

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

FY 2021 STATEMENT OF NEED

Environmental Restoration (ER) Program Area

**IMPROVED UNDERSTANDING OF PROCESSES INFLUENCING THE
EFFECTIVENESS AND FATE OF PARTICULATE AMENDMENTS**

1. Objective of Proposed Work

The objective of this Statement of Need (SON) is to develop an improved understanding of the process influencing the effectiveness and fate of particulate amendments for in situ treatment of contaminants in groundwater. Specifically, the following sub-objectives are of interest:

- Improve understanding of the distribution of particulate amendments in heterogeneous aquifers, and the efficacy of methods to improve distribution. This would include but is not limited to an assessment of the extent and impacts of preferential flow paths, the impacts of enhancements such as fracturing, and the potential for plugging in situ.
- Assess the long-term adsorptive capacity of the amendments and the factors that may influence this capacity (e.g., co-contaminants, fermentable substrates, etc.).
- Determine the extent to which contaminants adsorbed to the amendments are biodegraded and the influence of contaminant, geochemical and microbiological factors on biodegradation kinetics and extent.
- Elucidate the long-term adsorption capacity and potential for re-release of contaminants over time.
- Determine the potential detrimental effects of these amendments, such as transport of injected amendments into local monitoring wells or reduction in aquifer permeability.
- Evaluate the extent to which these amendments influence back-diffusion of chlorinated volatile organic compounds (CVOCs).

Proposals may address one or more of the sub-objectives listed above. Research and development activities at laboratory-, bench-, and field-scale will be considered although work does not necessarily have to culminate in a field-scale effort. Contaminants of interest are those that drive the cost to complete at Department of Defense (DoD) sites and include but are not limited to CVOCs or per- and polyfluoroalkyl substances (PFAS). Proposals focused on development of new amendments will not be considered; proposed efforts should focus on commercially available amendments. Proposers must explicitly state the rationale for the selected amendment(s) of focus, as well as that for the contaminant and hydrogeological setting of focus.

2. Expected Benefits of Proposed Work

Research should lead to improved site management, specifically for groundwater sites contaminated with CVOCs or PFAS, by improving tools and guidance for applying commercially

available amendments at DoD sites. The resulting tools and understanding should improve the ability to implement effective remedial strategies at DoD sites.

3. Background

The potential magnitude of the DoD's contaminated groundwater liability requires a sustained and continuous effort to characterize, treat, monitor, and manage these sites. Many of the less complex sites have been cleaned up to some extent, while the remaining sites are often highly challenging. A number of technology vendors are now promoting in situ particulate/colloidal amendments (e.g., powdered activated carbon) designed to adsorb contaminants in groundwater, subsequently reducing their dissolved phase concentration. Biodegradable contaminants, such as CVOCs, are reported to initially concentrate on the sorptive matrix and subsequently be biodegraded by naturally occurring or augmented bacteria. The primary concern with this approach is that the technology has not yet received the scientific scrutiny needed to understand issues such as distribution of particulate amendments in aquifers, extent of preferential flow paths, long-term adsorptive capacity of the amendments, and the extent to which the adsorbed contaminants are biodegraded. There is a clear need to provide objective data to address such issues before these amendments become more widely applied at contaminated sites.

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 \$250,000 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](#).