INDIVIDUAL PROTECTION
Ground Ensembles

October 2007
Outline

• JPM-IP Program Overview
  – Ground Ensembles

• Program Update
  – Past
  – Present

• Warfighter Needs
  – Future

• Technical Challenges

• Acquisition Strategy/ Schedule

• Contacts
Program Overview

• The Joint Project Manager for Individual Protection (JPM-IP) is responsible for the development, procurement, fielding, and overall life cycle management of all Individual Protective equipment programs and reports to the Joint Program Executive Officer for Chemical & Biological Defense (JPEO-CBD).

• Our ultimate outcome is to deliver the best individual protective ensembles (including respiratory, ocular, and percutaneous protection) and mask test equipment to the warfighter.

• Ground Ensembles Team is the JPM-IP representative for the acquisition development, procurement and sustainment of all CBRN Individual Protection Equipment to support the ground forces.
Ground Organization

Ground Ensemble
Mr. Vic Murphy

Individual Protection Engineering Team
Mr. Jim Church

M45 - CVC
Ms. Mandi Yocum
- Engineer
  - Mr. Jon Sampson
  - Mr. Sam Carter

M40/42 - Ground
Ms. Bobbie Jo Witherspoon
- Scientist
  - Ms. Megan Hower
- Engineer
  - Vacant
  - Mr. Willie Felix
- Technician
  - Mr. David May

M48 - Apache
Ms. Bobbie Jo Witherspoon
- Engineer
  - Mr. Colin Andreas
  - Mr. Sam Carter

JSGPM/JCESM
Mr. Bill Fritch
- Deputy PM/Logistician
  - Mr. Jose Irizarry
- Lead Engineer
  - Mr. William Compton
- Engineer
  - Ms. Carol Hillen
  - Vacant
- Electronics Engineer
  - Mr. Paul Lee
- Engineering Tech
  - Mr. Gary Hiob

Protective Clothing
Ms. Danielle Fleming
- Deputy PM
  - Ms. Ru Rok
- Lead Engineer
  - Ms. Anne Barnie
- Programmatics
  - Ms. Marlene McDonald
  - Mr. Greg Upperman
- Logisticians
  - Ms. Cindy Serrano
  - Ms. Pamela Upshur
- Test
  - Ms. Angelia Carter
Program Update

• What's New ??
  – Last JPM-IP Conference 2005

• Since the last conference 5 Ground Ensemble programs have achieved successful Full Rate Production & Fielding Decisions

• Two additional programs scheduled during FY08

• Product Improvements and Performance Enhancement efforts on-going

• JPM-IP continues work with S&T community and warfighters to meet future requirements for enhanced Individual Protection capability
Current Programs
JSLIST Overgarment

Technology/Description

- A two-piece garment system composed of 50% nylon and 50% cotton poplin ripstop outer shell and interior carbon bead filter fabric liner
- 17% less heat build up, one pound less weight and 50% more wear time than legacy garment
- 120-day service life once removed from foil packaging and may be worn for a total of 45 days. The suit can also be laundered up to six times
- Universal Camouflage being implemented

Status

- Production: Active with three manufacturers
- Program buys complete
- Back ordered suits: 3,000 (PROC/O&M)
- FY07 concludes Joint procurement all future suit procurement will be Service-funded

Suit Cost: Type II and Type VII ~$270.00

Program Status

- Performance
- Test & Evaluation
- Logistics
- Cost
- Funding
- Schedule
- Contracts
- Production
- Management
- Interoperability

Funding

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Prior year as JSLIST Line
AFS / AFS-SV / IFS

System Description

• AFS: Butyl rubber CB protective overboot packaged in a vacuum sealed bag; Enhances recovery rate of issued footwear
• IFS: A CB protective sock/liner worn under standard Service combat footwear; Benefits over current CB overboots include improved traction, mobility and agility, and reduced combat load
• AFS-SV: Issued as part of the AP-PPE; provides improved operational suitability for SOF-specific missions in CB environments

Acquisition Snapshot

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Program Status

Performance
Test & Evaluation
Logistics
Cost
Funding
Schedule
Contracts
Production
Management
Interoperability

Over All Assessment

Funding

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System Description

• AFS Unit Cost ~$27.00 / pair
• AFS-SV Unit Cost ~$125.00 / pair
• IFS Unit Cost ~$35.00 / pair
JB2GU nFR

System Description

- JB2GU will provide hand protection for military personnel from battlefield concentrations of all known CB agents as part of a CB protective ensemble.

- Non-Flame Resistant (nFR) Variant: Molded glove made from compounded butyl rubber and a removable Coolmax/Lycra/Viscose protective liner.

Program Status

Performance Test &Evaluation Logistics Cost Funding Schedule Contracts Production Management Interoperability

Over All Assessment

Acquisition Snapshot

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nFR Unit Cost: $28.00 / pair
Joint Service General Purpose Mask (JSGPM)

System Description

Provide Face, Eye and Respiratory Protection from Battlefield Concentrations of CB Agents, Toxins, Toxic Industrial Materials and Radioactive Particulate Matter

Program Status

Performance  Test & Evaluation  Logistics  Cost  Funding  Schedule  Contracts  Production  Management  Interoperability

Over All Assessment

Acquisition Snapshot

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Joint Service Chemical Environment Survivability Mask (JSCESM)

System Description

Provide a lightweight/Disposable Mask that Provides 2-8 Hours of Respiratory and Face Protection Against Vapor and Aerosol CB Agents in Low Levels of Contamination

Program Status

Performance
Test & Evaluation
Logistics
Cost
Funding
Schedule
Contracts
Production
Management
Interoperability

Acquisition Snapshot

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System Description

• The JC3 is designed to provide improved percutaneous protection from CB agents and radiological particles for combat vehicle crewman.

• The JC3 is a single piece, four times launderable, lightweight, flame resistant, garment that can be worn for 30 days and provide CB protection over a 16-hour minimum mission duration.

Program Status

Performance
Test & Evaluation
Logistics
Cost
Funding
Schedule
Contracts
Production
Management
Interoperability

Over All Assessment

Acquisition Snapshot

Next MS: FRP, 1QFY08

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JB2GU FR

System Description

• JB2GU will provide hand protection for military personnel from battlefield concentrations of all known CB agents as part of a CB protective ensemble

• Flame Resistant (FR) Variant: A combination outer NOMEX® / leather glove and inner CB protective liner

Program Status

Performance
Test & Evaluation
Logistics
Cost
Funding
Schedule
Contracts
Production
Management
Interoperability

Acquisition Snapshot

Next MS: FRP/MR 4QFY08 (FR)

Document Title | Status
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Clarification Ltr | Jan 04
MS B ADM | Apr 04
MS B APB | Apr 04
FRP APB | Jul 08
FRP SAMP | Mar 07
TEMP | May 05
SEP | Mar 07
PESHE | Feb 07

Funding

| $K | PRIOR | FY07 | FY08 | FY09 |
--- | --- | --- | --- | ---|
PROC | 0 | 0 | 1,914 | 2,029 |
RDT&E | 6,862 | 0 | 0 | 0 |

FR Unit Cost: ~$58.00 / pair
Warfighter Needs
Warfighter Needs

• Respiratory/Ocular Protection
  – Protection Against Toxic Industrial Chemicals/Materials (TICs/TIMs)
  – Improved Seals/Integration with Suit/Helmet
  – Residual Life Indicator
  – Operate at Higher Flow Rates
  – Longer Life, Lighter and Smaller Filters

• Vision & Comfort
  – Reduced Lens Distortion
  – Increased Field of View
  – Reduced Lens Fogging
  – Minimize Physiological Burden
    • Heat stress & sweat management
Warfighter Needs (Cont’d)

• Percutaneous
  – Cooler System (Lightweight, More Breathable Materials, Increased Water Vapor Transport Properties)
  – Integrate Protection into Duty Uniform
  – Improve Protection Around Areas of Integration
  – Increased Protection (TIC, TIM, Aerosol, etc.)
  – Residual Life Indication
  – Low Cost Flame Retardant Materials
  – Self-Detoxifying Materials
Warfighter Needs (Cont’d)

Footwear
• Boots - Common Combat Footwear with Integral Chem/Bio (C/B) Protection
• Socks - Self Detoxification

Gloves
• Improved Protection (TIC, TIM, Aerosol, etc.
• Integrated Closure Technology
• Better Tactility & Dexterity
• Improved Breathability
• Self Detoxification
Path Forward to Address Warfighter Needs
Path Forward
Enhanced Filtration

• SPIRAL Development Using Modernization Through Spares to:
  • Lower Breathing Resistance
  • More TIC Protection and CWA Protection at Higher Breathing Rates
  • Lower Cost
  • Smaller Size
  • Residual Filter Life Indicator

Once technology demonstrates a significant military benefit in accordance with an operational context and/or significant cost decrease it will be incorporated into production
Path Forward

Current
5 minutes protection for 19 of the 21 TICs

Desired
24 hours protection for all TICs

2007
Test and Evaluation

2020
Test and Evaluation

FASQ
Mature Technology

BA07PRO104
Maturing Technology

Discovery Science

Advanced Super Adsorbents

New Media

New Bed Designs
Path Forward
Mature Technology

• NIOSH Filter
  – Calgon’s Nickel Chloride/ASZM-TEDA Blend
  – Calgon’s EUMC
  – 3M’s Broad-Spectrum Carbon
Path Forward
Mature Technology

Option #1:
Decrease required CWA protection capacity, allowing for more room in the primary filter configuration

Option #2:
Increase the bed depth of the filter, allowing for higher capacities of blended and/or layered sorbents

Option #3:
Increase the surface area of the filter, effectively lowering the airflow velocity while increasing sorbent volume
Path Forward
Maturing Technology

• Bed Designs
  – Layered Beds
  – Supported Beds
  – Carbon Monoliths
  – Finishing Layers

• New Media
  – Zeolites
    • m-BF-38 (EtO, NH$_3$, basic gases)
    • KRM-623 (NO$_2$, HNO$_3$)
  – 3M CO Catalyst
Path Forward
Maturing Technology

• End of Service Life Indicators/Residual Life Indicators
  – TIC Life Indicator

• Particulate Filtration Technology
  – Electrostatic Technology
Path Forward
Discovery Science

• Super Adsorbents
  – Porous Coordination Polymers (PCPs)
  – Metal-Organic Frameworks (MOFs)
  – Carbon Nanotubes
  – Porous Metal Oxides
  – Framework-substituted Nanoporous Aluminosilicates
  – Carbon-silica Composites
**Objective:** Develop integrated filter concepts for the Next Generation General Purpose Mask (NGGPM) incorporating novel sorbents embedded in supported structures and advanced particulate media.

**Description of Effort:**
- Identify candidate novel sorbents through adsorption equilibria, kinetics and breakthrough behavior.
- Engineer composite supported structures encompassing multiple functional removal mechanisms.
- Identify, T/E media for particulate and biological removal.
- Mature manufacturability of supported structures and particulate media.
- Integrate optimal sorbents, particulate media & design breadboard filters for T/E.

**Benefits of Proposed Technology:** Integrated filters offering broad spectrum protection against CWA’s, TIC’s, particulates and biologicals with reduced encumbrance and cube.

**Challenges:**
- Extend protection range while reducing filter size & airflow resistance.
- Identify sorbents with increased reaction capacities for broad spectrum protection.
- Integration of novel sorbent/particulate media.
- Manufacturability of consistent materials.

**Maturity of Technology:** TRL 2

**Capability Area:** Protection

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**Flex-c Web**

**Electret**

**Electrospun Nanofibers**

**Novel Functional Sorbents**

**Major Goals/Milestones by Fiscal Year**
- Supported structure model development and mature sorbent identification
- Mature manufacturing techniques
- Fabricate, T/E integrated design(s)
Path Forward
Challenges

• TIC Protection
  – Nitrogen Dioxide, Ethylene Oxide, and Carbon Disulfide protection
  – Prioritization
  – Definition of threat

• Compact Size

• Manufacturing Processes

• Tradeoffs (Breathing Resistance Vs. Size Vs. Protection Vs. Cost)
Lightweight Chemical-Biological Protective Garment (LCBPG or new name)

October 2007
What is the LCBPG?

The LCBPG will be a Short Duration, Lightweight Chemical / Biological (CB) Protective Garment; Desired Attributes Include:

- Lightweight, lower bulk
- Decreased thermal burden
- No laundering
- Reduced Challenge Level
- 2-4 Day Duration
- Reduced Volume / Package Size
- Meet SOF-Specific Mission Profiles
- Improved Operational Suitability
- No laundering
- Decreased thermal burden

The LCPBG must interface with all existing Respiratory, Hand-Wear, and Footwear Items, and be compatible with MOPP Exchange / Contaminated Doffing and Protective Ensemble Decontamination Doctrine.

Low Unit Cost is Highly Desired
Requirement

• LCBPG System Requirements were Revalidated by U.S. SOCOM in June 2005 and Clarified in June 2007

• A Stand-Alone Capability Production Document (CPD) is currently in Staffing
Acquisition Strategy

• Full Scale R&D or Modified COTS/NDI?
  – Funding and Schedule for Full Scale R&D Unlikely
  – Significant CB Material Advances Since JSLIST Type VII Development Supports Modified COTS/NDI

  

 Modified COTS Strategy Best Meets Readiness Timeline

• Responses to April 2007 Request for Information (RFI) Demonstrated Material Technologies Exist with:
  – Likelihood of Meeting Shorter Duration / Lower Liquid Threat Requirements
  – Lighter-Weight, Lower-Bulk Requirements
  – Rapid Application of Material to LCBPG While Maintaining Design Concept Similar to JSLIST Type VII Suit

• Future IP Programs (i.e., JCE) Can Leverage LCBPG Data Package to Facilitate Revolutionary Development
Contracting Strategy

• FAR Part 12 Full and Open Competition

• Acquire Samples from Each Offeror and Down-Select on Technical Challenges

• Base Contract Awarded for DT II and OT Quantities

• Contract: Firm Fixed Price (FFP) Indefinite Delivery / Indefinite Quantity (ID/IQ)
  – Natick Would be Contracting Office
  – Base Year Plus 4 Option Years
  – Production CLINs Built into Contract
Test Strategy

• Phase I: Initial Evaluation (Pass/Fail)
  – Chemical Protection Data
  – Weight / Volume
  – Thermal Burden
  – Garment Design Concept
  – General Compatibility / Suitability

• Phase II: Combined Developmental Testing / Operational Testing (DT/OT)
  – Complete Physical Properties Testing
  – Human Factors Testing
  – Chemical Agent Testing on New and Worn Materials
  – Integration with Existing Equipment
  – Full-Range of Compatibility Testing
  – System Testing – Aerosol, MIST
Supportability

- Sustained Through Replacement
- No Impact on Manpower or Facilities Over Existing Ensembles
- No Additional Training or Training Support Required Over Existing Ensembles
- No Support Equipment Required
Summary

• The LCBPG Will Provide Capability Enhancement to the Warfighter
  – Estimated Quantity ~ 200,000 Suits
  – Currently LCBPG is a U.S. SOCOM Requirement with Potential for Joint Service Interest

• RFI Indicates Material Technologies Exist to Meet LCBPG Performance Requirements

• Modified COTS Strategy, Full and Open Competition, Phased Testing Approach, and No Additional Supportability Requirements Over Existing Ensemble

• Future IP Programs (i.e., JCE) Gain Ability to Leverage LCBPG Data Package Enabling Potential Revolutionary Development
Program Acquisition Strategy

Next generation protective ensemble:
- Cool & Lightweight
- CB Protective
- Standard duty uniform
- Increased mission duration
- Reduced logistics burden
- Fully integrated w/ mask, boots, gloves, helmet, body armor & weapons
- Reduced doffing hazard
## Upcoming Business Opportunities

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<th>Description</th>
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| JSLIST Lightweight Chem/Bio Protective Suit | • RFI released March 2007  
• RFP release July 2008                        | FY08 |
| Joint Chemical Ensemble         | Next Generation Protective Ensemble                         | FY10 |
Ground Ensemble Points of Contact

- **Ground Ensemble Lead**
  - Mr. Victor Murphy
  - (703) 617-2413
  - victor.murphy@usmc.mil

- **Mask PM (Legacy)**
  - Mr. James Church
  - (410) 436-5868
  - jim.church@us.army.mil

- **JSLIST PM**
  - Ms. Danielle Fleming
  - (703) 617-2411
  - danielle.fleming@usmc.mil

- **JSGPM/JSCESM PM**
  - Mr. Bill Fritch
  - (410) 436-6652
  - william.fritch@us.army.mil
Questions?