

AN OVERVIEW OF THE US DoD INDIVIDUAL PROTECTION TECH BASE PROGRAM



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**Joint Service Scientific Conference
on Chemical and Biological Defense Research
17 November, 2003**

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE 18 NOV 2003	2. REPORT TYPE N/A	3. DATES COVERED -			
4. TITLE AND SUBTITLE An Overview Of The Us Dod Individual Protection Tech Base Program		5a. CONTRACT NUMBER			
		5b. GRANT NUMBER			
		5c. PROGRAM ELEMENT NUMBER			
6. AUTHOR(S)		5d. PROJECT NUMBER			
		5e. TASK NUMBER			
		5f. WORK UNIT NUMBER			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Surface Warfare Center, Panama City		8. PERFORMING ORGANIZATION REPORT NUMBER			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)			
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)			
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES See also ADM001851, Proceedings of the 2003 Joint Service Scientific Conference on Chemical & Biological Defense Research, 17-20 November 2003. , The original document contains color images.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 12	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

INDIVIDUAL PROTECTION

Investment Rationale

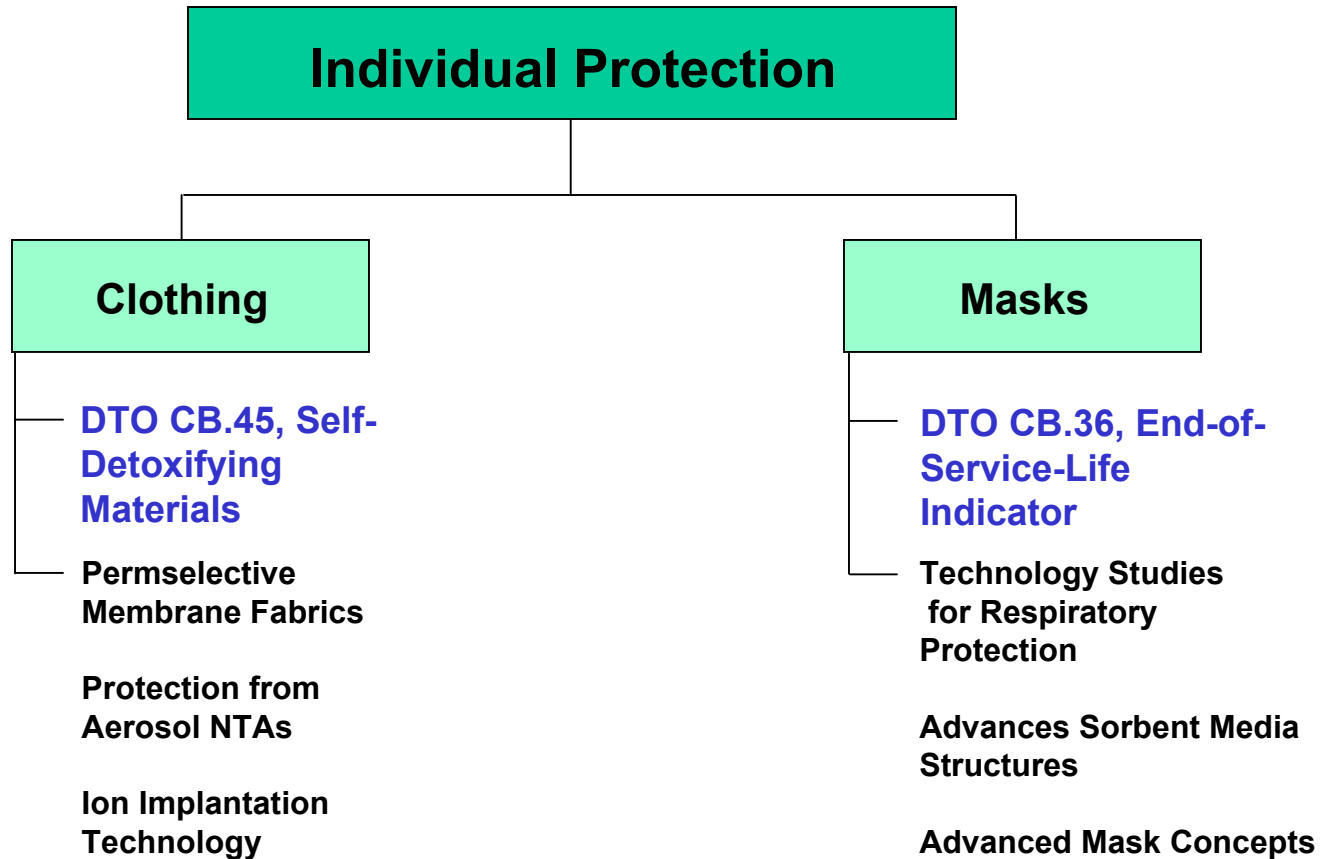
Rationale for Investment: The warfighter cannot always avoid a CBRN contaminated environment, thus, he needs the ability to perform his assigned mission at near-normal tempo in that environment.

Statement of Objectives:

- Minimize mission degradation by reducing the effects of the use of individual protection on the warfighter's performance
- Improve protection against current threats
- Add protection to address all potential threats
- Reduce logistics burden

INDIVIDUAL PROTECTION

Taxonomy



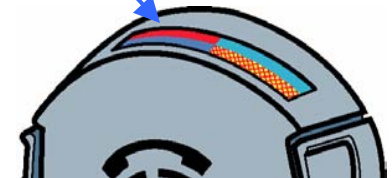
INDIVIDUAL PROTECTION

Mask Operational Context

Advanced lens system with improved vision, field-of-view, chemical resistance, and durability. (JFOC)



ESLI with improved user confidence and safety and reduced logistics. (JSGPM & JFOC)



Next generation mask system with improved protection, reduced weight and bulk, reduced thermal burden, and improved system integration. (JFOC)

Advanced filter system with improved protection and reduced breathing resistance. (JFOC)

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Mask Technology Needs

Technologies to remove the remaining TIMs and NTAs

Technologies to further reduce breathing resistance

Filters that are long-life, regenerable, or non-depleting

Sensors that indicate when TIM protection is no longer provided

Sensors that indicate when mask leakage is occurring

Advanced materials and designs that further enhance communications with individuals and interface with equipment.

INDIVIDUAL PROTECTION

Mask Technology Transitions

Mature Devt Program	Candidate Technologies (TRL)	Potential FY 6.4 transition	Major element of tech risk
Joint Service General Purpose Mask (JSGPM)	End-of-Service-Life Indicator (3)	FY05	Sensitivity to a broad range of CWA's Environmental stability Battlefield Interferents
Next Generation General Purpose Mask (NGGPM) Next Generation Aircrew Mask (NGAM)	Advanced Mask Concepts (2) Novel Sorbent Media Structures (2) Advanced Lens Materials (2) Supporting technologies (2)	FY10 FY12	Balance of increased protection, reduced breathing resistance, and improved interface with reduced weight and bulk

INDIVIDUAL PROTECTION

Clothing Operational Context

Improved system integration with suit, mask, helmet, gloves, boots, body armor, weapons, etc. (JFOC)

Reactive clothing materials with increased protection, reduced doffing hazard, and reduced logistics burden. (JFOC)



Cool, lightweight CB duty uniform based on nanofiber or membrane technology with increased mission duration and a reduced logistics burden. (JSLIST/JFOC)

INDIVIDUAL PROTECTION

Clothing Technology Needs

Technologies to address remaining TIMs and NTAs

Advanced materials to further reduce reduce thermal load

Technologies that provide a more durable garment system

Sensor that provides an indication when protection is lost

Materials for reducing garment weight and bulk

**Advanced materials and designs that improve interface with
other mission equipment**

INDIVIDUAL PROTECTION

Clothing Technology Transitions

Mature Devt Program	Candidate Technologies (TRL)	Potential FY 6.4 transition	Major element of tech risk
Joint Service Lightweight Integrated Suit Technology (JSLIST) Block II Upgrade	Self-Detoxifying Materials (3)	FY10	Identify stable, broad spectrum, fast acting catalysts
Joint Service Lightweight Integrated Suit Technology (JSLIST) Block I Upgrade	Individual Protection from Aerosols (3)	FY06	Durability of the technology Selecting technologies for fielded garments
Joint Service Lightweight Integrated Suit Technology (JSLIST) Block II Upgrade	Optimized perm-selective membranes (2)	FY10	Improving protection without increasing garment weight or thermal load

Individual Protection

DTO CB.36 End-of-Service-Life Indicator for NBC Mask Filters

Objective: To develop a low-cost, qualitative, end-of-service-life indicator (ESLI) for use in NBC mask filters capable of detecting the presence of a wide range of chemical warfare agents (CWAs).

Description of Effort: Colorimetric indicator film technology is being investigated to develop a multi-gas ESLI for CWAs. These thin-film products are coated with pH sensitive dyes and reagents that target common functional groups and/or chemical properties of the major classes of CWAs. Lead candidates are specially formulated to detect acid gases and acidic vapor by-products caused by the hydrolysis of nerve and blister agents. The approach is to incorporate the ESLI films along the inside wall of the filter next to the carbon bed so that they will react with the passing vapor wave front. A transparent window will be used to view distinctive color pattern change.

Benefit to Warfighter: DTO supports QDR Transformation Operational Goals by increasing warfighter readiness and survivability through improved protection and sustainment. Also addresses JFOC goals for unlimited respiratory protection. ESLI will provide an objective means to determine optimum time to replace filter, thereby increasing user safety and confidence in protective mask.

Challenges:

- Optimize sensitivity and placement of indicators to target a wide range of CWAs
- Environmental stability (i.e., minimize effects of interferents and temperature and humidity extremes to prolong use and storage life)
- Manufacturability (i.e., ease of integration)



Major Goals/Milestones:

FY04

- Fabricate and test ESLI filter concept model for key agents
- Evaluate effects of environmental factors (heat & humidity) and long-term storage on ESLI filter concept model

FY05

- Assess the effects of common battlefield interferents on ESLI performance
- Optimize ESLI design and conduct demonstration testing of ESLI filter prototypes
- Investigate new indicators to detect battlefield interferents

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DTO CB.45: Self-Detoxifying Materials for CB Protective Clothing

Objective:

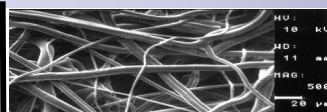
Demonstrate lightweight, self-detoxifying CB protective clothing

Description of Effort:

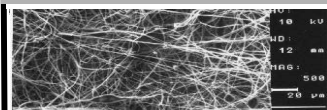
Incorporate agent reactive catalysts and biocides into CB protective fabric systems.

Demonstrate the effectiveness of incorporated catalysts and biocides to neutralize CB agents

Supports Joint Future Operational Capability 3.3.3.2 – Unlimited Percutaneous Protection.



Meltblown Liner



Electrospun Layer



Reactive Shell



Multi-Layered Garment Manufacturing Concept

Benefit to warfighter:

- Increased protection.
- In-situ neutralization of CB agents.
- Reduced hazard during doffing and disposal.
- Reduced logistics burden.

Challenges:

- Identify agent reactive catalysts which are effective in neutralizing more than one specific type of agent.
- Identify fiber and film supported catalysts and biocides which act rapidly against vapor and liquid challenges.
- Balance increased protection vs. weight.
- Add self-detoxifying capability while minimizing additional cost of fabrics/treatments.
- Meet catalyst durability and stability needs for clothing.

Major goals/milestones by FY:

- FY04: Demonstrate surface decon levels of 2mg/cm²/day.
Downselect most promising technologies
- FY05: Demonstrate reactivity stability (time, temp., use)
Optimize materials for reactivity and stability
Integrate technologies from DARPA, SBIRs, etc.
- FY06: Fabricate 1st prototype garment
Conduct both simulatant and agent testing of garment
Conduct field testing of self-detox fabric garment
- FY07: Design and manufacture optimized garment
Demonstrate optimized garment

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Leveraging of Non-CBDP Efforts

Thrust	Known OGA efforts	Extent of leveraging
Masks	ARL (Nanomaterials) ARO (Sorbents) NIOSH (Masks) AMC SBIRs (ESLI) (\$0.6M) DARPA (Sorbents) USAF SBIR (Nanocomposites)	Information exchange Information exchange Information exchange Oversight Information exchange Information exchange
Clothing	NRL (Electrospun Enzymes) DARPA (Membranes)(\$2.7M) Idaho National Environmental Lab AMC SBIRs (Reactive Materials) AF SBIRs (Reactive Materials) (\$0.6) ARO STTR-TDA, MURI-UPITT ISN at MIT	Information exchange Direct participation Information exchange Oversight Direct participation Information exchange Information exchange
Masks and Clothing	Objective Force Warrior UK, Canada, Australia, Israel, Netherlands	Direct participation TTCP-Information exchange DEA-Information exchange