Winter 2001

RPM News

▲ Remedial Project Manager News ▲

"Communicating Navy Installation Restoration Program News and Information Among All Participants"

In This Issue

Successful Navigation of the Ecological Risk Assessment Process

As part of environmental investigations performed at Naval Research Laboratory (NRL) Orlando, Florida, the Florida Department of Environmental Protection (FDEP) requested that the Navy perform an ecological risk assessment (ERA) for Lake Gem Mary (Figure 1), which is located on the former facility. Potential chemical impacts to the lake were considered possible due to the Navy's use of the lake for research and development of sonar transducers and related acoustical materials until the facility's closure in 1996. The purpose of the study was to determine if Navy-related chemical impacts were present, and if these impacts posed potential risks to the Lake Gem Mary ecology.

FDEP requested that the Navy determine if concentrations of Navy-related chemicals in Lake Gem Mary media were elevated, and if so, whether an unacceptable risk was present for ecological receptors. The Navy, Tetra Tech NUS, Inc. (TtNUS), and FDEP worked together throughout the entire ERA process. Cost avoidance and efficient use of resources were realized throughout the course of the project. Some examples of the cost avoidance were based on the most appropriate selection of chemicals of potential concern (COPCs), and the most appropriate selection of ecological endpoints and related analyses to determine if these COPCs posed unacceptable risks. In addition, the use of chemical and biological data from a similar, nearby reference lake was successfully employed for comparative purposes. As a result of these actions, the Navy was able to demonstrate that although some potential risks were present, unacceptable risks were not. As a result, the Navy and FDEP concluded that a potentially costly remediation of sediments was unnecessary.

Early in the project, TtNUS analyzed preliminary samples in the lake media for a wide range of organic chemicals. Concentrations of the few organic chemicals that were detected were generally low. Based on the general absence of organic contamination and lack of a historical basis for the presence of these chemicals at this site, the Navy and FDEP agreed to reduce the analyte list and focus future work on metals only.

Figure 1: Lake Gem Mary

At the completion of a "screening-level" ERA, it was determined that the concentrations of several metals were elevated in sediments. The Navy determined that the metals in lake sediments were elevated, at least in part, due to what is referred to as a "sink-hole effect." Occurring in bowl-shaped lakes formed by sinkholes, the "sink-hole effect" describes how fine-grained sediment particles settle toward the center of these lakes. This can result in the natural accumulation of metal concentrations in mid-lake sediments.

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Using Appropriated Funds

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The Navy was also able to demonstrate that, in general, the metals in lake sediments were not accumulating in fish and did not pose an unacceptable risk to wildlife.

FDEP generally agreed with the conclusions of the "screening-level" ERA, but further requested that potential risks to sediment dwelling (benthic) organisms be evaluated. The Navy, FDEP, and TtNUS then selected the most appropriate and efficient tests to assess potential risks to sediment dwelling organisms (Figure 2). The Navy and TtNUS also located and sampled a reference sinkhole lake nearby as a basis for comparison with Lake Gem Mary. These endpoints and the analyses to investigate them constituted the "baseline" ecological risk assessment steps of the ERA process.

The "baseline" ERA concluded that although the elevated concentrations of metals in Lake Gem Mary were due at least in part to Navy operations, the noted concentrations were mainly due to the "sink-hole effect." Also, the community of sediment dwelling organisms present in Lake Gem Mary was similar to that present in the nearby reference lake, suggesting that any Navy related impacts had not adversely affected these organisms. As a result, the Navy and FDEP agreed to a determination of "No Further Action" (NFA) for the lake.

In an effort to inform the public, the Navy distributed "Fact Sheets" during the project to the residents in the Lake Gem Mary area. These Fact Sheets presented an overview of the environmental work conducted to date, the plans for future work, and the ultimate goals of the study. The Fact Sheets kept the public informed with the project progress, and solicited community involvement and input in all aspects of the project.

Lake Gem Mary is located in a residential neighborhood where a majority of the lake abuts private property. The residents are particularly interested in the outcome of environmental issues because of human health, aesthetic value, and the recreational use of the lake. Keeping the public informed of the project progress was very important to the success of the project.

Figure 2: Benthic organism data collection on Lake Gem Mary.

Using the ERA process and sound technical evidence, the Navy, TtNUS (on behalf of the Navy), and FDEP realized significant reductions in the level of effort and cost savings. First, based on the reduction of the analyte list, the Navy saved several thousand dollars in analytical costs alone. Further time and cost avoidance were realized by proper selection of COPCs, endpoints, and analyses to investigate potential risks to the selected endpoints. Therefore, no unnecessary analyses were performed and all data generated were pertinent to the ERA and risk management decision. Cost avoidance was also realized from reduced data management, interpretation, and reporting. Third, because it was demonstrated that unacceptable risks from sediment chemicals did not exist, a potentially costly and logistically difficult remediation was avoided.

Based on sound and logical use of the ERA process, the Navy and FEDP agreed that reductions in the level of effort, analytical requirements, and a NFA decision were appropriate at Lake Gem Mary. These decisions yielded significant cost avoidance (estimated to be $100,000+) to the Navy.

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Dual Drop Tube Bioslurper Design for Improved and Cost-Effective Free-Product Recovery

Introduction

Conventional bioslurping has proven to be an efficient and effective remedial technology at many sites contaminated with LNAPL (Light Non-Aqueous Phase Liquid) products such as jet fuels (JP-4, JP-5), diesel, fuel oils and other fuels. However, while bioslurping is effective at removing fuel and contaminated groundwater from the subsurface, it has several limitations. The most difficult and expensive limitations of conventional bioslurping stem from the fact that the groundwater, soil-gas, and LNAPL are extracted in the same stream and are incidentally mixed in the extraction pump during recovery. This mixing can cause:

- Frothy foam and emulsions which are hard to separate and treat.
- High concentrations of total petroleum hydrocarbons (TPH) in the effluent water.
- High concentrations of volatile organic compounds (VOCs) in the off-gas released from the system.

Depending on local air and water discharge requirements/standards, the air and liquid streams may require secondary treatment trains that will significantly increase the capital and operation and maintenance (O&M) costs. Moreover, operational difficulties can result in increased system shutdown and downtime, which increases overall O&M costs and delay site cleanup. In the new dual drop tube bioslurper design, the conventional system was modified to reduce these problems but still retain its efficiency at LNAPL removal.

Dual Drop Tube Design

The new design uses two drop tubes (Figure 1). One of the tubes removes groundwater and soil-gas, and the other removes the LNAPL from the well in a separate stream. The use of an isolation sleeve over the end of the groundwater/soil-gas extraction tube allows the removal of only the groundwater and soil-gas. The isolation sleeve (generally 2 to 4 ft. in length) surrounds and extends both above and below the end of the primary drop tube (usually 1-in. diameter PVC). This sleeve keeps the LNAPL from entering the primary drop tube, while allowing for the entry of groundwater from below and soil-gas from above the sleeve ends. A smaller tube (usually 0.25 in. diameter stainless steel) is situated outside of the isolation sleeve, usually 0.25 in. above the end of the primary drop tube; it serves to remove LNAPL in a separate stream. The LNAPL is drawn to the surface by the same vacuum pump used for groundwater/soil gas extraction and is captured in a separate tank for temporary storage. This design makes it possible to recover LNAPL as effectively as the conventional bioslurping configuration but eliminates the problems associated with mixing during recovery. Since there is no mixing of the groundwater, soil-gas, and LNAPL, the effluent groundwater requires no treatment. Hence, O&M requirements are minimized, resulting in cost avoidance.

Results From Case Studies

The Environmental Security Technology Certification Program (ESTCP) primarily funded the Navy and Battelle to demonstrate the effectiveness of the dual drop tube system compared to the conventional bioslurper system at seven different sites including Naval Air Station (NAS) Fallon, Naval Air Warfare Center (NAWC) China Lake, Naval Fuel Depot (NFD) Point Molate, and Marine Corps Air Station (MCAS) Cherry Point. The seven sites had different geologic conditions, LNAPL thickness, and LNAPL types, which resulted in different average LNAPL and groundwater recovery rates.

The LNAPL and groundwater recovery rates were not affected by the use of the dual drop tube configuration. The dual drop tube design demonstrated near complete elimination of the emulsions and a reduction in the average TPH concentration of the effluent water and off-gas of 98% and 38%, respectively (Table 1).

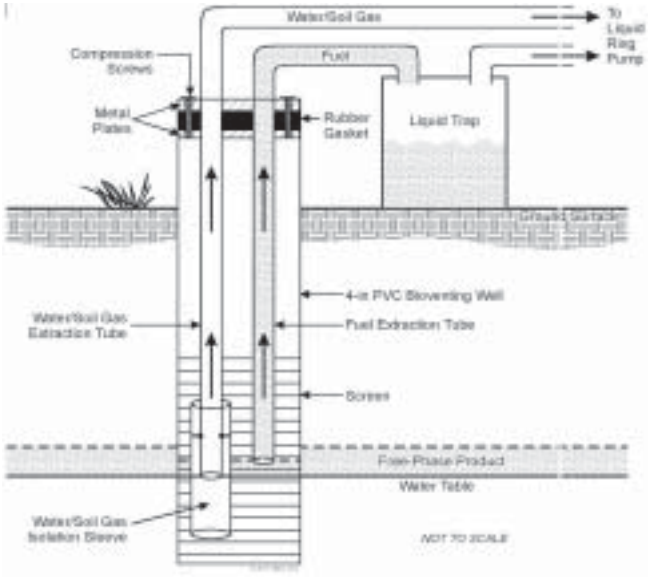

Figure 1. Dual Drop Tube Bioslurper Design

Site Location	Type of LNAPL	Thickness of LNAPL (ft)	Average TPH Conc. (mg/L) (% reduction from conventional) Conventional	Dual Drop Tube	Average TPH Conc. (ppmv) (% reduction from conventional) Conventional	Dual Drop Tube
NAS Fallon, NV	JP-5	0-2.5	4,750	56 (99%)	4,900	2,800 (43%)
Bolling AFB, D.C.	No. 2 Fuel Oil	0-3.0	547	2.1 (99.6%)	180	100 (44%)
NAWS China Lake, CA	JP-5	1.0-3.5	3,300	7.2 (99.8%)	3,225	2,250 (30%)
Tyndall AFB, FL	JP-4	0-2.0	278	ND (100%)	6,533	4,000 (39%)
NFD Point Molate, CA	Bunker and JP-5	0.5	92	2.6 (97%)	131	100 (24%)
MCAS Cherry Point, NC	No. 2 Fuel Oil	5-8	28	1.5 (95%)	899	314 (65%)
Hickam AFB, HI	JP-4	0.5-3.0	1,717	102 (94%)	31,333	24,333 (22%)

Table 1. Water and Off-Gas Quality Improvements

Conclusions

The improved bioslurper dual drop tube design resulted in:

- >98 % reduction in pump effluent water TPH concentration (< 10 mg/L TPH at most sites).
- 38% reduction in off-gas TPH concentration.
- Complete elimination of emulsion in pump effluent water.
- Reduced O&M costs (from the elimination of emulsion).
- Reduced effluent water and off-gas treatment costs.

Eliminating the aggressive mixing of LNAPL, groundwater, and soil-gas during the extraction process prevents the formation of the frothy emulsions, thereby reducing the O&M requirements of the bioslurper system. Since the effluent water and off-gas recovered from the dual drop tube configuration contain lower concentrations of TPH and VOCs, the need for costly treatment before release is reduced.

The cost of operating a bioslurper at a site with and without a dual drop tube system is compared and presented. The normalized costs for conventional bioslurper operation with Dissolved Air Flotation (DAF) for water treatment were generated from the Petroleum Products Corporation Superfund Site in Pembrook Park, Florida and the normalized cost for the dual drop tube bioslurper system were generated from NAS Fallon, Nevada.

Conventional Bioslurper Operation with DAF for Water Treatment

Bioslurper System	=	$50,000
O&M (Annually)	=	$85,000
Water Treatment System (DAF)	=	$70,000
Sludge Disposal (Annually)	=	$10,000
Total Cost	=	$215,000

Bioslurper Operation with Dual Drop Tube System

Bioslurper System	=	$50,000
O&M (Annually)	=	$30,000
Dual Drop System	=	$1,000
Sludge Disposal	=	$0
Total Cost	=	$81,000

Total Cost Avoidance using Dual Drop Tube System: $134,000

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Gosport Wetlands Celebrates Teamwork of Many Agencies

ROICC PORTSMOUTH. The Atlantic Division was one of several organizations recognized for cleaning up the New Gosport Landfill at the Norfolk Naval Shipyard (NNSY) in Portsmouth, Virginia.

LANTDIV and its remedial action contractor, OHM/IT Corporation teamed with the Shipyard, the NNSY Restoration Advisory Board (RAB), the Virginia Institute of Marine Sciences (VIMS), the Elizabeth River Project, the City of Portsmouth, the Virginia Department of Environmental Quality (VDEQ), and the U.S. Environmental Protection Agency (EPA), to turn a former landfill into a newly created wetlands area. Tim Reisch is the LANTDIV Remedial Project Manager (RPM) for NNSY.

A joint effort allowed the transformation of the 5.5 acres, which was once used for disposal of grit blast from ships at the NNSY, to clean soil with 23,000 plant and tree seedings and a salt marsh. "These 1.9 acres are more wetlands than are lost in a typical year," said Walter Priest, VIMS.

The original disposal during 1969 and 1970 included paint chips and abrasive blast material, which contained low levels of lead. When the removal began in October 2000, the remediation contractor, OHM/IT Corporation, proposed using a type of fertilizer that would pre-treat the soil, making it non-hazardous during clean up. The hazardous waste disposal was cost effective with consideration of protecting human health and the environment resulting in a cost avoidance of $1.4 million.

Instead of filling the area with more dirt, the team decided to create a wetland, resulting in a cost avoidance of approximately $750,000. "The contractor had the Navy's and the community's interests at heart," said Capt. James Dell, LANTDIV HQ Operations Officer.

The Navy was required to perform an environmental cleanup on the 30-year old debris due to disposal practices before recent regulations preventing such disposal, but did not have to build the marsh. "This project is a team effort and a win-win situation for everyone involved," said Capt. Dell.

A challenge presented itself when some of the hazardous waste was detected on private property. Through the RAB, concerns from the residents were addressed.

"The city is pleased with the way the RAB conducted business," said J. Brewer Moore, a community representative. "We've improved relations dealing with this project."

NNSY Commanding Officer, Capt. Mark Hugel said, "This is a proud day for the Navy and the community."

Princess Elizabeth, left, Portsmouth Mayor James Holley, Capt. Mark Hugel, NNSY Commanding Officer, and Rear Adm. Chris Cole, Commander Navy Region Mid-Atlantic and others unveil a plaque at the Gosport Wetlands site during the dedication in July.

"I want to commend everyone involved for their spirit of cooperation. When the tough questions were asked, everyone said 'why' instead of 'why not.'"
Walter Priest, VIMS

LANTDIV Forester Steve Hubner, NNSY Environmental Manager Jan Nielsen, and OHM/IT Project Superintendent John Dormi were presented a "Lizzy Award" by Princess Elizabeth, representing the Elizabeth River Project, for their overall involvement with the project.

The ceremony concluded with the unveiling of a stone marker commemorating the project.

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Technology Transfer (T2) News

Welcome to NAVFAC's Technology Transfer (T2) News. This page highlights T2 efforts conducted by the Navy environmental community and supports the Navy's efforts to increase the use of innovative technologies to reduce environmental cleanup costs (Figure 1). In addition to including T2 News in future RPM Newsletters, a web page has been developed, which serves as the source of the most up-to-date NAVFAC T2 information. The web page resides on the Environmental Restoration and BRAC Web Site.

T2 Web Site Address:
http://enviro.nfesc.navy.mil/erb/restoration/technologies/tech_transfer/main.htm

New Guidance on Air Sparging Now Available

The *Air Sparging Guidance Document* is now available to download from the Environmental Restoration and Base Realignment and Closure (BRAC), T2 Web Page (see address above). This document was developed by Naval Facilities Engineering Service Center (NFESC) to provide guidance on selection, design, installation, operation, optimization, and shutdown of air sparging systems. It is intended for use by Remedial Project Managers (RPMs) and their contractors. The manual applies the results from full-scale systems, field studies, and research to provide a concise yet complete life-cycle approach to air sparging design and implementation.

What is Air Sparging?

Air sparging is an innovative in-situ treatment technology that uses injected air to remove volatile or biodegradable contaminants from the saturated zone. The primary application of air sparging entails the injection of air directly into the saturated subsurface to remove volatile contaminants, such as solvents and gasoline, from the dissolved phase through air stripping. The stripped compounds are then biodegraded and/or removed via soil vapor extraction (SVE) in the vadose zone. For semivolatile contaminants, such as diesel and jet fuels, the primary removal mechanism is stimulated microbial activity caused by the increase of dissolved oxygen. The major components of a typical air sparging system, include an air sparge/injection well, a compressor or blower to supply air, monitoring points and wells, and an optional SVE system.

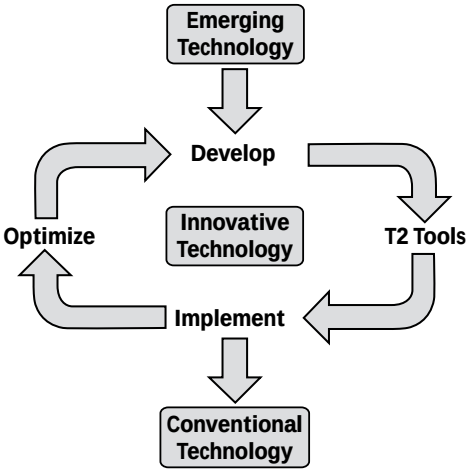

Figure 1: Technology Development and Transfer

How Will This Document Help the RPM?

The *Air Sparging Guidance Document* provides guidance on all aspects of air sparging implementation and contains a variety of tools for the RPM. The manual includes information on:

- Site Characterization and Feasibility Analysis: Includes information regarding site data requirements and tools to evaluate effectiveness, implementability, and cost.
- Air Sparging Ecomonics: Summarizes issues affecting costs and provides a worksheet to quickly prepare a budgetary cost estimate.
- Regulatory Issues and Permitting: Identifies potentially applicable Federal, state, and local regulations and permitting requirements.
- System Design and Construction: Describes pilot-scale testing requirements and full-scale design and construction considerations.
- System Operation, Monitoring, and Optimization: Presents information on cost-effective operation and evaluating progress toward achieving cleanup goals.
- System Shutdown, Long-Term Monitoring, and Site Closure: Describes when and how to stop system operation and methods to obtain site closure.
- Statement of Work Preparation: Provides guidance for preparation of a statement of work for an air sparging site.

Air Sparging Workshop

In conjunction with the *Air Sparging Guidance Document*, air sparging workshops are scheduled beginning May 2002. These 4-day workshops will be held at the National Environmental Technology Test Site (NETTS) in Port Hueneme, California and will provide training to RPMs on selection, design, construction, operation, optimization, and shutdown of air sparging systems. Additional information regarding these workshops will be provided in subsequent newsletters and on the T2 Web Site.

For further information please contact:

Naval Facilities Engineering Service Center
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Performance Monitoring Optimization Saves Money At NAS Key West

Presently there are numerous Solid Waste Management Units (SWMUs), Installation Restoration (IR) sites, Base Realignment and Closure (BRAC) sites, an Area of Concern (AOC), and Underground Storage Tank (UST) sites located throughout Naval Air Station (NAS) Key West. Monitoring of various media is ongoing at a number of these sites to ensure protectiveness of human health and the environment. Based on recommendations identified by the project team, performance monitoring optimization is taking place across NAS Key West.

The essence of performance monitoring optimization is to collect only useable and necessary data for site and/or and remedial action evaluation. A typical optimization strategy would include the following elements:

- Reducing number of monitoring points.
- Reducing monitoring frequency.
- Reducing the list of monitored parameters.
- Ensuring efficient field sampling procedures (e.g., diffusion samplers that reduces sampling costs, evaluating mobile versus fixed-base laboratory analysis).
- Include streamlining data evaluation and reporting [e.g., automated annual reports, time series plots, trend analysis and other statistical analysis, cost and performance plots, data tables, and Geographic Information System (GIS) for spatial data display/plume maps].

At NAS Key West, the project team identified the need to optimize the monitoring program. Through evaluation of the available data and monitoring locations, the team determined that minimization of sample parameters would be the first step in the optimization process. To determine what analytical parameters could be eliminated from future monitoring events, a database query was performed to identify chemical fractions for each location that had not been detected for two or more quarters. Results from this query were verified using quality assurance/quality control (QA/QC) procedures to prevent errors. The query results were also reviewed to determine if monitoring of certain chemical fractions could then be eliminated at select locations. Significant reductions in the monitoring program were implemented based on the data evaluation. These reductions resulted in cost avoidance for sample collection and laboratory analyses during the third and fourth quarters of 2000 that totaled approximately $17,000.

The second step in the monitoring program optimization, identified that due to the consistent quality of data that has been collected, Certificate of Analysis (CofA) data packages reporting sample results could be required from the laboratory in lieu of Contract Laboratory Program (CLP) data packages. These less detailed data packages resulted in a 75 percent ($50,000/event) avoidance in laboratory costs per monitoring event.

In the third step of the optimization process, the project team determined that since data was consistently of high quality the need for full data validation could be replaced by limited data validation. Limited data validation is best expressed as a review to preclude the possibility of false negatives and to eliminate false positives and takes approximately half the time that full validation takes. This translated to a cost avoidance of $4,500 for the Navy per monitoring event.

Figure 1: Groundwater sampling at NAS Key West

The fourth step was to look at when monitoring events could be combined for multiple sites. This resulted in avoidance of field costs for travel to and from the site. The most significant success for ongoing performance monitoring optimization at NAS Key West was the decision to continually evaluate the sampling plan for each site. The NAS Key West Partnering Team has determined that after two quarters of monitoring for any site, the various aspects of the monitoring program can be re-evaluated to optimize the monitoring program. In summary, unnecessary monitoring will be eliminated, which has and will continue to avoid substantial costs for performance monitoring for the Navy.

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Cultural Sensitivity Training and Recycling Assist Pipeline Removal

Naval Fuel Depot, Point Molate

The discovery of a prehistoric mortar and pestle, an archaeological artifact, temporarily halted pipeline removal activities along the south shoreline of former Naval Fuel Depot Point Molate. The area where the artifact was found is one of three Native American cultural resource sites identified at Point Molate (designated CA-CCO-283). Site CA-CCO-283 was first documented in 1907 as a shell midden approximately 9 feet high and 150 feet in diameter. The site was determined not eligible for listing in the National Register of Historic Places (National Register) due to extensive disturbance starting before Navy ownership. However, the Navy arranged for qualified archaeological monitoring during late 2000 and early 2001 when subsurface excavation work was conducted at CA-CCO-283. After the discovery of the artifact on December 21, 1999, the Navy additionally contracted a Native American monitor to be present during site excavation.

The two experts conducted Native American cultural sensitivity training with the IT Corporation field crew before fieldwork and construction activities along the south shoreline were resumed. The field crew resumed work on February 15, 2000 armed with a new understanding of the site's cultural and historical significance. Since the initial finding, 10 additional artifacts were found, including a six-inch human bone. Because of the training, the field crew was especially alert to the potential for finding these significant artifacts.

The Point Molate fuel line removal was no small task. The IT Corporation contract involved removing greater than 46,000 linear feet of underground lines. In preparation, over 800,000 gallons of water and residual fuel product were removed from the lines and processed through the Navy's on-site treatment system. To minimize the disposal of waste materials from the base, IT initiated pavement and pipe recycling. Approximately 4,800 tons of asphalt and concrete and over 450 tons of steel fuel piping and other metal debris were recycled. Pipeline removal activities were completed in October 2000.

The Navy is currently planning additional investigation at site CA-CCO-283 to reevaluate to the site's eligibility for listing in the National Register. A workplan was developed under the technical guidance of SWDIV Natural/Cultural Resources and will be submitted to the California State Office of Historic Preservation for approval.

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New Course Established: Field Training On Air Sparging Systems

Air sparging is the process of injecting clean air directly into an aquifer to remediate contaminated groundwater. Air is forced through contaminated aquifer materials providing oxygen for bioremediation and/or to strip contamination out of the aquifer. Air sparging is potentially applicable for sites contaminated with petroleum hydrocarbon such as jet fuel, diesel fuel, gasoline and other volatile compounds such as chlorinated solvents.

This two and a half day hands-on training course is designed to train Department of Defense (DoD) civilian and military personnel, federal and state Environmental Protection Agency (EPA) employees, and state and local regulators to appropriately evaluate and apply air sparging systems.

Training modules include (1) air sparging fundamentals and an overview of the air sparging system design paradigm, (2) an introduction to a simple computer design model to familiarize students with the basics of engineering parameters and hydrogeological considerations, (3) an overview of tracer tests and dissolved oxygen measurement, (4) the basics of operating a multi-well system, modifying air distribution in a system, and trouble shooting, (5) a presentation on soil vapor extraction systems, (6) an introduction to placement of monitoring wells (includes a direct-push well installation demonstration), (7) an overview of regulatory issues and permitting, and (8) guidance on understanding and preparing a statement of work (SOW) for government contracts.

The course will be conducted at the Air Sparging System Training site, Navy Base Ventura County, Port Hueneme site, California. The first two courses will be held July 9-11 and July 17-19, 2002. The course is limited to 12 participants. These initial courses are being funded by the Environmental Security Technology Certification Program and Navy Facilities Engineering Command and, therefore, will not require tuition.

For additional information and to register,
Telephone: (805) 982-5851, DSN 551-5851

New Gosport Landfill
Norfolk Naval Shipyard, Portsmouth Virginia

The mission of the Norfolk Naval Shipyard (NNSY) is to perform ship construction, repair and maintenance for the Navy. One of the activities performed in support of the Navy's mission is ship painting operations, which includes the removal of existing ship coatings, creating spent abrasive blasting material (ABM). This process produces ABM that typically contains metals (lead, chromium, cadmium), which are considered a risk to human health and the environment. At elevated levels, these metals may also be classified as hazardous waste. Past practices at the NNSY, disposed of these wastes by landfilling on Government property.

Project Summary

The New Gosport landfill is situated adjacent to Paradise Creek and covers approximately 5.5 acres. This site is situated close to a neighborhood and a Navy Youth Center, and was used between 1969 and 1970 for the disposal of ABM, which contained paint chips from paint removal operations performed on ships in dry-docks. In 1982 the area was analyzed and low levels of lead were detected. To prevent human exposure to the material, the Navy graded the site, covered it with clean soil and planted grass. Further studies initiated in January 2000 revealed that removal of the material would be the best option for the Navy and the community. The depth of ABM adjacent to Paradise Creek was approximately 9 feet deep in some places.

Analysis of soil samples adjacent to and underlying the ABM indicated that waste disposal had not significantly impacted the surrounding soils. Samples of wetlands soils collected along Paradise Creek indicated an increase in metal concentrations in samples parallel to and downstream of the landfill. While nine of twenty metals detected in the wetland soil samples exceeded Biological Technical Assistance Group (BTAG) screening criteria, most metals also exceeded BTAG screening criteria in upstream reference samples.

The removal of ABM at the New Gosport Landfill began 8 October 2000, and was completed in June 2000. There were 55,000 tons of ABM and soils removed from the site, with the removal process providing a cost effective method of being protective of human health and the environment. The Navy's remediation contractor (IT/OHM) proposed an innovative in-situ treatment process in the initial stages of the removal action.

Regulatory Requirements/ Community Involvement

This project was successfully executed with the full support and input of the Virginia Department of Environmental Quality (VDEQ) and the U.S. Environmental Protection Agency (EPA), as part of the Navy's Installation Restoration (IR) program. As part of the IR program, the Navy has teamed up with VDEQ and EPA to form the NNSY IR Partnering Team. The mission of the NNSY Partnering Team is to protect human health and the environment and to streamline the clean up of NNSY through the use of innovative, consensus-based site management strategies.

The challenge of working with the community was eased because of an aggressive information campaign by the Navy and the Navy's remedial action contractor (IT/OHM) before the project ever started.

Restoration Advisory Board (RAB) meetings were held to address the environmental issues and concerns from residents. During the RAB meetings, members of the community were able to get a better understanding of the project and how it affects them.

The community was also updated on the progress of the project through fact sheets and flyers.

Facility:	Norfolk Naval Shipyard Portsmouth, VA Established in 1767 Approx. 1,340 acres (includes 5 noncontiguous land areas)
EFD:	Atlantic Division
Facility: Description	The Norfolk Naval Shipyard is a facility that repairs, overhauls, maintains and completes modernization of navy ships, including nuclear powered ships. Shipyard operations include metal fabrication, metal plating, and painting operations.
Team Contacts	LANTDIV RPM Tim Reisch, P.E. LANTNAVFACENGCOM 1510 Gilbert St. Norfolk, VA 23511-2699 (757) 322-4758 ReischTA@efdlant.navfac.navy.mil NNSY Representatives Philip Host, Kathleen Mooney, Jan Nielsen LANTDIV CLEAN (CH2M Hill) Donna Caldwell, Stewart Barnes PE LANTDIV RAC (IT/OHM) Larry Stearns
Technology	In-situ treatment, "dig & haul," wetlands creation
Contaminant	Lead, contained in abrasive blast material
Action Levels	Lead - EPA action level for residential areas of 400 ppm
Legal Driver	Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) , Resource Conservation & Recovery Act; (RCRA)

Construction Challenges

- One challenge was that a portion of the ABM was present on private property. This area was first to be cleaned, and the property was restored to its original condition.
- Because the landfill was located adjacent to a residential area, residential concerns (dust, noise, working hours) needed to be address with more concern than a construction site in an isolated area.
- Both surface water and groundwater posed construction problems. Because the site was adjacent to Paradise Creek, work was influence by tidal changes. In addition, because the depth of ABM was below the water table, groundwater also had to be controlled.

Cost Avoidance Measures

Triple superphosphate was used to pre-treat the soil and stabilize the lead during the cleanup. This type of treatment makes the material non-hazardous and cheaper to dispose of. Other innovative uses of equipment helped save time and money. Because some of the ABM contained other debris (cement blocks, wood), the debris was sifted from the ABM and cut down the costs for transportation and disposal. These changes produced an estimated cost avoidance of $1.4 million.

After the ABM was excavated, in lieu of backfilling the large excavated area with clean fill, it was decided to create a 1.9 acre tidal wetland. 18,000 Spartina Alterniflora plants and 3,000 Spartina Patens plants were used to make up the wetland. The newly created wetland area of native salt marsh plants was designed to increase vegetated buffers in the Chesapeake Bay watershed. These changes produced an estimated cost avoidance of $750,000.

Project Successes

The Navy successfully fostered a synergistic relationship between regulatory and local communities. The Navy's project was warmly accepted by the community.

Through various cost avoidance ideas, the Navy benefited the taxpayers with a cost avoidance of over $2,000,000 in the removal of a hazardous waste site, and created a 1.9 acre wetland area in the process.

Figure 1: Excavation of Area C; cells 9 & 10 by IT/OHM.

On 13 June 2001, a New Gosport Wetlands Dedication ceremony was held at the site by the NNSY RAB. Local newspaper coverage was provided, and community representatives in attendance included the Mayor of Portsmouth, Virginia Institute of Marine Science (VIMS), and members of the Elizabeth River Project. In addition, many Navy representatives, as well as the regulatory representatives were present. Some comments from the attendees follow:

- Capt James Dell, LANTDIV Mid-Atlantic Operations-- "This project is a team effort and a win-win situation for everyone involved."
- Capt Mark Hugel, NNSY Commanding Officer-- "This is a proud day for the Navy and the community"; the "NNSY will continue to protect the environment and team with the local community."
- James Holley, Portsmouth Mayor-- "I am pleased the citizens of Portsmouth are the beneficiaries of this good project."

Figure 2: Close-up of the 21,000 wetlands plants (right side of photo) that were planted.

- Walter Priest, VIMS wetlands expert-- "I want to commend everyone involved for their spirit of cooperation. You have gone from a toxic superfund site to a wetland in a matter of months, and its very gratifying."
- Marjorie Mayfield, Elizabeth River project-- "There's a lot of opportunity to make Paradise Creek a model for urban restoration."
- Scott Harper, newspaper reporter for the Virginia Pilot-- "And on Wednesday, environmentalists and local officials saluted the move, saying this small but symbolic project enhances the landscape of downtown Portsmouth, protects the creek, creates a wildlife habitat and cost avoidance of taxpayer's money."

Figure 3: Completed 1.9 acre wetland area.

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Enhanced Decision Making Using an Environmental Geographic Information System

Managing the substantial amount of environmental data that is generated during a typical full-scale remedial investigation requires the use of a sophisticated environmental information management system such as a Geographic Information System (GIS). Unfortunately, most GIS implementations are sufficiently complicated that they must remain on the desktop of the GIS Specialist, rather than on the desktop of the actual decision makers. This results in the "bring me another map" scenario that reduces many of the efficiencies that GIS is designed to address.

To address this concern, SOUTHDIV's Comprehensive Long-Term Environmental Action Navy (CLEAN) Contractor, Tetra Tech NUS, Inc., designed and developed an Environmental GIS (EGIS) application for several facilities impacted by chlorinated solvent groundwater plumes (Figure 1).

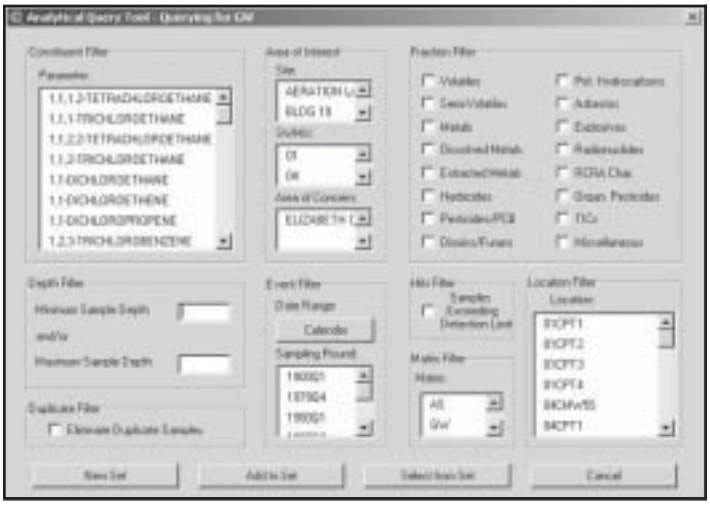

Figure 1 shows the Analytical Query Tool developed for the EGIS. This tool provides a user-friendly approach to querying an analytical database. The user is presented with the option to perform multiple queries simply by selecting the options presented in this window. Queries can be based on parameter(s), sample depth, sampling round, media, fraction, sample locations, or by site. Upon execution, the results of the query are highlighted both in the sample locations and the associated analytical table (See Figure 2).

Figure 2 shows the EGIS Feature Location and Documentation Module. This module provides the user with a list of Solid Waste Management Units (SWMUs), Areas of Concern (AOCs), Sites, etc. and its available media. Once a selection of a SWMU, AOC, Site, etc. has been made, the selected feature is magnified and labeled and a list of available media is presented. Media may include documents (boring logs, site descriptions), photographs, figures (GIS or CADD (Computer-Aided Design and Drafting) figures), or videos.

The EGIS application combines the power and versatility of a relational database management system with the visual/spatial interface of GIS. Through the user-friendly GIS interface, the system's intuitive query tools can be used to obtain specific environmental sampling results, analytical chemistry data, or any other facility information as needed. This allows the end user to run multiple "what-if" scenarios to help determine optimal management and/or remediation strategies. The query results are displayed on selected facility map layers, and the built-in graphics tools can be used to generate full-color maps and tables. This can be done without specialized GIS training or skills (Figure 2).

The EGIS application has significantly enhanced the decision making and productivity of the project teams faced with tight budgets, limited resources, and cleanup and property transfer schedule constraints.

The EGIS was used to assist SOUTHDIV in managing and evaluating the extremely large environmental data sets that have been collected at their facilities for the past 15 years. For example, at one of the SOUTHDIV facilities, over 5,000 samples have been collected and analyzed at over 1,600 individual locations. The analytical database alone for this one facility consists of more than 660,000 records (Figure 3).

Figure 3 shows the EGIS Project Status module. This module provides the user with the status and detailed description of a particular SWMU, AOC, Site, etc. After a selection has been made, the project status is launched providing its associated data: number and/or name, description, waste managed, release controls, history of releases, suggested further action, references, and current status.

Using conventional methods, the process of collecting, organizing, and evaluating this amount of spatially diverse data would be an overwhelming and costly task. The cost would have been reflected in significantly increased project schedules and labor charges, reduced accuracy, reliability, and security of the data, and a reduced ability to integrate the multiple data sources in order to make educated decisions. A few of the most significant benefits that the EGIS provides includes increased productivity at Base Realignment and Closure (BRAC) Team (BCT) Meetings, increasing accuracy and efficiency of map preparation, increased participation by the decision makers, and increased level of trust of the stakeholders.

Specific components of the EGIS include the following:

- ArcView-based GIS system that integrates relational databases from Microsoft SQL Server, as well as high-resolution aerial photography, both historical and current, planimetric mapping, digital photographs, and 3-D visualization movie files.
- Hot-links to descriptions of buildings and sites, historical reports and project documents, geologic cross-section and boring log graphics, and digital field photographs.
- Customized ArcView menus and buttons that allow the user to zoom to a specific site, select a specific view, add additional layers, and instantaneously query, extract, and export chemical data for selected sample locations.

The EGIS applications are operated directly by the project team as an interactive presentation tool which facilitates decision making during project meetings, public meetings, and negotiations with regulators. Using the EGIS enhanced the decision making process allowing for the completion of reports within reduced time frames. This allows property to be made available for transfer much sooner.

One of the primary reasons for the success of the EGIS was the planning that took place prior to its implementation. Typically, data management plans are developed to outline the data flow process, sample tracking procedure, Electronic Data-Deliverable (EDD) requirements for analytical and survey data, the EGIS data structure, as well as the software to be used for the various outputs of the EGIS. The plan allowed the field team, technical staff, project managers and subcontractors to understand their data requirements such that EGIS development, integration, and output could be expedited to meet the demanding schedule of the RCRA Facility Investigation (RFI) reports. As the EGIS application evolved from project to project, additional tools were added to the application and other tools were redesigned to better meet the needs of the decision makers and stakeholders.

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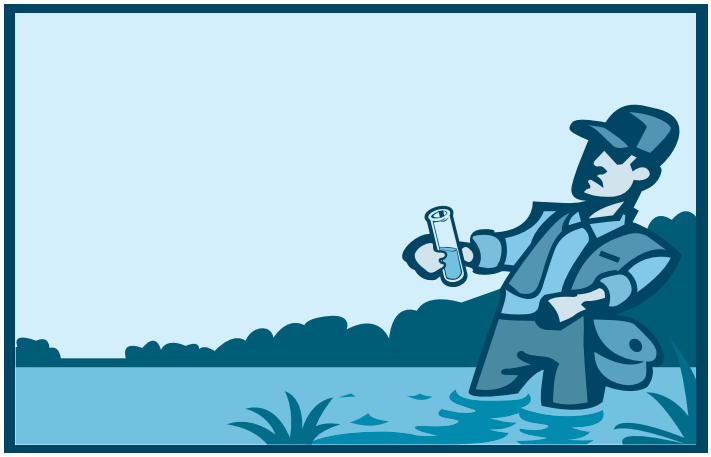
Tetra Tech NUS, Inc.
Telephone: (412) 921-8623

Remediation Innovative Technology Seminar Spring 2002

The Remediation Innovative Technology Seminar (RITS) provides training on new and innovative technologies, methodologies, and guidance under the Navy's Environmental Restoration Program. RITS is sponsored by the Naval Facilities Engineering Command (NAVFAC) in coordination with its geographical Engineering Field Divisions (EFDs) and Activities (EFAs), and its Naval Facilities Engineering Service Center (NFESC). The RITS training serves as one of many ways the Navy promotes innovative technologies to enable site restorations to take place faster, consume less energy, and provide better results at lower cost.



While the RITS is developed primarily for the Navy's Environmental Restoration and Base Realignment and Closure (BRAC) environmental professionals, it is also available to other Department of Defense (DoD) personnel, the Navy's environmental cleanup contractors, and environmental regulators.

Natural Resource Injury

This topic provides information on the role of Natural Resource Injury (NRI) in the Navy's Environmental Restoration Program. The Navy places a high priority on protecting natural resources and recently released a policy for performing NRI investigations. Details of this policy will be presented, including: using risk assessments to evaluate NRI, involving natural resource trustees when practicable, selecting remedies and conducting response actions that address NRI, and obtaining damages from other parties.

Sediments Part 1 - Policy, Guidance, and Characterization

Assessing and managing potentially contaminated sediment at Navy Environmental Restoration sites is of growing concern, due to both the complexity involved in investigations and the potential costs inherent in remedy implementation. This session presents an overview of the recent Navy Sediment Policy and the NAVFAC Implementation Guide for Assessing and Managing Contaminated Sediment at Navy Facilities. This session will provide the audience with a general knowledge of issues pertinent to sediment site characterization and risk assessment.

Sediments Part 2 - Cleanup Alternatives

This session presents sediment management and cleanup strategies including leaving sediments in place at low-risk sites, sediment capping, environmental dredging, and natural recovery. The focus will be on identifying the most appropriate management and cleanup strategy based on advantages vs. disadvantages of each strategy, cost, overall effectiveness, and short- and long-term risk management. Case studies will illustrate sediment practices implemented in the field.

Advances in Permeable Barrier Technologies

Along with promising new barrier materials, innovative design and construction methods are making more sites amenable to permeable barrier application. Adsorptive, reactive and biodegradation-enhancing materials are now used to remove a variety of dissolved contaminants including heavy metals, perchlorate, acid mine drainage, and explosive residues. This session will focus on alternative barrier materials and applicable contaminants, innovative design and construction techniques, performance and longevity expectations of zero-valent iron barriers, and illustrative case studies at several DoD sites.

Agenda

0800 - 0830	Welcome and Introductions
0830 - 1000	Natural Resource Injury
1000 - 1130	Sediments Part 1 - Policy, Guidance, and Characterization
1130 - 1230	Lunch
1230 - 1430	Sediments Part 2 - Cleanup Alternatives
1430 - 1600	Advances in Permeable Barrier Technologies

Schedule

EFD / A	2002 Date	Location
Atlantic Division	14 May Tuesday	Hilton Norfolk Airport, VA
Southern Division	16 May Thursday	Sheraton North Charleston Hotel, SC
Pacific Division	30 May Thursday	Makalapa BOQ, Pearl Harbor, HI
EFA Northwest	4 June Tuesday	Silverdale on the Bay Resort, Silverdale, WA
Southwest Division	6 June Thursday	Holiday Inn on the Bay, San Diego, CA
EFA Northeast	11 June Tuesday	Renaissance Hotel Philadelphia Airport, PA
EFA Chesapeake	13 June Thursday	Key Bridge Marriott Arlington, VA

Registration

Register on the web at http://enviro.nfesc.navy.mil/erb/support/rits/main.htm no later than one week prior to the date of the seminar you plan to attend.

Or, register by fax, email, or phone. Provide the following information no later than one week prior to the date of the seminar you plan to attend:

- Seminar Date & Location
- Name
- Organization/Activity/Company
- Telephone (Navy and Marine Corps, include DSN prefix)
- Fax
- Email

Fax, email or phone registration to:
Fax: (805) 982-3694
Voice: (805) 982-5575, DSN 551-5575

- Please note that you must make your own lodging arrangements.
- There is no cost to attend the seminar.
- No form DD1556 is required.

Due to space limitations, registration for Contractors is limited to those currently working under the Navy's environmental restoration program. If you are a Contractor, please provide us with your Contract Number and Primary Navy Technical Point of Contact.

DEPARTMENT OF THE NAVY

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