

Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVAIR 2020-840

Topic # N182-121

Low-Density, Low-Volume Explosion Suppression Material for Aircraft Fuel Tanks
TDA Research, Inc.

WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA-261 H-53 Heavy Lift Helicopters

Transition Target: H-1 attack and utility helicopters, H-53 heavy lift helicopters and the F-35 Joint Strike Fighter

TPOC:
(301)342-6070

Other transition opportunities:

Notes: Shown is an example of TDA's low density ESF showing its open pores that allow the fuel to quickly penetrate the entire structure.



Copyright 2020, TDA Research, Inc.

WHAT

Operational Need and Improvement: Explosion Suppressant Foam (ESF) is used for Fuel Tank Explosion Suppression in air vehicles. ESF protects by filling the fuel tank with reticulated foam and keeps a ballistically-induced or electrical failure-induced flame front and explosion from propagating throughout the fuel tank. The Navy, as well as other branches of the military, need an innovative ESF that weighs less and displaces less fuel while still meeting the same explosion suppression performance properties as current materials. TDA's lightweight explosion suppression foam will allow military aircraft to carry more fuel for extend flight range and enhanced mission capabilities.

Specifications Required:

- Displace $\leq 1\%$ of fuel volume
- Retain $\leq 1\%$ of fuel volume
- Nominal density ≤ 0.9 lbs/CF
- Compatible with JP-4, JP-5 FP-8, commercial Jet A fuels and their additives
- Non-toxic to maintenance workers
- Easy to install and remove during routine maintenance
- 10 year lifetime
- Storage life of 3 years
- No foreign object debris can detach from material during maintenance

Technology Developed: TDA's cutting edge research makes possible the production low-cost ESF that have a 30% decrease in density and a 60% decrease in fuel displacement and fuel retention compared to current ESFs and yet still exceed the requirements for explosion suppression and durability.

Warfighter Value:

- Reduced SWaP allows for longer flight time
- Aircraft can carry larger payload
- Easier to remove and install during routine maintenance

WHEN

Contract Number: N68335-20-C-0129 **Ending on:** November 11, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Lab-scale Production of ESF	Med	Meet requirements of density, fuel displacement and fuel retention	3	November 2020
Production Scale-up of ESF	Med	Able to produce >100 CF of ESF meeting requirements	4	October 2021
Complete Qualification Testing	Med	Demonstrate that ESF meet military specifications	5	November 2021

HOW

Projected Business Model: TDA will manufacture the ESF materials and supply them to the Navy at an initial annual production rate of 10,000 CF/year starting in 2024. We expect to be able to supply ESF in-house for at least the first few years of Navy acquisition. As demand increases from military and commercial planes, we may decide to partner with larger companies to produce the materials to our specifications.

Company Objectives: TDA is actively improving its ESF compositions and scaling-up their production. We are demonstrating that they can meet the relevant military requirements to be certified for use in Navy aircraft. TDA Research will commercialize the ESF and leverage the advantages of scalable production to develop a cost-effective manufacturing process for the technology

Potential Commercial Applications: Improved ESF will allow military aircraft to carry more fuel for extend flight range and enhanced mission capabilities. This will be a benefit to all branches of the military including ships and ground vehicles. They will be a direct replacement for ESF currently used and will be transition to various systems in both DOD and civilian applications.

Contact: Steven Dietz, Principal Scientist
sdietz@tda.com (303) 887-9510