MODELING PREDICTIONS OF MUNITIONS PENETRATION IN A VARIETY OF SOILS

1. Objective of Proposed Work

The objective of this Statement of Need (SON) is to develop models to predict the penetration depth of common military munitions in various soil conditions to support planning for munitions response actions and subsequent risk management decisions. Factors that may affect penetration depth include the platform from which the munition is delivered, whether the munition is delivered via direct or indirect fire, the initial velocity, and soil conditions at the target area. Other factors may also play a role and should be addressed as appropriate in the proposed model.

The ultimate goal of this effort is to develop a simple, parameterized model that takes as input the appropriate initial conditions and predicts the likely and maximum depths of penetration in a range of realistic conditions.

2. Background

As a result of past military training and weapons testing activities, munitions are present at ranges on military installations and at sites designated for base realignment and closure (BRAC) and Formerly Used Defense Sites (FUDS). On many of these sites, the chosen remedy is to remove munitions from the subsurface. Modern geophysical surveying techniques can be used to characterize these sites. However, the most commonly-used electromagnetic induction sensors have a limited depth of detection that is well understood. Less well understood is the likely depth at which munitions will be found. Site managers and regulators require evidence that any munitions present are within the detection depth of the geophysical sensor in order to have confidence that the munitions of concern are detected and removed. Alternatively, this information will inform risk management decisions if the munitions are likely to reside at depths beyond the sensor’s detection capability.

It is often said that 95% of all buried objects on a munitions site are located within the top 60 cm of soil. While this rule of thumb may be valid in many cases, modeling results to support this would increase stakeholder confidence in a remediation. Although it will never be possible to completely specify the conditions used for training conducted decades ago, useful guidance could be obtained from a reliable model based on typical firing parameters and present day site conditions.
Complementary SERDP/ESTCP-Funded Projects: Currently, SERDP and the Environmental Security Technology Certification Program (ESTCP) are supporting a wide array of efforts addressing the munitions response problem. Proposers are strongly encouraged to become aware of ongoing and recent research supported by SERDP and ESTCP and to clearly articulate how the proposed work is novel or different than existing work. For more information regarding these efforts, please consult the SERDP and ESTCP website.

3. 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.

4. Point of Contact

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