Naval Base Point Loma

2012 Secretary of Defense Environmental Award
Environmental Restoration - Installation

Narrative

Introduction

The mission of Naval Base Point Loma (NBPL) is to enable and sustain Fleet, Fighter, and Family readiness through consistent, standardized, and reliable shore support while preserving the critical resources necessary to secure the future of our forces. We are an extension of our Fleet's warfighting capabilities and are dedicated to providing the highest level of operational and shore support.

Established on October 1, 1998, Naval Base Point Loma (NBPL) consists of three geographically separated areas in the Point Loma region of metropolitan San Diego, California. Home to over 70 tenant commands, NBPL provides base operating support for Commander THIRD Fleet, SPAWAR Headquarters, Naval Mine and Anti-Submarine Warfare Command, SPAWAR Systems Command - Pacific, Submarine Squadron ELEVEN and several others. With its main base situated on the historically significant western entrance of San Diego Harbor, NBPL also serves as the guardian of an abundance of cultural and natural resources.

Picture 1: Point Loma Peninsula

Extending beyond the Point Loma peninsula, NBPL is responsible for 1869.5 acres of federal property, to include six distinct complexes, 41 special areas and 3,481 housing units. The installation and tenant commands are staffed by more than 18,000 active duty military and civilian employees, and several thousand contracted personnel.

Home to the Navy's Third Fleet leadership, technological, mine and anti-submarine warfare Centers of Excellence, and the West Coast's fast attack submarines, NBPL is vital to current operations and future capabilities. Positioned at the leading edge of innovation, NBPL tenants have access to a rich supply of human resources and a number of industry partners who are well prepared to support our mission objectives.

Uniquely, Naval Base Point Loma, the Department of the Interior, the Department of Veterans' Affairs and the City of San Diego are united in an informal partnership to help preserve the habitat and cultural resources of this historical location which includes; 640 acres of coastal sage scrub containing four endangered species, two pre-historic aboriginal sites, Spanish, WWI and

WWII military forts, and two National Register Eligible historic districts. The Point Loma peninsula hosts over 1.2 M visitors per year.

NBPL protects the past, supports current operations and prepares for future requirements.

Background

NBPL has a total of 37 Installation Restoration Program (IRP) sites. 20 of the sites are open, including one Military Munitions Response Program (MRP) site, and the remaining 17 sites are closed. The IRP at NBPL is led by a Remedial Program Manager (RPM) under the command of NAVFAC SW Coastal Integrated Product Team. Operating under tight fiscal controls, cleanup actions are prioritized to ensure issues that may impact human health are promptly addressed. The primary focus of environmental restoration is supporting mission requirements; ensuring that impacted lands meet strict environmental and safety standards, and making remediated properties available for reuse to the maximum extent practicable. The RPM coordinates restoration actions with NBPL Environmental staff and the Installation Commander to ensure IRP objectives are well aligned with mission requirements.

Picture 2: RAB members touring Enhanced Anaerobic Bioremediation and Soil Vapor Extraction Projects at Installation Restoration Program sites 10 & 11

Restoration Advisory Board (RAB). For the past three years, NBPL has had an active RAB with ten community board members, Navy and regulatory agency participation (Department of Toxics Substances Control and Regional Water Quality Control Board). The RAB is briefed on remedial investigations and remediation projects throughout NBPL. In FY12, NBPL hosted six RAB meetings and one onsite field tour of active remediation sites. Community awareness and involvement in NBPL's IRP remediation projects improves communications between stakeholders, providing transparency and a shared commitment to a valued resource. Proactive communications on IRP projects is important in supporting the development of decision documents and establishing a common understanding when working toward site closures.

Program Summary- IRP Sites 10 and 11 OTC

IRP Sites 10 and 11 are located at the Old Town Complex facility of NBPL. The sites contain soil gas and groundwater impacts from the release of a metal cleaning solvent related to historical WWII defense industries and Air Force aircraft fabrication activities. The primary chemicals of concern are trichloroethylene (TCE) and its breakdown products cis-1,2-

dichloroethylene (DCE), trans-1,2-dichloroethylene (DCE), and vinyl chloride (VC) along with tetrachloroethylene (PCE). Remedial actions for IRP sites 10 and 11 are combined.

High levels of contamination in both groundwater and soil gas were discovered on base during Phase 1 of the Remedial Investigation. A pilot study was proposed to quickly reduce contamination levels and provide time to evaluate technologies for remediation. Using the pilot study, we were able to shrink the time between problem identification and initial remediation efforts in half. Adding the pilot studies to the project reduced ground water and soil vapor contamination levels years ahead of standard project timelines while supporting processes required for a comprehensive resolution.

In March 2010, a contract was awarded for Phase 2 of the Remedial Investigation and a Pilot Study for Soil Gas and Groundwater Source Removal at OTC Sites 10 and 11. This enabled an accelerated cleanup of the sites while providing time for continued characterization of the plume. Technologies tested in the pilot study included enhanced anaerobic bioremediation (EAB) and soil vapor extraction (SVE). Results of the pilot studies showed EAB and SVE were both effective in the removal of source contamination. The pilot study reduced risk potential and provided additional time to evaluate long-term cleanup technologies.

Diagram #1 depicts the location and recent concentration estimates of the VC contamination. As the result of groundwater movement, the plume has migrated off base in diluted concentrations. The plume was divided into two areas; the source area, with the highest concentration levels marked in yellow, and the diluted plume area, with shades of blue and green identifying lower concentration levels. The pilot study focused on reducing source levels in high concentration areas while a separate effort worked on verifying plume boundaries. Boundary sampling also investigated the impacts of EAB and SVE remediation on concentration levels in adjacent areas.

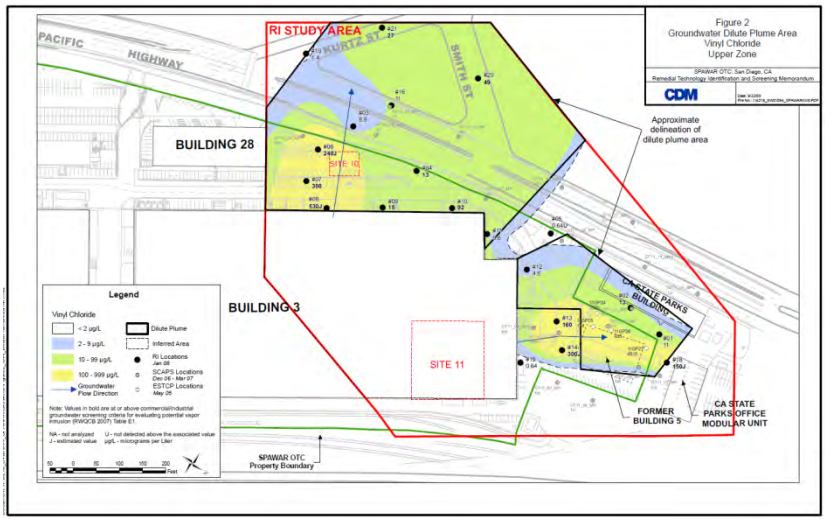

Diagram 1: Preliminary RI Study Area Mapping Dilute Plume Area IR Sites 10 & 11 OTC.

To implement this pilot project, we collaborated with regulatory agencies early in the planning process to get input and buy-in. This proactive outreach facilitated the development of required planning documents based on a common understanding and resulted in a 50% reduction in regulatory review time once complete. Furthering the spirit of cooperation, we received permission to begin the sampling portion of the project before the team reached full agreement on the risk assessment methodology, thus helping to keep the project on its aggressive schedule.

TECHNICAL MERIT:

Enhanced anaerobic biodegradation (EAB) Pilot for groundwater contaminant remediation:

Picture 3: Crew injecting of anaerobic water, vegetable oil and dehalococcodies bacteria into the groundwater to remediate groundwater contamination

Enhanced anaerobic biodegradation (EAB) is the practice of adding hydrogen, an electron donor, to groundwater and/or soil to increase the number and vitality of microorganisms performing anaerobic bioremediation (reductive dechlorination) on any anaerobically degradable compound or chlorinated contaminant.

The EAB pilot study occurred between August and October 2011, with continued quarterly groundwater sampling throughout 2012. This pilot study accomplished several goals: the first was to quickly reduce the levels of volatile organic compounds (VOCs) in the groundwater, the second, to reduce the human health risk, and lastly, to demonstrate the effectiveness of an innovative technology on a Navy IR site. The EAB pilot study included the injection of anaerobic water, vegetable oil and dehalococcodies bacteria into the groundwater to remediate groundwater contamination in an effective and sustainable way. The project helped to minimize the environmental impact of a remediation project with all work occurring on site, with negligible production of contaminated waste. Initial results indicate the pilot study has been extraordinarily successful, reducing contaminant concentrations several orders of magnitude. Samples in some locations show once high contaminations levels were all but eliminated (refer to figure 1). And while the contamination is decreasing, the bacteria colony populations are growing as the bacteria feed on the contamination and reproduces. The bacteria will continue to

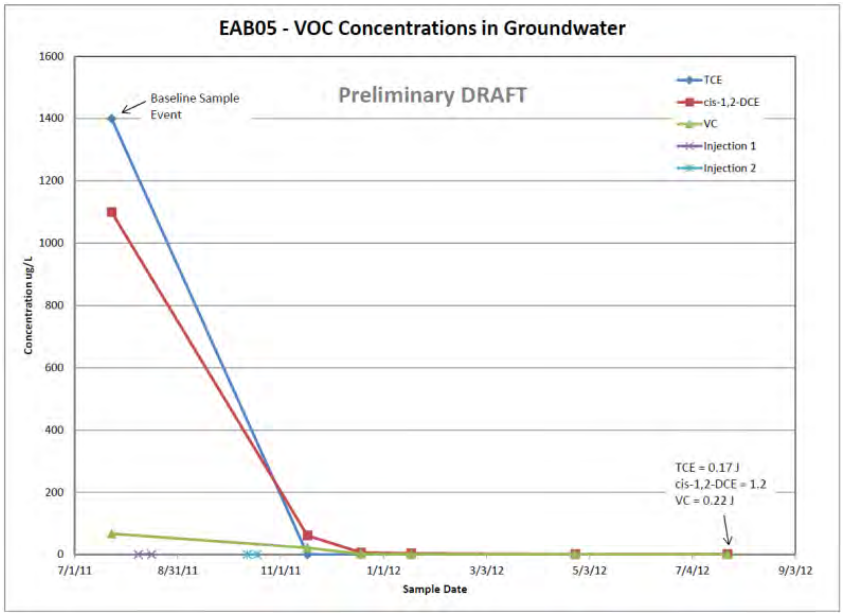

Figure 1: Example of groundwater Volatile Organic Compound (VOC) reduction from initial Enhanced Aerobic Bacteria injection in July 2011 to July 2012 in one sampling location.

consume contamination until depleted, at which time the bacterial population will eventually die off. Figure 2 demonstrates the aggressive growth and then the gradual decline, in some instances, of bacteria colonies at each sample site.

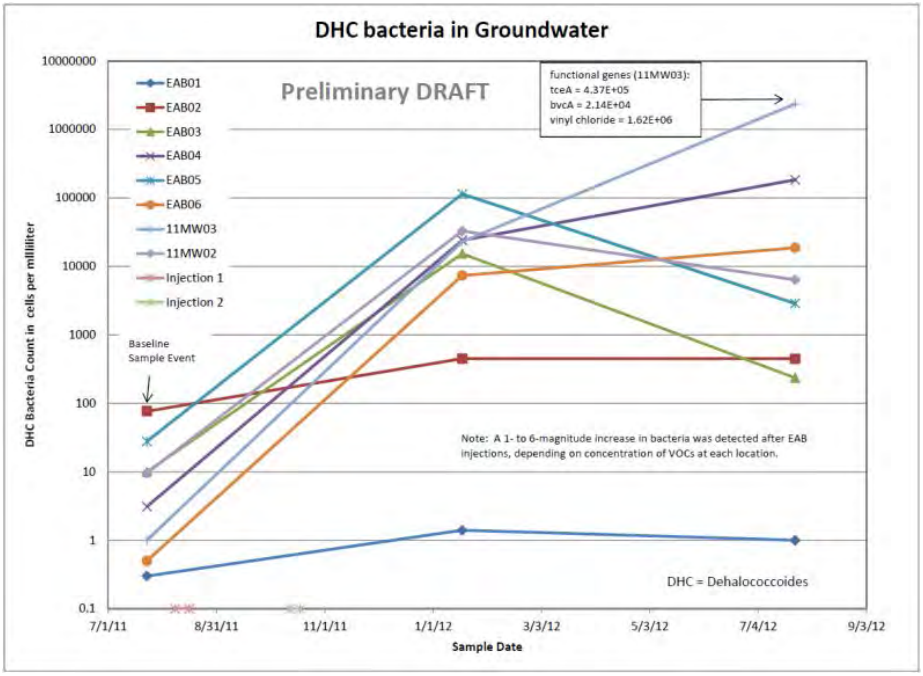

Figure 2: Example of DHC bacteria in groundwater from initial Enhanced Aerobic Bacteria injection in July 2011 to July 2012.

Soil Vapor Extraction (SVE) Pilot for soil gas remediation

Soil vapor extraction (SVE) is a technology that is used to remove volatile organic compounds (VOCs) from any porous material, in this case the ground. SVE takes advantage of the characteristic of volatility of the contaminant. VOCs in soil will readily evaporate until the vapor pressure reaches equilibrium with the liquid. The vapors fill the spaces between the grains of soil, and can migrate through the soil along with atmospheric gases that are normally present. If left in place long enough, any volatile liquid in soil will evaporate just like an open container of water. However, due to the slow rate of natural soil gas movement, the process could take years, or even centuries. SVE creates conditions that accelerate the evaporation process and then channels gasses produced to collection facilities.

Picture 4: Soil Vapor Extraction system for remediation of contaminated soil vapors is tested at NBPL Old Town Campus.

The SVE pilot study construction began in October 2011. The system ran for six months from February to August 2012. Like EAB, SVE also rapidly reduced contamination levels and demonstrated the effectiveness of an innovative

technology on a Navy IR site. Samples in some locations show once high contaminations levels were all but eliminated.

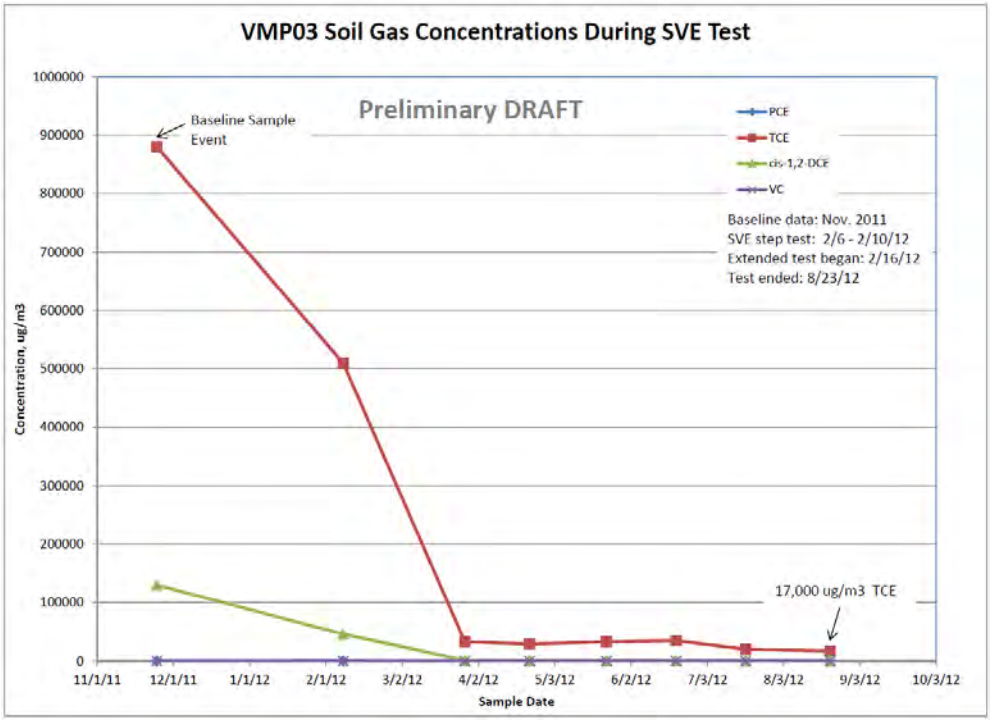

Figure 3: Example of soil gas concentration reduction from the start of Soil Vapor Extraction operations in November 2011 to system shut down in August 2012 in sampling site #VMP03.

Summary of Accomplishments:

PROGRAM MANAGEMENT:

The NBPL IR Team has been instrumental in developing partnerships with stakeholders which has contributed significantly toward the program's success. Accomplishments included:

- Negotiated with regulatory agencies on Public/Tenant notification to reduce misinformation.
- Negotiated with regulatory agencies on indoor air monitoring requirements.
- Negotiated with regulatory agencies on Pilot Study fast track for SVE and EAB remediation.
- The data from the pilot studies is available to determine remediation applicability elsewhere.

TECHNICAL MERIT:

EAB and SVE have proven to be viable remediation technologies for the removal of contamination at IRP sites 10 and 11.

ORIENTATION TO MISSION:

During Phase 2 Remedial Investigation and Pilot Study planning discussions, regulatory agencies voiced concerns over potential vapor levels in occupied buildings at NBPL OTC and neighboring State Parks buildings off site. The IR team quickly responded with actions that effectively demonstrated vapor concentrations in these buildings were within safe limits. As a result of the IR team's quick response and open communications, employees were able to safely return to work without impacting mission.

Additionally, regulatory agencies approached the Navy concerning contamination found in pools of surface water on city streets located near a closed IR site. Springing into action, the IR team developed and executed a sampling plan that conclusively proved the Navy was not the source of the contamination and worked with regulators to help identify potential source candidates.

Lastly, with parking and vehicle traffic space on NBPL OTC at a premium, EAB and SVE remediation systems proved to be good choices due to their minimal space requirements. After initial EAB injection and SVE underground piping installation, parking and traffic flow in the area was restored. Expedited efforts to remediate the impacted lands protected human health and made progress toward restoring the environment while remediating the property for reuse.

TRANSFERABILITY:

Based on the success of this pilot study, the model used for accelerating decontamination efforts in parallel with the development of comprehensive site remediation plans should be considered for incorporation in standard business practices. Aside from quickly reducing the concentration of hazardous materials, accelerating the removal of contaminants reduced the spread which may in turn lower the total cost of remediation. Additionally, proving the effectiveness of EAB and SVE technologies supports their continued use and challenges us to improve our application of these promising technologies.

STAKEHOLDER INTERACTION

IRP Sites 10 and 11 required partnerships with:

- California State Parks, whose facility is within the diluted plume area
- County of San Diego, property where sampling occurred
- Private property owners where sampling occurred
- Tenant commands, whose work place is within the project site
- Restoration Advisory Board, a group of community leaders
- Regulatory agencies

Engagement with key stakeholders early in the process facilitated favorable outcomes for project implementation and expedited remediation approval. Through the coordinated efforts of the RAB and IR teams, we were able to keep the public aware, informed and confident in our actions to restore the environment.