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Reducing Noise from Supersonic Military Jet Aircraft

Advanced fighter aircraft require engines with greater thrust that can provide increased speed and maneuverability. These engines, however, generate significant levels of noise during takeoff and landing, levels that often exceed specified noise thresholds and directly impact the public and affect health and safety of flightline workers. Responding to this mission-critical issue, the Naval Research Laboratory (NRL) in collaboration with the University of Cincinnati (UC) and GE Aircraft Engines, under SERDP project WP-1584, investigated the use of mechanical chevrons and fluidics to successfully reduce the noise from supersonic military jet aircraft.

The advances achieved in this SERDP-sponsored noise reduction research have been recognized by the Navy as a Top Twenty Research Accomplishment of 2009. The results obtained during this study demonstrate the potential for significant noise reduction of high



SERDP researchers have developed new methods of mitigating noise generated by high performance, supersonic military aircraft gas turbine engines without loss of performance or increase in air pollution.

performance jet engines without compromising performance or environmental standards.

Computational analysis was performed to characterize the flow from the nozzle exhaust of a supersonic jet engine. An example of this analysis (illustrated on page 2) depicts the nondimensional density of the exhaust. Key

See NOISE MITIGATION, page 2

FUNDING OPPORTUNITIES

SERDP Solicits Proposals for FY 2012 Funding

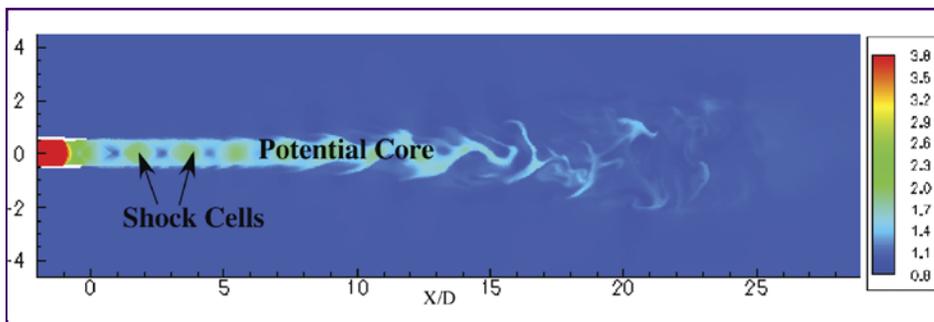
SERDP released its FY 2012 Core and SERDP Exploratory Development (SEED) solicitations on October 28, 2010. Funds are available through a competitive process to both federal and private organizations to perform basic and applied research and advanced technology development. Statements of Need (SONs) are listed on page 14 of this issue. For the Core solicitation, pre-proposals from the non-federal sector are due January 6, 2011. Federal proposals are due March 10, 2011. All SEED proposals are due March 10, 2011. For more information, visit www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations.

ESTCP Solicits Proposals for Perchlorate Treatment

In November, ESTCP released a solicitation under the Environmental Restoration program area requesting proposals to demonstrate and validate technologies for treatment of perchlorate for drinking water. Detailed information is available at www.serdp-estcp.org/Funding-Opportunities/ESTCP-Solicitations. Pre-proposals are due January 20, 2011.

ESTCP's Annual Solicitation To Be Released in January

In early January, ESTCP will release its FY 2012 solicitation. Details will be available at www.serdp-estcp.org/Funding-Opportunities/ESTCP-Solicitations.



SERDP-funded numerical simulations in conjunction with experiments provide insight into the generation and mitigation of noise from military aircraft under a variety of operating conditions. Shown here is the flow field of a supersonic jet.

features of the flow field are the diamond shaped pattern created by shock waves in the flow, called shock cells, and the potential core, which is an indicator of jet mixing, where the jet exhaust blends into the surroundings.

Results indicated that spacing of the shock cells and the length of the potential core increased as the ratio of the pressure inside the nozzle to that outside, known as the total pressure ratio, increased. These results were in good agreement with experimental



Mechanical chevron.

data from UC, indicating that computational analysis could be used to assess the effectiveness of chevrons and fluidics. A landmark paper on these results was published in the American Institute of Aeronautics and Astronautics (AIAA) journal and selected to receive a 2009 Alan Berman Research Publication Award for outstanding archival research as judged by NRL management.

With the success in the simulations of the jet flow and noise, efforts shifted to the simulation and assessment of specific noise reduction concepts. Experiments and simulations were conducted to assess the impact of mechanical chevrons—serrations at the rim of the exhaust nozzle—on the flow from the exhaust nozzle and near-field noise. The results from the numerical simulations showed that chevrons cause the shock cells to move closer to the nozzle and reduce the spacing between them. In addition, the chevrons induce more

spread of the jet flow and decrease the strength of the shock cells. All of these factors result in a significant reduction in the noise, by more than 3 decibels at the locations interrogated.

Researchers investigated replacing the mechanical chevrons with fluidic injection of air at discrete locations along the rim of the jet nozzle to mimic the mechanical chevrons. These studies showed that noise could be reduced by the same amount as the mechanical chevrons with very modest 1-2 percent injection of air under a variety of operating conditions. One of the advantages of fluidic injection is that it can be easily turned on and off.

A combination of mechanical chevrons and fluidics was also investigated. By suitably positioning the fluidic injection, the effect of the chevrons on flow modification and noise reduction could be further enhanced. Air also was injected upstream of the nozzle exit, near the throat, to effectively modify the flow area. This resulted in modification of the shock cell structures and hence reduction in the noise generated.

A follow-on project using the validated computational capability is being funded by the Office of Naval Research to further increase the level of noise reduction and advance the technology.

For more information, contact Dr. Kazhikathra Kailasanath, Naval Research Laboratory, Washington, D.C., at (202) 767-2402 or kailas@lcp.nrl.navy.mil. ♦

S ♦ U ♦ C ♦ C ♦ E ♦ S ♦ S S T O R I E S

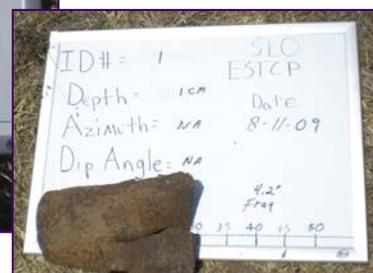
SERDP research and development and ESTCP demonstration and validation efforts are leading to technical and environmental advances that are relevant to the Department of Defense (DoD), Department of Energy (DOE), Environmental Protection Agency (EPA), and many other user communities.

Pilot Program Demonstrates Successful UXO Classification at Increasingly Complex Sites

In the second in a series of live site demonstrations being conducted through the ESTCP Classification Pilot Program, emerging electromagnetic induction (EMI) sensors optimized for unexploded ordnance (UXO) classification produced nearly perfect classification results at the former Camp San Luis Obispo in California. Commercially available sensors were paired with advanced processing methods to successfully classify munitions from other nonhazardous items on a site with a mix of munitions types. Successful classification paves the way for reduced costs and an accelerated timeline to remediate munitions-contaminated sites throughout the nation.

Pilot Program Overview

The Military Munitions Response Program (MMRP) is charged with characterizing and, where necessary, remediating munitions-contaminated sites. When a site is cleaned up, it is typically mapped with a geophysical system, based on either a magnetometer or EMI sensor, and the locations of all detectable signals are excavated. Many of these detections are not munitions, but rather harmless metallic objects or geology: field experience indicates that often in excess of 90 percent of objects excavated during the course of a munitions response are found to be nonhazardous items. Existing technology, as it is traditionally implemented, does not provide a



Distinguishing intact munitions from nonhazardous metal and geology, or classification, was the aim of demonstrations conducted as part of ESTCP's Pilot Program at the former Camp San Luis Obispo, California. Above are two examples of classified items, a seeded munition item (left) and a nonhazardous munition fragment (right).

physics-based, quantitative, validated means to discriminate between hazardous munitions and nonhazardous items.

Remediation of the entire site inventory using current practices is cost prohibitive and estimated completion dates for munitions response on many sites are decades out. If the potential savings from distinguishing munitions from nonhazardous objects were fully realized, the limited resources of the MMRP could be used to accelerate the cleanup of munitions response sites.

In response to this need, ESTCP initiated a pilot program that is validating the application of recently developed classification technologies in a comprehensive approach to munitions response. A series of demonstrations at live sites of increasing difficulty is under way, with demonstrations at the former Camp Sibert in Alabama and the former Camp San Luis Obispo in California

now complete. Demonstrations at the former Camp Butner in North Carolina are ongoing. Results from the former Camp Sibert were reported previously. Highlighted here are results from the former Camp San Luis Obispo.

Former Camp San Luis Obispo Results Now Available

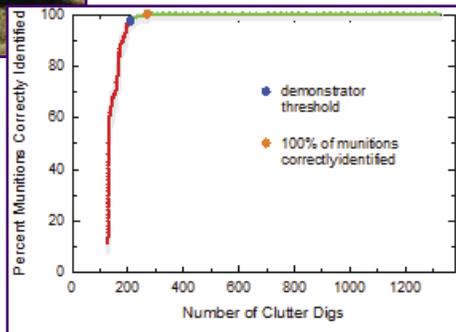
A hillside range at the former Camp San Luis Obispo was selected for its wide mix of munitions types. At this site, there were four known munitions types prior to the study, including 60-mm, 81-mm, and 4.2-in mortars and 2.36-in rockets. Three additional munitions types were discovered during the course of the demonstration.

The demonstration consisted of several combinations of data collection platforms and analysis approaches, ranging from careful application of commercial EM61 survey instruments to

See PILOT PROGRAM, page 4



Receiver operating characteristic curve based on analysis of MetalMapper data from the former Camp San Luis Obispo. Items correctly classified as non-munitions are highlighted in green.



three prototype EMI systems specially designed to maximize detection and classification of munitions.

After the survey systems completed data acquisition, anomalies were selected from the data by recording all locations for which the sensor signal exceeded a system-specific threshold. Multiple groups demonstrated classification approaches 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 munition or another source.

The site was seeded with inert munitions and all anomalies were dug to confirm technology performance. Demonstrators were scored based on their ability to eliminate nonhazardous items while retaining all detected munitions.

Substantial classification ability was demonstrated. In the application of

classification analyses to carefully collected survey data from commercial EMI sensors, the best performers correctly classified all or nearly all of the targets of interest, while achieving reductions of up to 50 percent in the number of non-munitions. Recently developed EMI sensors optimized for UXO classification that were demonstrated at the former Camp San Luis Obispo showed even better results. For example, an analyst using data from the MetalMapper system in cued mode was able to correctly classify nearly 1,000 of the approximately 1,300 non-munitions. A simple cost model based on these results shows the potential for large savings as the

classification approach is adopted on munitions response sites.

Former Camp Butner Demonstrations Ongoing

The former Camp Butner is known to be contaminated with items as small as 37-mm projectiles, adding yet another layer of complexity into the process. Data collection occurred over the summer of 2010, data analysis is being performed throughout the fall, and initial results will be presented at the upcoming Partners in Environmental Technology Technical Symposium & Workshop (www.serdp-estcp.org/symposium).

In an effort to engage members of the local community, an open house was held at the demonstration site in July. The former Camp Butner Restoration Advisory Board and neighbors were invited to observe data collection sensors in the field and meet with technology developers. ESTCP plans to host open houses at future demonstration sites based on the positive response from this event.

For further information on the ESTCP Classification Pilot Program, including the Final Report documenting the former Camp San Luis Obispo demonstrations, visit [Featured Initiatives > Munitions Response Initiatives > Classification Applied to Munitions Response at www.serdp-estcp.org](#). ♦



ESTCP hosted an open house at the former Camp Butner for community members to meet technology developers and observe data collection sensors in the field.

VAPOR INTRUSION

Vapor intrusion (VI) refers to the transport of volatile chemical vapors from subsurface sources to surface and subsurface structures leading to the intrusion of contaminant vapors into indoor air. This risk pathway is now the driver for many corrective action plans and site cleanups at DoD sites.

SERDP and ESTCP are developing cost-effective technologies for the characterization and monitoring of VI. SERDP research is leading to a more robust understanding of VI, while ESTCP demonstrations are improving current sampling methodology and risk assessment approaches for VI assessments. A summary of these efforts follows.

For fact sheets and documents describing these projects and their results in detail, visit [Featured Initiatives > Cleanup Initiatives > Vapor Intrusion](#) at www.serdp-estcp.org.

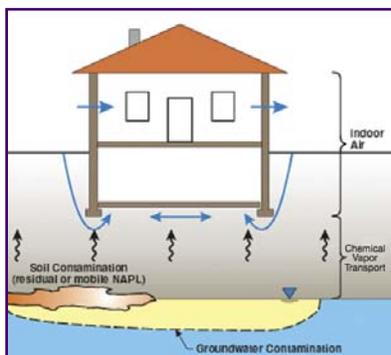
Improved Understanding of VI Processes and Issues

The basic data requirements for VI pathway assessment have increased with time, and data interpretation and decision making are becoming more conservative and complex, a reflection of low confidence in the ability to correctly interpret the data. To gain insight into the intricate processes involved in VI and to guide assessment practices, SERDP project ER-1686 uses an existing home with known vapor intrusion impacts to test an integrated field-scale, laboratory-scale, and modeling study on the (1) temporal variability of indoor air concentrations, (2) relationship between groundwater and indoor air impacts, (3) changes in vapor emissions from and soil gas profiles above impacted groundwater plumes, (4) variability in subslab and near-foundation soil gas concentrations, (5) investigation of alternate assessment approaches, and (6) indoor chemical

sources. Under SERDP project ER-1687, carefully controlled experiments are being conducted to reproduce realistic boundary conditions at the land/atmospheric interface, the results of which will identify screening model limitations, propose alternative formulations, and aid remediation site managers with risk assessment and the selection of alternative remediation strategies.

Building Better Tools

To advance sensor products adapted to or proven for VI application, ESTCP project ER-200702 is screening available advanced sensor technologies, selecting the most promising technology for VI, and building sensor packages including a portable “sniffer” unit for near real-time contaminant-specific source assessment and a fixed, remote communication “smoke detector” unit for compound-specific exposures. An additional indoor air testing challenge is the ability to distinguish between VI and indoor contaminant sources, a condition that greatly increases the cost and complexity of investigations. ESTCP project ER-201025 is evaluating the application of compound-specific stable isotope analysis (CSIA) as a tool to distinguish between VI and indoor sources of volatile organic compounds (VOCs),



SERDP and ESTCP efforts are improving our understanding of the vapor intrusion pathway from chlorinated solvent-contaminated groundwater plumes and demonstrating sampling methodologies that will provide more accurate prediction, monitoring, and management tools.

while ER-201119 is developing a validated standard protocol for using a portable gas chromatograph/mass spectrometer (GC/MS) to rapidly discriminate between the two sources.

The most common VI laboratory analyses utilize U.S. EPA methodologies that cost between \$250 and \$400 per sample. Passive diffusive sampling and analysis can be 30 to 50 percent less expensive. To identify the conditions under which the passive samplers provide good quality data before they will be accepted by regulators, ESTCP project ER-200830 is comparing five distinct types of passive diffusive samplers with active gas sampling methods. None were specifically designed for soil gas monitoring, although the benefit of having data from both soil gas and indoor air is very attractive for VI assessments, so the proposed research is designed to test their applicability to soil gas as well.

Streamlining Public Acceptance

ESTCP project ER-200423 identified a cost-effective and accurate protocol for investigating VI into buildings overlying contaminated groundwater. The demonstration results supported the use of this step-wise process for evaluating VI. Building on the results of this project, ESTCP project ER-200707 is working to develop and validate Tier 2 VI screening procedures and limited-scope Tier 3 investigation methods based on easily measured site-specific characteristics from two key interfaces—the groundwater-soil gas interface and the building foundation. These screening procedures can be used individually or together to provide maximum flexibility for cost-effective evaluation of VI at each site. ♦

Technical Report to Help Guide SERDP Investments in Sustainable Forward Operating Bases

The term Forward Operating Base (FOB) is used to describe an evolving military facility that supports the military operations of a deployed unit and provides essential support and services for sustained operations. The sustainability of FOBs in Iraq, Afghanistan, and around the world has never been a more relevant issue, and the challenges faced today and the benefits from bridging the gap to more sustainable FOBs will extend to future conflicts and locations. To assist SERDP in assessing potential research investments in this area, Noblis, Inc.—a nonprofit science, technology, and strategy organization—prepared a report that identifies and characterizes the logistical components and practices required to develop, build, and sustain FOBs.

FOBs are specifically focused on supporting expeditionary capabilities—the ability to deploy combined armed forces into any operational environment and operate effectively upon arrival—and campaign capabilities—the ability to sustain operations as long as necessary to conclude them successfully. FOBs vary widely in sophistication depending on size, support requirement, host nation infrastructure, nature of the operation, and anticipated duration. Based on these factors, FOBs can range from austere, platoon-size bases on the tactical edge to division-size enduring bases.

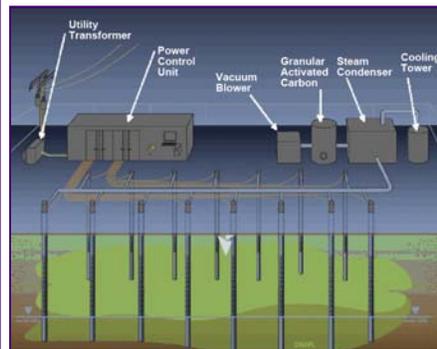
The report, in addition to defining FOB types and roles, examines issues related to construction planning; supply considerations; structures and facilities; and the quantity, composition, and current operational practices associated with food, water, wastewater, energy, and solid waste streams. For each of these elements, the report characterizes current realities and explores implications for future research. The scope of the report is limited to a survey of primary FOB sustainability concerns.

Improving the sustainability of FOBs will require extensive coordination among multiple parties and careful navigation of complex tradeoffs. Teams across the federal government, DoD, and the military Services have created initiatives to design more sustainable FOBs. Collaboration, communication, and knowledge sharing will be key to developing solutions in a timely and comprehensive manner.

The Sustainable Forward Operating Bases report is available at www.serdp-estcp.org using FOB as the *Search* phrase. To kick off investments in this area, SERDP released an FY 2012 Core Solicitation Statement of Need, *Development of Sustainable Wastewater Treatment Processes for Forward Operating Bases*. Refer to www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations for more information.

State-of-the-Practice Overview for Assessing Performance of Thermal-Based DNAPL Treatment Technologies

In situ thermal soil and aquifer remediation technologies have undergone rapid development and application in recent years because of their potential for accelerated and more thorough treatment of dense non-aqueous phase liquid (DNAPL) source zones. Field-scale



In situ thermal remediation technologies such as electrical resistance heating, shown here, can effectively treat DNAPL source zones at sites where other in situ treatments may be limited. Developed with ESTCP support, a State-of-the-Practice Overview document is now available for practitioners, regulators, and site owners to predict and monitor the performance of thermal treatment in various hydrogeologic settings.

application of these technologies has, however, not been well-documented in the technical literature. Dr. Paul Johnson of Arizona State University reviewed 182 applications of thermal technologies for remediating DNAPL source zones and summarized the results in a State-of-the-Practice Overview document. This overview document, developed under the ESTCP project *Critical Evaluation of State-of-the-Art In Situ Thermal Treatment Technologies for DNAPL Source Zone Treatment (ER-200314)*, will aid practitioners, regulators, and site owners in assessing the performance of thermal-based DNAPL treatment technologies at their sites.

The State-of-the-Practice Overview is divided into three main sections to provide background information on the technologies, field applications, and state of the science. The first section introduces the most commonly applied in situ thermal technologies, describing how the technologies work, any limitations and unique features, and the importance of process monitoring. The second section outlines key information gained from reviewing the 182 thermal applications, emphasizing the subsurface settings, system designs, operating conditions, and performance achieved in groundwater quality improvement and chemical discharge. The third section, an appendix authored by technology vendors, contains in-depth discussion of the state of the practice for electrical resistance heating (ERH), conductive heating/in situ thermal desorption (ISTD), steam/hot air injection, and in situ soil mixing combined with steam/hot air injection.

The State-of-the-Practice Overview is a useful tool and primer for program managers considering the use of thermal technologies at their sites and is available, along with the Final Report, at www.serdp-estcp.org using 200314 as the *Search* phrase. Technical questions may be directed to Dr. Paul Johnson, Arizona State University, at (480) 965-9115 or paul.c.johnson@asu.edu.

See TECH NOTES, page 7



ASETSDEFENSE 2011 WORKSHOP
SUSTAINABLE SURFACE ENGINEERING FOR AEROSPACE AND DEFENSE
February 8-10, 2011
New Orleans, Louisiana

ASETSDefense 2011 is a forum that will summarize the state of the science and state of practice for addressing environmental safety and occupational health (ESOH) coating issues relevant to the production and sustainment of aerospace and defense systems, including aircraft, vehicles, ships, and electronics. Geared to authorizing agencies, weapon system program offices, depot engineers, and the commercial supply chain, briefings will present engineering data and discuss practical issues of implementing new processes. The emphasis will be on the available options, successes and failures, what has been approved and implemented, what works best in different situations, gaps in capabilities and knowledge, and developments in materials, processes, and test methods.

For more information and to register, visit <http://workshops.serdp-estcp.org/ad11>.

TECH NOTES, from p. 6

Animation Depicts DoD's Efforts to Address Climate Change Impacts and Vulnerabilities

Efforts are being made worldwide to reduce greenhouse gas emissions that represent the underlying cause of global climate change; however, a focus on emissions alone is not enough. Changes in climate will continue for decades or centuries to come, making adaptation and mitigation essential. DoD initiatives aim to better understand and respond to the impacts of climate change on the landscapes and biological diversity of military lands, environmental management, and the military mission. To communicate these efforts, SERDP and ESTCP, in collaboration with the Legacy Resource Management Program (Legacy), have developed *Department of Defense Responding to Climate Change*, a multimedia animation.

This animation summarizes ongoing work throughout the country supported by SERDP, Legacy, and other groups to provide information, analyses, and tools that DoD resource managers and policy makers need to meet current and future mission and stewardship responsibilities, considering the impacts of climate change. Efforts highlighted in the animation include:

- Developing guidelines for assessing ecological vulnerability to climate change (SERDP and Legacy)

- Assessing risks to natural, cultural, and operational resources at five DoD installations in North Carolina (Legacy)
- Assessing the impacts of sea level rise and associated storm surges on barrier islands and marshes that provide habitat for species of concern and protection for base infrastructure in the Southeast (SERDP)
- Evaluating assisted migration and colonization as a management tool for plant species subject to increased levels of storm surge (SERDP)
- Assessing the physical effects of sea level rise and storm surge and the impacts to mission-essential infrastructure over a range of geophysical settings and climate conditions (SERDP)
- Developing modeling approaches to predict and map how climate change may alter vegetation and bird distributions on DoD lands in California (Legacy)
- Developing population models to investigate the effects of multiple stressors on at-risk populations (SERDP)
- Understanding the interactions between non-native invasive species (NIS), fire regimes, and climate change on ecological systems in the Southwest (SERDP)

- Assessing climate change impacts on intermittent and ephemeral stream systems in the Southwest (SERDP)

Numerous DoD-sponsored meetings and workshops are highlighting climate change management and research efforts. Funding opportunities also are available through SERDP, ESTCP, and Legacy to continue this work. Refer to page 14 in this issue for information on the active SERDP FY 2012 Core Solicitation. To learn more, visit www.serdp-estcp.org and www.dodlegacy.org.

Department of Defense Responding to Climate Change is available at <http://www.dodworkshops.org/CC-Animation.html>. ♦



SPOTLIGHT on SERDP and ESTCP FY 2010 Resource

New initiatives in the SERDP and ESTCP program areas are highlighted throughout

SERDP and ESTCP initiatives in **Resource Conservation and Climate Change (RC)** focus on the science and technologies required to sustain military training and testing areas as well as the natural and cultural resources that support these areas. In 2010 SERDP initiated research and development efforts to characterize altering fire regimes and associated non-native invasive plant introductions in Southwest ecological systems; manage and restore Southwest intermittent and ephemeral stream systems on DoD lands; improve understanding of fugitive dust emissions due to DoD activities; and develop innovative control and eradication approaches for the brown treesnake. The ESTCP demonstration initiated in 2010 is developing high-resolution landscape (2-D) mosaics for improved coral reef monitoring capabilities.

SERDP Research

Additional information on these projects can be found at www.serdp-estcp.org under Program Areas > Resource Conservation and Climate Change.

Understanding and Combating the Fire-Enhancing Impact of Non-Native Annuals in Desert Scrub through the Tools of Population and Landscape Ecology (RC-1721)

Principal Investigator: Claus Holzapfel - Rutgers

This project will test hypotheses related to the strategies that non-native invasive species (NIS) use to colonize barren areas versus areas beneath shrubs, the role of fire and soil disturbance in fostering NIS establishment, the interactions of NIS with native species and fire regimes, and how climate change may affect those interactions. Data collected from studies in the Mojave and Sonoran Deserts will be used to parameterize landscape-scale, spatially explicit population models capable of projecting the spread of NIS and assessing the causes and consequences of increased fire frequency and intensity under different climate change scenarios. Results will aid in developing landscape-scale management protocols that can mitigate the impacts of potential future NIS dispersal events and introductions.

Integrated Spatial Models of Non-Native Plant Invasion, Fire Risk, and Wildlife Habitat to Support Conservation on Military Lands in the Arid Southwest (RC-1722)

Principal Investigator: Brett Dickson - Northern Arizona University

The objective of this project is to integrate empirically based models of non-native plant invasion, fire, and sensitive wildlife habitat in a spatially explicit decision-support package that informs sustainable resource management and recovery of native habitats and species in the face of ongoing climate change. Distribution, biomass, invasion risk, and fire risk will be modeled for non-native species typically found in the Sonoran Desert. This research will yield cutting-edge techniques for generating new models and maps of fundamental ecological changes related to invasive species, fires, and global change that will aid land managers in sustaining training and testing lands.

Predictive Tools to Manage Altered Fire Regimes Caused by Plant Invasions in the Mojave Desert (RC-1723)

Principal Investigator: Janelle Downs - Pacific Northwest National Laboratory

The main objective of this project is to produce decision-support tools that DoD

can use to more effectively and efficiently manage NIS and wildfire in the Mojave Desert. Extensive field data sets documenting the presence, abundance, and growth stages of invasive annual grasses will be used in conjunction with remote sensing data to develop and improve models predicting the distribution of invasive species, burn severity, post-fire recovery, and potential ranges of invasive annual grass species. Products of this research will enable installation land managers to assess the direction and magnitude of landscape changes caused by fires and NIS and, as a result, improve management and recovery of Southwest ecological systems.

Hydroecology of Intermittent and Ephemeral Streams: Will Landscape Connectivity Sustain Aquatic Organisms in a Changing Climate? (RC-1724)

Principal Investigator: Julian Olden - University of Washington

This project aims to understand how southwestern intermittent and ephemeral streams provide key habitat and population connectivity for obligatory aquatic species and addresses whether these ecological functions will be maintained in a changing climate. The research will link hydrologic modeling with ecological and molecular investigations to quantify the sensitivity of intermittent to ephemeral ecosystems to future climate change. Model predictions will help identify aquatic taxa whose persistence on military lands is particularly jeopardized by future climate change and that, as a result, may require active management efforts such as corridor connections, translocations, or water management for their long-term conservation.

Watershed to Local Scale Characteristics and Function of Intermittent and Ephemeral Streams on Military Lands (RC-1725)

Principal Investigator: David Cooper - Colorado State University

The objectives of this project are to develop and test a watershed and stream classification system, improve understanding of stream system function and the effects of climate change, and develop specific monitoring, management, and restoration tools. The detailed analysis of each stream type in four watersheds will provide new perspectives on the geomorphic, hydrologic, and ecological functioning of desert streams. The watershed and stream classification tool to be developed by this project will enable land managers to map stream types and provide them with basic information on stream characteristics, hydrologic processes, vegetation, and degree of and potential for disturbance prior to initiating field operations.

Structure and Function of Ephemeral Streams in the Arid and Semiarid Southwest: Implications for Conservation and Management (RC-1726)

Principal Investigator: Juliet Stromberg - Arizona State University

This project seeks to improve understanding of the linkages between abiotic processes and biotic communities and how they are influenced by hydroclimatology and anthropogenic land and water use. Ephemeral stream study sites will be established in three representative stream systems of the southwestern United States that differ in duration, intensity, and frequency of seasonal precipitation events and water table depths. The results of this effort will aid DoD land managers in prioritizing locations for stream restoration and protection.

An Ecohydrological Approach to Managing Intermittent and Ephemeral Streams on Department of Defense Lands in the Southwestern United States (RC-1727)

Principal Investigator: Lainie Levick - The University of Arizona

The objective of this project is to develop and test an ecohydrologic-based

Conservation and Climate Change Initiatives

the year. Resource Conservation and Climate Change efforts are featured here.

classification and measurement methodology that distinguishes intermittent and ephemeral (I&E) channel types by abiotic and biotic attributes and enables evaluations of perturbations of their hydrologic regimes. This research will represent a broad survey of I&E stream systems across the Southwest, and the products of this work will enable DoD land managers to evaluate the impacts of climate change, training activities, and land management actions on channel condition and habitat values.

Fugitive Dust Emissions: Development of a Real-Time Monitor (RC-1728)

Principal Investigator: Thomas Holsen - Clarkson University

This project will develop and characterize a novel instrument capable of measuring ambient concentrations of fugitive dust particles between 5 µm and 70 µm in real time. The instrument will combine a large particle inlet with a particle spectrometer capable of measuring a wide range of fugitive dust particles. This instrument can then be used to help develop and validate models that estimate the emission fluxes resulting from military activities at the scale of a few hundred meters and to improve understanding of how soil, vegetation, meteorology, and terrain characteristics interact with physical processes in the atmosphere to affect dust transport in the near-field.

Characterizing and Quantifying Emissions and Transport of Fugitive Dust Emissions Due to Department of Defense Activities (RC-1729)

Principal Investigator: John Gillies - Desert Research Institute

The objectives of this project are to quantify fugitive dust emissions from military activities, improve models to predict ambient particulate matter concentrations that account for near-field deposition, and link magnitude of dust emission potential with surface and environmental conditions. New emission potential measurement methods will be linked with emissions measurements and subsequently used to estimate emissions at other locations. Results will include improved emission factors for vehicles that account for surface and environmental conditions and an enhanced DUSTAN model that enables quantification of near-field deposition.

Development of a Windbreak Dust Predictive Model and Mitigation Planning Tool (RC-1730)

Principal Investigator: Eric Paradyak - The University of Utah

This project will develop and validate a proof-of-concept computational model for predicting fugitive dust emission and transport fluxes that can be used to design dust mitigation windbreaks. Model development will be accomplished by integrating model theory with wind tunnel experiments and field data. Installation-level environmental staff will be able to use this near source emission-reduction model for planning and operational purposes.

Purifying and Testing Gecko Skin Compounds, a Promising Attractant for Small Brown Treesnakes (RC-1731)

Principal Investigator: Julie Savidge - Colorado State University



The objective of this SERDP Exploratory Development (SEED) project is to advance the development of a synthetic brown treesnake (BTS) attractant that resembles the scent of geckos. Researchers will separate different compounds in gecko skin extracts, test the different substances within the extracts for

BTS attraction, and characterize the compounds within those substances that

affect BTS attraction. Bioassays using BTS that select between food items scented with different combinations of gecko skin extract will determine which combinations contain compounds that elicit a foraging response. An effective synthetic attractant will improve BTS control techniques for smaller BTS that currently escape interdiction.

Development of Non-Prey Baits for Delivery of Acetaminophen to Brown Treesnakes (*Boiga irregularis*) on Guam (RC-1732)

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

The objective of this SEED project is to qualitatively isolate decomposition products from dead neonatal mice by chemical extractions and identify those extracts that, when applied to a non-prey food item, promote the consumption of that non-prey food item by BTS. Successful isolation of these decomposition products will enable production of extracts that can be used to treat other types of non-prey food items as part of a practical bait matrix for BTS.

A Phylogenetic Strategy for Identifying a Biological Control Agent for Non-Native Populations of the Brown Treesnake (*Boiga irregularis*) (RC-1733)

Principal Investigator: Robert Fisher - U.S. Geological Survey, San Diego Field Station

The objective of this SEED project is to identify a parasite or pathogen that occurs in native BTS populations that can be used as a biological agent for controlling the introduced population on Guam. Parasite assays will focus on native populations that are most distantly related to the Guam population, as distant relatives are more likely to harbor pathogens or parasites that will be lethal to BTS on Guam. As opposed to current costly, labor-intensive, and environmentally harmful BTS control methods, a biological control agent can be sustained without additional economic investment or environmental impact.

ESTCP Demonstrations

Additional information on these efforts can be found at www.serdp-estcp.org under Program Areas > Resource Conservation and Climate Change.

High Resolution Landscape (2-D) Mosaics for Improved Coral Reef Monitoring Capability (RC-201021)

Principal Investigator: William Wild - SPAWAR Systems Center Pacific

Federal policy mandates that DoD characterize, assess, and monitor underwater benthic communities on and adjacent to its facilities. Efficient survey methodologies that provide comprehensive assessments of reef condition are fundamental to this effort. Current state-of-the-art techniques in coral reef assessment rely on highly trained scientific divers to measure indices of reef health. Limitations of these approaches include the need to employ highly trained scientific divers/coral reef ecologists, restricted dive time, and spatially inaccurate underwater imagery with a limited footprint. This project will demonstrate an innovative mosaic technology for coral reef assessment that uses underwater video integrated with high-resolution still photography to construct plot-scale, spatially accurate images of benthic habitat patches on coral reefs with sub-millimeter scale resolution.

SPOTLIGHT on ESTCP FY 2010 Energy and

New initiatives in the SERDP and ESTCP program areas are highlighted throughout the year.

SERDP and ESTCP initiatives in **Energy and Water (EW)** focus on the science and technologies required to reduce DoD's installation energy consumption and carbon footprint, improve energy security, and facilitate water conservation. Initiatives begun in FY 2010 focus on technology demonstrations in ESTCP. ESTCP investigators are demonstrating (1) innovative energy efficient lighting, heating, air conditioning, and other technologies that support sustainable building design and operations; (2) renewable energy sources at various power levels; (3) energy storage and control technologies to manage these resources; and (4) technologies that reduce both water and energy demand.

ESTCP Demonstrations

Additional information on these efforts can be found at www.serdp-estcp.org under Program Areas > Energy and Water.

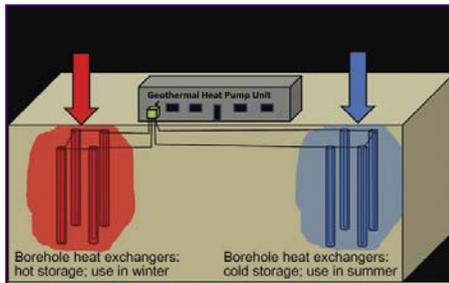
Advanced Lighting Controls for Reducing Energy Use and Cost at DoD Installations (EW-201012)

Principal Investigator: Satyen Mukherjee - Philips Research North America

Lighting is the most pervasive energy-consuming element in most buildings on military installations when the cooling requirements needed to offset the heat gain attributed to the use of existing lighting systems are factored in. The objective of this project is to deploy advanced lighting control technologies that integrate scheduling, personalized dimming, daylight harvesting, occupancy sensing, and scene setting to reduce the energy consumed for DoD building lighting needs. These advanced lighting control systems are each tailored to meet specific building and space lighting needs. The potential DoD energy-related cost savings achievable through widespread deployment of these lighting control technologies are estimated at \$300 million per year based on a 50% reduction in energy use annually.

Subsurface Thermal Energy Storage for Improved Heating and Air Conditioning Efficiency (EW-201013)

Principal Investigator: Ronald Falta - Clemson University



Although the benefits of using natural and waste heat as alternative energy sources are known, it is difficult to take full advantage of those sources because of their intermittency and seasonality. The objectives of this project are to (1) develop a

field application of subsurface thermal energy storage (STES) for exploiting natural or waste sources of heat and cold and (2) couple the STES system with a ground-source heat pump to improve heating and cooling efficiency. With this technology, the heat (or cold) is harvested from the ground using a ground-loop heat pump with two separate ground loops, thus enabling higher efficiencies to be achieved. This method of heating and cooling is more efficient than conventional HVAC systems as well as existing geothermal heat pump systems.

Daylight Redirecting Window Films (EW-201014)

Principal Investigator: Raghunath Padiyath - 3M

Electric lighting accounts for 25% of a commercial building's total energy consumption. Moreover, 30% of the cooling load of these buildings is a direct result of heat gains from the electric lighting. The objectives of this project are to (1) reduce lighting and HVAC energy consumption by installing daylight redirecting window films on selected DoD buildings, (2) determine the effect of these films on daylight penetration into deep spaces within the building, and (3) quantify the resulting environmental, economic, and human factor benefits from these films. The films utilize innovative microstructure features that direct sunlight towards the ceiling, thus facilitating a more uniform and comfortable distribution of light in the occupied building space than conventional daylight buildings.

Scalable Deployment of Advanced Building Energy Management Systems (EW-201015)

Principal Investigator: Trevor Bailey - United Technologies Research Center

HVAC systems account for more than 30% of a building's energy consumption, and most of these systems consume 20% more energy than their design intent because of equipment degradation, failure, and detrimental interactions among subsystems. Existing building diagnostic technologies only focus on detecting equipment level faults and do not include whole building diagnostics and visualization. The objective of this project is to demonstrate an advanced building energy management system, on a variety of building types and sizes, that enables facility managers to visualize building energy performance, diagnose building energy faults, and assess alternative energy-efficient HVAC operation strategies. The key enabling technologies that will be advanced include tools and methods for real-time load estimation, reduced-order physics-based models for the building and HVAC systems, building and HVAC system energy diagnostics that apply advanced statistical learning algorithms to identify patterns of anomalies, building and HVAC system energy visualization, and HVAC operation sensitivity analysis.

High Efficiency-Reduced Emissions Boiler Systems for Steam, Heat, and Processing (EW-201016)

Principal Investigator: Guido Poncia - United Technologies Research Center

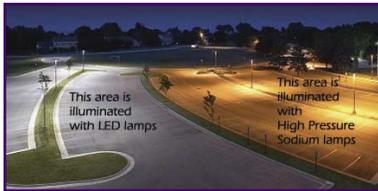
Boilers with a capacity larger than 10 MMbtu/hr represent the bulk of commercial boiler systems delivering steam for industrial processes, space heating, and hot water; however, the overwhelming majority of these systems are more than 10 years old and do not operate at optimum efficiency. Because replacing these boilers is often cost prohibitive, upgrading the combustion control system represents a more cost-effective solution for increasing boiler efficiency and reducing associated emissions. This project will demonstrate a combustion control and monitoring system for commercial and industrial boilers that will improve fuel efficiency by at least 7% on boilers equipped with legacy controllers and 2% on boilers equipped with state-of-the-art controllers and that will also reduce associated flue gas emissions from both. This system is based on a novel algorithm for efficiency and emission control and monitoring, an automated procedure for system commissioning, low-cost sensors to monitor exhaust composition, and a user-friendly tool for visualization of boiler performance.

Water Initiatives

Energy and Water efforts are featured here.

Bi-Level Demand-Sensitive LED Street Lighting Systems (EW-201017)

Principal Investigator: Saifur Rahman - Virginia Tech



High intensity discharge (HID) lamps are the most prevalent technologies being used for street lighting applications in DoD. Although HID lamps produce a high lumen output, they also require large amounts

of energy to operate. Furthermore, because HID lamps are not dimmable, they constantly produce full intensity light, even when such light levels are not needed. The objective of this project is to design, develop, and demonstrate an energy-efficient bi-level and traffic-sensitive light emitting diode (LED) street lighting system. This system consists of LED light fixtures, streetlight controllers, traffic sensors, a smart server, and a network management center for remote control and monitoring. The integrated lighting monitoring and control system is expected to deliver at least a 50% reduction in electricity usage, a similar reduction in carbon footprint, and a lower life-cycle cost as compared to existing HID streetlight systems.

Concentrated Solar Air Conditioning for Buildings (EW-201018)

Principal Investigator: Kathleen Paulson – Naval Facilities Engineering Service Center



Summer air conditioning loads account for 30 to 60% of total energy expenditures at DoD facilities. This project will demonstrate a system that integrates parabolic solar collectors with a double-effect absorption chiller to provide a renewable source of energy for air conditioning applications. The system design consists of three functional components: parabolic solar collectors, an absorption chiller, and a

monitoring and microcontroller system. An energy savings of 20% is the expected result of applying this technology broadly, yielding an aggregate life-cycle cost savings totaling several million dollars annually. A substantial amount of carbon emissions would also be avoided.

Smart Water Conservation Systems for Irrigated Landscapes (EW-201019)

Principal Investigator: Gary Anguiano – Naval Facilities Engineering Service Center

DoD irrigates large turf areas using inefficient processes that are unsustainable given currently available water supplies and projected future water demands. The objective of this project is to demonstrate an integrated suite of commercially available smart water conservation technologies for irrigated landscapes that include advanced evapotranspiration irrigation controllers, centralized and site-specific sensor inputs, efficient water delivery systems, and rooftop rainwater and HVAC water condensate harvesting systems. Existing irrigation systems will be retrofitted with smart water conservation systems. Replacing current irrigation practices with smart water conservation systems could cut the current potable water consumption and costs by 70%.



DoD's Strategic Sustainability Performance Plan 2010

The FY 2010 Strategic Sustainability Performance Plan charts the path DoD will take over the coming decade to improve sustainability across all aspects of the Department. It applies to all DoD mission and program areas, with the objective of incorporating sustainability principles into DoD's daily operations.

This comprehensive plan contains eight goals, listed below, and 21 performance-based sub-goals.

Sustainability Goals

1. Use of fossil fuels reduced
2. Water resources management improved
3. Scope 1 and Scope 2 greenhouse gas emissions (GHG) reduced 34% by 2020, relative to FY 2008
4. Scope 3 GHGs reduced 13.5% by 2020, relative to FY 2008
5. Solid waste minimized and optimally managed
6. Chemicals of environmental concern minimized
7. Sustainability practices become the norm
8. Sustainability built into DoD management systems

Sustainability metrics addressed in this Plan include GHG emissions, solid waste management, energy efficiency, the use of landfill gas, renewable energy, toxic and hazardous materials, non-tactical vehicle fleets, high-performance sustainable buildings, water efficiency and reclaimed water, and employee business travel and commuting.

Beginning in 2010 and 2011, DoD priorities and significant efforts are to (1) invest in fixed installations using a three-part strategy to reduce energy demand, apply microgrid technologies, and increase the supply of renewable energy; (2) enhance governance structures to ensure top-level commitment and accountability; and (3) ensure that all DoD Components are incorporating the concepts of sustainability into their doctrine, policies, and guidance documents.

Reducing the Department's reliance on fossil fuels through energy efficiency and renewable energy is the primary path targeted to reach these sustainability goals. SERDP and ESTCP's investments in this area have the potential to contribute significantly to DoD's long-term success in meeting its sustainability goals.

The Department of Defense Strategic Sustainability Performance Plan FY 2010 is available at http://www.acq.osd.millie/download/green_energy/dod_sustainability/DoD%20SSPP-PUBLIC-26Aug10.pdf. ♦

Congratulations to...

SERDP Principal Investigator **Dr. Julian Olden** of the University of Washington, who was honored with the Society for Conservation Biology's 2010 Early Career Conservationist Award. Dr. Olden was recognized for extraordinary scientific contributions to global conservation ecology at an early career stage and for leadership in the field. In the five years after completing his Ph.D. at Colorado State University, Dr. Olden published more than 85 papers and became internationally recognized for developing a quantitative framework for investigating biotic homogenization. He has made important contributions to understanding the establishment and spread of invasive aquatic species, and his research integrates science-based approaches with on-the-ground management strategies in order to address pressing conservation questions.

SERDP and ESTCP Principal Investigator **Dr. Robert Borden** from North Carolina State University, who was awarded the 2010 Lifetime Achievement Award presented by Brown and Caldwell at Battelle's Seventh International Conference on Remediation of Chlorinated and Recalcitrant Compounds. In his role as professor of civil, construction, and environmental engineering at North Carolina State University, Dr. Borden has directed groundbreaking research on bioremediation and mentored more than 60 master and doctoral students. In addition to his faculty duties, Dr. Borden is a research and engineering consultant to the environmental engineering firm Solutions-IES and bioremediation products firm EOS Remediation. His work has contributed to the practical understanding of in situ bioremediation, development of new products for soil and aquifer remediation, and advances in the understanding of bioremediation processes.

ESTCP Principal Investigator **Dr. Patrick Evans** and colleagues from CDM who received an International Water Association (IWA) Project Innovation Award in the applied research category for their *Patented Gaseous Electron Donor Injection Technology (GEDIT) for In Situ Biodegradation of Perchlorate and Nitrate*. To date, treatment technologies for perchlorate contamination in groundwater have not been successful in addressing source contamination in soil that leaches into groundwater. Under ESTCP project ER-200511, CDM used its patented gaseous electron donor injection technology to demonstrate that indigenous bacteria in soil will consume perchlorate and nitrate in the presence of injected hydrogen gas. The IWA Project Innovation Awards Program recognizes excellence and innovation in water engineering projects throughout the world.

SERDP and ESTCP Sponsor Student Participation at ICCB and ESA

To increase awareness of research opportunities involving DoD by up and coming scientists, SERDP and ESTCP provided travel awards to 17 promising students to attend either the International Congress for Conservation Biology (ICCB) or the Ecological Society of America (ESA) Annual Meeting. The award-winning students and their paper topics follow.

24th International Congress for Conservation Biology July 3-7, 2010 Edmonton, Alberta, Canada

- ◆ **Marcus Beck**
University of Minnesota
Development of a Macrophyte-Based Index of Biotic Integrity for Minnesota Lakes
- ◆ **Tracy Bowerman**
Utah State University
How Do Habitat Connectivity and Dispersal Rates Affect Population Dynamics of an Imperiled Freshwater Fish?
- ◆ **Jason Courter**
Clemson University
Optimizing Bird Conservation and Function on Sustainable Farms Using a Yardstick of Temperature Response across Trophic Levels
- ◆ **Jessica Pratt**
University of California, Irvine
*Assessing the Need for Assisted Migration of *Artemisia californica* in Coastal Sage Scrub Habitat*
- ◆ **Tien Ming Lee**
University of California, San Diego
The Structure of Global Extinction Risk in Birds
- ◆ **Ashwin Naidu**
University of Arizona
Genetic Analysis of Feces Reveals Minimum Number, Sex, and Diet of Mountain Lions on Kofa National Wildlife Refuge, Arizona
- ◆ **Zoe Nyssa**
University of Chicago
Global Science and Global Policy: A Survey of Collaborative Networks in Conservation Biology

95th ESA Annual Meeting August 1-6, 2010 Pittsburgh, Pennsylvania

- ◆ **Minda R. Berbeco**
Tufts University
The Effect of Warming and Nitrogen Addition on the Decomposition of Woody Debris
- ◆ **Chris M. Bowman-Prideaux**
California State University, Northridge
Searching for a Needle in a Haystack: Using GIS to Identify Likely Locations of Previously Unknown Populations of an Endangered Species
- ◆ **Eduardo Carrillo-Rubio**
Cornell University
Modeling the Response of Breeding Bird Communities to Timber Harvesting in La Sierra Tarahumara, Mexico
- ◆ **Libby Eakin**
University of Chicago
Using Agent-Based Models to Determine How Gypsy Moth Feeding Behavior Affects Transmission of LdNPV
- ◆ **Lisa M. Ellsworth**
University of Hawaii at Manoa
*Using Soil Moisture and Antecedent Weather to Predict Live and Dead Fuel Moisture in Nonnative Guinea Grasslands (*Urochloa maxima*) on the Island of Oahu, Hawaii*
- ◆ **Colin H. Kyle**
University of Chicago
Count Your Eggs before They Invade: Models Estimating Egg Number in Clutches Laid by Invasive Apple Snails Using Clutch Dimensions and Volume
- ◆ **Megan L. Mobley**
Duke University
Accumulation and Decay of Coarse Woody Detritus over 50 Years of Pine Forest Development
- ◆ **Ajay Sharma**
University of Florida
Understory Light Availability in Slash Pine and Longleaf Pine Ecosystems of the Gulf Coastal Plain Flatwoods: Implications for Uneven-Aged Management
- ◆ **Benjamin D. Wissinger**
University of Idaho
Plant Nutrient Availability following Wildfire and Different Restoration Practices in a Sagebrush Community in Northwestern Utah
- ◆ **Phoebe L. Zarnetske**
Oregon State University
Biotic or Abiotic Control? Assessing the Mechanisms and Implications of Coastal Dune Bioengineering

Members Join SERDP's Scientific Advisory Board

SERDP's Scientific Advisory Board (SAB) helps to ensure that the Program maintains a clear focus on technical quality. The SAB is a formal Federal Advisory Committee. The SAB reviews proposed research projects and has the authority to make recommendations to the SERDP Council regarding technologies, research, projects, programs, activities, and funding. The SAB consists of no more than 14 and no fewer than six members, who are jointly appointed by the Secretary of Defense and the Secretary of Energy in consultation with the Administrator of EPA. SERDP is fortunate to have a group of prominent experts in their fields serving on the SAB. Following is an introduction to our newest members.

Costel D. Denson

Dr. Denson has been a managing member of Costech Technologies since 2005 and previously served as president of Costech Associates. He was a professor of Chemical Engineering at the University of Delaware for 28 years. Dr. Denson has been a member and chair of numerous advisory committees, including the National Research Council's Board on Environmental Studies and Toxicity, the Environmental Protection Agency's Board of Directors, and the National Science Foundation's Advisory Committee for Engineering. He was a fellow of the Society of Plastics Engineers and won a Distinguished Service Award from their Extrusion Division. Dr. Denson is the author or co-author of more than 30 journal articles and has two patents. He holds a Ph.D. in Chemical Engineering from the University of Utah.

Mary L. Klein

Ms. Klein has been President and CEO of NatureServe since 2006 and has been with the organization since 2000. Her previous roles at NatureServe include Vice President for Network Operations and Chair of the Board of Directors. Ms. Klein has also served as director of the Colorado Natural Heritage Program and adjunct professor at Colorado State University. She has held regional leadership positions with The Nature Conservancy in the western United States for several years as well. Ms. Klein is a member of various professional committees, councils, and advisory boards, including the Science and Research Committee of the Association of Fish and Wildlife Agencies and the University of Florida's Department of Wildlife Ecology and Conservation Advisory Council. Ms. Klein has a Master of Science in Wildlife Biology from the University of Florida.

Jerry L. Miller

Dr. Miller is currently serving as Senior Policy Advisor for the White House Office of Science and Technology Policy. Prior to this appointment, he was Director of the Atlantic Meridional Overturning Circulation effort at the U.S. Climate Variability and Predictability Program Office, as well as Technical Director and Director of Research at the Consortium for Oceanographic Research. He is a charter member of The Oceanography Society and a member of many scientific organizations, including the American Geophysical Union, the American Association for the Advancement of Science, the Marine Technology Society, and the International Union of Geodesy and Geophysics. Dr. Miller is the author or co-author of many articles in various scientific publications. He received the Naval Research Laboratory's "Special Act" Technology Transfer Award in 1998 and the Memorial D.S. Rozhdestvensky Award from the Rozhdestvensky Optical Society in Russia in 2003. He holds a Ph.D. in Meteorology and Physical Oceanography from the University of Miami. ♦

Student Paper Competition Features SERDP-Funded Work

At Battelle's Seventh International Conference on Remediation of Chlorinated and Recalcitrant Compounds, three of the five student paper awards recognized work funded by SERDP. Our congratulations to the following students:

Katarzyna H. Kucharzyk

University of Idaho

Title: Increasing Microbial Degradation of Perchlorate Using a Genetic Algorithm: Media Optimization

Advisor: T.F. Hess

Coauthors: R.L. Crawford and T.F. Hess

(SERDP Project ER-1562)

Balaji Rao

Texas Tech University

Title: Mechanism of Perchlorate Formation with UV and Ozone in Relation to the Isotopic Composition of Natural Perchlorate

Advisor: W. Andrew Jackson

Coauthors: W.A. Jackson, J.K. Bohlke, P.B. Hatzinger, B. Gu, and N.C. Sturchio

(SERDP Project ER-1435)

Alexandra J. Salter

Oregon Health & Science University

Title: Remediation of 1,2,3-Trichloropropane by Reduction with Zero-Valent Zinc

Advisor: Paul G. Tratnyek

Coauthors: P.G. Tratnyek and J.H. Fortuna

(SERDP Project ER-1457)

Additional information on these projects is available at www.serdp-estcp.org by entering the project number (e.g., 1562) in the Search box.

Program Update

SERDP

Proposals selected in response to the FY 2011 SERDP solicitations were presented to the SERDP Scientific Advisory Board (SAB) for review at its September and October 2010 meetings. The SAB review will continue at the upcoming March 2011 meeting. Forty-one projects were recommended for funding from the Core Solicitation and 10 projects from the SERDP Exploratory Development (SEED) Solicitation.

On October 28, SERDP released the **FY 2012 Core Broad Agency Announcement (BAA) and Federal Call for Proposals** and the **FY 2012 SEED Solicitation**. The box below lists the Statements of Need (SONs) for the FY 2012 solicitations. Private sector pre-proposals responding to the FY 2012 BAA for the Core Solicitation are due **January 6, 2011**. Full proposals responding to the Federal

Call for Proposals and requested full proposals responding to the BAA are due **March 10, 2011**. Full proposals responding to the FY 2012 SEED Solicitation also are due on **March 10**. Visit www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations for the FY 2012 solicitation instructions and schedule for proposal submission.

ESTCP

In September, as part of the FY 2011 Solicitation process, full proposal submitters presented their proposed work to the ESTCP Technical Committees (ETCs). The ETCs made recommendations to the ESTCP Director, who selected projects to be funded in FY 2011. Proposal acceptance letters have been disseminated, and Principal Investigators are requested to enter their initial project plan information in the online reporting

system. These plans must be submitted before the release of FY 2011 funding. Project initiation conference calls then will be scheduled with the ESTCP Program Managers.

On October 8, 2010, ESTCP released a special BAA for proposals in response to the single topic, Demonstration of Advanced Electromagnetic Induction Classification Technologies on Munitions Response Sites. Full proposals were due on November 8, 2010, and proposal acceptance letters have been disseminated. Principal Investigators will commence the project initiation process once contracts have been awarded.

A solicitation for the FY 2012 Program is planned for release on or about January 6, 2011. Watch www.serdp-estcp.org/Funding-Opportunities/ESTCP-Solicitations for details. ♦

FY 2012 SERDP Statements of Need

For more information, visit www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations.

Environmental Restoration

- Development of Sustainable Wastewater Treatment Processes for Forward Operating Bases
- Environmental Fate and Impacts of Insensitive Munitions Compounds

Munitions Response

- Advanced Technologies for Detection, Discrimination, and Remediation of Military Munitions on Land
- Improvements in the Detection and Remediation of Military Munitions Underwater
- Advanced Technologies for Detection, Discrimination, and Remediation of Military Munitions on Land and Underwater (SEED)

Resource Conservation and Climate Change

- Assessment and Monitoring of Biological Diversity: Method Development
- Climate Change Impacts to Department of Defense Installations

Weapons Systems and Platforms

- Chemical Agent Resistant Powder Topcoats
- Scale-Up and Formulation of Green Insensitive Secondary Explosives
- Waste to Energy Converters for Overseas Contingency Operations
- Reliability of Tin-Whisker-Mitigating Conformal Coatings

New SERDP and ESTCP Resources

The following are samples of new publications now available on the SERDP and ESTCP web site (www.serdp-estcp.org). Access them from the *Search* box by entering the project number noted after the report title (e.g., 200125). Other documents may be accessed by entering an appropriate keyword.

Energy and Water

- Final Report: Modeling and Simulation of a Distributed Generation-Integrated Intelligent Microgrid (SERDP EW-1650)

Environmental Restoration

- Cost & Performance Report: Demonstration and Validation of a Regenerated Cellulose Dialysis Membrane Diffusion Sampler for Monitoring Groundwater Quality and Remediation Progress at DoD Sites (ESTCP ER-200313)
- Cost & Performance Report: In Situ Bioremediation of Perchlorate and Nitrate in Vadose Zone Soil Using Gaseous Electron Donor Injection Technology (GEDIT) (ESTCP ER-200511)
- Cost & Performance Report: Bioaugmentation for Groundwater Remediation (ESTCP ER-200515)
- Final Report: Integrated Ion Exchange Regeneration Process for Drinking Water (ESTCP ER-200545)
- Final Report: Improved Monitoring Methods for Performance Assessment during Remediation of DNAPL Source Zones (SERDP ER-1490)
- Final Report: Development of Biomarkers for Assessing In Situ RDX Biodegradation Potential (SERDP ER-1606)

Munitions Response

- Final Report: Dredging Equipment Modifications for Detection and Removal of Ordnance (ESTCP MR-200322)
- Final Report: Predicting the Mobility and Burial of Underwater Unexploded Ordnance (UXO) Using the UXO Mobility Model (ESTCP MR-200417)
- Final Report: Improved Processing, Analysis and Use of Historical Photography (ESTCP MR-200812)
- Final Report: Improving Detection and Discrimination of UXO in Magnetic Environments (SERDP MR-1414)
- Final Report: UXO Navigation Technology (SERDP MR-1441)
- Final Report: Enhancement of TEM Data and Noise Characterization by Principal Component Analysis (SERDP MR-1640)
- Final Report: Detection and Classification of Buried UXO and Determination of Seafloor Parameters in Littoral Environments Using Resonance Scattering Sonar (SERDP MR-1668)

Resource Conservation and Climate Change

- Final Report: Physiological Response and Habituation of Endangered Species to Military Training Activities (SERDP RC-1396)
- Final Report: Particulate Matter Emissions Factors for Dust from Unique Military Activities (SERDP RC-1399)
- Final Report: Impulse Noise Bearing and Amplitude Measurement and Analysis System (BAMAS) (SERDP RC-1427)
- Final Report: Understanding the Role of Typhoons, Fire, and Climate on the Vegetation Dynamics of Tropical Dry Forests: Looking to the Past to Develop Future Management Solutions (SERDP RC-1644)

Weapons Systems and Platforms

- Final Report: In Situ Characterization of Point-of-Discharge Fine Particulate Emissions (ESTCP WP-200420)
- Final Report: Temporal and Modal Characterization of DoD Source Air Toxic Emission Factors (SERDP WP-1247)
- Final Report: Catalytic Nitration of Toluene: Elimination of Red Water (SERDP WP-1409)
- Final Report: Polyhydroxyalkanoates (PHA) Bioplastic Packaging Materials (SERDP WP-1478)



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

INFORMATION BULLETIN

FALL 2010 NUMBER 43

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CALENDAR FOR SERDP AND ESTCP

JANUARY 2011

January 6

Pre-proposals due in response to the SERDP FY 2012 Core Solicitation Broad Agency Announcement

A Federal Call for Proposals and a Broad Agency Announcement for ESTCP FY 2012 project funding to be released on or about this date

January 15

SERDP and ESTCP project quarterly progress reports due for the first quarter of government FY 2011

FEBRUARY 2011

February 1-2

Energy and Water (EW) In-Progress Review (IPR) meeting

February 3

Full proposal requests sent to qualified proposers responding to the SERDP FY 2012 Core Solicitation Broad Agency Announcement

February 7-9

Munitions Response (MR) IPR meeting

February 10-11

Resource Conservation and Climate Change (RC) IPR meeting

February 14-17

Environmental Restoration (ER) IPR meeting

February 23-24

Weapons Systems and Platforms (WP) IPR meeting

MARCH 2011

March 1-3

SERDP Scientific Advisory Board (SAB) meeting
Arlington, Virginia

March 3

Pre-proposals due in response to the ESTCP FY 2012 Solicitation Federal Call for Proposals and Broad Agency Announcement

March 10

Full proposals due in response to the SERDP FY 2012 Core Solicitation Federal Call for Proposals and Broad Agency Announcement

Full proposals due in response to the SERDP FY 2012 SERDP Exploratory Development (SEED) Solicitation

RELATED CONFERENCES & EVENTS

December 13-17, 2010

2010 AGU Fall Meeting
San Francisco, California

For more information, visit
www.agu.org/meetings/fm10.

February 7-10, 2011

Battelle's Sixth International Conference on Remediation of Contaminated Sediments
New Orleans, Louisiana

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

February 8-10, 2011

ASETSDefense 2011: Sustainable Surface Engineering for Aerospace and Defense
New Orleans, Louisiana

For more information, visit
www.asetsdefense.org/UpcomingWorkshops.aspx.

March 7-11, 2011

2011 Air Force Restoration and Technology Transfer Workshop, "Collaboration for Closure"
San Antonio, Texas

For more information, visit
www.afce.af.mil/resources/technologytransfer/technologytransferworkshop.

March 14-19, 2011

2011 National Military Fish and Wildlife (NMFWA) Annual Meeting
Kansas City, Missouri

For more information, visit
http://www.nmfwa.org/2011_Meeting.