

**Strategic Environmental Research and Development Program
(SERDP)**

FY 2017 STATEMENT OF NEED

Environmental Restoration (ER) Program Area

**IMPROVED STRATEGIES FOR REMEDIATING MIXED
CONTAMINANTS IN GROUNDWATER**

1. Objective of Proposed Work

The overall objective of this Statement of Need (SON) is to improve our ability to treat mixed contaminants of concern (COCs) in groundwater. To do so requires a better understanding of the synergies among different treatment technologies. The ultimate goal is to develop methods that can be used in series or in parallel to address the Department of Defense's (DoD) most commonly found COCs in commingled (or co-existing) plumes. In particular, cost-effective methods are needed to stimulate degradation processes likely to have a positive effect on other processes, and to estimate the in situ capability of sustaining the process rates over time.

Specific objectives include:

- Develop a greater understanding of the effect of intrinsic physical, chemical, and biological properties and their associated impact on contaminant behavior and fate when contaminants are present in mixtures in lower mobility zones.
- Develop a greater understanding of potential treatment synergies that could lead to cost savings and improved remedial strategies.
- Develop procedures to validate efficacy and implementability of potential treatment trains addressing mixed contamination in groundwater.
- Develop procedures to maximize benefit from treatment interactions and to provide a systematic approach for users on how to effectively identify and manage potential synergies early in the planning process.
- Develop protocols that can be used to: (1) establish achievable remedial goals, (2) assess treatment performance, and (3) estimate remedial outcome based on potential treatment synergies for the targeted COCs.

Proposals may address one or more of the objectives listed above; however, all proposals must demonstrate how the proposed research will ultimately be used to better manage remediation of mixed contaminants in groundwater. Research and development activities at laboratory-, bench-, and field-scale will be considered. Work does not necessarily have to culminate in a field-scale effort. Technologies and approaches should be applicable to a variety of hydrogeologic settings. Proposals focused on the common DoD COCs are of most interest. These include: chlorinated and non-chlorinated volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs),

metals, perchlorate, 1,4-dioxane, perfluorinated chemicals (PFCs), N-nitrosodimethylamine (NDMA) and munitions constituents. Mixtures of chlorinated compounds with 1,4-dioxane or PFCs are of particular interest, but others will be considered if the proposer can demonstrate that the mixed contamination is present and a concern at a DoD site.

2. Expected Benefits of Proposed Work

Research should lead to improved site management, specifically for groundwater sites with mixed contamination. Products should provide tools and guidance to users (i.e., Remedial Program Managers [RPMs]) on effective management options for such sites. Further, this information will be used to support cost-benefit analyses of treatment methods for the different contaminants. The resulting tools and understanding should improve the ability to implement effective remedial strategies at DoD sites.

3. Background

Mixed contaminants pose particular challenges to characterization and remediation activities, which ultimately increase remedial cost. Identifying treatment synergies amongst the different contaminants and treatment schemes could bring about savings. Regulatory prescriptions may also impact cost specifically in the cases where specific requirements may affect treatment synergy potential. Further, multiple contaminants are often subject to multiple types of treatments.

While scientific evidence supports degradation and potential destruction of some contaminants when they occur as a single source, additional research is needed to understand COC fate under conditions where other contaminants co-exist. A recent detailed review of 29 DoD sites illustrated that 59% of the sites had more than one contaminant in groundwater, often in commingling plumes. The contaminants most often found included chlorinated and non-chlorinated VOCs, PCBs, metals, inorganics, perchlorate, 1,4-dioxane, PFCs, NDMA and munitions constituents.

Developing the fundamental knowledge to understand the effect of intrinsic physical, chemical, and biological properties and their associated impact on contaminant behavior and fate when contaminants are present in mixtures in lower mobility zones is of particular interest. With limited treatment options in these low mobility zones, this is a high priority for DoD.

Further, the ultimate goals of this SON are to develop: 1) scientific protocols to maximize treatment efficiencies and 2) the scientific background needed to help guide users identify and manage potential synergies early on in the planning process. Sites with multiple COCs are challenging; therefore, planning, budgeting and setting performance goals are critical to site management.

4. Cost and Duration of Proposed Work

The cost and time to meet the requirements of this SON are at the discretion of the proposer. Two options are available:

Standard Proposals: These proposals describe a complete research effort. The proposer should

incorporate the appropriate time, schedule, and cost requirements to accomplish the scope of work proposed. SERDP projects normally run from two to five years in length and vary considerably in cost consistent with the scope of the effort. It is expected that most proposals will fall into this category.

Limited Scope Proposals: Proposers with innovative approaches to the SON that entail high technical risk or have minimal supporting data may submit a Limited Scope Proposal for funding up to \$200,000 and approximately one year in duration. Such proposals may be eligible for follow-on funding if they result in a successful initial project. The objective of these proposals should be to acquire the data necessary to demonstrate proof-of-concept or reduction of risk that will lead to development of a future Standard Proposal. Proposers should submit Limited Scope Proposals in accordance with the SERDP Core Solicitation instructions and deadlines.

5. Point of Contact

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For Core proposal submission due dates, instructions, and additional solicitation information, visit the SERDP website at www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations.