

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

FY 2012 STATEMENT OF NEED

Weapons Systems and Platforms (WP) Program Area

CHEMICAL AGENT RESISTANT POWDER TOPCOATS

1. Objective of Proposed Work

The objective of this statement of need (SON) is to develop a chemical agent resistant coating (CARC) based on a powder coat system that can meet the requirements of MIL-PRF-32348, (Powder Coating, Camouflage Chemical Agent Resistant) Type III for either Class 1 or 2. The primary colors to be formulated are 383 Green, 686 Tan, Aircraft Green, Black, and Brown. The powder topcoat should meet Army and Marine Corps coating requirements and should be compatible with the current pretreatments and primers used for CARC systems. The powder topcoats should also be capable of having standard water-based or solvent-based CARC topcoats applied over them. Current CARC topcoats are used by both the Army and Marine Corps for their camouflage coating system and represent a combined market volume of approximately two million gallons a year.

To meet CARC coating requirements, the coatings must provide resistance to chemical warfare agents, meet color and IR requirements, impart low gloss and sheen specularly, withstand UV degradation in both outdoor and accelerated chamber evaluations, resist decontamination solutions, and meet the conventional roster of physical testing typically conducted to validate an exterior topcoat. This SON solicits proposals to conduct research and formulate powder coatings that meet the requirements of a zero volatile organic compound (VOC), zero hazardous air pollutant (HAP) exterior topcoat conforming to the above-mentioned specification. The maximum cure temperature should not exceed 400 °F and lower cure temperatures are preferred. Application processes, cure temperatures, and cure times are expected to readily adapt to typical powder coat facilities.

A critical aspect to meet coating requirements is to have compatibility with the current pretreatments and primers used with CARC systems and permit recoating of the topcoat. The powder coating may be used over a conventional non-powder primer or at a later date may be cleaned and top-coated with a non-powder CARC. Therefore, compatibility with existing CARC systems is a top priority. It is important that the proposer look at all of the performance requirements in MIL-PRF-32348; each requirement is unique and must be met. The key to success is to meet the requirements and provide a cost effective and reproducible process for formulation and subsequent application. Surface preparation is critical in both initial and long-term performance of a powder coat and consideration of end-users is also a requirement.

Additionally the cure process and time for cure are also major variables that are key elements for consideration.

Proposals submitted in response to this SON will be considered responsive if they (1) conduct research to understand the critical balance of properties required to meet the specification, or (2) if they address both that topic and the development of new materials leading to the formulation of a robust exterior powder CARC topcoat.

2. Expected Benefits of Proposed Work

The proposed research will benefit the environment and enhance worker safety by leading to the development of a zero VOC exterior topcoat for camouflage application. The results will significantly reduce emissions and exposure from operations including original equipment manufacturers (OEMs), depot facilities, and subcontractors to OEMs.

At approximately two million gallons per year and an average of 2.6 pounds of total organic solvent per gallon, the Department of Defense (DoD) and its industrial base currently emit upwards of 5.2 million pounds (2,600 tons) of organic solvents per year from CARC topcoat application. The use of solventless powder topcoats in high production environments (e.g., depots and OEMs) has the potential to eliminate hundreds if not thousands of tons of VOCs, HAPs, and other organic solvent emissions per year.

Another significant advantage to this technology is providing superior preparation of surfaces and pretreatments prior to the primer application to support a powder topcoat. This will support DoD initiatives to reduce and/or eliminate corrosion. It will also benefit military operations by reducing the logistical burdens associated with the handling and disposal of hazardous waste since powder applications can recycle material and have zero HAP emissions. As a result of new regulations, increased costs of hazardous waste disposal, and an increased awareness of the costs associated with employees' health and safety, it has become imperative to develop viable robust coatings to minimize repainting and provide an exceptional first line of defense to DoD assets through use of protective coatings.

3. Background

The focus of the SON is the formulation and evaluation of powder coatings to meet MIL-PRF-32348. The Army Research Laboratory, who is the preparing activity for MIL-PRF-32348 and the CARC Commodity Item Manager for DoD, determined it was appropriate to put forth performance requirements for a coating that has yet to be formulated. This would afford two distinct advantages to acquire such a technology. First it would clearly delineate the necessary performance requirements and, as a formally coordinated and published specification, ensure acceptance by the broader DoD community. Second, once a coating can be validated against the specification, it can immediately be placed on a Qualified Database and be available for use by DoD, affording a rapid transition to the field. To date no vendors, raw material suppliers or independent formulators have been able to successfully meet the requirements for a chemical

agent resistant powder topcoat that can be used as an alternative to current Army CARC topcoats (MIL-DTL-53039 or MIL-DTL-64159).

While conventional powder topcoats are often very good in regard to UV resistance and chemical agent resistance, these elements suffer significantly when their gloss is reduced to levels required for camouflage CARC (no greater than one unit of gloss at 60 degrees and no greater than 3.5 units of gloss for Green and 4.0 units for Tan at 85 degrees). It is imperative to establish a sufficiently high degree of cross-linking to impart chemical and UV resistance. However, introducing matting agents or cure characteristics to impart low gloss often degrades the agent resistance below acceptable levels.

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

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 Core Proposal submission due dates, instructions, and addition solicitation information, visit the SERDP web site at www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations.