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Improving DoD's Energy Efficiency Helps Safeguard Troops, Enhance National Security, Reduce Carbon 'Footprint,' and Cut Costs

Symposium & Workshop Expands Technical Program and Draws Record Crowd

Mr. Amory Lovins, chairman and chief scientist of the Rocky Mountain Institute and one of the nation's foremost experts on energy, describes a sobering reality facing the U.S. military: troops are dying and being injured because of energy inefficiencies in the war zone.

An estimated half of the casualties in the Iraq and Afghanistan theaters are associated with miles-long convoys, often involving whole divisions hauling fuel and more divisions trying to guard them, explained Mr. Lovins. And, back home in the United States, the Department of Defense's (DoD) dependence on the nation's precarious electricity grid to power its hundreds of installations presents a serious national security risk, he said.

In short, Mr. Lovins does not mince words when describing the gravity of the energy challenges DoD must confront. "The Department of Defense's mission is at risk, and huge costs are being paid in blood, treasure, and lost combat effectiveness due to pervasive waste of energy in the battlespace and fixed facilities' dependence on the highly vulnerable electricity grid," he said.

Mr. Lovins spoke at the opening Plenary Session of the Partners in Environmental Technology Technical Symposium & Workshop, hosted by SERDP and ESTCP at the Marriott Wardman Park Hotel in

Washington, D.C., December 2-4, 2008. A record 1,100 environmental professionals from the military, government agencies, academia, private industry, and the regulatory community participated in this event.

These energy challenges, while daunting, present enormous opportunities for DoD and SERDP and ESTCP, Mr. Lovins told participants. "There are ways to turn these weaknesses into revolutionary sources of strength, with significant gains in capability at comparable or lower cost and without tradeoff or compromise," he said.

Developing new, lower cost materials to design and build radically lighter-weight platforms, including vehicles and aircraft that use more fuel-efficient engines; developing and demonstrating alternative energy sources; and finding ways to shift from the military installations' dependence on the



Three distinguished Plenary Session speakers—Ms. Sherri Goodman (far left), Col. Cynthia Murphy, and Mr. Amory Lovins—discussed DoD's leadership in tackling energy efficiencies at the Symposium & Workshop.

electricity grid to self-sufficiency—these all are examples of how environmental professionals can work to help DoD make exponential improvements in energy efficiency, thereby safeguarding troops, reducing DoD's environmental impacts, achieving drastic cost savings, and improving both national security and combat effectiveness.

Mr. Lovins challenged participants to "think big" when developing, demonstrating, and applying energy-saving technologies to military applications. Not only can such energy advances act as force protector, multiplier, and enabler for the military, they could transform

energy use and affect climate change for generations to come.

“The DoD is emerging as a leader within our government in getting us off oil,” said Mr. Lovins. Much as the public and private sectors previously leveraged military science and technology in developing the Internet, GPS, and the microchip and jet-engine industries, “there’s now an opportunity for military science to catalyze leap-ahead technology that can help eliminate U.S. oil use by the 2040s,” he explained.

The link between energy independence and improved national security was also emphasized by Ms. Sherri Goodman, general counsel for CNA and a former Deputy Under Secretary of Defense for Environmental Security.

“Our dependence on fossil fuel leaves us more vulnerable to hostile regimes and terrorists, and clean domestic energy alternatives help us confront the serious challenge of global climate change,” Ms. Goodman said. “Because the issues are linked, solutions to one affect the other.”

DoD’s efforts to improve energy efficiency have far-reaching effects, she explained. “While the issue of oil dependence is one that affects our nation as a whole, the DoD, as the world’s number one consumer of energy, has an important role to play in redefining the nation’s relationship to energy and providing the kind of strategic decision making that can ripple across the rest of the economy.”

Any technological environmental advances for DoD must meet certain criteria—improving operational effectiveness, improving operational efficiency, improving energy productivity, and reducing greenhouse gas emissions. “In other words, we need to reduce our ‘carbon footprint’ as we develop and field more energy-efficient technologies,” Ms. Goodman said. “By selecting energy solutions that meet these criteria, the military can be a major

player in helping the nation achieve what we call ‘energy-climate security.’ ”

On a practical level, troops stationed at bases across the nation can take steps to reduce their “carbon footprint” using existing methods and harnessing emerging technologies, said Col. Cynthia Murphy, Commander of the U.S. Army Garrison, Fort Lewis, Washington.

Several years ago, leaders and troops at Fort Lewis committed to a set of 25-year sustainability goals, including reducing total energy consumption by 30 percent by the year 2015; generating all electricity on post and using only renewable energy sources by 2025; achieving net-zero waste by 2025; and creating sustainable neighborhoods for a livable community on post.

Col. Murphy, whose enthusiasm for the sustainability program is palpable, described the post’s net-zero waste efforts, including composting horse manure. “It’s exciting to be able to turn a byproduct into black gold,” she said. The combination of composting, recovering usable materials from building demolitions, and using asphalt derived from road renovations save the post \$756,000 a year, she added. Also, Fort Lewis is partnering with a local power company to build an improved mechanical and electrical system aimed at reducing consumption requirements, the first partnership of its kind for an Army base.

“Building a sustainable community is important, but at the same time we need to build a sustainable culture,” said Col. Murphy. “If we can make an imprint on each soldier and family, then when they move, they can take with them the lessons they’ve learned, and they can apply them to other installations and communities. They can be good stewards of our environment everywhere they go.”

At the conclusion of the Plenary Session, Dr. Jeffrey Marqusee, Executive Director of SERDP and ESTCP, and Dr. Anne Andrews,

Deputy Director of SERDP and ESTCP, presented five SERDP and two ESTCP Project-of-the-Year Awards that recognize successful research and technology developments with significant benefits to DoD. Recipients of this prestigious honor and descriptions of their award-winning projects follow.

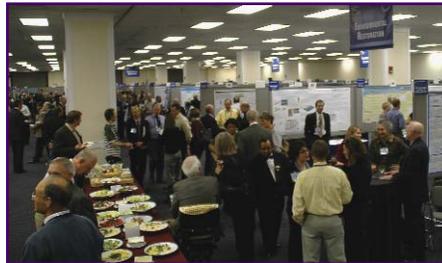
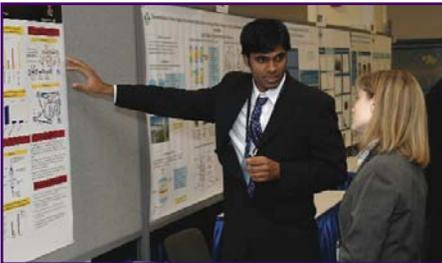
SERDP Projects of the Year for Sustainable Infrastructure. Predictive Spatial Analysis of Marine Mammal Habitats (SI-1390)—Dr. Andrew Read and Dr. Patrick Halpin, Duke University, Nicholas School for the Environment and Earth Sciences, Durham, North Carolina. Predictive Modeling of Marine Mammal Density from Existing Survey Data and Model Validation Using Upcoming Surveys (SI-1391)—Dr. Jay Barlow, National Oceanic and Atmospheric Administration (NOAA), Southwest Fisheries Science Center, La Jolla, California.

Few environmental topics raise as much emotion and passion as the protection of marine mammals and the military’s use of sonar. To assess the extent of potential impacts, more complete information on the distribution and habitat of these animals is needed. Both the Navy and regulatory agencies such as NOAA need to be able to estimate the location, distribution, and density of marine mammals.

These two projects provide DoD and NOAA with essential tools that until now did not exist—new methods for estimating and predicting the distribution and density of marine mammals. Working on both coasts of the United States, Dr. Barlow, Dr. Read, and Dr. Halpin developed cutting-edge models to predict the presence and absence as well as the number of marine mammals in particular areas at certain times based on the underlying physical and biological conditions of the oceans. This research served as the foundation for a state-of-the-art spatial decision



The Symposium & Workshop annually assembles this nation's best environmental researchers and technology developers with the defense user and regulatory communities to showcase cutting-edge environmental science and technologies, as well as communicate the most difficult challenges of our defense establishment. Numerous events over the three days provided the approximately 1,100 attendees an excellent opportunity to network, share information, and develop partnerships.



The new expanded three-day format offered Symposium & Workshop attendees a dynamic Plenary Session featuring three distinguished speakers and the presentation of the Project-of-the-Year Awards, a comprehensive technical program including 13 technical sessions on efforts to tackle environmental challenges facing DoD, and five short courses on select technologies in environmental restoration and munitions management.



Photos by Craig Kellstrom and Kelly Magathan

SERDP and ESTCP Award FY 2009

Throughout 2009, new initiatives in all SERDP and ESTCP focus areas

SERDP and ESTCP initiatives in **Sustainable Infrastructure (SI)** focus on the science and technologies required to sustain military training and testing areas as well as the natural and cultural resources and built infrastructure that support these areas and deployed forces. In 2009 SERDP initiated research and development efforts to foster science-based recovery objectives for ecological systems in the southeastern United States; manage and restore southeast coastal ecosystems under the threat of climate change; assess the prevalence and spatial extent of pine forest decline in the southeastern United States; understand the impacts of military activities on archaeological resources; and gauge the impact of sea-level rise on military infrastructure. ESTCP investigators began demonstrating technologies to improve energy efficiency and generate renewable energy for DoD installations; measure the hydrologic functioning of vernal pool wetlands; produce an environmentally benign, corrosion-reducing runway deicing fluid; control brown tree snake populations through aerial application of treated baits; and calculate energy and other costs and benefits of reusing historic and non-historic DoD buildings.

SERDP Research

Information on these efforts can be found at www.serdp.org under the Research Projects link.

Assisted Migration as a Management Tool in Coastal Ecosystems Threatened by Sea-Level Rise (SI-1692)

Principal Investigator: Loretta Battaglia/Southern Illinois University

Low-lying coastlines are ecosystems directly impacted by hurricane disturbance and incursions of the sea. This project will test the effects of shifting tropical storm regimes on the disassembly and reassembly of coastal transition zone plant communities in the context of climate change and its effects on sea-level rise and storm surge. Coastal species may cope with environmental changes over the short term, but eventually they will decline or disappear completely unless they can successfully migrate to and establish in hospitable habitat. Mechanisms of species migrations in the context of climate change-driven shifts in disturbance regimes and habitat will be assessed as will the need for assisted migration.

Temporal and Spatial Patterns of Pine Mortality in the Southeastern United States (SI-1693)

Principal Investigator: Joan Walker/U.S. Forest Service, Southern Research Station



The objectives of this project are to (1) determine whether a presumed recent decline in southeastern loblolly, longleaf, and slash pines is measurably different from historical patterns of growth and mortality and (2) if decline is real, identify the southern pine species experiencing decline and confirm the patterns of pine forest decline at the stand, landscape, and regional scales. Understanding patterns and rates of changing forest health provides the basis for strategic management of resources for recovery and sustainable use. For the federal endangered red-cockaded woodpecker in particular, the long-term recovery trajectory may be adversely impacted if pine forest decline is real and pervasive.

Development of Ecological Reference Models and an Assessment Framework for Streams on the Atlantic Coastal Plain (SI-1694)

Principal Investigator: Michael Paller/Savannah River National Laboratory

Degradation of streams, blackwater streams in particular, can result in a significant loss of biodiversity and adversely affect nutrient cycling, natural mechanisms of water purification, and other valuable ecological functions of floodplain ecosystems. This project will develop ecological reference models and an assessment framework for such streams within the Atlantic Coastal Plain. The models can serve as the basis for establishing recovery objectives compatible with current and future land uses, and the assessment framework will provide DoD with practical methods for measuring current levels of degradation and progress towards recovery objectives.

Developing and Testing a Robust, Multiscale Framework for the Recovery of Longleaf Pine Communities (SI-1695)

Principal Investigator: John Orrock/Washington University



Longleaf pine communities have experienced significant anthropogenic impacts that make determining and achieving appropriate recovery objectives a challenge. This project will provide comprehensive insight into how site conditions and ecological mechanisms affect the potential for recovery of longleaf pine savanna plant communities in the

southeastern United States. By combining comparative and experimental approaches across a spectrum of site conditions at multiple spatial and temporal scales, the assessment framework to be developed will enable DoD to identify potential conflicts between recovery and military training and testing activities, as well as conflicts between recovery and the supposed habitat requirements for threatened, endangered, and at-risk species.

Initiatives in Sustainable Infrastructure

will be highlighted. This issue features recently awarded Sustainable Infrastructure efforts.

Developing Dynamic Reference Models and a Decision Support Framework for Southeastern Ecosystems: An Integrated Approach (SI-1696)

Principal Investigator: Robert Mitchell/Joseph W. Jones Ecological Research Center

Recovering longleaf pine while understanding impacts on the recovery of the red-cockaded woodpecker (RCW) and facilitating the military mission represents a significant ecological challenge to bases throughout the Southeast. This project will quantify dynamic reference conditions to create benchmarks for recovery and will determine recovery rates of degraded sandhill ecosystems in response to hardwood removal treatments. Based on this information, a modeling tool will be developed for RCW management and a decision support framework created for evaluating landscape-scale ecosystem integrity.

Physical and Geophysical Measurement of Replicated Military Training Impacts to Archaeological Sites (SI-1697)

Principal Investigator: Darby Stapp/Pacific Northwest National Laboratory



The Department of Defense needs tools to quantify the manner and extent to which specific impacts due to military activities diminish the potential for recovering useful scientific information from archaeological sites. The objective of this project is to develop and employ a method that uses

changes in magnetic signatures to measure and assess training-related vehicle impacts to buried sediments and archaeological materials. This non-invasive method for assessing post-impact site integrity will enable DoD to reduce the cost and time associated with identifying archeological sites on military training land.

Integrated Climate Change and Threatened Bird Population Modeling to Mitigate Operations Risks on Florida Military Installations (SI-1699)

Principal Investigator: Igor Linkov/U.S. Army Corps of Engineers, Engineer Research and Development Center-Environmental Laboratory



Climate change impacts including sea-level rise and altered weather patterns are expected to significantly alter low-lying coastal and intertidal areas that provide seasonal habitat for a variety of shoreline-dependent organisms. The objective of this project is to integrate multiscale climate, land use, and ecosystem information into a systematic tool capable of evaluating climate change effects on habitat and population dynamics for snowy plovers, piping plovers, and red knots along the Florida coastline. This risk-informed,

multicriteria decision analysis system will enable DoD natural resource managers to assess potential management options for these threatened and endangered birds.

Effects of Near-Term Sea-Level Rise on Coastal Infrastructure (SI-1700)

Principal Investigator: Joseph Donoghue/Florida State University

Mission critical infrastructure on coastal installations, including training and testing lands, transportation infrastructure, and facilities, are subject to increased risk of damage or even total loss as sea level rises and accompanying storm surge impacts are exacerbated. This project will develop a numerical model to quantitatively predict the potential impact and risk to Gulf Coast military infrastructure resulting from various sea-level rise scenarios and increases in hurricane activity. The methodology will provide a set of unique tools to DoD decision makers for predicting and adapting to the effects of sea-level changes and associated phenomena on coastal infrastructure.



ESTCP Demonstrations

Information on these efforts will be available soon at www.estcp.org under the Technologies link.

Implementation of Technology to Measure Hydrological Functioning of Vernal Pool Wetlands and Their Watersheds for Use in Base-Wide Habitat Protection and Management and Evaluation of Mission Impacts, Regulatory Permitting, and Future Mitigation Through Habitat Restoration (SI-0923)

Principal Investigator: Kirsten Christopherson/Beale Air Force Base

Vernal pools are temporary pools of water found predominantly in the western United States that provide habitat for many amphibian and insect species. This project will demonstrate how integrating water level loggers, soil moisture sensors, a global positioning system, and ground penetrating radar can enable accurate measurement of the hydrologic function of vernal pools as well as the identification of appropriate mitigation sites. This technology will assist DoD in identifying activities that have little or no hydrologic impact on vernal pools.

Demonstration of an Environmentally Benign and Reduced Corrosion Runway Deicing Fluid (SI-0924)

Principal Investigator: Mary Wyderski/U.S. Air Force, Aeronautical Systems Center

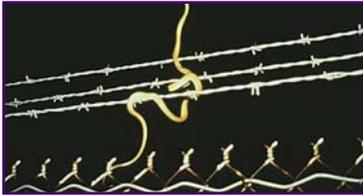
This project will demonstrate bio-based runway deicing fluids (RDF) that will improve environmental and aircraft brake corrosion performance properties while maintaining acceptable deicing property requirements. If implemented throughout DoD, the use of bio-based RDFs will reduce the environmental burden from discharging hundreds of thousands of pounds of mildly toxic, oxygen-demanding waste each year.

See FY 2009 SI INITIATIVES, page 6

FY 2009 Sustainable Infrastructure Initiatives (continued)

Aerial Application of Acetaminophen-Treated Baits in Cargo Areas for Control of Brown Tree Snakes (SI-0925)

Principal Investigator: Peter Savarie/U.S. Department of Agriculture-Wildlife Services, National Wildlife Research Center



This project will demonstrate the effectiveness of applying toxic baits by helicopter to control brown tree snake populations on the island of Guam. Application of this brown tree snake control technology can improve the cost and efficacy of

brown tree snake interdiction efforts in Guam and help prevent the brown tree snake from spreading to other vulnerable Pacific islands.

Fort Knox Vertical Axis Wind Turbine Demonstration (SI-0926)

Principal Investigator: Manette Messenger/U.S. Army-Installation Management Command Southeast Region

The objective of this project is to demonstrate the economic, environmental, and mission performance of a prototype vertical axis wind turbine. The wind turbine will be installed at a military installation with limited wind resources, a location once considered ineffective for generating energy from wind. Use of this distributed energy technology will increase renewable energy production and reduce carbon dioxide emissions from DoD facilities.

Demonstrating and Validating the Performance of Architectural Wind (SI-0927)

Principal Investigator: Paul Glenney/AeroVironment, Inc.



This project will demonstrate and validate the performance of small, modular, building-mounted wind turbines in a variety of geographic locales and climate conditions. This wind-energy system can provide a reliable form of backup power to meet critical needs in the event of power outages. Implementation of this wind-energy system throughout DoD will contribute to reductions in carbon dioxide and harmful air pollutant emissions as well as enhance energy security.

Demonstration of a Solar Thermal Combined Heating, Cooling, and Hot Water System Utilizing an Adsorption Chiller for DoD Installations (SI-0928)

Principal Investigator: Richard Adamson/Southern Research Institute

The objective of this project is to demonstrate the technical and economic efficacy of integrating solar thermal panels with a desiccant cycle adsorption chiller in a whole-building heating, cooling, and hot water system. The system will enable DoD to reduce energy consumption and exposure to energy price volatility in buildings of sufficient size and cooling/heating load. Furthermore, electricity and boiler-associated emissions of criteria pollutants and greenhouse gases will be proportionally reduced.

Automated Continuous Commissioning of Commercial Buildings (SI-0929)

Principal Investigator: Scott Bortoff/United Technologies Research Center

This project will demonstrate a whole-building monitoring system capable of continuously acquiring performance measurements for heating, ventilation, and

air conditioning (HVAC), lighting, and water usage. These measurements will be compared in real time to a reference simulation model that represents the design intent for each system. As a result, the system will alert facility managers of any deviations of building energy and water consumption away from design intent so that corrective actions can be taken. This technology will enable reduced energy consumption, peak electric demand, and water use in DoD buildings by providing actionable information to facility managers and building operators.

50kW Demonstration of SolarPoint Power System—A Concentrating Photovoltaic System for Distributed, Low-Cost Power Production (SI-0930)

Principal Investigator: Dennis Earl/Sunlight Direct, Inc.



The objective of this project is to demonstrate the effectiveness of a concentrating photovoltaic technology sized at 1kW peak output, manufactured using low-cost, high-durability plastic parabolic mirrors, and scaled for installation on both rooftops and ground-based sites. This demonstration will provide quantifiable information on energy savings and power production capacity as well as a robust assessment of DoD-specific installation integration issues.

Demonstrating Relative Cost-Benefits for the Reuse of DoD Historic and Non-Historic Properties Using Scientifically Derived Data (SI-0931)

Principal Investigator: David Shiver/Bay Area Economics

This project will demonstrate a life-cycle cost analysis (LCCA) program for determining the cost-effectiveness of reuse and rehabilitation of historic and non-historic buildings as compared to new construction. The LCCA will help DoD cultural resource and facility managers determine which buildings are most economically viable for reuse based on scientifically derived data. In addition, the LCCA will determine the actual dollar savings in energy conservation generated by the reuse of existing materials, infrastructure, and water reuse found through renovations of existing buildings.

Demonstration and Validation of a Waste-to-Energy Conversion System for Fixed DoD Installations (SI-0932)

Principal Investigator: Harris Gold/Infoscitex Corporation

The objective of this project is to demonstrate and validate a waste-to-energy conversion (WEC) system capable of converting combustible municipal solid waste (refuse-derived fuel) and biomass into electricity and heat on DoD installations. The system processes the solid waste into homogeneous and high-density pellets for use in a downdraft gasifier, which produces a synthetic gas that provides the fuel for electricity generation. If deployed to the extent possible across all DoD installations, the total amount of electricity that can be generated from this WEC system is 89 MW, resulting in a net waste reduction in landfills of 3,300 tons per day and a total minimum savings of approximately \$190 million per year.

Program Update

SERDP

SERDP released a Federal Call for Proposals and a Broad Agency Announcement (BAA) for its FY 2010 Core Solicitation on November 6, 2008. By the January 8, 2009, deadline for the BAA, the Program Office received 276 pre-proposals responding to 14 Statements of Need (SON). SERDP Staff reviewed these pre-proposals and by early February extended requests for full proposals to the most qualified pre-proposals that met the relevance criterion. Full proposals responding to the Federal Call for Proposals and requested full proposals responding to the BAA were due March 12, 2009.

On November 6, SERDP also released its FY 2010 SERDP Exploratory Development (SEED) Solicitation with one SON in each of

the following three focus areas: Munitions Management, Sustainable Infrastructure, and Weapons Systems and Platforms. Full proposals were due by March 12, 2009. SEED efforts are high risk and potentially high-payoff projects that last no longer than one year, with a budget of \$150,000 or less.

Visit www.serdp.org under *Funding Opportunities* for details.

ESTCP

The ESTCP FY 2010 Solicitation encompassing a BAA as well as a DoD and non-DoD Federal Call for Proposals was released on January 8, 2009. Pre-proposals were due on March 5, 2009. The non-DoD Federal Call for Proposals and BAA solicited pre-proposals in five topics within the Environmental Restoration, Munitions Management, and Sustainable

Infrastructure focus areas (see box below). The DoD Call for Proposals solicited pre-proposals in the four focus areas: Environmental Restoration, Munitions Management, Sustainable Infrastructure, and Weapons Systems and Platforms. For details regarding the FY 2010 Solicitation, visit www.estcp.org under *Opportunities*. ◆

FY 2010 ESTCP BAA and Non-DoD Federal Topics

- Remediation of Contaminated Groundwater
- In Situ Management of Contaminated Sediments
- Characterization, Control, and Treatment of Range Contamination
- Military Munitions Detection, Discrimination, and Remediation
- Energy Efficiency and Renewable Energy for DoD Installations

Congratulations to...

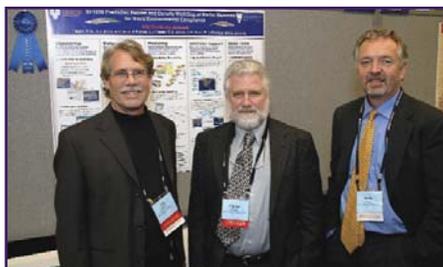
SERDP Scientific Advisory Board Member **Dr. Michael Rosenzweig**, Professor of Ecology and Evolutionary Biology at the University of Arizona, who was recognized by the Ecological Society of America (ESA) with its 2008 Eminent Ecologist Award. This award is given annually to a senior ecologist in recognition of an outstanding body of ecological work or sustained ecological contributions of extraordinary merit. In its accolades, ESA noted that Dr. Rosenzweig has been the discoverer and creator of seminal concepts in ecological thought, including the stability of predator-prey dynamics, the relationship between primary production and evapotranspiration, theories of habitat selection, and perhaps most importantly the competitive speciation hypothesis. His vision of promoting risky and innovative science led him to establish two scientific journals, *Evolutionary Ecology* and *Evolutionary Ecology Research*, and



Dr. Michael Rosenzweig (center) accepts ESA's Eminent Ecologist Award.

become an advocate and spokesperson for the Scholarly Publishing and Academic Resources Coalition. Dr. Rosenzweig served on two committees of the National Academy of Sciences to develop early warning indicators of environmental health and identify the most important challenges in environmental science. He has written three books and edited two.

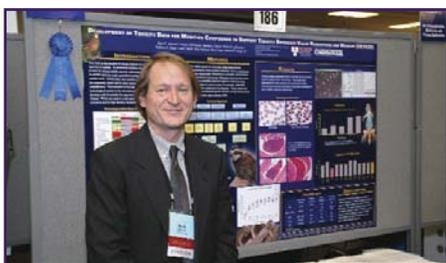
support system that enables people who are not experts in ecology or oceanography to predict the distribution and density of marine mammals from readily measurable environmental parameters in support of management and regulatory decisions.



Dr. Jay Barlow (left), Dr. Patrick Halpin (center), and Dr. Andrew Read present their award-winning research.

“These researchers not only developed the science to know where these marine mammals are, they are translating that science into a practical tool that can help people who have to deal with the tough questions of balancing training and marine mammal protection,” said Dr. Marqusee.

SERDP Project of the Year for Environmental Restoration. Development of Toxicity Data for Munition Compounds to Support Toxicity Reference Value Derivations for Wildlife (ER-1420)—Dr. Mark Johnson, U.S. Army Center for Health Promotion and Preventive Medicine, Health Effects Research Program, Aberdeen Proving Ground, Maryland.



Dr. Mark Johnson showcases his groundbreaking research during a poster session.

Military testing and training requires the use of munitions and explosives that can leave behind hazardous chemicals in the soil and water, potentially exposing wildlife to these toxic compounds. Dr. Johnson and his team developed critical data on these military-unique

compounds and their effects on wildlife such as birds, reptiles, and small mammals. “They have determined the doses that can cause harm and the concentrations below which the munitions compounds do not adversely affect wildlife, thus often eliminating the need for costly site-specific risk assessments,” said Dr. Marqusee.

These findings will enable military range managers to make science-based risk management decisions on whether specific residue levels of munition compounds at their ranges could harm wildlife and, therefore, whether they need to take actions to remediate those sites.

SERDP Project of the Year for Weapons Systems and Platforms. A Comprehensive Program for Measurement of Emissions from Military Aircraft (WP-1401)—Dr. Meng-Dawn Cheng, Oak Ridge National Laboratory, Oak Ridge, Tennessee.



Dr. Meng-Dawn Cheng (center) receives his award from Dr. Anne Andrews and Dr. Jeffrey Marqusee.

All aircraft engines emit chemicals and particulates that can potentially pose risks to human health and the environment. Existing data on the characteristics of military jet aircraft emissions are extremely limited because there have been no reliable measurement methods suitable for the extreme conditions under which data must be collected. Dr. Cheng and colleagues, working with the Environmental Protection Agency, now have developed state-of-the-art instruments and measurement techniques to collect accurate and high-quality data on jet aircraft emissions.

“These comprehensive data are

essential for DoD to develop cost-effective air pollution control strategies that comply with the Clean Air Act and other regulations,” said Dr. Andrews.

SERDP Project of the Year for Munitions Management. Development of a Micro-Fabricated Total-Field Magnetometer (MM-1512)—Dr. Mark Prouty, Geometrics, Inc., San Jose, California.



Dr. Mark Prouty displays a poster highlighting his cutting-edge research.

Magnetometers are one of two primary sensors used for munitions detection. Current generation magnetometers are about the size of a one-liter water bottle, cost tens of thousands of dollars each, and require big, cumbersome battery packs that consume copious amounts of power. Multiple sensor arrays of these magnetometers are possible only on large, complex platforms.

Building on previous efforts to develop miniaturized atomic clocks, Dr. Prouty and his team developed a new magnetometer sensor that is the size of a penny. The sensor’s reduced weight, power requirements, and cost provide an opportunity for designing novel magnetometer-based munitions detection systems.

“We can now think about entirely new configurations of sensors, which will help DoD realize its goal of producing more effective, efficient, and less expensive methods for detecting military munitions on thousands of sites throughout the United States,” said Dr. Andrews.

Beyond this immediate application, these new generation magnetometers have potential use in many other fields, including geology, security, and medicine.

ESTCP Project of the Year. Validation of Chlorine and Oxygen Isotope Ratio Analysis to Differentiate Perchlorate Sources and to Document Perchlorate Biodegradation (ER-0509)—Dr. Paul Hatzinger, Shaw Environmental and Infrastructure, Inc., Lawrenceville, New Jersey.

Perchlorate is a groundwater contaminant, which in the last decade has caused significant concern throughout the nation. It is a primary component of rocket fuel used by DoD and thus, when found in the environment, often has been assumed to come from a military source. But, as recent research has shown, there are many other sources of perchlorate.

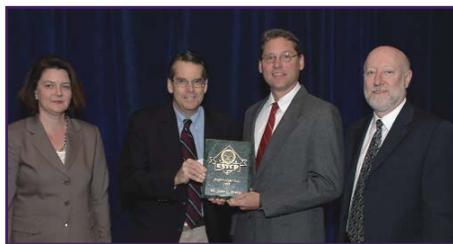


Dr. Paul Hatzinger (holding award) and members of his team are recognized during the Plenary Session.

“The key step in managing any environmental risk is to understand its source. Only then can cost-effective actions be taken,” said Dr. Marqusee. Dr. Hatzinger and his team developed and validated a forensic technique for distinguishing man-made sources of perchlorate from natural perchlorate and demonstrated that it also can be used to track biodegradation of this contaminant. This technique is so detailed that it essentially takes a fingerprint of the perchlorate, identifying the source of a particular perchlorate sample, for example, a military missile or imported fertilizer. Because the technique determines the specific source of the perchlorate contamination, site managers can use that information to decide on the action to take in reducing the environmental risk posed by perchlorate.

This innovative technique provides a firm scientific basis for both determining the responsibility for perchlorate contamination and designing the most cost-effective remediation method.

ESTCP Project of the Year. Scale-Up of Environmentally Friendly Non-Destructive Inspection for Corrosion Through Coatings (WP-0407)—Mr. John Benfer, Naval Air Systems Command, Jacksonville, Florida.



Dr. Anne Andrews and Dr. Jeffrey Marqusee (far right) congratulate Mr. John Benfer (right center) and team member Mr. John Weir.

One of the major sources of air pollution from DoD facilities is the extensive amount of painting and repainting required to maintain aircraft and other weapons platforms. This stripping and repainting, done in large part to identify and repair corrosion, can release volatile organic compounds, carcinogenic chromates, and other hazardous chemicals. Developing more environmentally friendly paints and repainting methods is one practice the military has adapted to reduce this source of air pollution.

Mr. Benfer and colleagues took a different approach: they demonstrated a technique that will enable the military to reduce the frequency of painting, repainting, and repainting. Using an innovative technology developed under SERDP, the project team validated the effectiveness and reliability of the infrared-reflectance non-destructive inspection technique.

“This technique enables maintenance crews to use a sophisticated spectral imaging system to ‘see through’ the paint to determine whether corrosion exists underneath without repainting,” said Dr. Andrews. With less frequent

stripping and repainting, fewer hazardous compounds are released into the air and less hazardous waste is produced. This innovative technique has been demonstrated to substantially reduce the environmental impacts and costs of corrosion inspection, while ensuring the safety of military personnel.

Technical Program

The Plenary Session set the stage for the Symposium & Workshop technical program, which was expanded this year to a full three-day format offering attendees a selection of 13 technical sessions and five short courses. Technical sessions highlighted research and innovative technologies that are assisting DoD in addressing increasingly complex environmental and mission sustainability challenges. Short courses on select technologies in environmental restoration and munitions management provided unique training opportunities on recent advancements in science and technology in these two areas. New this year, SERDP and ESTCP offered Professional Development Hours (PDH) to short course participants. Throughout the Symposium & Workshop, attendees took advantage of opportunities to meet with colleagues, exchange information, and discuss opportunities for technology transfer and partnerships in the Exhibit Hall, which featured more than 400 poster presentations and 17 exhibit booths showcasing technologies and scientific advancements from a variety of environmental research programs.

Presentations from the Plenary Session, technical sessions, short courses, and posters, as well as descriptions of the 2008 Project-of-the-Year Award recipients are available at www.serdp-estcp.org/symposium2008/. Planning is under way for the 2009 Symposium & Workshop, and as details become available, they will be posted on the web site. The event will be held December 1-3 in Washington, D.C. In early June, the Call for Poster Abstracts will be released with abstracts due in late July. ♦

ESTCP Pilot Program Demonstrates Success of Wide Area Assessment Report Highlights Technology Capabilities and Limitations

Wide area assessment (WAA) is a process for quickly and cost-effectively assessing 100 percent of a site potentially contaminated with military munitions. With tens of millions of acres suspected of contamination, WAA is essential to identify areas of concentrated munitions use such as target areas for more detailed investigation.

ESTCP conducted a Wide Area Assessment Pilot Program from 2005 through 2007. In a series of technology demonstrations in site conditions ranging from ideal to challenging, the Pilot Program accomplished its three primary objectives:

- Evaluate the effectiveness of individual technologies and a WAA process to identify areas of concentrated munitions use
- Demonstrate that WAA data can support decisions on areas that show no evidence of concentrated munitions use
- Understand site-specific factors that affect applicability and limitations of the technologies.

Results from the demonstrations clearly show that the technologies are effective and provide strong evidence that, when applied to suspected munitions sites, they have the potential to separate areas with extensive munitions use from those that show no evidence of munitions activity.

A recently released report provides an overview of the entire WAA Pilot Program for project managers, regulators, and stakeholders. It summarizes the demonstrations on each site, emphasizing the process used and the products to expect from WAA, and illustrates how these products can build confidence in conclusions about a site.

The report cites these and other frequently asked questions about WAA: Where could WAA fit into the regulatory/munitions response process? If no evidence of munitions is found, is my site clean? Are all three

technology layers required for every site? (See sidebar at right.) For which targets of interest is WAA useful?

Following the questions is an overview of the program approach, objectives, and criteria used for site selection. The report then describes the technologies demonstrated in the pilot program and discusses the methods used to validate data collected and conclusions drawn at each site.

A chapter is devoted to each of the four major demonstration sites—Pueblo Precision Bombing Range #2, Colorado; Former Kirtland Precision Bombing Ranges N-2, N-3, and New Demolitions Impact Area, New Mexico; Victorville Precision Bombing Ranges Y and 15, California; and the former Camp Beale, California. These chapters summarize the historical information about the sites gathered during this program, the data collected, analyses of those data, and conclusions drawn about the sites. This information is included in the appendices for the other three sites—Borrego Military Wash, California; Former Erie Army Depot, Camp Perry, and Toussaint River, Ohio; and the Dalecarlia Impact Area at the Spring Valley formerly used defense site, Washington, D.C.

Individual vendor reports provide comprehensive technical results.

Following the individual site summaries is a discussion of the capabilities and limitations demonstrated by each of the technologies and an estimate of the costs for deploying the technologies singly and in combination—information that will help project teams determine where application of the technologies would be appropriate.

For more information about the ESTCP WAA Pilot Program, including the Final Report and two videos illustrating the various technologies used for land-based and underwater applications, visit www.estcp.org/technology/waa-home.cfm.

Wide Area Assessment Layered Concept

The WAA process for identifying areas of concentrated munitions use can consist of a combination of technologies. High-airborne light detection and ranging (LiDAR) and orthophotography are able to survey thousands of acres per day. For the most part, however, they detect munitions-related features rather than munitions themselves. Geophysical sensors mounted on low-flying helicopters or on underwater platforms can detect medium and large munitions directly but are limited by terrain, tree cover, or underwater obstructions. Geophysical sensors mounted on ground platforms can detect all munitions types of interest in sufficient quantities to support WAA objectives, but can only economically be deployed to survey statistically planned transects covering a small percentage of the site's total area.



LiDAR, Orthophotography



Helicopter-Based Magnetometry



Statistical Sampling with Ground Systems

Recent Additions to the Online Library

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

Environmental Restoration

- Cost & Performance Report: Perchlorate Removal, Destruction and Field Monitoring Demonstration (Drinking Water Treatment Pilot-Scale) (ESTCP ER-0312)
- Final Report: Soil Amendments to Reduce Bioavailability of Metals in Soils: Experimental Studies and Spectroscopic Verification (SERDP ER-1351)
- Final Report: Environmental Fate and Exposure Assessment for Arsenic in Groundwater (SERDP ER-1374)
- Final Report: Evaluation of Alternative Causes of Wide-Spread, Low Concentration Perchlorate Impacts to Groundwater (SERDP ER-1429)
- Final Report: Remediation of TNT and RDX in Groundwater Using Zero-Valent Iron In Situ Treatment Wells (ESTCP ER-0223)
- Protocol: Natural Attenuation of Perchlorate in Groundwater: Processes, Tools and Monitoring Techniques (ESTCP ER-0428)
- FAQ Report: Frequently Asked Questions Regarding Management of Chlorinated Solvents in Soils and Groundwater (ESTCP ER-0530)
- Lessons Learned: In Situ Chemical Oxidation for Remediation of Contaminated Groundwater: Summary Proceedings of an ISCO Technology Practices Workshop (June 2008) (ESTCP ER-0623)

Munitions Management

- Cost & Performance Report: Simultaneous Magnetometer and EM61 Mk2 Vehicle-Towed Array for Wide Area Assessment (ESTCP MM-0531)
- Final Report: Handheld UXO Sensor Improvements to Facilitate UXO/Clutter Discrimination (SERDP MM-1381)
- Final Report: Statistical Methods for UXO Pattern Recognition (SERDP MM-1531)
- Final Report: Next Generation Data Collection System for Mobile Detection and Discrimination of Unexploded Ordnance (SERDP MM-1571)
- Final Report: Non-Traditional Physics-Based Inverse Approaches for Determining Buried Objects Location (SERDP MM-1592)
- ESTCP Wide Area Assessment Pilot Program
- Final Report: ESTCP Wide Area Assessment Pilot Program
- Interim Report: Demonstration and Performance Assessment of Statistical Methods for UXO Characterization (Camp Beale, California) (ESTCP MM-0325) ESTCP Classification Pilot Study
- Final Report: Detection and Classification of Buried Metallic Objects (Camp Sibert, Alabama) (ESTCP MM-0437)
- Interim Report: Data Modeling, Feature Extraction, and Classification of Magnetic and EMI Data, ESTCP Discrimination Study, Camp Sibert, Alabama (ESTCP MM-0504)
- Interim Report: Demonstration Report for Geonics EM-63 Cued-Interrogation Data Collection, Processing and Archiving at Camp Sibert, Alabama (ESTCP MM-0504)

Sustainable Infrastructure

- Final Report: Spatially-Explicit Assessments of Genetic Biodiversity and Dispersal in Gopher Tortoises and Gopher Frogs for Evaluation of Habitat Fragmentation at DoD Sites (SERDP SI-1470)

Weapons Systems and Platforms

- Executive Summary: Improved Large-Area Surface Cleaning Verification with Visual Cleaning Performance Indicator (VCPI) Technology (ESTCP WP-0410)



STRATEGIC ENVIRONMENTAL RESEARCH
AND DEVELOPMENT PROGRAM (SERDP)
ENVIRONMENTAL SECURITY TECHNOLOGY
CERTIFICATION PROGRAM (ESTCP)

INFORMATION BULLETIN

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F O R S E R D P A N D E S T C P

APRIL 2009

April 20-24

Weapons Systems and Platforms (WP) In-Progress Review (IPR) meeting

April 27-May 1

Sustainable Infrastructure (SI) IPR meeting

MAY 2009

May 12-15

Munitions Management (MM) IPR meeting and ESTCP Technical Committee (ETC) downselect meeting (closed meeting)

May 18-21

Environmental Restoration (ER) IPR meeting and ETC downselect meeting (closed meeting)

May 27-28

SI ETC downselect meeting (closed meeting)

JUNE 2009

June 9-10

SERDP Scientific Advisory Board meeting
Durham, North Carolina

June 15-17

WP ETC downselect meeting and SERDP Technical Committee (STC) proposal selection meeting (closed meetings)

June 18-19

SI STC proposal selection meeting (closed meeting)

June 23

MM STC proposal selection meeting (closed meeting)

June 30-July 1

ER STC proposal selection meeting (closed meeting)

RELATED CONFERENCES & EVENTS

March 29-April 2

22nd SAGEEP (Symposium on the Application of Geophysics to Environmental and Engineering Problems): Expanding Horizons for Near-Surface Geophysics
Fort Worth, Texas

For more information, visit www.eegs.org/sageep.

May 4-7

The National Environment, Energy, and Sustainability Symposium and Exhibition (E2S2)
Denver, Colorado

For more information, visit e2s2.ndia.org.

May 5-8

Battelle's Tenth International In Situ and On-Site Bioremediation Symposium
Baltimore, Maryland

For more information, visit www.battelle.org/conferences/bioremediation.

June 1-5

EPA's 19th Annual National Association of Remedial Project Managers (NARPM) Annual Training Conference
Atlanta, Georgia

For more information, visit www.epanarpm.org.



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