



PROGRAM EXECUTIVE OFFICE SOLDIER

THE BEST
FOR THE BEST

Non Woven Development Overview

Advanced Planning Brief for Industry

13 May 2009

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Clothing and Individual Equipment



Briefing Topics



- Developmental Fabric
 - Non Woven Fabrics
- Summary



Army Non-Woven Fabrics



OBJECTIVE: To develop a non-woven fabric offering superior performance in both thermal and flame protective attributes using inherently fire resistance (FR) fibers while offering increased durability and comfort to the wearer

BOI: TBD

NSNs: TBD

OVERALL DESCRIPTION:

Non-woven or engineered fabrics are filament structures bonded together by highly entangling fibers into a web. These fabrics have the potential to be cost effective in production and capabilities. The Army's goal in conjunction with the Marine Corps is to develop a non-woven capability to integrate into uniform products. Non-woven fabrics possess the potential to have equal to or greater than performance than current woven fabrics with a reduction of weight and cost

ACTIONS:

- SBIR N03-162 Non-Woven Textile Technologies
- SBIR A05-188 Flame Resistant Material For Use in Protective Garment Applications
- ASTM F 1930 testing will be used to evaluate current candidates
- Down-select to 2 candidates for small LUE, anticipated for 1FY10
- Requirements for an FR non-woven uniform that is water resistant to include bodily fluids
- Long term strategy is TBD



Summary



- Joint Coordination
 - USMC participation on non-woven technology development



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Permethrin Treatment Overview

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Briefing Topics



- Requirements
 - Threat
 - Uniform types to be treated
 - Challenges
 - Calculation of dosage



- Overview





Threat



- **Threat:** U.S. military personnel deployed and CONUS

- Malaria
- Dengue
- West Nile virus
- Typhus
- Plague
- Leishmaniasis (cutaneous)
- Lyme disease
- Yellow Fever



- **Permethrin:**

- A synthetic pyrethroid that repels as well as knocks down and kills insects
- When directly applied to clothing, binds to fabric
- Safe for use



Permethrin Treated Uniforms



OBJECTIVE: To execute the permethrin treatment of combat uniforms by factory methods, this provides an increased protection from disease carrying bite insects

BOI: TBD

NSNs: TBD

OVERALL DESCRIPTION: Uniform treatment method that will provide Soldiers protection from nuisance or disease carrying arthropods

ACTIONS:

- Small scale testing has been done to verify capability
- Permethrin treated uniforms have passed FR testing
- Down select of capable treatment vendors anticipated for 4FY09
- Requirements and long-term contracting strategy TBD



Permethrin Treated FRACU



FR ACU

Approved for all Soldiers not fielded the A2CU or iCVC

Fiber Blend:
65% FR
Rayon, 25%
Para aramid,
10% Nylon

Durability: 6
months
(projected)

- Insect Protection: Provide Soldiers protection from nuisance or disease-carrying arthropods
- Initial permethrin concentration required after combat/training/garrison uniforms treatment is 0.52% w/w (weight vs. weight) (+/- 10%) which equals 0.125 mg/cm² (with a range of 0.1125 to 0.1375 mg/cm²)
- The residual permethrin in the uniform must afford at least 70% threshold (T) bite protection out to at least 50 launderings with an objective of 90% (O) residual bite protection

Uniform Types Under Evaluation



FRACU

Approved for all Soldiers not fielded the A2CU or iCVC

Fiber Blend:
65% FR
Rayon, 25%
Aramid, 10%
Nylon

ACU

Garrison
Uniform

Fiber Blend:
50% Cotton,
50% Nylon
Untreated

iCVC

Approved for
Combat
Vehicle
Crewmembers

Fiber Blend:
46% Nomex,
27% Nylon,
27% FR Cotton

A2CU

Approved for
Air Crew, Fuel
& Ammo
Handlers, EOD
and flight
Medics

Fiber Blend:
92% Para-
aramid, 5%
Aramid, 3%
P140 anti-
static carbon
fiber

ACS

Approved for
Ground troops
and Air Crew

Fiber Blend:
75% Cotton,
6% Spandex,
16% Rayon,
3% Other, FR
Treated



Challenges



- Historically the 50/50 Nylon/Cotton uniforms were treated with permethrin by 3 different means:
 - 2-gallon sprayer
 - Individual Dynamic Absorption (IDA) Kit
 - Aerosol Can
- Application on FR uniform fibers
- Factory treatment is the path forward



Calculation of Dosage



FR ACU Min/Max Fabric weight is 5.5 - 6.7oz/yd²

Registration = 0.52% W/W permethrin add-on

FIFRA Guidelines = 0.52% +/- 10% W/W permethrin add-on

Minimum:

- Add-on = 0.468% W/W
- Weight = 5.5oz/yd²
- $5.5\text{oz/yd}^2 \times 28349.5\text{mg/oz} \times 1\text{yd}^2/8361.3\text{cm}^2 \times 0.468\% = \mathbf{0.087\text{mg/cm}^2}$

Maximum:

- Add-on = 0.572% W/W
- Weight = 6.7oz/yd²
- $6.7\text{oz/yd}^2 \times 28349.5\text{mg/oz} \times 1\text{yd}^2/8361.3\text{cm}^2 \times 0.572\% = \mathbf{0.130\text{mg/cm}^2}$