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
  - Engineer — Ms. Cindy Learn
  - Engineer — Mr. Sam Carter
- **M40/42 - Ground**
  Ms. Bobbie Jo Witherspoon
  - Scientist — Ms. Megan Hower
  - Engineer — Vacant
  - Engineer — Mr. Willie Felix
  - Technician — Mr. David May
- **M48 - Apache**
  Ms. Bobbie Jo Witherspoon
  - Engineer — Mr. Colin Andreas
  - Engineer — Mr. Sam Carter

JSGPM/JSCESM
Mr. Bill Fritch

- Deputy PM/Logistician — Mr. Jose Irizarry
- Lead Engineer — Mr. William Compton
- Engineer — Ms. Carol Hillen
- Engineer — 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
- Logistician — Mr. Greg Upperman
- Programmatics — Ms. Cindy Serrano
- Logistician — 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*

Program Status

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

Funding

$K	FY06	FY07	FY08	FY09
PROC	19.9	5.6	0	0
RDT&E	0	0	0	0

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

Program Status

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

Over All Assessmen

Acquisition Snapshot	
Next MS: N/A	
Document Title	**Status**
AFS/IFS Clarification Ltr	Feb 04 / May 04
IFS FRP ADM	Nov 06
AFS FRP ADM	May 07
AFS/IFS APB	May 07

Funding

$K	PRIOR	FY07	FY08	FY09
PROC	0	10,410	10,223	12,015
RDT&E	7,035	0	0	0

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

JB2GU nFR

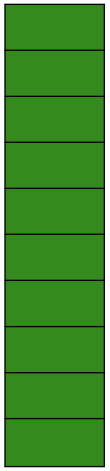
System Description

- 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 Assessmen

Acquisition Snapshot	
Next MS: N/A	
Document Title	**Status**
Clarification Ltr	Jan 04
MS B ADM	Apr 04
FRP ADM	Mar 07
MS B APB	Apr 04

Funding				
$K	**PRIOR**	**FY07**	**FY08**	**FY09**
PROC	0	4,926	6,137	7,170
RDT&E	6,862	470	0	0

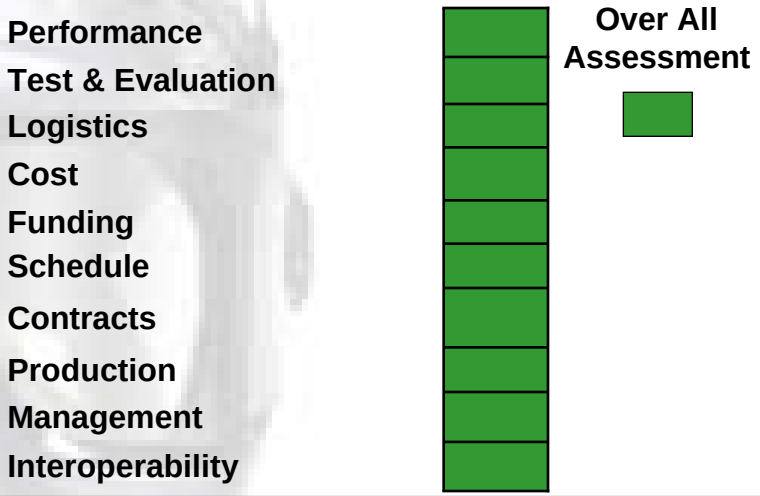
nFR Unit Cost: $28.00 / pair

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



Acquisition Snapshot

JSGPM CPD	Dec 2005
FRP ADM	Oct 2007
FRP APB	March 2007

Funding

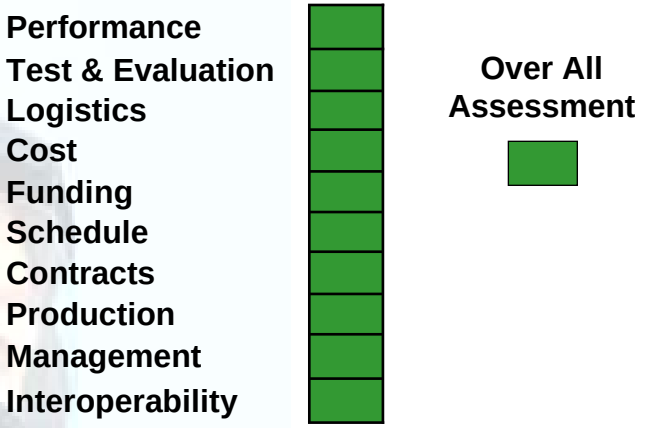
Proc	FY07	FY08	FY09	FY10	FY11	FY12	FY13
$M	24.7	42.8	43.0	42.1	42.8	44.5	49.6
QTY	84K	161K	161K	156K	159K	151K	151K

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



Acquisition Snapshot

Next MS: N/A

JSCESM MS C ORD	January 2004
FRP ADM	March 2007
FRP APB	June 2007

Funding

Proc	FY 07	FY 08	FY09
$K	12,000	600	0
QTY	104K	0	0

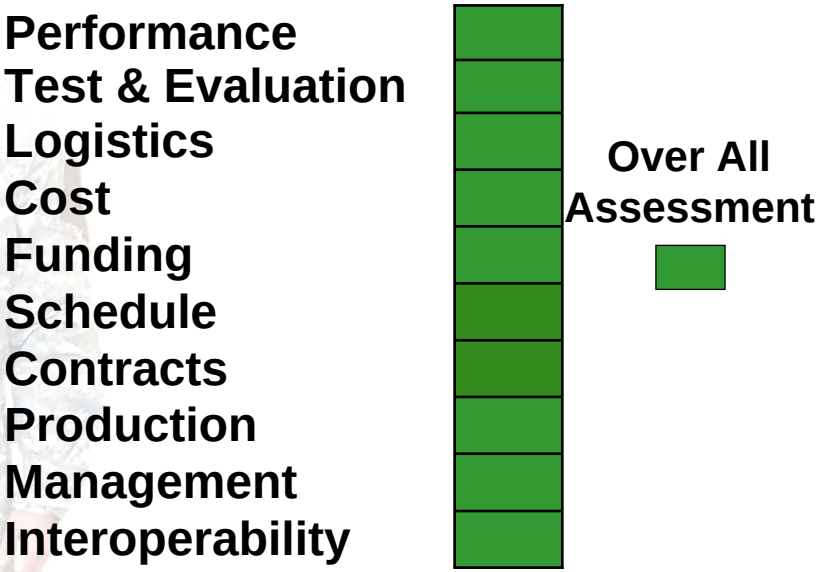
JSLIST C/B Coverall for CVC (JC3)

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



Acquisition Snapshot	
Next MS: FRP, 1QFY08	
Document Title	**Status**
JPACE CPD	Dec 05
MS C	1Q FY08
JSLIST Garment SAMP	Drafting
TEMP	Oct 05
SEP	Drafting

Funding				
$K	**FY06**	**FY07**	**FY08**	**FY09**
PROC	0	0	11,741	8,944
RDT&E	0	0	0	0

Quantities			
USA	0	8,851	7,871
USMC	0	3,706	1,695

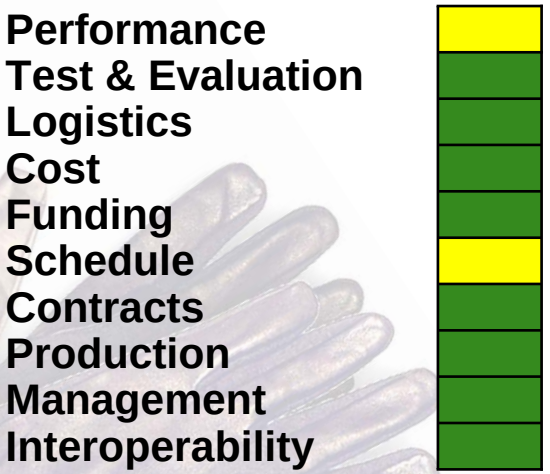
JB2GU FR

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



Acquisition Snapshot	
Next MS: FRP/MR 4QFY08 (FR)	
Document Title	**Status**
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

2007 → 2020

Desired
24 hours protection for all TICs

Test and Evaluation

Test and Evaluation

Test and Evaluation

Test and Evaluation

FASQ

BA07PRO104

Mature Technology

Maturing Technology

Discovery Science

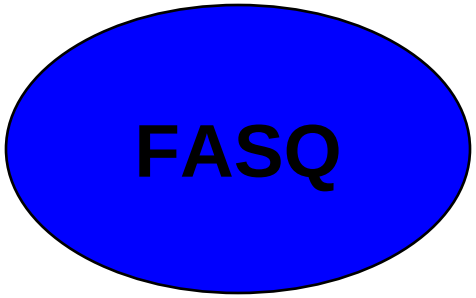
New Media

New Bed Designs

Advanced Super Adsorbents

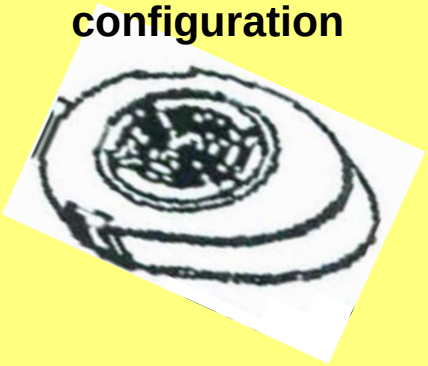
Path Forward
Mature Technology

- **NIOSH Filter**
  - **Calgon's Nickel Chloride/ASZM-TEDA Blend**
  - **Calgon's EUMC**
  - **3M's Broad-Spectrum Carbon**



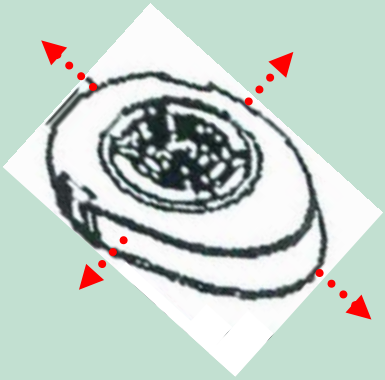
Path Forward
Mature Technology

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



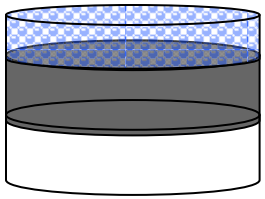
Option #2:
Increase the bed depth of the filter, allowing for higher capacities of blended and/or layered sorbents

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**

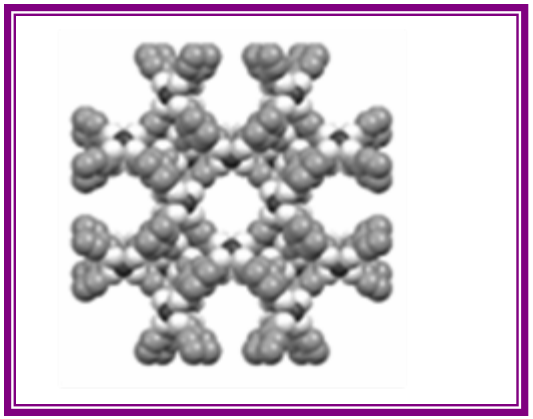


Path Forward
Maturing Technology

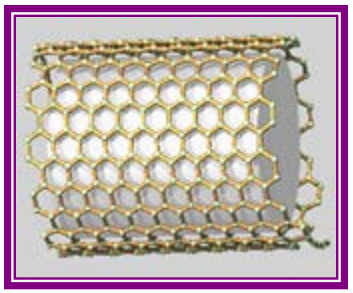
- **End of Service Life Indicators/Residual Life Indicators**
  - **TIC Life Indicator**
- **Particulate Filtration Technology**
  - **Electrostatic Technology**

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**



Unit Cell of Cu-BTC.



Nanotubes

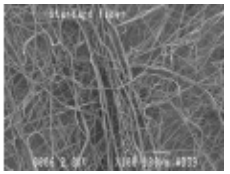
Next Generation IP Filter, BA07PRO104, Gregory W. Peterson, ECBC

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:

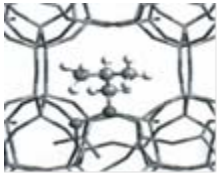
- Identify candidate novel sorbents through adsorption equilibria, kinetics and breakthrough behavior.
- Engineer composite supported structures encompassing multiple functional removal mechanisms.
- Identify, T/E media for particulate and biological removal.
- Mature manufacturability of supported structures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

Flex-c Web

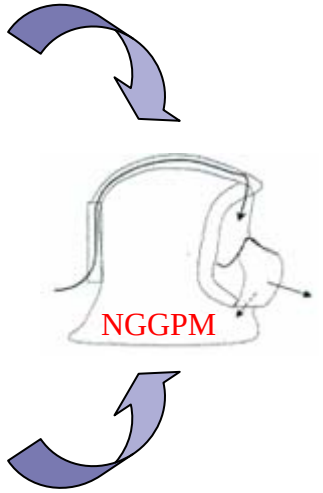


Electret

Electrospun Nanofibers



Novel Functional Sorbents



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

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

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

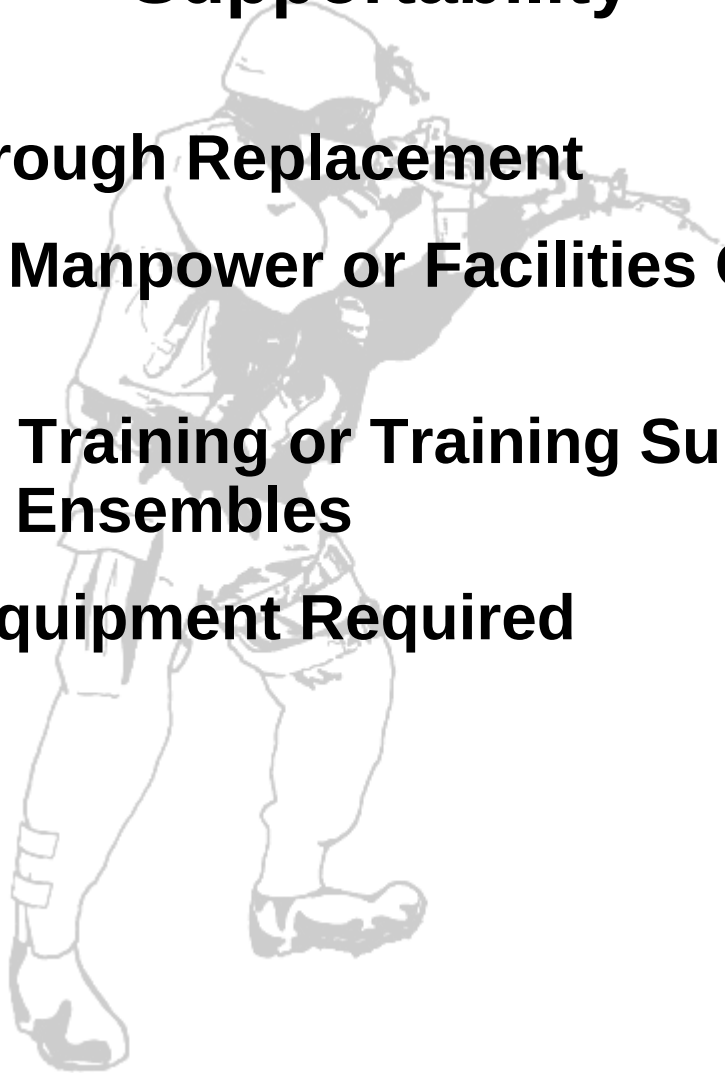
- **FAR Part 12 Full and Open Competition**
- **Acquire Samples from Each Offeror and Down-Select on Technical Challenges**
- **Base Contract Awarded for DT II and OT Quantities**
- **Contract: Firm Fixed Price (FFP) Indefinite Delivery / Indefinite Quantity (ID/IQ)**
  - **Natick Would be Contracting 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

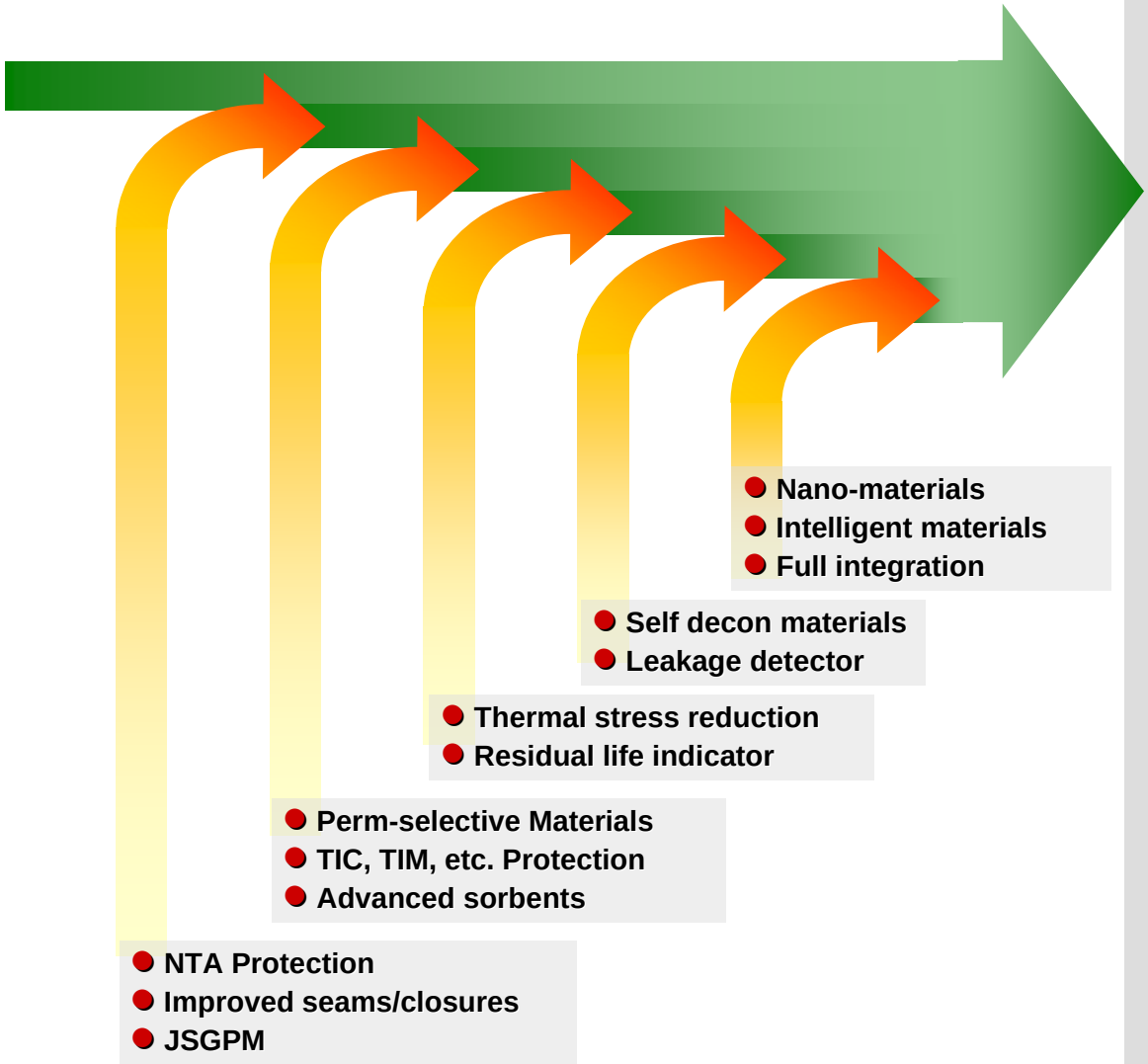
- **Sustained Through Replacement**
- **No Impact on Manpower or Facilities Over Existing Ensembles**
- **No Additional Training or Training Support Required Over Existing Ensembles**
- **No Support Equipment Required**



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



Joint Chemical Ensemble

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

Program	Description	Year
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

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- **JSGPM/JSCESM PM**
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Questions?