Completed seawall

Reclamation in Progress

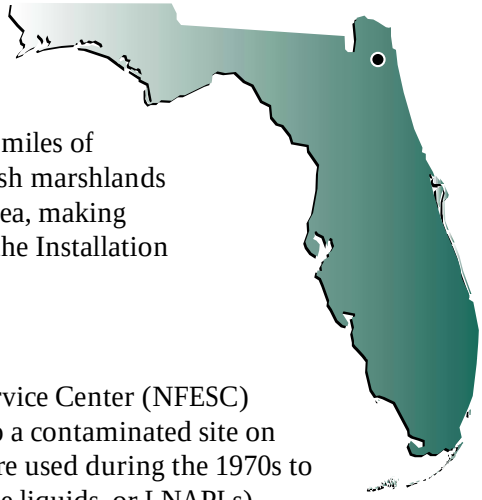
"So far we've reclaimed an estimated 8,600 gallons of fuel," said Rosen. "The RAB and our regulators are happy. . .we found the problem, told them what we were going to do, and we did it."

The selected cleanup actions from the RAC were as follows:

- Excavated a 500 foot long, three foot wide by 16 foot deep trench located 10 feet from the shoreline
- Installed 100 mil thick HDPE (plastic) liners on the seaward side of the trench
- Constructed a sheet pile wall across an intake duct on the south end of the trench
- Placed gravel, collector pipes, and 12 vertical sumps within the lined trench
- Built five portable fuel oil recovery skimmers
- Recovered approximately 1500 gallons of fuel oil within four weeks of system startup
- Managed offsite migration of oil with floating barriers and skimming

Navy Saves Time and Money With Bioslurping

NS Mayport, SOUTHDIV



Naval Station Mayport is located 15 miles east of downtown Jacksonville, Florida at the mouth of the St. Johns River and the Atlantic Ocean. The base has nearly a full mile of beach front, 4.5 miles of river shoreline, and approximately 1,700 acres of wetlands, brackish marshlands and beaches. Manatees, ospreys and sea turtles are native to the area, making conservation efforts critical. Southern Division (SOUTHDIV) is the Installation Restoration (IR) Program Manager for this installation.

Implementing Modern Technology

In conjunction with SOUTHDIV, Naval Facilities Engineering Service Center (NFESC) and the contractor, Mayport recently used bioslurping to clean up a contaminated site on the base. The site consisted of unlined sludge drying beds that were used during the 1970s to collect bilge water containing oily wastes (light non-aqueous phase liquids, or LNAPLs).

Team Assembles, Changes Course

The Navy assembled a partnering team that included representatives from the Florida Department of the Environment (FDEP), EPA, SOUTHDIV, the base, and Navy contractors. The team began meeting on a bimonthly basis to discuss site issues. The group initially agreed to pursue low-temperature thermal adsorption as a remediation strategy, but later discovered that bioslurping might be a better option. Bioslurping was found to be five times cheaper than the estimated cost of low-temperature thermal adsorption for this project. "There was a contracting group brought in to SOUTHDIV to discuss different ways of doing cleanup," said Adrienne Wilson, RPM for SOUTHDIV. "The team was so convincing about the lower cost that we decided to go with [bioslurping]."

The Process

Bioslurping works by using vertical pipes to pump contaminated water from the ground into tanks, where the petroleum products and water are separated. The fuel is sent through a filter and collected for reuse, while the clean water is reinjected into the ground along with air in order to oxygenate and clean the soil (bioventing). "We've been running the bioslurper for about a year and a half, and we expect to have one more year based on the current concentration level," said Wilson.

Manatees are native to the NS Mayport area.

Portable bioslurper system

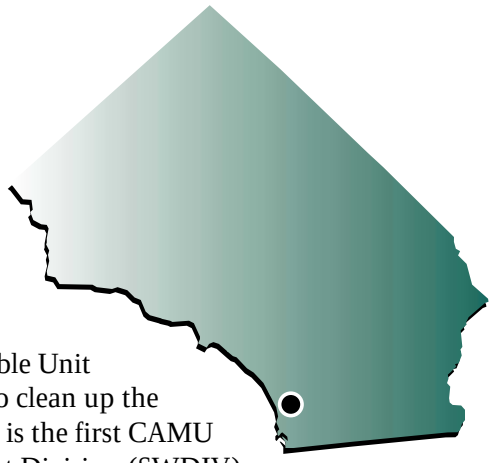
Reusable Remediation!

In addition to the initial cost savings of bioslurping, this system is mounted on trailers to be fully portable. In this way, the system can be used over and over in different areas, avoiding the expense of building a new system at other sites. As remediation of the current site draws to a close, Mayport is looking at additional sites within SOUTHDIV that could benefit from bioslurping technology. "The fact that we can move the system is a big plus," said Wilson. "We just hook up to a new electrical system and we're back in business. The biggest challenge for this project was getting over the fact that everyone had reached consensus, and then the Navy said 'wait–we have a better way.' The bottom line is that we all wanted to do what's best for the environment," said Wilson.

As a Navy Environmental Leadership Program (NELP) site, Mayport is developing innovative environmental cleanup and protection techniques and exporting those initiatives throughout the DON.

CAMU Equals Efficient Cleanup

Marine Corps Base Camp Pendleton, SWDIV



Marine Corps Base (MCB) Camp Pendleton, California is the largest Marine Corps base on the West Coast. With a total of 125,000 acres, the base has supported diverse Marine Corps activities since the 1930s. Past surface disposal practices on the base led to soil contamination at five sites, primarily with lead and other metals. Working with federal and state regulators, the DON designated a former landfill as a Corrective Action Management Unit (CAMU) in March, 1999 as part of the Operable Unit Three (OU3) Record of Decision (ROD). This made it possible to clean up the five site quickly, efficiently, and in a fully protective manner. This is the first CAMU successfully negotiated for SWDIV and the West Coast. Southwest Division (SWDIV) is the Installation Restoration (IR) Program Manager for this installation.

How a CAMU Works

The Resource Conservation and Recovery Act (RCRA) generally requires that contaminated soils be treated prior to placement in a landfill or other location. However, when dealing with certain types of contamination, it is sometimes possible to use another similar site as a consolidation and treatment area. With prior approval from regulators, the contaminated soil can be excavated from the original site(s), safely placed in the designated CAMU, and remediated at that new location. "It's basically a legal mechanism that allows you to conduct the remedial action in a different way," said Davis Mangold, Remedial Project Manager for MCB Camp Pendleton. "There are only certain situations where a CAMU can be used."

Stakeholder Agreement

SWDIV, EPA, the California Environmental Protection Agency/Department of Toxic Substance Control, and the California Regional Quality Control Board (San Diego region) worked together to achieve consensus on the remediation plan for OU3. After study and analysis of the contaminated areas, it was eventually determined that a remedial action was most appropriate for the sites requiring cleanup. A total of 140,000 cubic yards of contaminated soil will be excavated from the risk areas and relocated in an inactive 27-acre landfill (CAMU) on the base, which will then capped with a 200,000 cubic yard impermeable evapotranspiration (ET) soil cover to contain the excavated material and control rainwater runoff.

Cost Avoidance

The integration of the CAMU into the remedial action avoided approximately $28 million in off-base transportation and disposal costs. Surplus soil from other on-base construction projects was used as remedial action backfill, saving $2 million compared with the cost of importing soil from an off-base site. Installation of the ET soil cover eliminated the need to construct a regulatory multi-layer prescriptive cover, saving an additional $2.5 million.

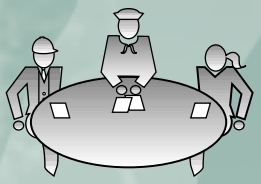
Box Canyon landfill

Field Work In Progress

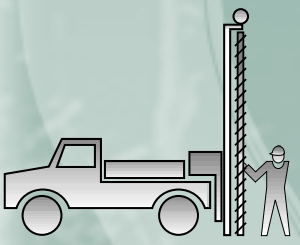
Cleanup at the OU3 sites is ongoing and will be completed by June 2000.

"This had never been done in the state of California before," said Mangold. "It was very intense, lots of debate. Eventually the right thing was done."

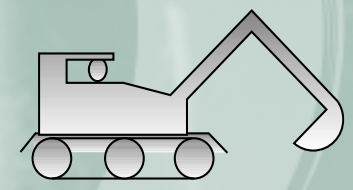
Cleanup in progress



Site Planning



Investigation



Cleanup

Site Closeout

Future Generations

Community and Navy Team Share Cleanup Goals

Naval Facility Centerville Beach, EFA West

Located near Ferndale, California, Naval Facility Centerville Beach (NFCB) was a listening post for underwater operations. The base was recently closed as a non-BRAC closure, because it was no longer needed for Navy purposes. Of the 13 NFCB sites initially identified, analysis determined that only eight required cleanup. In June 1998, EFA West set an ambitious goal to complete cleanup and closure of all sites in less than one year. Engineering Field Activity (EFA WEST) is the Installation Restoration (IR) Program Manager for this installation.

"The site was on layaway status, but the command was still incurring costs for maintenance," said Hubert Chan, Remedial Project Manager for EFA West. "We wanted to clean it up in an accelerated manner and transfer it for the community's use."

Community Interest

Expediting the NFCB closure was also a goal of the nearby City of Ferndale. The community wanted to return the base property to productive use in order to create revenue and jobs. "We provided the community with information about the need for cleanup based on future risks up front. They had confidence in our cleanup methods," said Chan.

Partnering

The partnering team included representatives from the Navy, EFA West contractors, California Department of Toxic Substance Control (DTSC), North Coast District Water Quality Control Board, and Humbolt County government. The team held monthly public meetings to inform the community about the status of the project. Fact sheets were released and public meeting notices were posted at the Ferndale town hall and in the two major local newspapers.

Soil removal from site OU1

Diverse Cleanup Sites

The sites identified for remediation included five petroleum underground storage tank (UST) sites, a lead skeet range, a polychlorinated biphenyl (PCB) spill site, and a solvent spill area. Working directly with regulators and the community, the Navy developed a practical strategy for the accelerated cleanup process.

Superb Regulator Involvement

Regulatory agencies were kept abreast of data results, issues, proposed approaches, and decisions on a constant basis. "Regulator participation was outstanding on this project. . .they provided us feedback in a real-time manner," said Chan. "They usually gave us concurrence or disagreement on the same day, so we never had to stall our contractors."

Jobs for Local Workers

At the Navy's request, the remedial action contractor utilized local truck drivers to haul the excavated soil to the Class I landfill, and hired local drilling companies for test drilling. That agreement generated income for the local community and provided the Navy with needed services at a reasonable cost.

Monitor well drilling in progress

Cost Avoidance

The NFCB team was able to avoid more than $5 million in costs on this project. Most of these savings stemmed from preparation of the cleanup design and eliminating the need for a full-blown assessment of cleanup alternatives. "Rather than going through extensive studies, we knew what the best action was and made it happen," said Chan.

Goal Achieved

The fieldwork at NFCB was completed in just eight months. Approval for no further action for seven of the eight sites was received from the water board in fall of 1999, and closure of the final site is expected by March of 2000. The closure documentation will be incorporated into the base-wide Remedial Action Plan / Record of Decision (RAP/ROD) at that time period. The property will be made available to the community under the GSA transfer process.

Shoreline at Centerville Beach

"We had a good team relationship and we kept the goal in mind," said Chan. "It was a common-sense approach."