

Strategic Environmental Research and Development Program (SERDP)

FY 2022 STATEMENT OF NEED

Weapons Systems and Platforms (WP) Program Area

**CHARACTERIZING PRODUCTS FROM THERMAL DEGRADATION OF
POLYMERIC PFAS IN MUNITIONS**

1. Objective of Proposed Work

The objective of this Statement of Need (SON) is to characterize and quantify products from thermal degradation of polymeric per- and polyfluoroalkyl substances (PFAS) in munitions and develop a mechanistic understanding of such processes. Of particular interest is understanding the impact of energetic materials on the thermal degradation of polymeric PFAS as well as how varying temperatures and thermal residence times impact such degradation. It is anticipated that this work will primarily be conducted at the laboratory scale so as to provide a basis for future validation at the field scale.

There is a substantial body of knowledge on sampling and analytical methodologies for measuring thermal degradation products of PFAS. Proposers should be cognizant of such methodologies and must provide the rationale for any deviations from standard practices.

2. Expected Benefits of Proposed Work

This research is expected to provide the Department of Defense (DoD) with the data required to accurately identify combustion products generated from the use or destruction of munitions containing polymeric PFAS. Identification and quantification of products will help the DoD to assess risk and mitigate potential impacts to both human health and the environment.

3. Background

Recent concerns about exposure to non-polymer PFAS has led to concerns about exposure to other types of PFAS. For example, there have been recent efforts to evaluate the regulation of all types of PFAS [e.g., HR 535 PFAS Action Act of 2019 and a May 2020 REACH restriction proposal]. Additionally, citizen action groups have sought to bar the DoD from open burning of waste explosives containing PFAS. Research is required to address these concerns and determine the potential risk of emissions from polymeric PFAS thermal degradation products.

PFAS is used in a small percentage of energetics as binders and oxidizers, and in some military munitions for liners, o-rings, or other components. Although many of these components are routinely removed before thermal treatment, the types of PFAS that can be found in munitions can include fluoropolymers such as Teflon® (polytetrafluoroethylene or PTFE) Viton® (vinylidene fluoride and fluoropropylene copolymers), and Kel-F® chlorotrifluoroethylene/vinylidene). In

most munitions, the mass of polymeric PFAS is small, less than 0.5 pound per munition item, which complicates the detection and quantification of fluorinated thermal degradation products.

Temperatures achieved during munitions use and thermal destruction depend on many factors including the characteristics of the munitions and their energetics (e.g., density, oxygen balance, etc.), level of confinement, and the method of treatment or expenditure. Temperatures and thermal residences time required for complete or partial combustion of PFAS may depend on the type of PFAS and other factors.

While munitions can contain small amounts of polymeric PFAS, the amount and identification of thermal decomposition products from these materials used in munitions are not known. Detection and identification of fluorinated products is an extremely complex subject as there are thousands of potential compounds and a very small percentage are currently targets for analysis.

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 \$250,000 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 website](#).