

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

FY 2014 STATEMENT OF NEED

Environmental Restoration (ER) Program Area

**IMPROVED REMEDIATION OPERATION THROUGH FINE SCALE
DELINEATION OF CONTAMINATED SUBSURFACE ENVIRONMENTS**

1. Objective of Proposed Work

The objective of this Statement of Need (SON) is to improve the operation of remedial technologies through fine-scale delineation of contaminated subsurface environments. Work may include more detailed and cost-effective techniques and data analyses and interpretation to delineate processes within either the unsaturated or saturated zones, and within either consolidated or unconsolidated media. Clear linkage between the proposed techniques and resulting data interpretation, and contaminated site management decisions should be demonstrated with the recognition that many sites are likely to have already completed initial characterization efforts, but site challenges necessitate additional investigation.

Proposed research should focus on developing technologies that address the following issues:

- Improved delineation of contaminant distribution after initial characterization activities have been conducted and while the remedial action-operation phase is in progress;
- Improved measurements of key biogeochemical processes at relevant scales; and
- Improved resolution of key hydrogeological features.

Research and development activities at laboratory-, bench-, and field-scale will be considered, but 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 that propose a new tool without clearly demonstrating how the collected data will improve site management decision making will not be considered.

2. Expected Benefits of Proposed Work

Improvements in fine-scale delineation should improve decision-making, risk analysis and remedial effectiveness, and thereby improve our ability to address contaminated sites in a cost effective manner. Techniques developed through this SON will expedite the cleanup and closure of contaminated Department of Defense (DoD) sites.

3. Background

The selection, design, and implementation of remedial technologies depend on our understanding of the extent and distribution of contaminants and their fate and transport in the subsurface. The practical limitations on our ability to delineate these characteristics of the subsurface are consistently cited as a limitation to our ability to remediate sites cost-effectively. The distribution of contaminants can be highly heterogeneous, often over very short distances. Similarly, key biogeochemical and hydrogeological features affecting contaminant fate can vary over several orders of magnitude over very short distances. This variability can lead to inaccurate estimates of degradation rates, for example, and inefficient remediation because poorly-treated areas are not identified.

Given that the DoD's Defense Environmental Restoration Program (DERP) goals call for achieving Response Complete (RC) at 90% of the Installation Restoration Program (IRP) sites at active installations by the end of FY 2018 and at 95% of these sites by the end of FY 2021, many sites have already completed the site characterization phase. However, much of the characterization effort has been conducted at a relatively large scale, primarily because of the costs of current site investigation methods. Higher-resolution mapping of the distribution of contaminants and key subsurface features will lead to more accurate site conceptual models, and a better ability to optimize existing remediation efforts, thereby yielding cost savings and improved clean-up performance through more efficient treatment.

Further, many biological and chemical reactions occur along interfaces or under specific environmental conditions, requiring finer-scale delineation to accurately evaluate those processes. These processes will become increasingly important as sites move towards reliance on monitored, or even unmonitored, natural attenuation and closure of low-risk sites. In addition, fine scale hydrogeological characterization methods may be useful to improve the understanding of hydraulic conductivity or the continuity and orientation of geologic structures, for example.

Finally, better strategies and tools are required to improve our understanding of the variability of biological and geochemical conditions, and to decide for which sites such efforts should be a priority. The level of resolution that is needed in any of the above delineation efforts to support management decisions remains a difficult question. Future research should address this question for a range of different parameters and subsequently seek to improve fine-scale measurements where they are needed.

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 \$150,000 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.