

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

FY 2012 STATEMENT OF NEED

Environmental Restoration (ER) Program Area

**ENVIRONMENTAL FATE AND IMPACTS OF INSENSITIVE
MUNITIONS COMPOUNDS**

1. Objective of Proposed Work

The objective of this Statement of Need (SON) is to solicit proposals to develop an improved understanding of the environmental impacts associated with the use of insensitive munition compositions in munitions on Department of Defense (DoD) training and testing ranges. Of particular importance are understanding the dominant fate and transport mechanisms of the compounds and compositions, and understanding the potential effects on environmental receptors. Proposed research should focus on one or more of the following specific objectives:

- a. Assess the predominant fate and transport mechanisms, breakdown products, and associated reaction rates, including abiotic and biotic degradation processes, under a variety of hydrogeological conditions likely to occur in upland soils and groundwater on testing and training ranges. Specifically:
 - i. Assess the fate and transport mechanisms, breakdown products, and associated reaction rates of the individual compounds as well as the entire composition.
 - ii. Determine site-specific fate and transport mechanisms, breakdown products, and reaction rates on training ranges likely to use munitions with insensitive munitions compositions (i.e., medium, large caliber artillery, bomb and mortar training).
- b. Develop effects data for the terrestrial environment. Studies should focus on standard environmental receptors that are used to support the development of regulatory levels. Priority examples include:
 - i. Development of ecological, mammalian, and non-mammalian toxicity data.
 - ii. Determining the relationship between the environmental effects of the individual compounds versus the entire composition.
 - iii. Developing data for bio-accumulation, bio-concentration, and bio-magnification.

Proposers must document how the proposed effort addresses a clear data gap in current knowledge. The munitions compositions of interest include, but are not limited to, Picatinny Arsenal eXplosive (PAX)-21, Insensitive Munition eXplosive (IMX)-101, IMX-104, PAX-34 and PAX-48. Although these compositions use many traditional explosives materials, such as cyclotrimethylenetrinitramine (RDX), cyclotetramethylenetetranitramine (HMX) and ammonium perchlorate (AP), the munitions compounds of interest for this SON are limited to 3-nitro-1,2,4-triazole-5-one (NTO) and 2,4-dinitroanisole (DNAN). The source material itself (composition or compound) and any breakdown products are all of interest.

2. Expected Benefits of Proposed Work

The knowledge of the potential environmental impact of munitions compositions, compounds and/or their breakdown products in the terrestrial environment will assist in the assessment of potential impacts from past and future DoD activities to ensure sustainable management of DoD ranges.

3. Background

Managing the environmental risks due to military munitions requires knowledge of the potential impact of the materials used in munitions. Developing scientific information on the transport, fate, and effects of these materials that reside in the environment is essential to a complete assessment of the potential for environmental impacts and exposure at current and future military ranges and disposal sites.

The research conducted in response to this SON is intended to contribute to DoD's capacity to: 1) understand range environmental issues; 2) improve management of terrestrial environmental resources; 3) assure the long-term viability of key DoD assets; and 4) facilitate compliance with current and proposed regulations.

The Joint Insensitive Munitions Technology Program (JIMTP) has developed high-explosive compositions as replacements for trinitrotoluene (TNT) and Composition-B to increase the safety of artillery projectiles, mortars, and bombs. Four main compositions are likely to be transitioned into production in the next few years: IMX-101, IMX-104, PAX-34 and PAX-48. PAX-21 has already been fielded. These compositions consist of mixtures of compounds, including NTO, RDX, DNAN, HMX, and AP. RDX and HMX are materials well-known in the DoD and environmental community. DNAN is a relatively new material that was first fielded in the M720A1 60-mm mortar in 2004. NTO has not yet been fielded in a DoD munition, but PM-Combat Ammunition Systems (CAS) plans to field an NTO-based composition in 155mm projectiles beginning in 2012, and in several other munitions in the following years.

At this time, DoD has only developed and assessed basic information on the fate, transport, and effects of NTO, DNAN and the IMX and PAX compositions. DNAN and NTO may pose an environmental risk due to their potential for release into the environment. Further data needs to be developed to quantify the level of these risks.

Complementary SERDP/ESTCP-Funded Programs: SERDP and ESTCP have supported several projects to assess the environmental impact of munitions compounds. A brief description of these completed and ongoing projects can be found at the SERDP and ESTCP web site (www.serdp-estcp.org/Program-Areas/Environmental-Restoration). In addition, other organizations have also supported research into the environmental impact of munitions compounds in the marine and terrestrial environment. Proposers must document how the proposed effort builds on previous research and is addressing a clear data gap in current knowledge

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 are 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.