SON Number: ERSON-13-01 **October 27, 2011**

Strategic Environmental Research and Development Program (SERDP)

FY 2013 STATEMENT OF NEED

Environmental Restoration (ER) Program Area

IN SITU REMEDIATION OF 1,4-DIOXANE-CONTAMINATED GROUNDWATER

1. Objective of Proposed Work

The objective of this Statement of Need (SON) is to seek innovative research to develop cost effective in situ remedial alternatives for 1,4-dioxane-contaminated groundwater. Consideration also must be given to common co-contaminants and how these co-contaminants impact the proposed treatment technology. Proposed research should focus on developing technologies that address the following issues:

- Develop cost effective, in situ remedial alternative to current approaches;
- Elucidate the impact of co-contaminants on the remedial process; and
- Evaluate whether remedial processes for 1,4-dioxane contamination can operate in parallel or in series with traditional treatment processes for co-contaminants.

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. Ex situ technologies will not be considered.

2. Expected Benefits of Proposed Work

Development of remedial alternatives for in situ treatment of 1,4-dioxane contaminated groundwater will improve our ability to address such sites in a cost effective manner. The improved treatment approaches that will be developed through this SON will expedite the cleanup/closure of contaminated Department of Defense (DoD) sites.

3. Background

Statement of Problem: 1,4-dioxane is used as a stabilizer for chlorinated solvents or volatile organic compounds. 1,4-dioxane has a high potential for entering the environment due to its volatility and solubility in water. Spent chlorinated solvents disposed of improperly can contaminate ground and surface water, and 1,4-dioxane has been detected in surface waters throughout the United States, as well as on DoD bases. Because of its physical and chemical properties (high solubility, low sorption), 1,4-dioxane tends to migrate in groundwater more rapidly and further than chlorinated solvents such as tetrachloroethene (PCE) and trichloroethene (TCE).

Exposure to small amounts of 1,4-dioxane may lead to significant adverse health effects. The primary routes of exposure include inhalation, ingestion, and dermal contact. The U.S. EPA has classified 1,4-dioxane as a Group B2, probable human carcinogen of low carcinogenic hazard, although they have not set a maximum contaminant level. However, several states have established guidance for 1,4-dioxane, including California (drinking water notification level of 3.0 micrograms per liter [µg/L]), Colorado (3.2 µg/L), and Massachusetts (regulatory limit of 0.3 µg/L).

Traditional processes for treating PCE and TCE contamination typically do not remove 1,4-dioxane. Current treatment approaches for 1-4-dioxane generally involve pump-and-treat of contaminated groundwater with ex situ treatment via advanced oxidation processes; however, this is a costly process. There has been some success with ex situ aerobic bioreactors; however, there is still a significant cost associated with groundwater pumping.

Complementary SERDP/ESTCP-Funded Projects: In 2005, SERDP released an SON to develop remedial alternatives for several emergent contaminants, including 1,4-dioxane. Some studies focused on developing a better understanding of microbial degradation of 1,4-dioxane, although the studies have not led to a field application of a technology. Information on these efforts can be found at http://www.serdp-estcp.org/Program-Areas/Environmental-Restoration. Development of a cost effective, in situ technology would be of great benefit at many sites throughout the country that are struggling with 1,4-dioxane contamination.

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 web site at www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations.