SERDP and ESTCP announce the formation of Advanced Surface Engineering Technologies for a Sustainable Defense (ASETSDefense), an initiative that will facilitate the implementation of new, environmentally friendly technologies for surface engineering by providing ready access to information and data from research, development, test, and evaluation (RDT&E) efforts supported by SERDP and ESTCP as well as work executed by other Department of Defense (DoD) organizations and the private sector. The central repository of data and information targets organizations and individuals responsible for qualifying and approving the use of new surface engineering technologies on weapons systems. Periodic workshops will provide opportunities to present key findings and results, encouraging open discussions among participants.

Under the Weapons Systems and Platforms Focus Area, SERDP and ESTCP have sponsored and are continuing to support surface engineering projects that are conducting research, development, and demonstrations in the following areas:

- Surface pre-treatments and conversion coatings
- Primers and paints
- Hard, wear-resistant coatings
- Surface cleaning
- Sacrificial corrosion protective coatings
- Coating removal
- Non-destructive inspection
- Accelerated corrosion test methods

An extensive amount of laboratory, component, and field testing has been conducted as part of these projects. ASETSDefense will centralize and disseminate results from these and other projects sponsored by SERDP, ESTCP, other DoD organizations, and the private sector.

The genesis for this initiative was the SERDP- and ESTCP-sponsored Hard Chrome Alternatives Team (HCAT) effort that was active from 1996-2006 and involved several projects that developed and demonstrated technologies to replace electrolytic hard chrome plating in DoD manufacturing and maintenance activities. Workshops were held to review results of testing and discuss implementation issues. A web site also was developed for users to easily access all test data obtained in the various projects.

To provide a central location for data and information resulting from surface engineering projects, SERDP and ESTCP are making available a number of online tools. The ASETSDefense web site (www.asetdefense.org) serves as the main entry point with general information on the initiative. From this entry point, there is a link to a second collaborative teaming web site (www.materialoptions.com) that provides data storage for completed and ongoing projects and allows registered team members to enter new data as it becomes available. It incorporates a Surface Engineering Database that houses all the engineering data for validation and qualification, including laboratory, component, and service test data, as well as production requirements. Building on this database, the Chromates Technology Map serves as an interactive, briefable map of the alternatives to chromates in all their uses—what the alternatives are, what data is available, and the status of implementation. Collectively, these tools will provide engineering data suitable for facilitating informed implementation decisions, as well as the backup information on specifications, producibility issues, and RDT&E needed to successfully adopt these environmentally friendly surface engineering technologies.
Emerging groundwater contaminants are gaining attention and making news because of their potential threat to human health and the environment. The level of uncertainty regarding their fate and transport and their impacts has elevated public concern. SERDP and ESTCP have been at the forefront of DoD efforts to proactively develop remedial alternatives for emerging groundwater contaminants, including the following:

- N-Nitrosodimethylamine (NDMA) is a product from the decomposition of unsymmetrical dimethyl hydrazine, a component used in the production of rocket fuel. This chemical is used as an additive in liquid propellant fuel for rocket engines.
- 1,4-dioxane is used as a stabilizer for chlorinated solvents or volatile organic compounds and has a high potential for entering the environment due to its volatility and solubility in water. It has been detected in U.S. surface waters.
- 1,2,3-trichloropropane (TCP) has commonly been used as a paint and varnish remover, a cleaning and degreasing agent, and a cleaning and maintenance solvent. TCP also is used as a pesticide.

Through a focused and integrated effort, projects supported by SERDP and ESTCP (described below) are providing a basic understanding of the mechanisms involved in both contaminant destruction and fate and behavior under varying natural and engineered conditions. Such information is needed to develop remedial technologies tailored for treatment of these emerging groundwater contaminants.

**NDMA Efforts**

Existing technologies for treating NDMA in water include ultraviolet irradiation and adsorption to granular activated carbon (GAC). However, these methods are very expensive and/or ineffective for removing NDMA to required levels. In response, SERDP is developing viable in-situ and ex-situ bioremediation strategies for cost-effectively treating groundwater contaminated with low concentrations of NDMA (e.g., part-per-trillion range). Initial studies focused on a mechanistic understanding of the enzymes and bacteria involved in the underlying biochemistry, key enzymes, and kinetics associated with both 1,4-dioxane and NDMA biodegradation. As a result of these studies, bacteria capable of biodegrading 1,4-dioxane and NDMA were discovered. Further, specific strains of propane- and toluene-oxidizing bacteria have now been identified that can degrade NDMA. Both ex-situ reactors and in-situ biostimulation may offer cost-effective treatment of this groundwater contaminant.

At the field validation level, ongoing projects are defining the conditions and operating requirements for effective in-situ and ex-situ NDMA remediation alternatives. For example, recognizing that there are no previous field studies examining in-situ cometabolic degradation of NDMA, ESTCP is determining the viability of in-situ biological remediation of NDMA in groundwater using oxygen and propane to stimulate indigenous bacteria. From an ex-situ NDMA treatment perspective, ESTCP is testing the biodegradation of NDMA part-per-billion concentrations using a GAC-based fluidized bed reactor (FBR). Unique to these studies is the ability to perform mass balance calculations allowing a less than 10 ng/L detection limit of NDMA to be achieved.

**1,4-Dioxane Research**

Recognizing the potential scope of the impact of 1,4-dioxane, SERDP is evaluating biodegradation of 1,4-dioxane in environmental samples under different redox and chemical/physical conditions as well as different treatment regimes. As 1,4-dioxane is seen to be very recalcitrant in contaminated aquifers, initial efforts centered on identifying and isolating new 1,4-dioxane-degrading microbes. These studies have now led to the

See EMERGING CONTAMINANTS, page 3
identification and DNA sequencing of a wide array of genes that could potentially be involved in 1,4-dioxane degradation.

TCP Studies
SERDP studies have explored the remediation of TCP by natural and engineered abiotic degradation reactions. Results indicate that TCP will be mobile and persistent in groundwater and will likely be resistant to natural attenuation. Through these studies, DoD managers and stakeholders can obtain timely and needed information on promising approaches for TCP remediation, including: (1) strong reducing agents like Zn or Fe/Pd, (2) catalytic treatments like Fe(II)-phthalocyanine, (3) hydrolysis at high temperatures, and (4) oxidation with hydroxyl radical (e.g., via activated peroxide) or sulfate radical (from activated persulfate). Technologies that are not considered promising at this point for TCP are conventional reductive treatment technologies like permeable reactive barriers.

In their efforts to address emerging groundwater contaminants, SERDP and ESTCP are working closely with the Materials of Emerging Regulatory Interest Team (MERIT), a DoD group supported by the Emerging Contaminants Directorate, that is addressing emerging contaminant assessment, management, and communication/outreach with the ultimate goal of enabling a fully informed, risk-based investment decision process that protects human health and DoD operational capabilities. For additional information on MERIT, please visit www.denix.osd.mil/portal/page/portal/denix/environment/MERIT.
Critical military training and testing lands in coastal and estuarine areas increasingly are at risk because of development pressures in surrounding areas, impairments from other anthropogenic disturbances, and requirements to comply with environmental regulations. The Department of Defense intends to enhance and sustain its training and testing assets as well as optimize its stewardship of natural resources through an ecosystem-based management approach. To support DoD in implementing this approach, SERDP in 2006 launched the Defense Coastal/Estuarine Research Program (DCERP) located at Marine Corps Base Camp Lejeune in North Carolina. This program, led by RTI International with contributing researchers from several regional universities and agencies, is designed to conduct mission-relevant basic and applied research.

DCERP’s primary goal is to enhance and sustain the military mission by developing an understanding of coastal and estuarine ecosystem composition, structure, and function within the context of a military training environment. To accomplish this goal, the DCERP team of interdisciplinary experts designed and is now implementing (1) an overarching, mission-relevant research strategy, (2) a baseline monitoring plan, (3) a detailed research plan, and (4) a data and information management system. DCERP will provide end users with an appropriate monitoring strategy, implementable management strategies, and decision support tools to aid in the adaptive management of natural resources.

Research and monitoring activities conducted under DCERP are organized according to one of five thematic modules—Aquatic/Estuarine, Coastal Wetlands, Coastal Barrier, Terrestrial, and Atmospheric. More than 200 monitoring stations have been established, many of which are collecting baseline and trend data of relevance to multiple thematic modules. Investigators have initiated or will soon initiate 13 research projects with an emphasis on collecting historical data and installing monitoring stations to improve scientific understanding within each thematic module. Ongoing research is examining such phenomena as marsh vegetation responses to sea level rise, long-term barrier island evolution, shorebird nesting success relative to beach management strategies, and harmful algal blooms. Research and monitoring elements are planned to ensure critical integration not only across the DCERP thematic modules but also with Camp Lejeune management needs. To strengthen DCERP’s research and monitoring components, a
In the first in a series of live site demonstrations, commercially available sensors have been paired with advanced processing methods to successfully classify munitions from other nonhazardous items on a simple site. Emerging more capable sensors produced nearly perfect classification results.

The detection and remediation of munitions is one of DoD’s most pressing environmental problems. Thousands of current and former DoD sites, comprising tens of millions of acres, are suspected of containing munitions. Estimates for the cleanup of munitions-contaminated sites are in the tens of billions of dollars. In FY 2006, Congress appropriated funds to ESTCP to establish a pilot program to develop and demonstrate advanced classification technologies for distinguishing intact munitions from harmless metal and geology, a capability that would translate to more cost-effective remediation efforts.

During cleanup, a site is typically mapped with a geophysical system that detects signals, known as anomalies, that arise from metallic subsurface objects or geology. Current technology does not distinguish anomalies that correspond to intact munitions from those associated with harmless metallic objects or geology, termed clutter. With no information to suggest the origin of the signals, all anomalies are currently treated as though they are intact munitions when they are dug. Certified technicians carefully excavate each item using a process that often requires extensive safety measures, such as barriers or exclusion zones. Since more than 90% of objects excavated during the course of a munitions response are generally found to be clutter, most of the costs to remediate a munitions-contaminated site are currently spent on excavating items that, in fact, pose no threat.

To address the need for more cost-effective cleanup strategies, SERDP and ESTCP researchers have been developing methods for “classification” that distinguish intact munitions from clutter. ESTCP’s Pilot Program sought to test and validate these technologies at a live site and to consider, in cooperation with regulators and program managers, how classification technologies can be implemented in cleanup operations.

The site selected to host the pilot study was the former Camp Sibert, Alabama, where 4.2-inch mortars were fired during military training. The site contains a single munitions type, has benign topography and vegetation that allowed for high-quality data collection, and has benign to moderate geology.

During the pilot study, multiple approaches to munitions classification were tested on data collected using commercially available and emerging sensors. Mature, physics-based analysis methods were used to estimate properties of buried objects, such as size, depth, aspect ratio, remnant magnetization, and electromagnetic decay rates—properties that may be useful in distinguishing munitions from other sources. Advanced classification algorithms use this information to determine whether a signal is likely to arise from a munitions item or another source.

Approximately 1,450 objects were dug and used to confirm technology performance. The anomalies were selected based on the weakest signal expected from a mortar at its maximum depth of interest. In addition, about 150 inert 4.2-inch mortars were seeded on the site to provide a sufficient sample size of the targets of interest.

Performance was measured in two phases—detection and classification. The detection phase confirmed the detection of all mortars. In the classification phase, the demonstrators’ performance was determined by their ability to eliminate clutter while retaining all detected munitions. They were tasked to rank the anomalies from highest certainty clutter to highest certainty munitions and to identify a point beyond which they would recommend that all anomalies be treated as munitions.

Data collected using the commercially available EM61 electromagnetic induction and G-858 magnetometer sensors were used to perform successful classification. Well over half of the detected clutter items were routinely eliminated with high confidence while retaining all of the detected mortars. Some processing
SERDP and ESTCP initiatives in **Munitions Management** (MM) focus on technologies to detect and remediate munitions on ranges, munitions burning and open detonation areas, and burial pits— one of the Department of Defense’s most pressing environmental problems. In 2008, SERDP research and development efforts are investigating the use of data sets from the ESTCP classification study, wide area assessment technologies, and detection and classification in both land and underwater environments. ESTCP investigators are demonstrating sensors and their platforms for land-based and underwater applications, munitions recovery technologies, and geolocation tools. Results from these initiatives will provide new capabilities to cost-effectively characterize and remediate munitions response sites through improved munitions detection, improved classification of munitions from other nonhazardous materials, and increased capabilities to deploy advanced technologies for a wide diversity of site conditions.

---

**SERDP Research**

Additional information on these efforts can be found at [www.serdp.org](http://www.serdp.org) under the Research Projects link.

**Robust Statistics and Regularization for Feature Extraction and UXO Discrimination (MM-1629)**
Principal Investigator: Stephen Billings/Sky Research, Inc.

Current methods for UXO discrimination using magnetic and electromagnetic induction (EMI) data generally rely on feature vectors extracted through least-squares inversion of the parameters of an underlying physics-based model. The objective of this project is to provide more statistically rigorous solutions that will result in more accurate feature vectors extracted from multitime, multifrequency, and multicomponent EMI data and lead to more reliable UXO discrimination.

**Detection of Underwater Military Munitions by a Synoptic Airborne Multi-Sensor System (MM-1630)**
Principal Investigator: Michael DeWeert/BAE Spectral Solutions, LLC

This project will investigate the feasibility of adapting and exploiting the capabilities of a suite of cutting-edge mine-detection sensors and processing techniques to detect proud and buried UXO underwater. The synoptic sensor system synergistically integrates three simultaneous distinct modes of passive and active sensing with knowledge-based information to create a detection system expected to be orders of magnitude more capable than any one sensor.

**Marine UXO Characterization Based on Autonomous Underwater Vehicle Technology (MM-1631)**
Principal Investigator: Jack Foley/Sky Research, Inc.

Leveraging existing autonomous underwater vehicle (AUV) platforms, this project will develop flexible marine surveying capabilities for wide-area screening of UXO under various marine conditions. Additionally, AUV technology will be extended to full-coverage geophysical mapping in marine environments for individual UXO detection. This project will overcome limitations of existing marine surveying systems by integrating land-based UXO geophysical surveying technologies with mature AUV systems.

**Electromagnetic Induction Modeling for UXO Detection and Discrimination Underwater (MM-1632)**
Principal Investigator: Fridon Shubitidze/Dartmouth College

The objectives of this project are to understand how marine environments change EMI sensor performance and processing approaches for detecting highly conducting and permeable metallic objects in marine environments and to evaluate under what conditions forward models are applicable to underwater UXO discrimination. This project will develop generalized, rigorous three-dimensional numerical models applicable to both frequency- and time-domain EMI problems and provide a detailed understanding of the physics of EMI scattering phenomena in underwater environments. It will also evaluate the capabilities of existing EMI inversion methodologies to discriminate between hazardous UXO and nonhazardous metallic items in marine environments.

**Examination of Airborne Frequency-Domain Electromagnetic System Attributes for UXO Mapping and Detection (MM-1633)**
Principal Investigator: Bill Doll/Battelle Memorial Institute

The objective of this project is to provide new capabilities for wide-area mapping and detection of UXO by evaluating the potential of airborne frequency-domain electromagnetic (FDEM) systems as an alternative to magnetometer and time-domain electromagnetic (TEM) systems. This project involves assessing the process of FDEM induction in the presence of a significant noise source (the helicopter) and at greater offset than with ground-based systems.

**Large-Moment Electromagnetic Induction Array for UXO Detection and Discrimination (MM-1634)**
Principal Investigator: I.J. Won/Geophex, Ltd.

This project will develop a new array sensor configuration to advance both detection and discrimination of UXO. The EMI array will provide a large transmitter for increased depth penetration and enhanced signal-to-noise ratio (SNR), a large swath to accelerate the production rate, and ample frequency-domain data for potential discrimination capability using the existing WinGEM UXO software.
Initiatives for Munitions Management
are being highlighted. Featured here are Munitions Management efforts.

Timed Neutron Technique for UXO Discrimination (MM-1635)
Principal Investigator: Daniel Holslin/SAIC

The objective of this project is to design an advanced system for UXO discrimination using timed neutrons, built on the Pulsed Elemental Analysis with Neutrons (PELAN) technology, and incorporating the associated particle imaging (API) technique. PELAN is a bulk analyzer that identifies an explosive, non-intrusively, by measuring its chemical elemental composition. The API technology has shown promising results in identifying small amounts of explosives in various environments.

Selecting Optimal Models for Inverting EMI Data (MM-1637)
Principal Investigator: Leonard Pasion/Sky Research, Inc.

This project seeks to improve UXO discrimination by delineating the circumstances for model selection and by generating methodologies and software that would allow a user to extract meaningful parameters from EMI data more efficiently. Researchers will assess the process of extracting physically realistic models of buried UXO from time- and frequency-domain electromagnetic data. The results will provide tools that improve on the existing capabilities of UXO discrimination by improving the quality of parameters that are used as inputs to classification methods.

Advanced UXO Detection and Discrimination Using Magnetic Data Based on Extended Euler Deconvolution and Shape Identification Through Multipole Moments (MM-1638)
Principal Investigator: Richard Krahenbuhl/Colorado School of Mines

The objective of this project is to advance UXO detection and discrimination technologies through the development of new processing methods for identifying anomalies of geologic origin and interpretation algorithms utilizing higher order moments of associated magnetic targets. The first component will be the detection of all dipole-like magnetic anomalies associated with both UXO and nonhazardous metallic items in the presence of geologic noise. The second component will develop a method to recognize UXO using shape reconstruction through higher order magnetic moments.

Detection and Discrimination of Small Munitions Using Giant Magnetoresistive Sensors (MM-1639)
Principal Investigator: Janet Simms/U.S. Army Corps of Engineers-Engineer Research and Development Center

The objective of this SEED Exploratory Development (SEED) project is to assess the feasibility of using giant magnetoresistive (GMR) sensors to detect and discriminate small munitions positioned with no influence from other objects, close to one other in a horizontal plane, and vertically above one another. This project will focus on characterizing the fundamental UXO detection and discrimination capabilities of GMR sensors. The results from this project will also aid in determining if dense sampling provides better results for discrimination of small munitions.

Enhancement of TEM Data Noise Characterization by Principal Component Analysis (MM-1640)
Principal Investigator: Yaoguo Li/Colorado School of Mines

This SEED project seeks to develop a practical algorithm that will enhance the signal in transient electromagnetic data for UXO applications. The intent is to develop a denoising algorithm that not only removes random uncorrelated noise but also separates the signals from various sources through principal component analysis. Effective separation of noise components from field TEM data will contribute to improving UXO detection in difficult geologic environments and enhancing TEM data for discrimination purposes.

Blow-in-Place Pressure Reduction (Covering Technology) (MM-1641)
Principal Investigator: Bill Wild/Space and Naval Warfare Systems Center

The objective of this SEED project is to develop proof-of-concept data for the mitigation of underwater blasts using covering technology, as well as identify additional techniques to reduce near-field explosive blast damage to habitats and biota and far-field acoustic impacts on marine species. Covering technology has the potential to mitigate shrapnel and blast and to greatly reduce underwater explosion pressures during blow-in-place operations to clear unexploded munitions in the shallow marine environment.

Enhancement of Magnetic Data by Stable Downward Continuation for UXO Application (MM-1642)
Principal Investigator: Yaoguo Li/Colorado School of Mines

This SEED project seeks to develop a robust algorithm for stable downward continuation of magnetic data acquired at some height above the ground to reconstruct the magnetic data with a higher resolution at the ground surface and to characterize the noise in ground-based and airborne data for use in improved inversion algorithms. Researchers will also conduct feasibility studies on synthetically simulated data as well as field data sets to understand the utility of the algorithm in enhancing ground-based and airborne magnetic data and in estimating the noise characteristics of UXO magnetic data.

Precision Geolocation of Active Electromagnetic Sensors Using Stationary Magnetic Sensors (MM-1643)
Principal Investigator: Stephen Billings/Sky Research, Inc.

The objective of this SEED project is to conduct a proof-of-principle demonstration that a single, fixed gradiometer or vector magnetometer can track an active electromagnetic sensor at subcentimeter position and subdegree accuracy over short baselines and at approximately 10-cm position accuracy over longer baselines. The system will be suitable for deployment in either a cued-interrogation mode or in an area detection and discrimination mode for larger areas. It will not require line-of-sight and hence will be suitable for wooded terrain and potentially for location of active sensors deployed underwater.

See FY 2008 MM INITIATIVES, page 8
FY 2008 Munitions Management Initiatives (continued)

ESTCP Demonstrations

Additional information on these efforts can be found at www.estcp.org under the Technologies link.

Demonstration of UXO-PenDepth for the Estimation of Projectile Penetration Depth (MM-0806)
Principal Investigator: Janet Simms/U.S. Army Corps of Engineers-Engineer Research and Development Center
This project will demonstrate that the software UXO-PenDepth provides realistic depth-of-projectile penetration estimates for munitions types in a variety of conditions. Application of UXO-PenDepth during the initial stages of the evaluation of a UXO-contaminated site will provide an estimation of projectile penetration depth, which, in many situations, is representative of actual depth of burial and can be used to establish more accurate clearance depths and to select the most appropriate sensors and procedures.

Handheld Electromagnetic Induction Sensor for Cued UXO Discrimination (MM-0807)
Principal Investigator: Barry Spargo/Naval Research Laboratory
The objective of this project is to assemble and demonstrate a handheld EMI sensor for cued interrogation of anomalies with improved UXO/clutter discrimination performance relative to currently available technology. The sensor will have two modes of operation: (1) a quick screen to identify obvious clutter items and (2) grid template data collection, using a plywood (or paint) grid template that is placed on the ground over a suspected UXO anomaly, and dipole inversion to identify potential UXO items.

Wide Area Assessment for Marine UXO (MM-0808)
Principal Investigator: Robert Feldpausch/Tetra Tech EC, Inc.
The Marine Gradiometer Array sensor and navigation system was developed to detect and precisely locate UXO items in an underwater environment. This project will continue this development and integrate high-resolution multibeam bathymetry, sidescan, subbottom, and geophysical marine surveys, providing a complete integrated system of hardware, software, data processing and analysis to be used to cost-efficiently survey large areas and effectively characterize the nature and extent of underwater UXO.

ALLTEM Multi-Axis System Demonstration and Validation (MM-0809)
Principal Investigator: David Wright/U.S. Geological Survey
The objective of this project is to demonstrate that the newly developed ALLTEM data, with appropriate data processing and inversion, provide better discrimination between UXO and non-UXO targets than existing benchmark EMI systems. ALLTEM is an EMI sensor specifically designed for UXO detection and discrimination. This project also will demonstrate that the ALLTEM prototype system and software are sufficiently mature that they could be operated by DoD or contractor personnel after appropriate training.

Advancing Discrimination Performance by Integrating SAINT with Handheld Electromagnetic Induction Sensors (MM-0810)
Principal Investigator: Dean Keiswetter/SAIC
This project will demonstrate improved UXO discrimination performance in field settings by precisely spatially registering handheld EMI sensor measurements using a tactical grade inertial navigation tracking system integrated with a commercial EM61HH-MK2 sensor. The project team will utilize and advance a small area inertial navigation tracking (SAINT) system that has demonstrated a precision of 3-5 millimeters. The EM61HH-MK2 is a handheld complement to the EM61-MK2, providing greater sensitivity to smaller targets at shallow depths.

Advanced MEC Discrimination Comparative Study on Standardized Test Site Data Using LGP Discrimination (MM-0811)
Principal Investigator: Larry Deschaine/SAIC
The objective of this project is to demonstrate a computer-assisted process to discriminate subsurface munitions and explosives of concern (MEC) items from clutter based on electromagnetic and magnetometer data and to evaluate the risk that a site contains unexcavated MEC using data from the former Camp Sibert and Aberdeen Proving Ground test sites. The MEC discrimination process uses both the supervised machine learning technique Linear Genetic Programming (LGP) and the Lipchitz Global Optimization (LGO) algorithm.

Improved Processing, Analysis, and Use of Historical Photography (MM-0812)
Principal Investigator: Larry Tinney/Terraspectra Geomatics
This project will demonstrate the benefits that can be derived from advanced and novel image processing techniques, with special emphasis on image restoration algorithms to reduce lens and motion blur in historic aerial photography and digital photogrammetry techniques to generate improved orthophotographs. The potential for improvements in generating digital elevation models from historic photographs will be evaluated for crater detection and mapping. Current best practices for the use of historic aerial photography also will be addressed. These include the use of film diapositives rather than prints and the use of high-quality stereo-viewing equipment for photo interpretations.
The Technical Advisory Committee (TAC) was formed to provide technical review of DCERP and to assist with linking DCERP research with other related research and results, facilitating research integration, and transferring knowledge gained to appropriate user communities. The TAC consists of technical discipline experts who cover the subject matter inherent to one or more of the DCERP thematic modules.

The DCERP data and information management system is designed to facilitate the organization and storage of all program-related information. A key component of this system is the monitoring and research data information system (MARDIS), which allows researchers to upload data into an online repository available to the team. Additional components of the data and information system include a document database, a collaborative web site, a public web site (http://dcerp.rti.org), and a GIS mapping tool integrated with MARDIS, which will be phased in over the next several months.

Concurrent with DCERP research and monitoring efforts, SERDP assembled a Regional Coordinating Committee (RCC) consisting of representatives from key conservation organizations and the broader regional community, including federal, state, and local regulators. The RCC provides a forum for sharing information and results from the DCERP effort as well as a venue for promoting collaboration between DCERP and the regional community. Two RCC meetings have been held to date, and already the DCERP team and RCC are coordinating on data sharing and siting of monitoring stations.

After just one year of field work and data collection, several important results of benefit to Camp Lejeune have emerged. For example, researchers from the Aquatic/Estuarine module have determined that photopigment levels of phytoplankton communities can be used as indicators to detect and quantify algal blooms. When coupled with remote sensing data, photopigment levels potentially could be used to detect perturbation events that stimulate harmful algal blooms. Researchers from the Coastal Barrier module have developed detailed digital maps of coastal barrier morphology and identified the diverse community of shorebird predators on the barrier island. DCERP will continue to phase in additional research projects over the next eight years in accordance with the overarching research strategy, and results will continue to feed into adaptive management strategies that enhance and sustain the military mission as well as influence ecosystem-based management strategies at Camp Lejeune and throughout the southeastern seaboard.

For additional information about DCERP, visit http://dcerp.rti.org or contact Dr. Patricia Cunningham, RTI International, Research Triangle Park, NC, at (919) 316-3722 or patc@rti.org.
FY 2009 Program Update

SERDP
Following the independent peer review of the 174 full proposals received in response to the FY 2009 SERDP Core Solicitation, 98 were forwarded for review to the SERDP Technical Committees (STC) in May. The STCs reviewed these proposals in May and June, along with 4 of the 16 proposals received in response to the one Statement of Need for the FY 2009 SERDP Exploratory Development (SEED) Solicitation. The STC downselect meetings were held in June, and recommendations were made to the SERDP Executive Director for the FY 2009 Core and SEED efforts. On September 29, the SERDP Council met to approve the FY 2009 Program Plan.

The FY 2010 SERDP Core and SEED Solicitations currently are under development and will be released on or around November 6. Refer to www.serdp.org under the Funding Opportunities link for specifics about the solicitations and deadlines.

ESTCP
Of the 239 pre-proposals received in response to the FY 2009 ESTCP Call for Proposals and Broad Agency Announcement, the ESTCP Technical Committees (ETC) reviewed 172 relevant pre-proposals during April and May. Their recommendations on pre-proposals that merit full proposal requests were made in May and early June. In June, 65 proposers were requested to submit full proposals by August 7. In September, these proposers were asked to present their proposals to the ETCs, which then will make recommendations for funding to the ESTCP Director.

approaches using these data were able to eliminate up to 80% of the clutter.

The emerging BUD (Berkeley UXO Discriminator) system developed by Lawrence Berkeley National Laboratory achieved near-perfect performance. The graphic above shows classification results for this system. In all, 236 of the 240 clutter items in this section of the site were correctly identified with high confidence, and all seeded munitions were correctly identified as mortars.

This first phase of the ESTCP Pilot Program demonstrated that with commercially available sensors and processing techniques, substantial classification is possible at the former Camp Sibert. Emerging sensors that collect more complete data achieved vastly improved capability. Additional demonstrations are planned at more complex sites. A second pilot study will begin later this year at the former Camp San Luis Obispo in California.

For further information on the results of the first phase of ESTCP’s Pilot Program, refer to the Final Report available this fall in the SERDP and ESTCP Online Library at http://docs.serdp-estcp.org.

To foster the implementation of new information and technologies resulting from these projects, ASETSDefense will sponsor periodic workshops for individuals from government, industry, and academia. The SERDP and ESTCP Workshop on Surface Finishing and Repair Issues for Sustaining New Military Aircraft held February 26-28, 2008, in Tempe, Arizona, represented the first of several such forums. This workshop brought together original equipment manufacturers, users, DoD experts, and vendors to exchange information on the development and implementation of new surface engineering technologies in use on new aircraft and some legacy systems, with the additional purpose of defining future requirements and technology gaps requiring additional research and development. Presentations from this and future workshops are available in the teaming portion of the ASETSDefense web site (www.materialoptions.com).

For more information on this new initiative, visit www.asetdefense.org or contact Mr. Bruce Sartwell, the SERDP and ESTCP Weapons Systems and Platforms Program Manager, at bruce.sartwell@osd.mil or Dr. Keith Legg, ASETSDefense Technical Manager, at klegg@rowanntechnology.com.
Recent Additions to the Online Library

The following are samples of new publications now available in the SERDP and ESTCP Online Library (http://docs.serdp-estcp.org). Access them by entering the project number (e.g., 0125) under Search Phrase. Other documents may be accessed by entering an appropriate keyword or selecting the relevant search filters.

Environmental Restoration
- Cost 8 Performance Report: Radon-222 as a Natural Tracer for Monitoring the Remediation of NAPL Contamination in the Subsurface (ESTCP ER-9916)
- Cost 8 Performance Report: Demonstration/Validation of Long-Term Monitoring Using Wells Installed by Direct-Push Technologies (ESTCP ER-0011)
- Final Report: The Effects of Ammonium Perchlorate on Reproduction and Development of Amphibians (SERDP ER-1236)
- Final Report: Decreasing Toxic Metal Bioavailability with Novel Soil Amendment Strategies (SERDP ER-1350)
- Final Report: Detailed Hydraulic Assessment Using a High-Resolution Piezoecone Coupled to the GeoVis (ESTCP ER-0421)
- Final Report: Monitoring of Water and Contaminant Migration at the Groundwater-Surface Water Interface (ESTCP ER-0422)
- Final Report: Estimating Cleanup Times Associated with Combining Source-Area Remediation with Monitored Natural Attenuation (ESTCP ER-0436)

Munitions Management
- Cost 8 Performance Report: UXO Precise Position Tracking Using Time-Modulated Ultra-Wideband Communications (ESTCP MM-0029)
- Final Report: UXO Discrimination in Cases with Overlapping Signatures (SERDP MM-1282)

Sustainable Infrastructure
- Final Report: Analysis of Biophysical, Optical and Genetic Diversity of DoD Coral Reef Communities Using Advanced Fluorescence and Molecular Biology Techniques (SERDP SI-1334)
- Final Report: Total Copper Analyzer for Rapid In-Situ Characterization of Effluent Discharge (ESTCP SI-0311)

Weapons Systems and Platforms
- Cost 8 Performance Report: Demonstration of M855 and M856 5.56 mm and M62 and M80 7.62 mm Alternative Core Bullets (ESTCP WP-9901)
- Final Report: Elimination of Chlorine-Containing Oxidizers from Pyrotechnic Flare Compositions (SERDP WP-1280)
- Final Report: Environmentally Acceptable Medium Caliber Ammunition Percussion Primers (SERDP WP-1308)
<table>
<thead>
<tr>
<th>OCTOBER 2008</th>
<th>NOVEMBER 2008</th>
<th>DECEMBER 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 7-8</td>
<td><strong>November 3-7</strong></td>
<td>December 2-4</td>
</tr>
<tr>
<td>Munitions Management (MM) In-Progress Review (IPR) meeting</td>
<td><strong>November 6</strong></td>
<td>Partners in Environmental Technology Technical Symposium &amp; Workshop, sponsored by SERDP and ESTCP</td>
</tr>
<tr>
<td></td>
<td>Federal Call for Proposals and Broad Agency Announcement for SERDP FY 2010 project funding to be released on or about this date</td>
<td>Arlington, Virginia</td>
</tr>
<tr>
<td>October 16</td>
<td><strong>November 6</strong></td>
<td>Washington, D.C.</td>
</tr>
<tr>
<td>Weapons Systems and Platforms (WP) In-Progress Review (IPR) meeting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>October 21-22</td>
<td><strong>November 6</strong></td>
<td></td>
</tr>
<tr>
<td>Sustainable Infrastructure (SI) In-Progress Review (IPR) meeting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>October 28-30</td>
<td><strong>November 6</strong></td>
<td></td>
</tr>
<tr>
<td>SERDP Scientific Advisory Board (SAB) meeting</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**RELATED CONFERENCES & EVENTS**

- **October 20-24**
  - Interstate Technology & Regulatory Council (ITRC) Fall Meeting
  - Phoenix, Arizona

- **November 9-14**
  - Society of Exploration Geophysicists Annual Meeting
  - Las Vegas, Nevada
  - For more information, visit [www.seg.org](http://www.seg.org).

- **November 16-20**
  - Society of Environmental Toxicology and Chemistry (SETAC) North America 29th Annual Meeting
  - Tampa, Florida
  - For more information, visit [tampa.setac.org](http://tampa.setac.org).

**INTERSTATE TECHNOLOGY & REGULATORY COUNCIL**

**ADDRESS CHANGES**

Send an e-mail to changes@hgl.com.

**RESTON, VA 20190**

Suite 400

1107 Sunset Hills Road

C/O HydroGeoLogic, Inc

Support Office

SERDP and ESTCP

Printed on recycled paper
Partners in Environmental Technology
Technical Symposium & Workshop

This year’s program has been expanded to a full three-day format that includes the opening Plenary Session, 13 technical sessions, five short courses, and an Exhibit Hall featuring more than 400 posters and booths.

**PLENARY SESSION**

The Symposium & Workshop will commence on Tuesday morning with presentations by our distinguished Plenary Session speakers, including Col. Cynthia A. Murphy, Commander of the U.S. Army Garrison—Fort Lewis, Washington; Ms. Sherri W. Goodman, General Counsel for CNA; and Mr. Amory B. Lovins, renowned author, physicist, and expert on energy and the environment who is Chairman and Chief Scientist of the Rocky Mountain Institute. Together, these Plenary Session speakers will offer attendees key insights into current and emerging environmental and national security issues.

**TECHNICAL SESSIONS**

The technical sessions will highlight research and innovative technologies that assist DoD in addressing increasingly complex environmental and mission sustainability challenges. Following are this year’s topics.

- Monitoring and Mitigation of Vapor Intrusion from Contaminated Groundwater
- Recent Advances in Characterization and Remediation of Dense Non-Aqueous Phase Liquid (DNAPL) Source Zones
- Management of Contaminated Sediments: The Path to Risk-Based Remedial Action Decisions
- Approaches for Managing Contaminated Upland Soils
- Military Munitions in the Underwater Environment
- Munitions Response: Taking Technology to the Field
- Munitions Response: Advances in Science and Systems
- Alternative Fuels for DoD Weapons Systems
- Replacement of Hexavalent Chromium in DoD Manufacturing and Maintenance Activities: Hard Chrome Plating and Surface Treatments
- Replacement of Hexavalent Chromium in DoD Manufacturing and Maintenance Activities: Primers and Sealants
- Net Zero Installations: Energy and Beyond
- Marine Mammals and Military Operations
- Science Underlying the Post-Recovery Management of Listed Species

**SHORT COURSES**

Short courses on select technologies in environmental restoration and munitions management will offer unique training opportunities on recent advancements in science and technology. Following are this year’s short courses.

- Principles and Practices of In Situ Chemical Oxidation
- Management of Contaminated Sediments: Capping and Monitored Natural Recovery Approaches
- In Situ Bioremediation of Perchlorate in Groundwater
- Introduction to Classification Methods for Military Munitions Response Projects
- Introduction to the Visual Sample Plan Unexploded Ordnance (UXO) Module

Professional Development Hours (PDHs) will be offered for the short courses!

**OTHER HIGHLIGHTS**

By attending the Symposium & Workshop, you will have access to:

- Unparalleled networking opportunities with approximately 1,000 environmental professionals
- Information about world-class research and demonstrations being conducted on persistent environmental challenges
- More than 400 posters supporting the technical program theme
- Booths offering information about funding opportunities in related research programs

Register Now!
Advance Registration Deadline is November 19

For the most up-to-date information on the technical program or to register, visit www.serdp-estcp.org/symposium.