REPLACEMENT OF AMMONIUM PERCHLORATE IN TACTICAL MISSILE ROCKET MOTORS

The SEED Solicitation is a means for researchers to test a proof of concept during an effort of approximately one year.

1. Objective of Proposed Work

The objective of this SEED Statement of Need (SON) is to develop environmentally benign solid rocket propulsion technologies for tactical missile rocket motors which do not use ammonium perchlorate as an oxidizer. For the purpose of this SON, a tactical missile is defined as any missile that can be launched from a mobile platform. Currently, ammonium perchlorate (AP) is used as an oxidizer in most solid rocket propellants with no available, fielded alternatives. AP is a compound of concern due to its human health and ecological impacts.

Replacement materials developed under this SEED SON must demonstrate performance that is at least equivalent to AP-based materials used in reduced-smoke solid rocket motors. They must meet or exceed current and planned performance standards, including, but not limited to, reduced smoke emissions, density specific impulse, burn rate, insensitivity to mechanical stimuli (i.e., impact, friction, electrostatic discharge), non-detonable, and operational temperature limitations. Proposed materials should focus on the oxidizer, with the goal of developing a total fuel/oxidizer solution.

The focus of this SON is to find novel materials for replacing AP. Proposals that reformulate or slightly modify well-known, existing compounds such as ammonium dinitramide (ADN), hydroxylamine nitrate (HAN), or hydrazinium nitroformate (HNF) will not be considered. In addition, materials must have properties believed to be environmentally benign (i.e., low solubility, high vapor pressure, low toxicity, etc.). See ASTM E2552-08, “Standard Guide for Assessing the Environmental and Human Health Impacts of New Energetic Compounds” for guidance.

2. Background

Perchlorate is the main oxidizer in solid rocket propellants. It has been estimated that over 24,000,000 pounds of perchlorates are produced each year, with a large portion of it going to solid rocket production. As of March 2007, a total of 1,216 munitions were identified as...
containing perchlorate. AP is a highly persistent, mobile compound and is extremely soluble in water. It can persist for decades in ground water stores under typical conditions.

There are currently no known viable alternatives for AP as the main oxidizer in solid rocket propellants. Although alternative oxidizers exist that do not contain perchlorates, these alternatives suffer from cost, availability, stability, and performance issues which prevent them from being viable alternatives. In order to identify a viable replacement, individual tactical missile systems requirements must be considered due to the wide range of performance requirements of the entire U.S. tactical missile arsenal.

Proposers are advised to familiarize themselves with previous SERDP projects in this area. This includes WP-1403: Synthesis, Evaluation, and Formulation Studies on New Oxidizers as Alternatives to Ammonium Perchlorate in DoD Missile Propulsion Applications and WP-1404: Robust, Perchlorate-Free Propellants with Reduced Pollution. Information on both projects is available on the SERDP web site, www.serdp.org.

3. Cost and Duration of Proposed Work

To meet the objectives of this SEED SON, proposals should not exceed $150,000 in total cost and approximately one year in duration. Work performed under the SEED SON should investigate innovative approaches that entail high technical risk and/or have minimal supporting data. At the conclusion of the project, sufficient data and analysis should be available to provide risk reduction and/or a proof-of-concept. SEED projects are eligible for follow-on funding if they result in a successful initial project.

4. Point of Contact

Bruce D. Sartwell
Program Manager for Weapons Systems and Platforms
Strategic Environmental Research and Development Program (SERDP)
901 North Stuart Street, Suite 303
Arlington, VA 22203
Phone: 703-696-2128
E-Mail: Bruce.Sartwell@osd.mil

For SEED proposal submission due dates, instructions, and additional solicitation information, visit the Funding & Opportunities page on the SERDP web site: http://www.serdp.org/funding.