Contingency Basing S&T: What we need from Industry

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**Supplementary Notes**
7th Bi-Annual DOD JOCOTAS Meeting with Rigid & Soft Wall Shelter Industry & Indoor & Outdoor Exhibition, 1-3 Nov 2011, Panama City Beach, FL
Purpose of Briefing

• Update the JOCOTAS community on the current situation of Contingency Basing
• Identify the high priority Contingency Basing science and technology challenges
• Make Industry aware of the opportunities to work with DOD to address these challenges
• Initiate brainstorming and collaboration to address Contingency Basing
Outline

• Contingency Basing: Current Problem
• Results of the Current Problem
• Current Status of Contingency Basing
• Vision for the Future
• Program Overview
• S&T Focus Areas & Technical Challenges
• Program Strategy & Plan
• Summary
• Current base camp systems are focused on company level and above, forcing small combat units to **improvise the establishment of base camps** in austere environments with little to no organic resources, no construction or handling equipment, often **under enemy threat**.

• **More than 800 base camps** have been identified in theater – all of various sizes and fidelity, the majority **consisting of a combination of standard and non-standard equipment**. This equipment is typically inefficient, unreliable, cost prohibitive, not integrated of interoperable, not supportable and not environmentally friendly.
Results of Current Situation

- **Operational effectiveness, Warfighter safety and cost effectiveness suffer from the lack of holistic base camps**
- **The Tactical Small Unit is forced to establish camps and combat outposts in austere environments with little/no resources/equipment and often under enemy threat**

<table>
<thead>
<tr>
<th></th>
<th>Current State</th>
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<tbody>
<tr>
<td><strong>Water</strong></td>
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<tr>
<td>Battalion-size camp:</td>
<td>22,000 gals/day</td>
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<tr>
<td>• Consumes 22,000 gals/day</td>
<td>19,000 gal/day of gray water</td>
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<td>• 3,500 gals/day of black water</td>
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<td><strong>Power &amp; Energy</strong></td>
<td>Battalio-size camp:</td>
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<td>• Consumes 2,200 gals/day of fuel</td>
<td>1MW average power demand</td>
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<tr>
<td><strong>Waste</strong></td>
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<td>• 4,000 lbs/day of solid waste</td>
<td>Disposed in landfills, incinerators and burn pits → health and safety risks</td>
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*Excessive cost of $40-$80M per year for fuel, water, waste logistics support in theater per Force Provider 550-man module*
Status of Current Efforts

- Contingency Basing has become an Army and DOD priority
- Army Maneuver Support Center of Excellence is establishing requirements and standards for base camps
- Line of effort recently conducted to identify readily available products to increase efficiencies and effectiveness
  - Market surveys and request for information from Industry
- Multiple Communities of Practice established
  - Joint Serve, ASAALT, Army G-4, RDT&E
- Plan and preparation to being a robust S&T program starting in FY12

- Significant progress and momentum has been made, but there is still much to be done
  - Significant inefficiencies exist in base camps in the field, specifically associated with fuel consumption, water demand, waste reclamation, and manpower requirements
  - Advanced capabilities exist in technologies among Industry and Academia, yet need to be designed for Contingency Basing applications
  - Trade-offs must be made to balance capabilities with logistics, supportability and system-level impacts
**Purpose:**
To research and create integrated system designs for mission focused, relocatable and rapidly deployable base camp components and integrated holistic capabilities to enable the Tactical Small Unit operating in a wide range of environments. Harvest ongoing government and industry investments to leverage existing technologies and capabilities.

**Results/Products:**
- Integrated, open architecture that enables mission-specific plug-and-play systems optimized for protection, ease of sustainment, situational awareness and manpower requirements
- Increased survivability
- Interoperability with current and emerging mission command systems
- Novel energy & water systems for self-sustaining capabilities
- Systems analysis and modeling tools for force protection, power, water reuse, and waste reduction technologies.

**Warfighter Payoff:**
- Provide a force projection platform that is a combat enabler for the Tactical Small Unit in a broader range of operations
- Multiple threat protection integrated into a tailorable system solution
- Greater troop availability for mission operations
- Enhanced physical and cognitive performance through reducing loads on the individual
Contingency Basing S&T Overview

**Identify Needs/Gaps**
- Troop to Task Ratios
- Analyze & Prioritize Capability Gaps
  - TRADOC
  - FORSCOM
  - JCIDS

**Materiel Technology & Modeling**
- Develop Materiel Solution Concepts
  - NSRDEC
  - ERDEC/CERL
  - RDECOM

**EBC Community of Practice**
- Mature/Test Technologies, Integrate Systems
  - Community of Practice

**System Optimization**
- Optimize Designs and System Prototypes
  - NSRDEC
  - Community of Practice

**Warfighter Payoff**
- Operational Force Projection Platform Established in 24 Hours
  - 50% increased troop-to-task ratio
  - 50% reduction in fuel consumption
  - 75% reduction in water resupply demand
  - 50% reduction in waste generation

**TRADE OFFS**
- Efficiency
- Effectiveness
- Human Interface
- Technical Risk

**Force Projection Platform for the Small Combat Unit**
- PEO CS & CSS
- PEO Integration
- JPEO CBD

**Systems Approach**

**Enterprise Architecture**
Problem: Lightweight, rapidly deployable shelters do not offer Warfighters a habitable environment for optimized performance.

Objective: Enhanced Warfighter performance through increased habitability and reduced burdens.

- Technical Challenges
  - Reducing weight, packing volume and manpower requirements without sacrificing durability.
  - Optimizing for thermal efficiency and addressing thermal weaknesses such as ducting, windows, doors, etc.
  - Creating portable, lightweight materials and structures that can mimic habitability features of permanent buildings.
  - Overcoming the lack of durability and strength in high performance thermal barriers for military shelter applications.
  - Making additional features integral to the shelter, such as lights, power distribution, shading or camouflage.
  - Optimizing environmental control for efficiency and the application.
Problem: Base camps consume excessive water, which makes up 40-60% of daily resupply requirements. Base camps also generate vast quantities of grey and black water waste.

Objective: Enable a 75% reduction in water resupply requirements by providing water reclamation and water generation capabilities.

• Technical Challenges
  – Overcome the cost, high maintenance requirements and complexity of current membrane pre-treatment systems.
  – Provide the capability to measure water quality continuously.
  – Overcome the high size, weight and power requirements of water purification, reuse and generation systems.
  – Develop the ability to adapt to widely varying load conditions of feed water.
  – Establish the capability to filter micro-particles, enabling full reuse.
Problem: Base camps consume excessive amounts of fuel, requiring resupply, which increases security convoy demand and diverts Warfighter efforts.

Objective: Achieve 50% reduction in (non-vehicle) fuel consumption and provide renewable energy capabilities.

- Technical Challenges

  Supply
  - Current generator design does not allow parallel or synchronous operation
  - Improve the low conversion efficiencies and militarize alternative and renewable energy technologies
  - Reduce size and weight as well as increase energy density of energy storage solutions

  Demand
  - Lack of ability to convert waste heat to useable energy
  - High cost and manufacturing challenges of very high efficiency lighting
  - Inefficient thermal management

Shelter with Wind & Solar Power

Advanced Insulation & Lighting

PowerShade (1 - 3KW) also blocks 90% of radiant heat
Problem: Base camps produce excessive amounts of waste, which is disposed of in landfills in host nations or burned under potentially hazardous circumstances.

Objective: Reduce solid waste disposal by 50%. Use waste generated as a source of energy.

- Technical Challenges
  - Meet durability, shelf life and other requirements with less or alternative materials
  - Address the size, cost and feed stock restrictions of waste to energy technologies
  - Reduce the high power requirements of waste and waste water reduction and management systems
  - Develop modular, scalable systems
  - Eliminate health and environmental hazards
Project Plan

• Two Phase Approach
  – Phase I: Multiple Design Approaches
  – Phase II: Prototype, Demonstrate, Validate

• Notional Schedule

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<td>Evaluate Full Proposals</td>
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<td>Testing &amp; Demonstrations</td>
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Keep an eye on NSRDEC BAA and FedBizOpps
Summary

• Current state and results
• Challenge areas
  – Habitation, Water, Power & Energy, Waste
• Program Plans
  – Two phase approach addressing the challenge areas
• How you can be involved
  • Solicitation under FedBizOps forthcoming – anticipated for release by the end of Nov, 2011
  • Seeking concept papers focusing on futuristic, forward-thinking base camp technologies
  • Submission through the NSRDEC Broad Agency Announcement (BAA) (https://www3.natick.army.mil/ssbaa.html)
  • Additional details will be provided within the solicitation
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