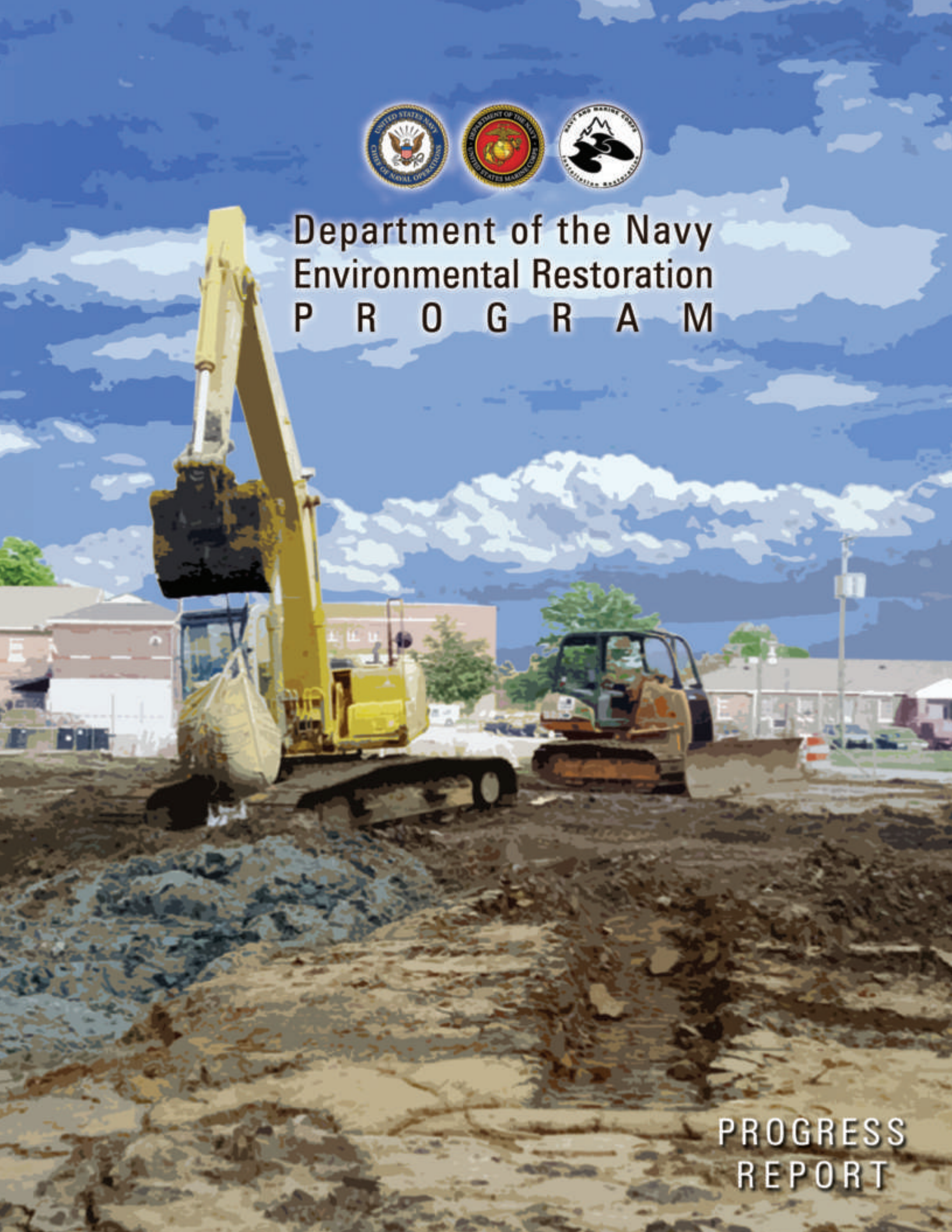
Department of the Navy Environmental Restoration PROGRAM



PROGRESS REPORT

In Our Past . . .

The United States is a maritime nation, dependent on the seas for both commerce and defense. Our Naval forces provide strategic deterrence, crisis response, and humanitarian operations in support of our national security objectives. Ensuring our Navy's ability to operate anywhere in the world requires a vast land-based support infrastructure that includes many industrial operations. In the past, many of these industrial practices resulted in contamination that the Navy and Marine Corps cleanup team is aggressively addressing.

The Department of the Navy (DON) started the Environmental Restoration Program in response to Superfund legislation to mitigate past releases of hazardous waste. Since the early 1980s, comprehensive assessments at Navy and Marine Corps installations began to identify potential areas of contamination and develop cleanup strategies to address them. Of the 3,700 individual cleanup sites that have been identified, 75% have remedial solutions in place or have fully achieved cleanup goals. It is the DON's goal to complete the Installation Restoration Program (IRP) by the end of fiscal year 2014.

Sites that include the cleanup of Munitions and Explosives of Concern (MEC) are included in the newly established Munitions Response Program (MRP). These are typically sites where munitions were used at former training ranges or where munitions were discarded as a means of disposal…a practice no longer allowed. The DON is taking early actions to identify and study Munitions Response Program sites and to ensure that the public is protected from any explosive hazards or environmental concerns.

RESTORING OUR FUTURE

Cleanup of our past hazardous waste contamination is a responsibility that the Department of the Navy (DON) takes very seriously. Through the use of innovative technologies, partnering with environmental regulators and community members, and establishing aggressive cleanup goals, the DON is on target to complete cleanup at all hazardous waste sites by the end of 2014. The Munitions Response Program is placing emphasis on identifying and cleaning up former DON test and training ranges and other areas where military munitions may have been discarded.

This report describes the DON's cleanup progress as of the end of Fiscal Year 2005 and its future plans for completing environmental restoration at active Navy and Marine Corps installations.

THE PROCESS

The Environmental Restoration Process

The DON Environmental Restoration Program follows the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response action process. This approach is used as a template for most Installation Restoration Program (IRP) and Munitions Response Program (MRP) sites and provides a comprehensive cleanup approach from site identification and investigation through cleanup and closeout.

THE ENVIRONMENTAL RESTORATION PROCESS

Preliminary Assessment (PA) determines the probability of and possible locations of potentially contaminated areas based on review of existing information.

Site Inspection (SI) includes a physical inspection of potential sites and may include limited soil, surface water, and/or groundwater sampling.

Remedial Investigation (RI) fully characterizes the nature and extent of contamination at a site, determining the regulatory requirements, assessing baseline risk to human health and the environment, and developing cleanup alternatives.

Early Response Action is taken if significant contamination is discovered that poses an immediate threat to human health or the environment that cannot wait until the final remedy is selected.

Feasibility Study (FS) identifies and assesses potential technologies for remediation, then develops a proposed plan. A Decision Document or Record of Decision (ROD) is written to document the remediation decisions made.

Remedial Design (RD) consists of designing the selected remedial system to meet the remedial objectives described in the Decision Document or Record of Decision.

Remedial Action (RA) is the actual cleanup work. The Remedial Action construction portion covers the construction of the remedial solution to be used for cleanup. Once construction is complete and the remedy is working as designed, it is considered to be Remedy In Place (RIP). The Remedial Action operation portion covers the period of time that the remedial system must operate to achieve cleanup objectives in the Record of Decision or Decision Document. The remedy may include Land Use Controls (LUCs). These controls may include fences, signs, landfill caps, pumping and treating groundwater, zoning changes, deed restrictions, and other ways to limit site access or contain contamination.

Remedy in Place (RIP) is achieved when the construction of the remedy is complete and the remedy is operating as planned in the Remedial Design.

Response Complete (RC) is achieved once all cleanup goals specified in the Record of Decision or Decision Document are met.

Long-Term Management (LTMgt) and monitoring may be required to ensure that the site continues to meet cleanup goals after Response Complete.

Site Closeout (SC) is reached when the DON has completed active management and monitoring and the site can safely be returned to unrestricted use and unlimited access.

The RCRA regulatory framework also may be applied by regulatory agencies for corrective actions at sites or facilities impacted by past treatment, storage, and disposal practices for hazardous substances. State underground storage tank (UST) programs guide cleanup at most petroleum-contaminated sites.

INSTALLATION RESTORATION PROGRAM

The purpose of the Installation Restoration Program is to reduce the risk to human health and the environment from past waste disposal operations and hazardous material spills at Navy and Marine Corps installations. The Installation Restoration Program combines aggressive policies; technical training; innovative technologies; partnering with stakeholders; and proactive, dedicated personnel to restore and preserve property under Navy and Marine Corps stewardship. It is the DON's goal to complete cleanup in a cost-effective manner consistent with Defense Environmental Restoration Program requirements and to minimize impacts to our military mission. The Installation Restoration Program provides funding for bases to locate, investigate, and clean up past waste and spills. Cleaning up military bases is done in partnership with the federal, state, and local regulatory agencies and members of the community.

The DON's goals for the Installation Restoration Program are to:

- Fully comply with federal, state, and local requirements.
- Act immediately to eliminate human exposure to contamination that poses imminent threats.
- Prioritize cleanup of sites that pose the greatest relative risk to human health and the environment.
- Develop partnerships with regulatory agencies.
- Involve local communities. Establish Restoration Advisory Boards (RABs) to encourage stakeholder participation.
- Expedite the cleanup process and demonstrate a preference for action.
- Consider current planned land use in developing cleanup strategies.

MUNITIONS RESPONSE PROGRAM

The DON initiated the Munitions Response Program in response to Defense Environmental Restoration Program guidance released in September 2001. The Munitions Response Program is designed to clean up discarded military munitions, unexploded ordnance, and their chemical residues at closed ranges and munitions disposal sites.

The DON's Munitions Response Program is modeled after the Installation Restoration Program and is implemented using the process developed for cleanup under the CERCLA legislation. However, the Munitions Response Program also must address the unique explosive safety hazards associated with munitions and explosives of concern and human health risks posed by munitions constituents at Navy and Marine Corps locations not designated as operational ranges. Current goals of the DON's Munition Response Program are to:

- Reduce hazards to people and the environment.
- Educate communities on hazards associated with unexploded ordnance.
- Support technology transfer to efficiently and effectively clean up sites.
- Maximize public involvement.
- Facilitate appropriate reuse of properties.

Although the Munitions Response Program is considered to be part of the Navy's environmental restoration efforts, its funding and cleanup status are uniquely identified and the following program metrics are being used to gauge the program's progress:

- All preliminary assessments must be completed by 2007.
- All site inspections must be completed by 2010.

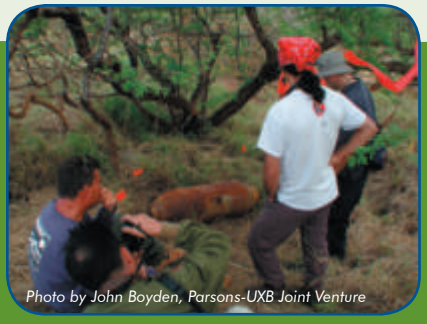


Photo by John Boyden, Parsons-UXB Joint Venture

Although a completion date for the Munition Response Program has been tentatively established as 2017, that goal will be reevaluated once all site inspections are complete.

SUCCESS

New Treatment Technologies Accelerate Cleanup

Marine Corps Air Station Cherry Point, NC

The use of innovative biological and chemical technologies is accelerating the cleanup of contamination in groundwater at Marine Corps Air Station (MCAS) Cherry Point in North Carolina. The cleanup approach allowed continued use of the buildings in the area of contamination, reduced contaminant concentrations, and avoided the high costs of traditional treatment methods. The more traditional cleanup approach is groundwater extraction and then treatment in an above ground facility.

Buildings 133 and 137 were formerly metal plating shops in the Naval Aviation Depot area of Cherry Point. These buildings were decontaminated and renovated in 1996 and are now used for helicopter and military aircraft maintenance, mainly blade refurbishing. Then, a groundwater plume of solvents was identified underneath the former plating shops. The source zone of contamination was beneath the buildings.

The Navy selected Enhanced Reductive Dechlorination (ERD) to reduce the solvent plumes under both buildings based on its relative safety and ease of implementation. This dechlorination process involves the physical addition of a special material to stimulate microbial activity and promote natural degradation of solvents at an accelerated rate. A plant-based, controlled-release carbon source with zero-valent iron (ZVI), known as EHC™, was selected as the preferred technology. The granular mixture of materials was designed to perform both biological and chemical remediation within the soil and groundwater beneath the buildings.

EHC™ was injected into the soil and groundwater beneath the buildings. Groundwater monitoring was conducted after injection to determine the remaining concentrations of solvents. The well at Building 137 with the highest initial concentrations showed a substantial decrease in solvents, up to 94% after 195 days. No significant accumulation of breakdown chemical compounds was observed. In another well, intermediate breakdown chemical compounds accumulated and then the levels declined as biodegradation progressed.

At Building 133, concentrations of solvents measured during initial monitoring were significantly higher than expected, indicating a previously unknown additional source of contamination. Although the pilot study was designed to address lower concentrations, the technology still proved effective in reducing higher initial solvent concentrations. The well at Building 133 with the highest initial concentration of solvent exhibited a 48% reduction in concentration. Breakdown compound concentrations at this well increased as solvent concentrations decreased. In another well, solvent concentrations decreased by 68%. Evidence of microbial activity, in the form of methane gas production and sulfate reduction, was observed. This was positive evidence that microbiological processes were occurring to degrade the solvents.

Despite several implementation challenges, such as scheduling remediation activities around the Air Station's wartime activities, the pilot study was successful at both locations. Enhanced Reductive Dechlorination effectively reduced solvent contamination at both buildings, and the project was conducted with a minimal impact on operations in Buildings 133 and 137.

Safety and Efficiency are Accomplished Through Innovation

Naval Surface Warfare Center, Dahlgren, VA

To solve explosives safety concerns and increase operational efficiency, the Naval Surface Warfare Center, Dahlgren Division's Weapons Dynamics Branch developed a remote control excavator and mechanical screening equipment for remediation of the World War I era Scrap Metal Mound. The Scrap Metal Mound presented a unique challenge because, although records were not available, there was high expectation that ordnance items were mixed with the scrap metal. To address concerns for the safety of the excavation equipment operators, the Navy partnered with a local university, Virginia Tech, to retrofit a CASE CX-160 tracked excavator with a fully operational remote control system. The Virginia Tech team of students and faculty advisors designed, built, and installed the control system in only nine months using off-the-shelf components.

The excavator operator sits in an ordnance-safe location about 3,000 feet from the restoration site and operates the machine with joysticks and foot pedals that duplicate the controls in the excavator. Three video monitors provide visual feedback from the excavator, and a computer display monitors engine and hydraulic gauges.

Once excavated, it was necessary to separate scrap metal, waste, and ordnance from the soil. A Finlay 883 Reclaimer, designed for the aggregate materials industry, was selected to break up and sift the soil to remove materials greater than 1 inch in size. The track-mounted reclaimer provides portability and was fitted with differing sized screens (2-inch, 4-inch, etc.) depending on changing site conditions and the specific material that needed to be screened. After screening, piles of sifted soil can be easily checked with a magnetometer to remove ferrous metal. An all-metal detector is also used depending on the type of nonferrous metal found (i.e., aluminum, brass, etc.).

To remove the ferrous metal, magnets were incorporated into the end rollers of the conveyor belts so that scrap metal could be collected automatically in separate wooden catch boxes. The magnets saved Explosive Ordnance Disposal personnel from removing metal by hand or cleaning the magnets. More importantly, the magnet addition has helped ensure the screened piles are free of metal contaminants. Verification sampling usually indicated that the soil was clean and could be placed back into the excavated area and "clean closed" or disposed off-site free of metal and ordnance. Since 2004, the site workers have safely excavated and screened nearly 10,000 cubic yards of soil, recovered over 40,000 pounds of scrap metal, and separated and removed 166 ordnance items. The site is nearing completion of restoration with a "clean closure" status.

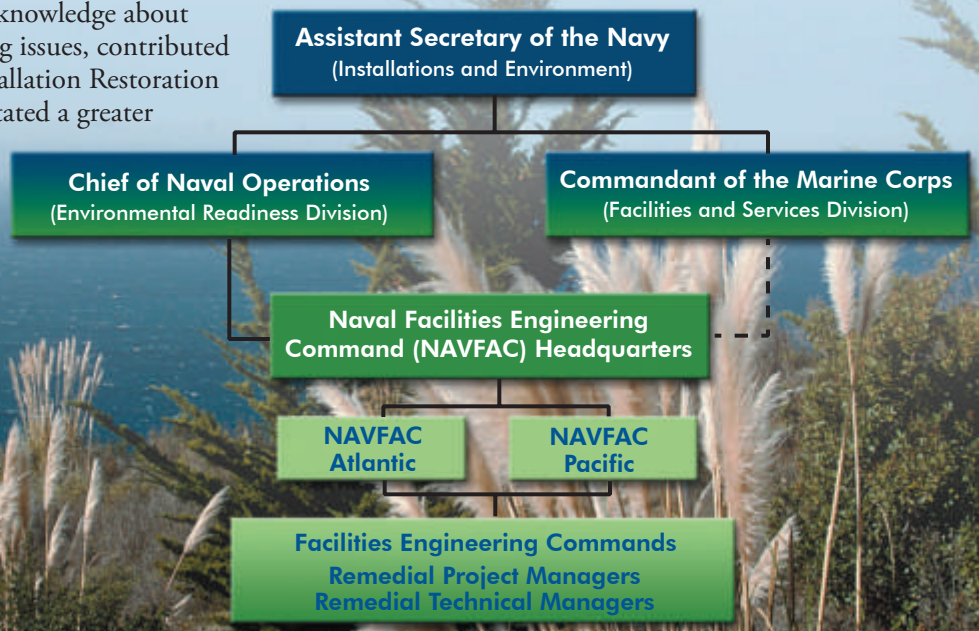
The presence of ordnance items at the site complicated excavation operations by causing a potential safety hazard to personnel. Since the condition of the ordnance items was unknown, extra safety precautions had to be observed. The remote control excavator and remote soil screening operation resulted in successfully overcoming these challenges.

SUCCESS

WORKING TOGETHER

Under direction of the Assistant Secretary of the Navy (Installations and Environment), the Chief of Naval Operations Environmental Readiness Division (N45), the Commandant of the Marine Corps Facilities and Services Division, and the Naval Facilities Engineering Command (NAVFAC) are the primary DON organizations responsible for overseeing and implementing the Installation Restoration Program and the Munitions Response Program. The NAVFAC Facilities Engineering Commands (FECs) are assigned to facilitate cleanup at sites in the various geographic regions. The FECs report to two NAVFAC commands: NAVFAC Atlantic in Norfolk, VA, and NAVFAC Pacific in Pearl Harbor, HI (formerly Engineering Field Division Atlantic and Engineering Field Division Pacific, respectively).

Community and stakeholder input is also a key component of the DON's environmental restoration process to ensure that remedial actions gain stakeholder acceptance. The primary mechanism for ensuring the public is proactively involved in the Installation Restoration Program and eventually in the Munitions Response Program is the Restoration Advisory Board (RAB). Restoration Advisory Boards give individuals in the community the opportunity to participate in the cleanup process and are a key partnering mechanism for developing cleanup strategies that are acceptable to all team members. Restoration Advisory Boards are made up of DON installation representatives, local citizens, regulators, and other government agencies. The Restoration Advisory Board members meet face-to-face to discuss the restoration project, develop plans, and review results. Involving the community and regulators early in the process often prevents delays at later phases of the restoration process. Navy and Marine Corps installations have formed Restoration Advisory Boards at all major installations where sufficient, sustained community interest exists. Restoration Advisory Boards have fostered an exchange of knowledge about scientific and engineering issues, contributed to cost avoidance at Installation Restoration Program sites, and facilitated a greater understanding of total Navy readiness issues.



THE TEAM

By developing partnerships, the DON works together with the communities, regulators, and stakeholders to accomplish efficient cleanup that is acceptable to all parties.

Under direction of the Assistant Secretary of the Navy (Installations and Environment), Chief of Naval Operations, Commandant of the Marine Corps, and NAVFAC are the primary DON organizations responsible for overseeing and implementing environmental restoration at Navy and Marine Corps sites. The DON organizations work hand in hand with the communities, regulators, and other stakeholders to develop cleanup strategies and select remediation technologies that solve the problems and are acceptable to all parties.

Restoration Advisory Board Supports Cleanup and Completion of Environmental Restoration Program

Naval Support Facility Carderock, MD

Environmental restoration at Naval Support Facility Carderock is an excellent example of how partnering with a Restoration Advisory Board can expedite completion of cleanup.

The Carderock Restoration Advisory Board has been an integral part of the investigation, cleanup, and closure of these sites; and the partnering success has resulted in an expected completion date of 2006 for all sites. Members of the Restoration Advisory Board included the Naval Facilities Engineering Command Washington, Naval District Washington, Army Corps of Engineers, National Park Service, Maryland Department of the Environment, and 10 community members representing all residential developments around the facility.

The remedial investigation for the Carderock facility identified seven sites requiring removal actions. Initially, the Navy provided training to community Restoration Advisory Board members on topics such as the cleanup program, groundwater transport, risk assessment, and cleanup methodologies to give them a foundation for understanding the issues being discussed. Later, the Navy provided overviews of documents requiring public comment and maintained an open, honest dialogue regarding schedule, successful cleanups, ongoing challenges, uncertainty, and risk management. The most dramatic success of the Restoration Advisory Board was building trust between the Navy and the community. This trust gave the Restoration Advisory Board confidence that the risk management decisions made by the Navy were reasonable, responsible, and defensible.

Also, the Navy promoted an atmosphere of mutual benefit with the community. For example, to address community concern about potentially hazardous material being transported through the neighborhoods, the Navy negotiated a special permit with the National Park Service to use the adjacent Clara Barton Parkway, normally off limits to truck traffic, to avoid the neighborhoods.

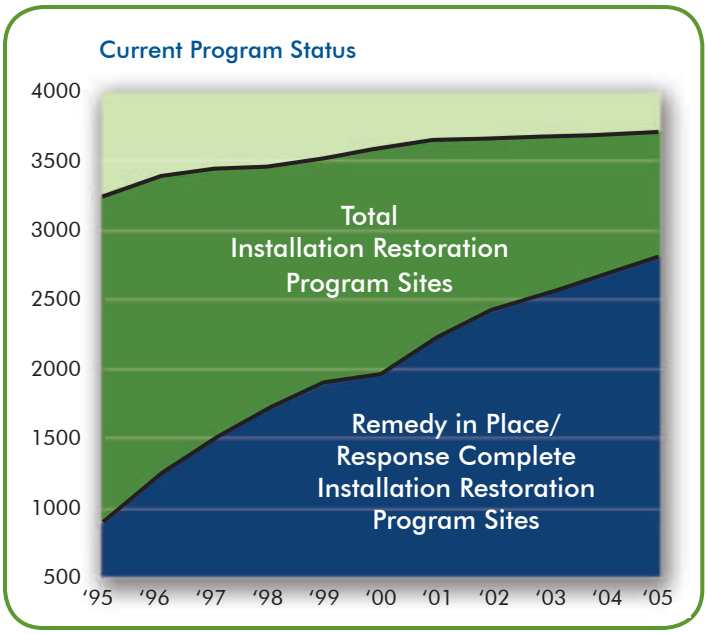
The cooperation of the Restoration Advisory Board allowed the Navy to promote risk management decisions to minimize or eliminate potential cleanups in other areas of the facility, avoiding significant investigation and cleanup in minimally contaminated areas. Additionally, the community's support allowed the Navy and the Maryland Department of the Environment to expedite program completion, avoiding significant costs. Through successful partnering, cleanup efforts at the Carderock facility were completed in FY2005 with the final documentation signed in the spring of 2006.

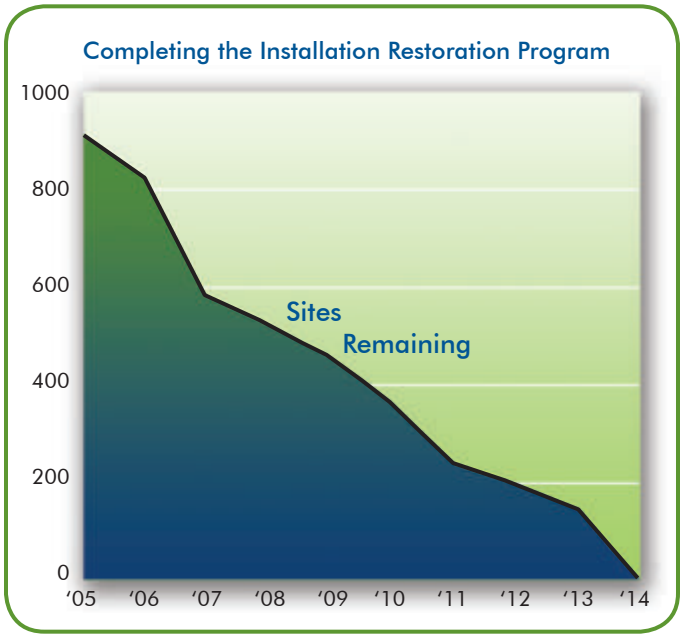
SUCCESS

INSTALLATION RESTORATION PROGRAM STATUS

The total number of Installation Restoration Program sites has stabilized as fewer and fewer new sites are discovered each year. The number of sites in this program has grown from 3,256 sites in Fiscal Year (FY) 1995 to 3,714 sites in FY2005. During FY2005, 15 new sites entered the Installation Restoration Program.

At the end of FY2005, a total of 2,801 Installation Restoration Program sites (75%) are considered Remedy In Place or Response Complete. There are 913 sites yet to be completed. Over the next five years (FY2006–2010), DON's goal is to complete cleanup actions and have Remedy in Place or Response Complete at 3,350 sites, leaving only 364 sites requiring further action after FY2010. The long-term goal of the Installation Restoration Program is to have all sites at Remedy in Place or Response Complete by the end of FY2014.





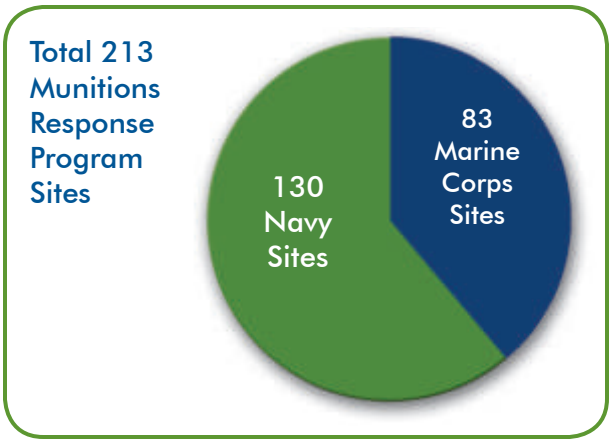
THE PROGRESS

DON's Continuing Progress

Status information provided here includes the number of sites being restored and their completion status as well as current and projected funding levels. At the end of Fiscal Year 2005, the total number of sites in both the Installation Restoration Program and the Munitions Response Program is 3,927. Of these, 75 percent of the Installation Restoration Program sites have achieved Remedy In Place or Response Complete status while 25 percent of the Installation Restoration Program sites and all Munitions Response Program sites remain to be completed. The funding source for both programs is Environmental Restoration, Navy (ER,N) funding.Funding for these programs is expected to be stable for the next five years.

MUNITIONS RESPONSE PROGRAM STATUS

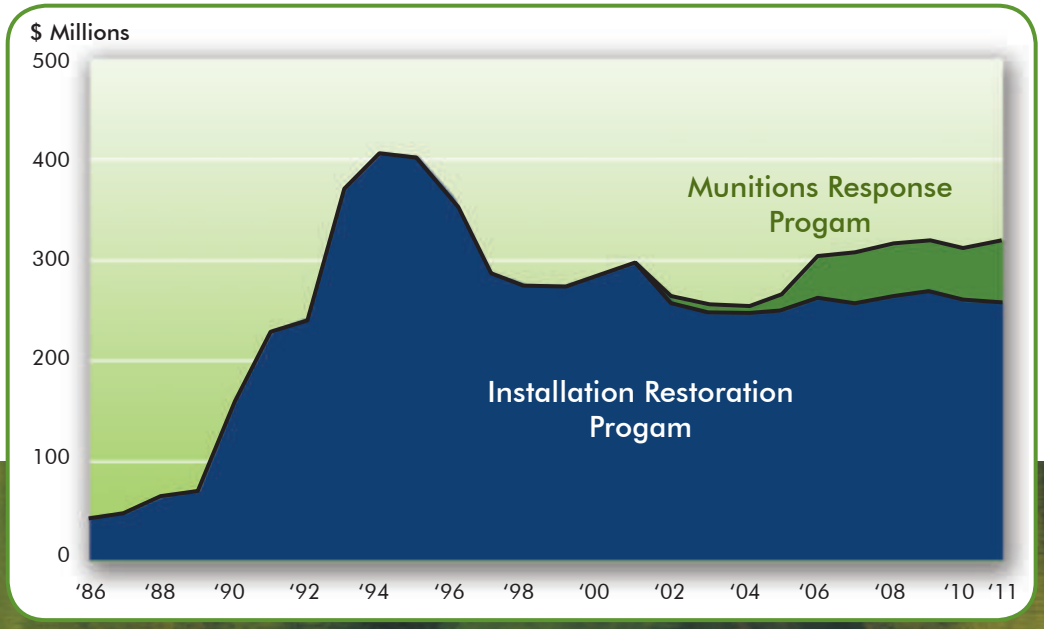
As the Munitions Response Program develops, new sites are being identified. In FY2005, one additional site was added to the Munitions Response Program bringing the total to 213. Of these, 130 are Navy sites and 83 are Marine Corps sites.



FUNDING HISTORY AND PROJECTIONS

The funding source for cleanup at all active installations is Environmental Restoration, Navy (ER,N) funding. Funding for the DON's Installation Restoration Program projects reached its peak at $407 million in FY1994 and has dropped to a current budget of $262 million for FY2006. The Navy's commitment to partnering with stakeholders, finding innovative ways to optimize treatment systems, instituting stable funding, and incorporating risk management into remedial decisions has been essential to reducing funding requirements.

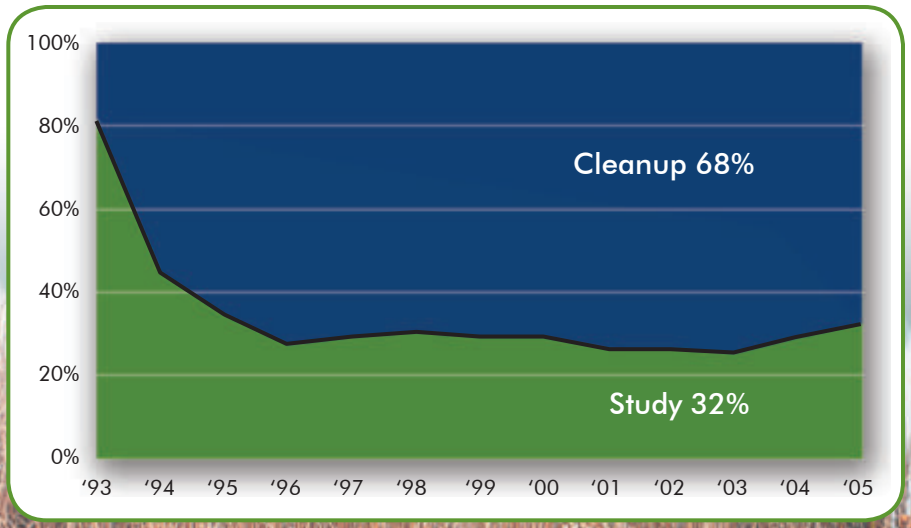
The Munitions Response Program began receiving funding for site remediation in FY2000. Funding for this program from FY2006 through FY2011 is projected to be $499 million.

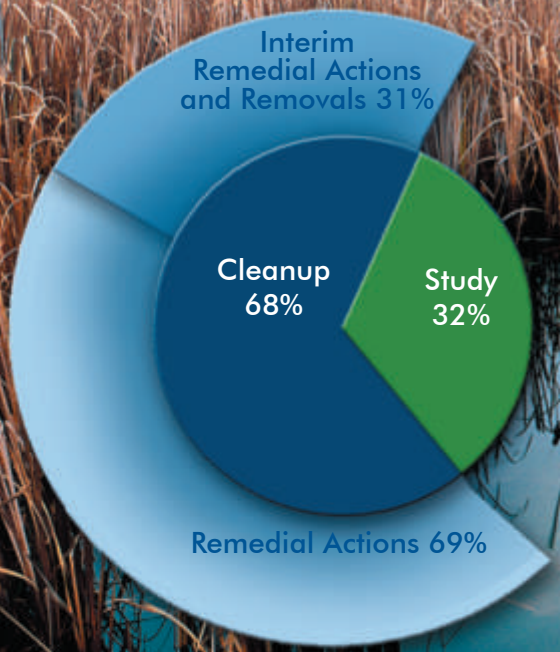


HOW ENVIRONMENTAL RESTORATION, NAVY FUNDS WERE SPENT

Environmental Restoration, Navy funding is broken into two main cost categories: studies and cleanup. At the outset of the Installation Restoration Program, the DON spent most of its budget on the studies needed to locate potential sites and determine the levels of contamination. Over time, the DON has developed new sampling techniques and strategies for these studies that focus efforts on the areas of greatest concern and reduce costs. Although site characterization and pilot studies continue today, over the past ten years the DON has placed an increasing emphasis on performing actual cleanups to reduce the risk of exposure to hazardous contaminants. Cleanups can be either full-scale Remedial Actions or smaller scale Interim Remedial Actions or Removals.

During FY1993, only 21% of funds were devoted to cleanup; however, from 1996 to the present, approximately 70% of funds were dedicated to cleanup. Unless unforeseen circumstances demand otherwise, the DON plans to maintain this level of 70% for cleanup expenditures through the remainder of the program.





Practical Solutions Solve Complex Environmental Problems

Camp Lejeune, Jacksonville, NC

Soil mixing with reactive iron particles in clay proved to be a successful method for remediating dry cleaning solvents at Marine Corps Base Camp Lejeune's former dry cleaning site. The iron particles are specially manufactured and are known as Zero-Valent Iron (ZVI). Initial evaluation of soil data indicates that all contaminants across the site are being reduced and solvent reduction is on the order of 98%.

Camp Lejeune, located near Jacksonville, North Carolina, has been on the EPA's National Priorities List (NPL) since 1989. Historical dry cleaning activities at Site 88 resulted in a release of dry cleaning solvents onto the ground. The estimated volume of contaminated soils was 7,000 cubic yards, containing an estimated 14 tons or 2,100 gallons of solvents. Dissolved concentrations of solvents were detected at very high concentrations in the groundwater, and almost pure solvent was observed in several monitoring wells.

Soil mixing, using a zero-valent iron and clay mixture, was selected for Site 88 remediation based on a careful evaluation of several remedies and their costs. Soil mixing with the iron-clay mixture is a patented technology that can overcome wide variations in soil types within a limited area. A crane-mounted auger is used to mix soil while injecting a slurry of the zero-valent iron and clay mixture. Multiple passes of the auger result in a homogenous treatment area bringing all contamination into contact with the zero-valent iron, which then treats the contaminants. The clay creates a zone that limits groundwater flow into and out of the treatment area, retaining the contamination in the zone. The zero-valent iron ultimately degrades the solvents into harmless byproducts such as ethene and ethane.

To compensate for increased soil volume caused by soil mixing, three feet of clean soil were removed from the top of the treatment area and transported to the base landfill for use as daily cover. The soil mixing was completed during a 17-day period in February 2005. A crane was used to turn a 10-foot auger while injecting the slurry of iron and clay. A total of 200 tons of zero-valent iron and 100 tons of bentonite clay were mixed to create 146 overlapping augured columns in the ground. The auger made several vertical passes at each location throughout the mixing process. The slurry of zero-valent iron and bentonite clay was pumped into the augured soil columns. The quality of the mixing process was measured periodically by taking samples of the mixed material and testing it for iron.

After six weeks were allowed for soil settlement, 195 tons of cement were added to the top five feet of soil to provide structural stability for a one-acre parking lot. The lot will provide about 60 new spaces in a highly developed area of the base.

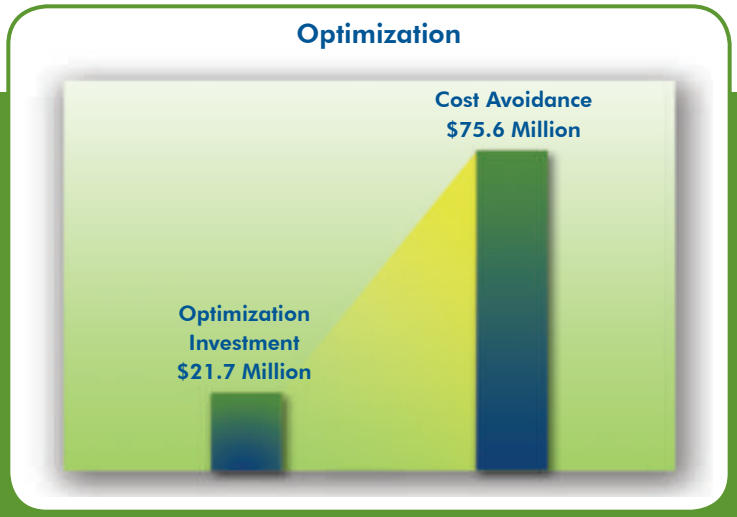
Solvent concentrations in soil were reduced about 98% after 24 weeks. Excavation was the only other alternative that satisfied the time limits on the cleanup. When compared with excavation, the use of the zero-valent iron and clay technology avoided $3,626,000 in costs. This first full-scale implementation of the technology shows that it may be more effective and less costly than competing options for treating chlorinated compounds such as solvents in soil and groundwater.

SUCCESS

COST TO COMPLETE AND COST AVOIDANCE

The cost for implementing the entire Installation Restoration Program continues to decrease as funds are spent for cleanup and as sites achieve Remedy in Place or Response Complete status. The FY2005 estimated total cost to complete for the Installation Restoration Program is $2.4 billion.

In addition to the focus on bringing sites to completion, the DON is continually looking for ways to improve efficiency and avoid costs through optimization of processes, thus further reducing the cost to complete. In 2004, the DON issued an optimization policy that requires the selected remedies to be continually reviewed and evaluated to assure that these remedies continue to operate efficiently. To date, the Installation Restoration Program has spent $12.3 million for optimization studies and review costs and $9.4 million to implement the optimization recommendations. These expenditures for study, review, and implementation have shown good return on investment, resulting in a cost avoidance estimated at $75.6 million.



SUCCESS

Optimization Avoids Costs and Allows Reuse of Facilities

U.S. Marine Corps Mountain Warfare Training Center, Bridgeport, CA

Through a successful remedial optimization, the DON continued cleanup, avoided costs, and reutilized an existing structure at the U.S. Marine Corps Mountain Warfare Training Center. The Training Center is a year-round facility located in the eastern Sierra Nevada near Bridgeport, CA, that supports mountain warfare and survival training for fleet Marines and reserve troops.

The highest priority site at the Training Center is Installation Restoration Site 4, which encompasses the base gas station with groundwater impacting a nearby alpine wetland. In 1988, Site 4 was included in the Preliminary Assessment for the Installation because of a diesel fuel surface release within the gas station area.

In 1998, the DON initiated aggressive active remediation at the site to address petroleum in the soil and groundwater. During operation of the active system, the DON removed an estimated 23,000 gallons of fuel.

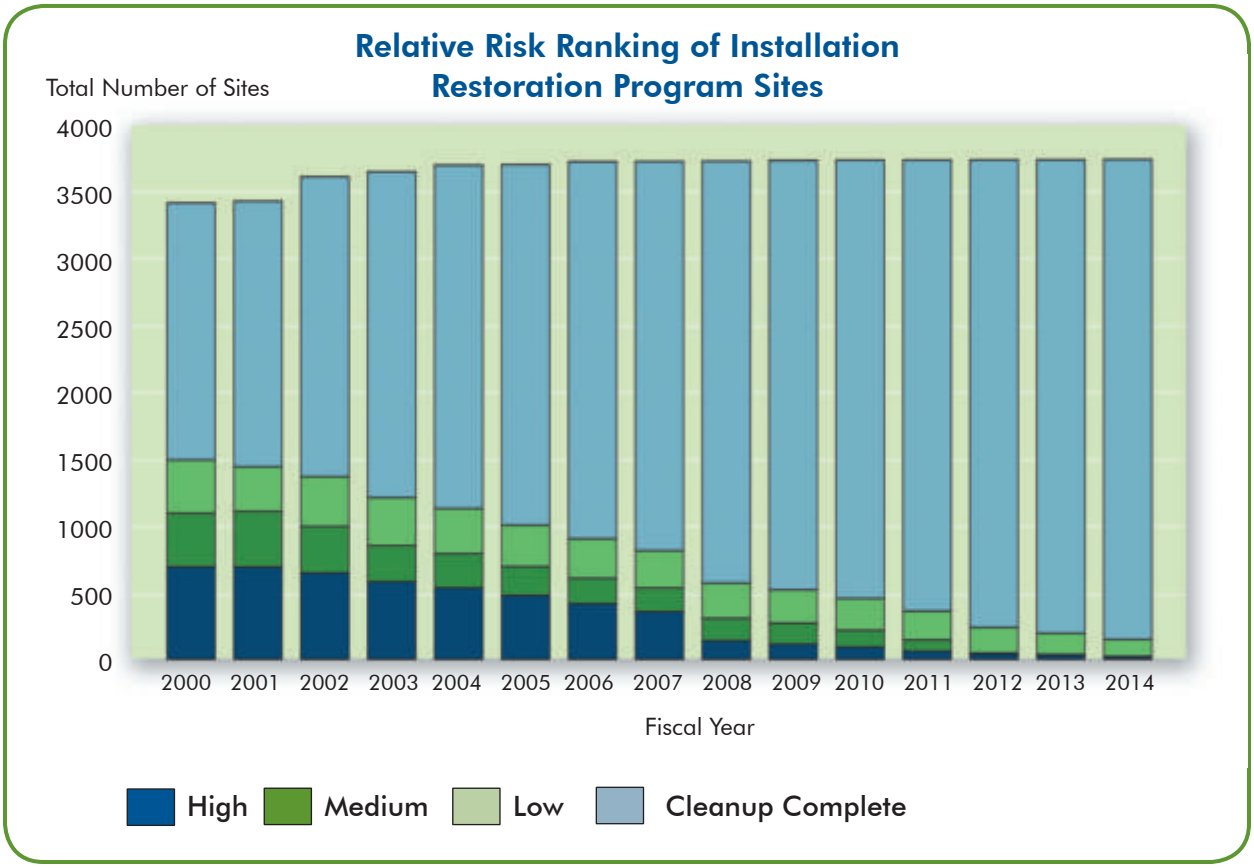
Although scheduled for continual operation until 2008, this treatment system was optimized on an ongoing basis through quarterly and semiannual groundwater monitoring and soil respiration testing. As part of the optimization process, the conceptual site model, operations and cost data, and remedial alternatives were reviewed. This review identified that significant cost avoidance could be achieved at Site 4 by modifying the current remediation configuration. In close coordination with the stakeholders including the regulatory agencies at the onset of optimization, the DON immediately implemented the recommended actions. Remediation was switched from active to monitored natural attenuation, resulting in significant cost avoidance. In 2004, the system was shut down for rebound testing and dismantled in 2005.

In 2004, prior to system shutdown, a new all-weather hazardous waste/hazardous materials storage facility for the Training Center was designed. However, in mid-2005, the team recognized that the existing treatment system building at Site 4 could be renovated to meet the Installation's hazardous waste/hazardous materials storage needs. Through the reuse of this building, the DON will avoid an estimated $250,000 in construction costs, have a superior work space, and be able to continue current hazardous waste/hazardous materials operations during construction.

Thus, by allowing early system shutdown, the optimization avoided an estimated $1.1 million in monitoring costs, operating costs, and building construction costs.

ADDRESSING RELATIVE RISK

The DON uses the DoD's Relative Risk Site Evaluation Model to rank and prioritize Installation Restoration Program sites, one against the other. Sites are ranked as high, medium, or low based on their relative risk. To ensure the best protection of human health and the environment, the Installation Restoration Program requires that sites be addressed on a worst-first basis. Sites with a high relative risk are normally given priority for funding. In FY2005, 86.7% of the funding was spent on cleanup of sites having a high relative risk ranking.



THE PRIORITY

The DON places priority on cleaning up high relative risk sites first.

Using DoD's Relative Risk Site Evaluation Model to rank sites according to the relative risk that they present to human health and the environment, the DON focuses cleanup on the sites that present the highest relative risk first. Although all sites will eventually be cleaned up, the DON strives to remediate those that pose the greatest threat first. Thus, the majority of the funding is currently being spent to address sites having high relative risk. As these sites are cleaned up, the program will move on to sites with lower risk categories.

DEFENSE MANAGEMENT GOALS

DoD established program metrics as part of the Defense Management Goals to measure progress and provide a framework for assessing budgeting requirements. Current Defense Management Goals milestones call for cleanup of all high and medium relative risk sites by FY2007 and FY2011, respectively. All remaining sites are to be completed by FY2014. The Defense Management Goals milestone of having achieved Remedy in Place or Response Complete at 50% of the high relative risk sites by the end of FY2002 was exceeded by 9%. The FY2005 current progress towards meeting the FY2007, FY2011, and FY2014 Defense Management Goals is shown below. The Defense Management Goal for FY2007 is to achieve Remedy In Place or Response Complete at 100% of the high relative risk sites and current progress towards that goal is 72%. The Defense Management Goal for FY2011 is to achieve Remedy In Place or Response Complete at 100% of the medium relative risk sites and current progress towards that goal is 63%. Finally, the Defense Management Goal for FY2014 is to achieve Remedy In Place or Response Complete at 100% of all sites (high, medium, and low) and current progress towards that goal is 60%.

By the end of FY2002, the goal was to have 50% of the High Relative Risk sites completed.*

By the end of FY2007, the goal is to have 100% of the High Relative Risk sites completed.* (FY2005 Progress is 72%)

By the end of FY2011, the goal is to have 100% of the Medium Relative Risk sites completed.* (FY2005 Progress is 63%)

By the end of FY2014, the goal is to have 100% of the Low Relative Risk sites completed.* (FY2005 Progress is 60%)

*Completed refers to Remedy in Place or Response Complete.

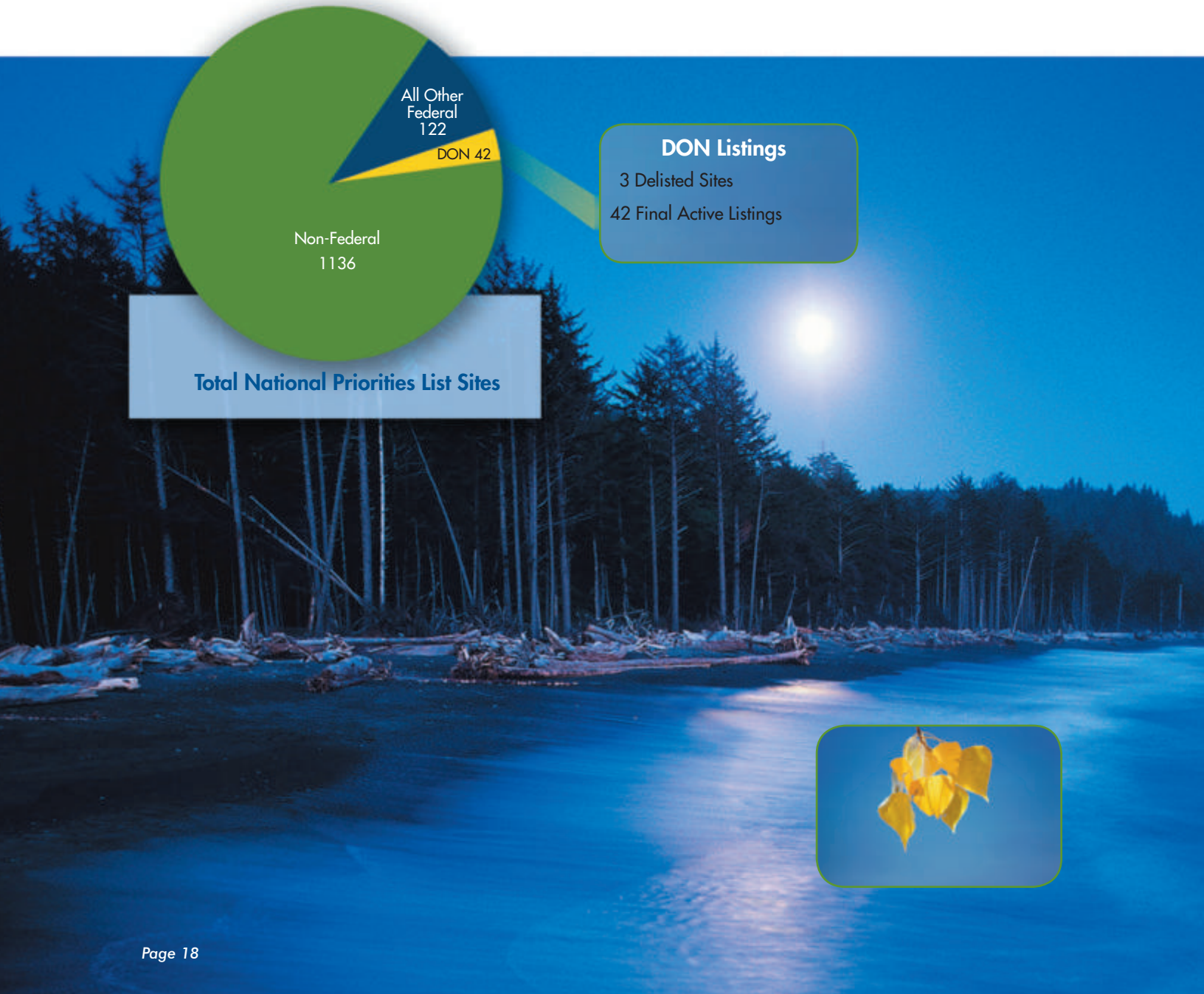
Defense Management Goal

DON current progress toward the goal

NATIONAL PRIORITIES LIST SITES

The EPA's National Priorities List identifies sites that are believed to present the greatest risk to human health and the environment on a nationwide basis, including federal and non-federal sites. As of September 30, 2005, there were 1,300 listings on the National Priorities List, both proposed and final, of which 42 were DON installations. In FY2005, one new DON Environmental Restoration, Navy-funded installation was added to the National Priorities List. On February 11, 2005, the Atlantic Fleet Training Area, Island of Vieques, Puerto Rico, was added to the final list.

When all cleanup requirements at a National Priorities List installation are met, the installation is eligible for delisting. On June 14, 2005, the Naval Magazine Indian Island was delisted from the National Priorities List following completion of cleanup at all 19 sites. Previous delistings of DON facilities include Sabana Seca, Puerto Rico, in 1998; and Naval Air Station Whidbey (Seaplane) Base, WA (partial delisting), in 1995.



Naval Magazine Indian Island Achieves Deletion from the CERCLA National Priorities List

Naval Magazine Indian Island, Puget Sound, WA

NAVFAC Northwest and Naval Magazine Indian Island recently celebrated the deletion of this facility from the CERCLA National Priorities List. This deletion concluded 11 years of planning, scientific analysis, engineering design, construction, and monitoring involving 19 contaminated sites.

Naval Magazine Indian Island, located in Puget Sound, is the Navy's most strategic weapons and port complex for handling and storage of ordnance. The primary sources of contamination at this facility were obsolete production areas, tanks, storage areas, landfills, and munitions disposal areas.

Challenges faced during cleanup included protection of archeological artifacts and endangered species as well as worker safety issues from potential hidden munitions and explosives of concern and asbestos-containing material. The Navy worked closely with Washington State's Department of Ecology, EPA, and Native American tribes as well as residents to ensure that all concerns were adequately addressed and that the selected remedies were not only protective of human health and the environment, but also caused minimum impact to existing natural and cultural resources.

Contaminated soil was remediated with minimum disruption to the natural ecosystems and no interruptions to the Navy's mission. At Sites 11 and 12 (munitions disposal areas), native vegetation was replanted after the soil was excavated. At the Site 10 Northend Landfill, an innovative shoreline protection system demonstration project incorporated native salt vegetation and was carefully engineered to withstand various intensities of wave action. A phased approach was used, and the initial remedy was monitored to ensure that the approach was successful before continuing work on other sections, avoiding repair costs. A protective cap placed over the landfill was designed in several layers, including a geosynthetic layer, gas collection layer, drainage layer, and vegetated cover. Even underwater areas were checked for potential munitions and explosives of concern by a Navy Explosive Ordnance Disposal dive team, using it as a training dive to avoid cost. The dive team scoured the area off the former Crane Point Ammo Pier, but did not discover any munitions. Native American artifacts were successfully recovered from many sites and were repatriated to the culturally affiliated tribes.

After determining that no further action was required at any of the 19 sites, EPA and the Washington State's Department of Ecology recommended Naval Magazine Indian Island for deletion from the National Priorities List in early 2005. On June 14, 2005, EPA officially deleted the site from the National Priorities List with the concurrence of the Department of Ecology.

SUCCESS

ENVIRONMENTAL RESTORATION IN THE FUTURE

The DON will continue progressing toward the goal of a clean, healthy environment that supports the fleet mission. The DON will achieve this goal through the continued proactive and innovative execution of the Installation Restoration Program and Munitions Response Program. Through the Installation Restoration Program the DON will continue implementing cleanup and plans to meet its goal of achieving Remedy in Place or Response Complete at all Installation Restoration sites by the end of 2014. The Munitions Response Program will continue to develop, and the program will transition from its current focus on investigation to a focus on designing and implementing remediation solutions. The DON will continue to engage in partnerships with communities, regulatory agencies, and other stakeholders to ensure environmental restoration is accomplished efficiently and in a way that addresses the concerns of all parties. It is the people and the partnerships that make efficient and effective environmental restoration possible. The DON will continue to invest in its people through technical workgroups that research emerging issues, educational opportunities such as the Remediation Innovative Technology Seminars, and annual conferences that bring the restoration staff together to share lessons learned. The DON will continue to implement its policy of requiring optimization reviews in order to achieve more efficient, cost-effective restoration and to accelerate Site Closeout. The DON will look for advancements in technology and support the use of new technologies to help solve challenging restoration problems and address emerging issues and emerging contaminants.

THE FUTURE

Meeting the Challenges

The DON will continue to provide efficient cleanup of the environment by investing in its people, partnerships, and new technologies. The Installation Restoration Program will continue toward its goal of completion by 2014, and the Munitions Response Program will continue to develop as investigations are completed and remediation begins.

SUCCESS

Enhancing Tomorrow's Environment

Naval Amphibious Base Little Creek, Chesapeake Bay, MD

Naval Amphibious Base Little Creek, located adjacent to the Chesapeake Bay, is working to promote restoration of natural resources in Little Creek Cove. To determine the success of restoration, a project was recently completed to monitor a submerged aquatic vegetation bed, adjacent to a former landfill (Site 7). Submerged aquatic vegetation has long been recognized for its importance to the health of Chesapeake Bay, providing erosion control, water quality improvement, and habitat and critical nursery areas for economically important species of finfish and shellfish.

In 1998-1999, supplemental plantings were added to Little Creek Cove just offshore of Site 7 by the Alliance for the Chesapeake Bay and the National Aquarium in Baltimore in conjunction with the Department of Defense Chesapeake Bay Program Liaison. The submerged aquatic vegetation in this area flourished for several years; however, Hurricane Isabel struck this area in the fall of 2003, causing damage. In an effort to re-establish the viability of this site and provide a benchmark for further restoration efforts, the Navy initiated this investigation.

In October 2004, personnel from the National Aquarium in Baltimore worked with Navy Natural Resource Specialists and staff from the Regional Environmental Group at the Naval Amphibious Base Little Creek to survey Little Creek Cove for submerged aquatic vegetation. The species of primary interest was eelgrass *(Zostera marina)*, a species that provides habitat for a number of economically and environmentally important animals but has been lost in large tracts throughout the Chesapeake Bay. Information was collected and hurricane impacts documented to provide a map to target future restoration efforts within Little Creek Cove. Surveys also identified existing habitat for the native Chesapeake Bay seahorse, an indicator species of good water quality, and the presence of parasite or invasive species.

Survey results demonstrate that past restoration efforts have established an eelgrass community at Area A, and that the habitat was being used by numerous species of fish and invertebrates. In addition to finding eelgrass in Area A, the survey in Area B revealed naturally occurring eelgrass as well as other submerged aquatic vegetation species. At the time of the survey, conditions seemed favorable for future restoration in these areas as well as expanding to adjacent areas. In addition, this project has shown how good coordination and planning have helped to blend Site 7 into the natural environment.

There are also plans to offer an educational outreach program for pre-school children at the Base Child Development Center, highlighting the Chesapeake Bay and restoration of submerged aquatic vegetation as habitat for the Chesapeake Bay seahorse.

SUCCESS

Photo Courtesy National Oceanic and Atmospheric Administration/Department of Commerce

SUCCESS

Munitions Response at Kaho'olawe Island

Kaho'olawe Island, HI

The Navy completed munitions response and contaminant cleanup at the former bombing range on Kaho'olawe Island, HI. The Kaho'olawe range cleanup project was the largest and longest continuous unexploded ordnance project ever attempted by DoD. Although this project received specific funding from Congress, it exemplifies the type of activities that will be performed in the future under the Munitions Response Program. Completion of this project represents a successful partnering effort between the DON, the Kaho'olawe Island Reserve Commission, and the State of Hawaii.

Kaho'olawe Island was an active bombing and ship artillery training and target range from 1941 through 1990. Over these 50 years, a full spectrum of conventional ordnance was expended at the site. The entire 28,800 acres of Kaho'olawe Island is listed on the National Register of Historic Places, and portions of the island are designated as critical habitat under the Endangered Species Act.

In 1994, the island was conveyed back to the State of Hawaii, at which time clearance of unexploded ordnance and environmental restoration began with the goal of providing meaningful and safe use of the island for appropriate cultural, historical, archaeological, and educational purposes as determined by the state. From 1994 to 1997, the DoN partnered with the Kaho'olawe Island Reserve Commission, a seven-member volunteer board appointed by the Governor of the State of Hawaii, to develop a cleanup plan for ordnance removal and environmental cleanup. This project presented both logistical and technical challenges. The remote location required helicopters to ferry workers to and from the island, and the presence of cultural resource sites and protected natural resources required additional care in range clearance to minimize disturbance. As with all unexploded ordnance operations, worker safety was a major concern. The site was mapped into 11,000 grid units of 100 meters by 100 meters. Each grid was surveyed by a three-member team consisting of an unexploded ordnance technician to identify ordnance; a natural resources specialist to identify and log endangered species of plants and animals; and an archaeologist to document significant historic, cultural, or religious artifacts.

The unexploded ordnance clearance process required about six to nine months for a particular area including the surveys, brush and tree clearance, surface pickup of scrap and debris, subsurface detection with instruments, excavation, and ultimately unexploded ordnance disposal. The preferred method of unexploded ordnance disposal was to detonate it where it was found (called blow in place) unless there would be harm to archaeological or natural resources. In this case, special protective barriers were considered or the unexploded ordnance was moved to another area for demolition if possible. The Navy performed constant monitoring of contractor work with full-time staff.

During the course of the project, 22,000 acres were surface cleared and resolved of environmental concerns. Items removed included unexploded ordnance, small arms, targets, tires, miscellaneous solid waste, munitions remnants, fragments, and casings. More than 11.4 million pounds of munitions fragments, remnants, and targets were collected, of which approximately 3.8 million pounds were thermally processed and more than 7.6 million pounds were shipped off-island for recycling and disposal. Approximately 14,000 tires were collected and shipped off-island. The Navy believes it accomplished the original goal to provide reasonably safe and meaningful use of the island, as evidenced by several thousand visits by the public that have already been recorded.

Photos by John Boyden, Parsons-UXB JV

Consolidated Design-Build Approach for a Vegetative Cap Avoids Cost and Expedites Redevelopment

Puget Sound Naval Shipyard and Intermediate Maintenance Facility, Puget Sound, WA

At the Puget Sound Naval Shipyard and Intermediate Maintenance Facility, the Navy is constructing a vegetative cap and an asphalt concrete pavement cap at Operable Unit D. To minimize overall cost at the site, the Navy is utilizing an innovative design-build contracting approach to consolidate multiple projects. As the project is completed in phases, the Navy will transfer the vegetative cap area to the City of Bremerton for redevelopment as a park. The area where the asphalt concrete pavement cap is installed will be retained by the Navy.

Located in Bremerton, WA, along the Sinclair Inlet on Puget Sound, the shipyard and maintenance facility provides overall maintenance, fueling, defueling, and dry-dock activities to support the Navy's mission. Operable Unit D was a storage area for raw steel, keel blocks, and other materials and equipment. To facilitate construction and to accommodate the land transfer to the City of Bremerton, the vegetative cap area was segregated from the controlled industrial area by a security fence and by alternate access from the city streets.

The Navy utilized a design-build contract to consolidate multiple projects in the area under one contractor and scheduled these projects to run concurrently. By doing this, the Navy realized a cost avoidance of approximately $500,000.

The vegetative cap design cross-section consisted of three components: grading fill, a low-permeability soil layer, and topsoil. Approximately 10,000 tons of imported borrow material were required to achieve final design grades at an anticipated cost of $140,000. However, through an effective procurement effort, an inexpensive material source was procured at half the cost.

Challenges on this project included the density and unpredictability of active and abandoned underground utilities as well as other obstructions such as abandoned concrete foundations. Since many of these utilities and foundations were not documented in site drawings, close coordination between the Navy and the contractor was required to avoid damage to active systems. Construction of the vegetative cap was scheduled to begin concurrently with the demolition of a building at the site under a different project, requiring the project to temporarily redirect construction efforts to other areas of the site. However, because other projects at the site were being conducted concurrently, they were able to complete different tasks and later resume work on the vegetative cap without downtime.

During the planning phase, the Navy met regularly with the City Planner and coordinated closely on the design and schedule for the vegetative cap. This coordination continued throughout the project, resulting in many design changes that were communicated to the contractor and incorporated into the project. The Navy also coordinated with the City regarding construction of alternate access routes using city streets, requiring vehicle and pedestrian traffic management plans to be approved. Close coordination between the City, the Navy, and contractors was key in the successful implementation of this project.

The first phase of the project (80% of the area) was completed in 2005, and the property will soon be transferred to the City to begin development of the new Maritime Park. This is a successful example of community and Navy teaming to return a previously contaminated site to productive public use.

SUCCESS

THE COMMITMENT

The Department of the Navy (DON) is committed to being a good steward of the environment while sustaining military readiness. It is not only possible, but also essential to our military mission, that we preserve a healthy environment for our sailors, marines and their families. The Environmental Restoration Program is making a positive difference in sustaining our important warfighting capabilities while enhancing the quality of life for those who live and work on our installations.