Department of the Navy SBIR/STTR Transition Program

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MCSC-PRR-4124

Topic # N181-004

Application of a Low-Cost, Flame-Resistant Treatment to the Marine Corps Combat Utility Uniform that Provides Durable, Flame-Resistant Properties

SciGenesis, LLC

WHO

SYSCOM: MARCOR

Sponsoring Program: MCCUU, FROG Tropical Clothing, MC uniforms

Transition Target: Marine Corps Combat Utility Uniform (MCCUU)

TPOC:
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Other transition opportunities: All branches of the military's soldier protection systems

Notes: Image depicts fabric treated with SciGenesis' flame retardant (FR) technology undergoing the vertical flame test (ASTMD6413)

Image courtesy of SciGenesis LLC

WHAT

Operational Need and Improvement: SciGenesis has improved the Marine Corps Combat Utility Uniform (MCCUU) to meet the operational need for an MCCUU with high flame retardancy while maintaining the operational need for durability, comfort, and camouflage.

Alternative flame retardant (FR) uniforms use expensive specialty fibers. These FR uniforms trap in air and sweat and have poor durability. They are not as comfortable and durable as the MCCUU making them less practical for combat.

Specifications Required: All specifications have been met on a lab scale level.
(A) Pass Vertical Flame Test (ASTM-D 6413) with (a1) an afterflame time of no more than 2 seconds, (a2) a char-length of less than 6 inches, and (a3) no melt/drip.
(B) Maintain FR-properties (a1-a3) after laundering (AATCC 135) at 50 laundering cycles.
(C) Treatment applicable to pre-sewn fabric and post-sewn uniforms.
(D) Minimal cost increase of approximately 10% of the current cost of an MCCUU.

Technology Developed: SciGenesis Flame Retardant Textile Treatment (SFRTT) attacks all aspects of the combustion triangle (a) heat source, (b) fuel, and (c) oxygen. The result is a flame retardant finish (passes ASTM D 6413) that withstands stringent laundering processes (AATCC 135). SFRTT (1) reduces the heat flux through the fabric, (2) converts combustible fibers into incombustible char, and (3) dilutes combustible volatiles with incombustible gases.

SFRTT(c) is proven on 50/50 nylon cotton textiles, the textile used in MCCUU. SFRTT is a proven clear finish with direct application onto an existing MCCUU as well as a proven color ink system for printing the camo pattern on textile.

Application of this technology will reduce the costs of an FR-uniform by 60%.

Warfighter Value: SciGenesis' SFRTT technology mitigates burns with no trade-off in comfort or durability to their current MCCUU.

WHEN

Contract Number: M67854-20-C-6520 **Ending on:** April 26, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Mid-scale Industrial Application to sewn MCCUUs	Med	Meets criteria set forth by ASTM D 6413 & AATCC 135; and the physical requirements set forth by the MIL-PRF-MCCUU	5	1st QTR FY22
Industrial Scale Equipment Design	Med	System capable of treating 2500 uniforms per day at 30 mmHg	6	2nd QTR FY22
Production of 100 uniforms	Low	Meets criteria set forth by ASTM D 6413 & AATCC 135; and the physical requirements set forth by the MIL-PRF-MCCUU	7	3rd QTR FY22
Stability and Shelf Life Studies	Med	1 year shelf life with maintained FR durability	7	1st QTR FY23
User Acceptance Testing	Low	Warfighter comfort/cost/protection balance approved	8	2nd QTR FY23

HOW

Projected Business Model: We will license our FR formulations to manufacturers of Marine Corps uniforms on a royalty basis. For industrial markets, we will license to finished fabric manufacturers in the US. Manufacturers using brominated FR chemicals are the highest value customers.

The US Army Natick Soldier Center projected initial use of 100,000 uniforms/yr after scale up certification. Longer term volumes of 400,000 uniforms/yr are projected. Scale up certification target is the end of 2022 with sales starting in 2023. Projected revenue for 2023 - $0.5M; 2024 - $1.0M.

The US Marine Corp projects initial use level upon certification would be 180,000 uniforms/yr. Development is expected to run through Mid-2022 with first sales expected in 2024.

Company Objectives: 1) To supply all of the US military's needs for a flame retardant nylon cotton uniform.
2) To extend the use of the technology to civilian applications.
3) To accomplish items 1 & 2 profitably.

Potential Commercial Applications: Treatment of clothing used by workers at moderate risk of burns. Commercial kitchen workers, electricians, police, and laboratory workers are examples.

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