



WINTER 2017

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SERDP and ESTCP Continue Webinar Series - [View Schedule](#)

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## DoD's Environmental Research Programs

### 2017 SERDP AND ESTCP PROJECTS OF THE YEAR

The Strategic Environmental Research and Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP) are pleased to announce the 2017 Projects of the Year. These awards recognize scientific advances and technological solutions to some of the Department of Defense's (DoD's) most significant environmental and installation energy challenges. The findings, approaches, tools, technologies, and guidance developed by these projects will help DoD enhance its mission capabilities, improve its environmental and energy performance, and reduce costs. Read more about each project in the articles below.



### MEMS-ENABLED RELIABLE SUBMUNITION (MERS) (WP SERDP POY)

Contamination of military ranges from low order detonation and unexploded submunitions is a significant environmental and personnel safety concern for the DoD. Even the acceptable failure rate of submunitions results in a significant number of items that must be removed from DoD training ranges.

Mr. Charles Robinson, Mr. Jeffrey Smyth, and their team from the U.S. Army Armament Research, Development and Engineering Center (ARDEC)

addressed this issue by focusing on the development of microelectromechanical system (MEMS)-enabled safety and arming submunition fuze technology. The technology eliminates causes of submunition unreliability, and also contributes to alternative concepts to comply with DoD policies to reduce or eliminate lead energetic materials from fuze components. [MORE](#)



### PARAMETERIZED PROCESS MODELS FOR UNDERWATER MUNITIONS EXPERT SYSTEM (MR SERDP POY)

SERDP has been sponsoring development of a simple engineering model of mobility, burial, and re-exposure of unexploded ordnance (UXO) and UXO-like objects for a number of years. An essential first step in construction of the model was the compilation of existing measurements on items ranging from UXO and UXO-like objects to river cobbles from across the DoD, engineering, and scientific community and development of a simple framework to reconcile and understand the totality of the prior work. Dr. Carl Friedrichs at Virginia

## CALENDAR

### January 9

FY 2019 ESTCP Environmental Technologies and Installation Energy Solicitations Released

### March 6

FY 2019 SERDP SEED Solicitation Proposals Due

## RELATED EVENTS

### January 29-31

The Toxicology Forum - 42nd Annual Winter Meeting, Washington, D.C.

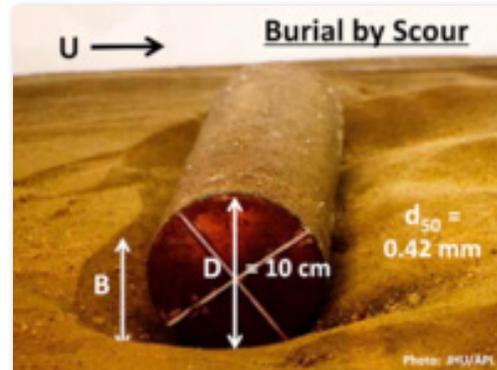
### March 13-15

ARPA-E Energy Innovation Summit, Washington, D.C.

### April 8-12

AR Battelle Conference on Remediation of Chlorinated and Recalcitrant Compounds, Palm Springs, CA

Institute of Marine Science and his team developed simple, parameterized models from predicating munitions' behavior underwater. The parameterized models developed by Dr. Friedrichs provide an improved and unified understanding of fundamental parameters in the interactions of munitions-sized objects with sediments. The parameterized model relations have been incorporated into more complex tools designed to guide DoD installation personnel in the management of underwater UXO sites. [MORE](#)



## ASSESSING CLIMATE CHANGE IMPACTS FOR DOD INSTALLATIONS IN THE SOUTHWEST UNITED STATES DURING THE WARM SEASON (RC SERDP POY)

Over the past 60 years, there have been important long-term changes in the atmospheric conditions during the period of the annual monsoon in the Southwestern United States. Given the potential impact of these changes and the risks they pose to infrastructural limits and operational capabilities of the many DoD facilities in the region, the DoD requested an



evaluation of the changes in extreme weather during the late summer. Dr. Christopher Castro from the University of Arizona and his team led a SERDP-funded project that evaluated how warm season extreme weather events in the Southwest will change with respect to occurrence and intensity. [MORE](#)

## CHARACTERIZATION OF THE FATE AND BIOTRANSFORMATION OF FLUORO-CHEMICALS IN AFFF-CONTAMINATED GROUNDWATER AT FIRE/CRASH TESTING MILITARY SITES (ER SERDP POY)

Per- and polyfluoroalkyl substances (PFASs) are common contaminants at sites where aqueous film-forming foam (AFFF) was used. Currently, the understanding of the composition of individual PFASs and their precursors in AFFF formulations and their impact on priority pollutant biotransformation is limited. Dr. Jennifer Field from Oregon State University and her team led a project that aimed to fully delineate the PFASs that persist in AFFF-contaminated groundwater, sediment, and soil and evaluate their impact on priority pollutant biotransformation. The study developed analytical tools and provided analytical advances for a more complete characterization of AFFF

contaminated media. During the course of the project, over 50 classes of PFASs, comprised of several individual homologs, were identified. [MORE](#)



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### COUPLING GEOTHERMAL HEAT PUMPS WITH UNDERGROUND THERMAL ENERGY STORAGE (EW ESTCP POY)

Conventional Geothermal Heat Pumps (GHP) Heating, Ventilating and Air-Conditioning (HVAC) systems are considered one of the most efficient active HVAC systems. However, conventional GHP ground-source designs are susceptible to performance deterioration in applications where annual heating and cooling loads are imbalanced. In facilities that are cooling dominant, this load imbalance can



lead to higher supply-water temperatures over time and cause the operating efficiencies of the water-cooled GHP to decrease. Mr. Charles Hammock from Andrews, Hammock & Powell, Inc. and his team demonstrated the performance and savings of an innovative system design, which couples a GHP system with underground thermal energy storage (UTES). This system demonstrates higher energy savings not only by capturing the waste heat of cooling systems and the waste cool of heating systems, but also by capturing out-of-season winter's "cold" or summer's "heat," if needed, in cooling-dominated or heating-dominated buildings, respectively. [MORE](#)

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### ZIRCONIUM OXIDE PRETREATMENT FOR MILITARY COATING SYSTEMS (WP ESTCP POY)

Finishing-systems for military vehicles require pretreatments that enhance adhesion and provide resistance to corrosion. Current treatments contain toxic metals, or require a sealer or other rinse products that contain toxic metals. To address this issue, Mr. Fred Lafferman and his team at the U.S. Army Research Laboratory demonstrated a zirconium pretreatment technology as a replacement for existing aluminum and steel pretreatments at military depots. This technology provides an alternative to both zinc phosphate with chromate post-rinse for ferrous substrates, or hexavalent- and trivalent-chromium-containing etch-primers and conversion coatings for aluminum substrates. Demonstrations were conducted at Anniston Army Depot, Letterkenny Army Depot, and at Marine Depot Maintenance Command-Production Plant, Albany. [MORE](#)



## DEVELOPMENT OF BLAST-BARGE TECHNOLOGY FOR UNDERWATER MUNITIONS DEMOLITION (MR ESTCP POY)

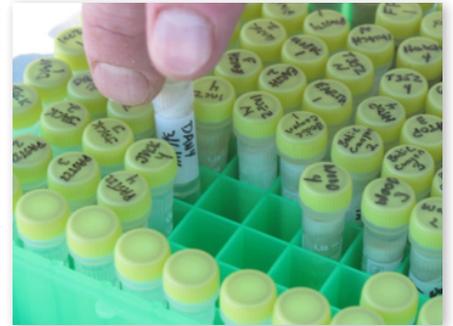
Disposal of underwater unexploded ordnance (UXO) encountered during a munitions response is commonly conducted using two primary methods: tow-to-shore and blow in place. Tow-to-shore operations require evacuating the surrounding area, and endanger DoD personnel who handle and transport UXO. Blow in place or in situ remediation of underwater UXO exposes the marine environment to potential damage, and is not allowed at many remediation sites. Mr. Timothy W. Shelton from the U.S. Army Corps of Engineers, Engineer Research and Development Center (ERDC) and his team developed and demonstrated a mobile blast barge system to provide improved remediation options to DoD personnel. The system consists of a blast box that can withstand the blast environment created during UXO disposal fitted to a standard barge. The blast barge system can be constructed using commercially-available parts, is reusable, and is easily transportable to various locations. [MORE](#)



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## ENVIRONMENTAL DNA AS A TOOL FOR INVENTORY AND MONITORING OF AQUATIC VERTEBRATES (RC ESTCP POY)

At least 22 at-risk amphibian species and over 40 at-risk fish species are known to inhabit DoD waters and lands. Detection of amphibian and fish species using conventional survey methods is not always possible. For these elusive species, lack of reliable monitoring data can lead to an underestimate of the species' distribution. An efficient alternative to traditional field surveys is the use of environmental DNA (eDNA)



to detect species presence. Animals shed cells containing their DNA into the environment regularly (through the shedding of skin, mucous, and excrement). By sampling this shed DNA, researchers can infer a species' presence in the sampled environment using existing genetic methods. Dr. Alexander Fremier from Washington State University and his team led an ESTCP-funded project that demonstrated the effectiveness of eDNA techniques for monitoring sensitive aquatic vertebrate species and their invasive threats at three DoD installations. [MORE](#)

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## 1,4-DIOXANE REMEDIATION BY EXTREME SOIL VAPOR EXTRACTION (XSVE) (ER ESTCP POY)

1,4-Dioxane, a cyclic diether used as an additive in chlorinated solvents is a common and persistent groundwater contaminant. While conventional soil vapor extraction (SVE) can remove some 1,4-dioxane, a substantial residual source is left behind causing long-term groundwater contamination. Due to the compound's complete miscibility in water, 1,4-dioxane becomes sequestered in

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the vadose zone pore water which serves as a long-term source of groundwater contamination. Dr. Rob Hinchee from Integrated Science & Technology, Inc. and his team led a project that aimed to evaluate and demonstrate the efficacy of enhanced or extreme soil vapor extraction (XSVE) designed specifically to remove 1,4-dioxane from the vadose zone by incorporating enhancements such as increased air flow, increased temperature and focused vapor extraction. A screening-level mass and energy balance model, HypeVent XSVE, was developed to simulate the remediation of 1,4-dioxane by XSVE. [MORE](#)



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## **SUCCESSFUL COMPLETION OF THE 2017 SERDP AND ESTCP SYMPOSIUM!**

The SERDP and ESTCP Symposium wrapped up on November 28, 2017, as a resounding success. Over 950 attendees representing the research, end-user, and regulatory communities participated in the insightful technical sessions and short courses, presented posters on cutting edge research, and networked with their peers. The efforts of all speakers, session chairs, and instructors was critical to the overall success of the event and was greatly appreciated.

Save the Date! The 2018 SERDP and ESTCP Symposium will be held November 27-29, 2018, in Washington, D.C. Planning for the 2018 Symposium will begin soon and details will be made available once they are finalized. The constructive feedback we received from attendees of the 2017 Symposium will help make the 2018 event even better. Many thanks to all who participated in the 2017 SERDP and ESTCP Symposium and we look forward to seeing you again next year!