

# ***Small Business Opportunities with the Army***

## ***Science, Technology and Requirements Forum***

***Maneuver Support Center of Excellence (MScOE)  
Fort Leonard Wood, MO  
October 17-18, 2012***

***Luke Doucette, Eric Roy, Dean Smith, Carl Tripp***



**Orono Spectral Solutions, Inc.  
A Full Spectrum Innovator.**

| Report Documentation Page                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                    |                                     |                                                                  | Form Approved<br>OMB No. 0704-0188                  |                                    |
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| 1. REPORT DATE<br><b>OCT 2012</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                    | 2. REPORT TYPE                      |                                                                  | 3. DATES COVERED<br><b>00-00-2012 to 00-00-2012</b> |                                    |
| 4. TITLE AND SUBTITLE<br><b>Small Business Opportunities with the Army</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                    |                                     |                                                                  | 5a. CONTRACT NUMBER                                 |                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                    |                                     |                                                                  | 5b. GRANT NUMBER                                    |                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                    |                                     |                                                                  | 5c. PROGRAM ELEMENT NUMBER                          |                                    |
| 6. AUTHOR(S)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                    |                                     |                                                                  | 5d. PROJECT NUMBER                                  |                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                    |                                     |                                                                  | 5e. TASK NUMBER                                     |                                    |
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| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)<br><b>Orono Spectral Solutions Inc,689 Odlin Road,Bangor,ME,04401</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                    |                                     |                                                                  | 8. PERFORMING ORGANIZATION<br>REPORT NUMBER         |                                    |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                    |                                     |                                                                  | 10. SPONSOR/MONITOR'S ACRONYM(S)                    |                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                    |                                     |                                                                  | 11. SPONSOR/MONITOR'S REPORT<br>NUMBER(S)           |                                    |
| 12. DISTRIBUTION/AVAILABILITY STATEMENT<br><b>Approved for public release; distribution unlimited</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                    |                                     |                                                                  |                                                     |                                    |
| 13. SUPPLEMENTARY NOTES<br><b>Presented at the 2012 Science, Technology &amp; Requirements Forum held 17-18 October in Fort Leonard Wood, MO. U.S. Government or Federal Rights License</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                    |                                     |                                                                  |                                                     |                                    |
| 14. ABSTRACT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                    |                                     |                                                                  |                                                     |                                    |
| 15. SUBJECT TERMS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                    |                                     |                                                                  |                                                     |                                    |
| 16. SECURITY CLASSIFICATION OF:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                    |                                     | 17. LIMITATION OF<br>ABSTRACT<br><b>Same as<br/>Report (SAR)</b> | 18. NUMBER<br>OF PAGES<br><b>25</b>                 | 19a. NAME OF<br>RESPONSIBLE PERSON |
| a. REPORT<br><b>unclassified</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | b. ABSTRACT<br><b>unclassified</b> | c. THIS PAGE<br><b>unclassified</b> |                                                                  |                                                     |                                    |

# What We Do

## RESEARCH

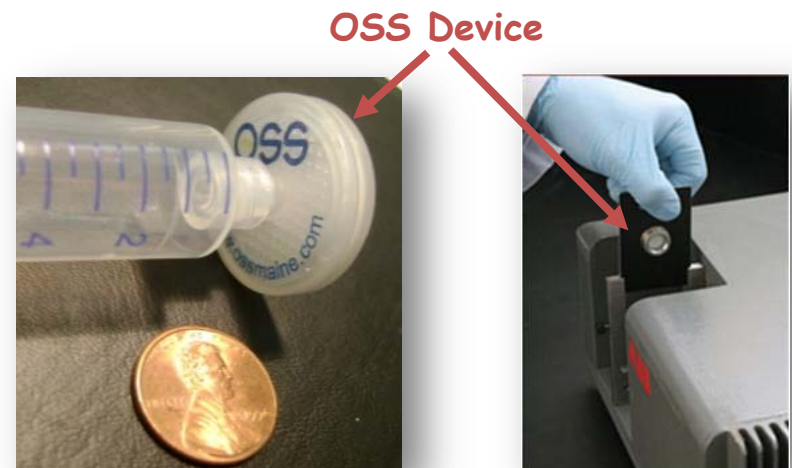
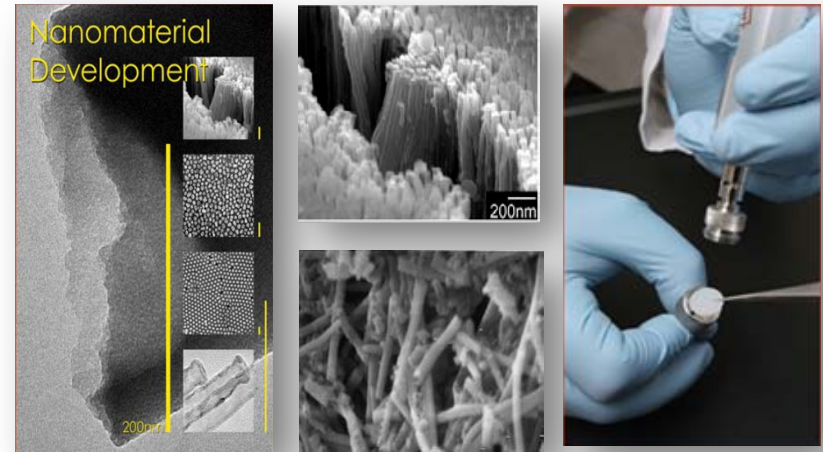
Innovate nanomaterials and sampling methods for reagentless trace detection of chem/bio agents

## DEVELOPMENT

Integration of OSS tech with optical based detection systems (IR/Raman)

## COMMERCIALIZATION

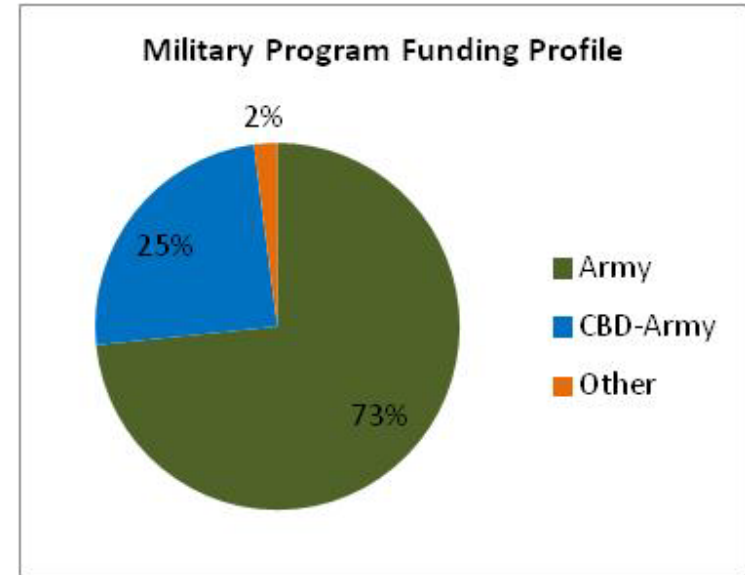
IP portfolio development leading to licensing and sales opportunities



# Doing Business with the Army

## Historically

- BAAs
- SBIRs/STTRs
- Primary Customer: S&T Army/CBD-Army



## Challenge: Commercializing S&T Funded Tech

- great ideas leading to functional prototype deliverable, but limited / no pull at end of contract
- ***Increased alignment between S&T and JPM / JRO = Commercialization Success***

## Current Strategy

- Identify and work with larger strategic industry partners
- License IP / Distribution Agreements
- Proving tech through Live Agent Testing **GREATLY** advances our business

# Live Agent Testing - ECBC



*ECBC Live Agent Testing  
Summer/Fall 2010*



*Water Sampling Kit Mockup*

## Agents in Water Successfully Tested

- Cyanide (200 ppb)
- Anthrax ( $10^4$  CFU)
- VX (50 ppm)

## Commercial Spinoff Products (2013)

- Oil/Grease in water analysis (ASTM D7575)
- Surface Sampler (sold with HazMatID™ Elite)



*Commercially Available (2013)  
For ASTM D7575 Testing*

# **Business Opportunity 1:**

## **OSS M8 Detection Paper**



# SBIR Phase I/II: US Army RDECOM – W911SR-12-C-0052

## Improved M8 Chemical Agent Detector Paper for Facilities Monitoring

*Orono Spectral Solutions Inc, Bangor, ME (www.ossmaine.com)*

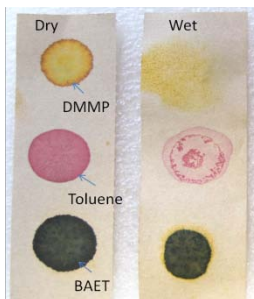


### Project Mission

To develop coatings for M8 paper that improve its robustness and rate of detection for chemical warfare agent (CWA) attacks.



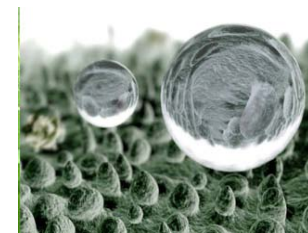
M8 Paper in the field



M8 Degraded Response



Lotus Leaf



Superhydrophobic + oleophilic material

### Innovations and Significance

- Modify COTS M8 paper with ultrathin superhydrophobic and oleophilic material coatings that provide self-cleaning and waterproofing while retaining its detection capabilities for CWA
- Mimic natural surfaces (lotus leaf) by fabricating low surface energy materials in combination with appropriate surface morphologies that increases micro/nanoscale roughness.
- Develop transduction mechanisms that integrate improved M8 paper with a self-reporting system (wireless sensor network arrays).

### Dual Use Applications

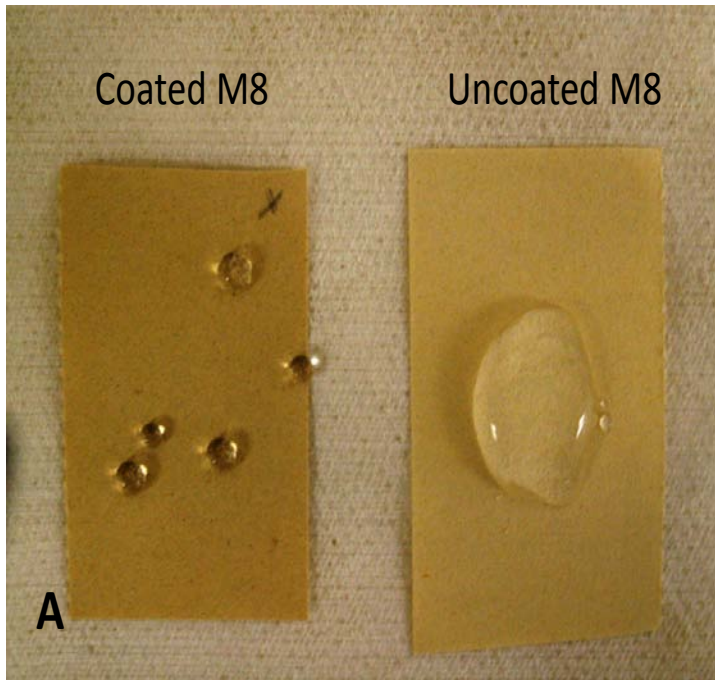
- Homeland Security
- First Responders

### PI Contact

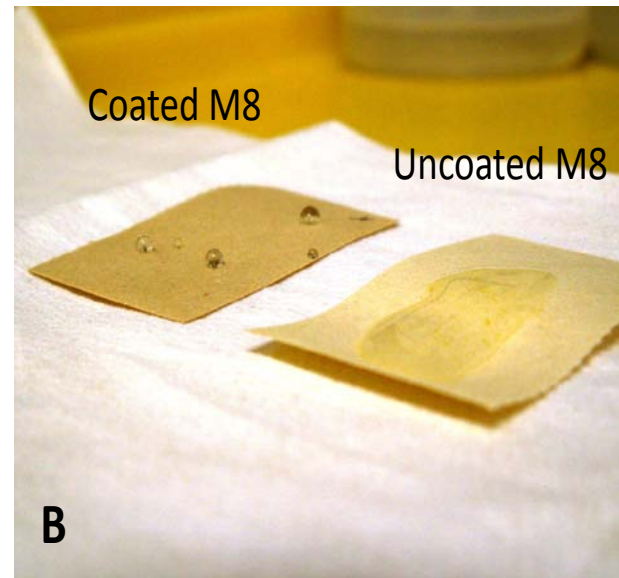
Dr. Eric Roy  
689 Odlin Road, Bangor ME 04401  
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(email) [eric.roy@ossmaine.com](mailto:eric.roy@ossmaine.com)

# Phase I Summary: OSS M8 Paper

## Waterproof Properties of OSS M8 Paper



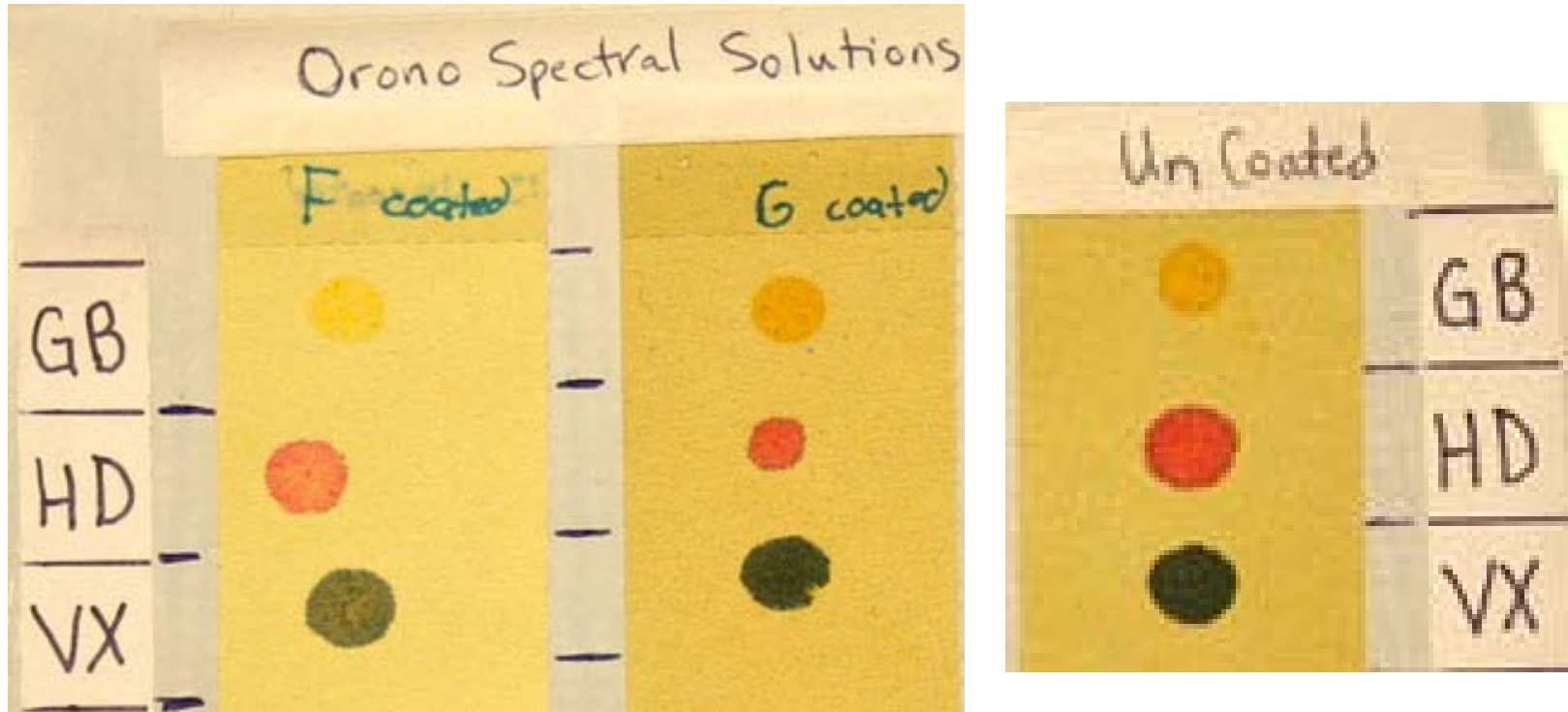
Time = 0 Minutes



Time = 30 Minutes

# Phase I Summary: ECBC Live Agent Testing

## Performance of OSS Coated M8 Paper



***Bottom Line: OSS M8 Successfully Detected CWAs***

***End Users Want this Now!***

# **Business Opportunity 2:**

## **OSS Surface Sampler**



# Multi-Agent Surface Sampler Integrated with Smiths Detection's HazMatID™ Elite Handheld Chemical Identifier

Orono Spectral Solutions Inc, Bangor, ME ([www.ossmaine.com](http://www.ossmaine.com))  
Army Contract # W911SR10C0064



## Project Goal/Product Description

To develop a simple to use multi-agent surface sampling device that is fully integrated with Smiths Detection's HazMatID Elite chemical identifier.



## Technical Innovations

- One device that is capable of collecting any chem, bio, TIC, TIM, explosive, and narcotic agent
- Successfully collects agents from any surface (plastic, metal, painted metal, roughened asphalt, concrete, ceramics, wood, vegetation, clothing, and much more)
- Collector material produces no interfering IR signature when used with ATR-IR based detectors (no changes to onboard ID algorithms)
- Collector material also being tested with Raman and IMS hardware
- Made of ruggedized material capable of withstanding harsh sampling and environmental conditions (high resistance to corrosion, temperature, shock)

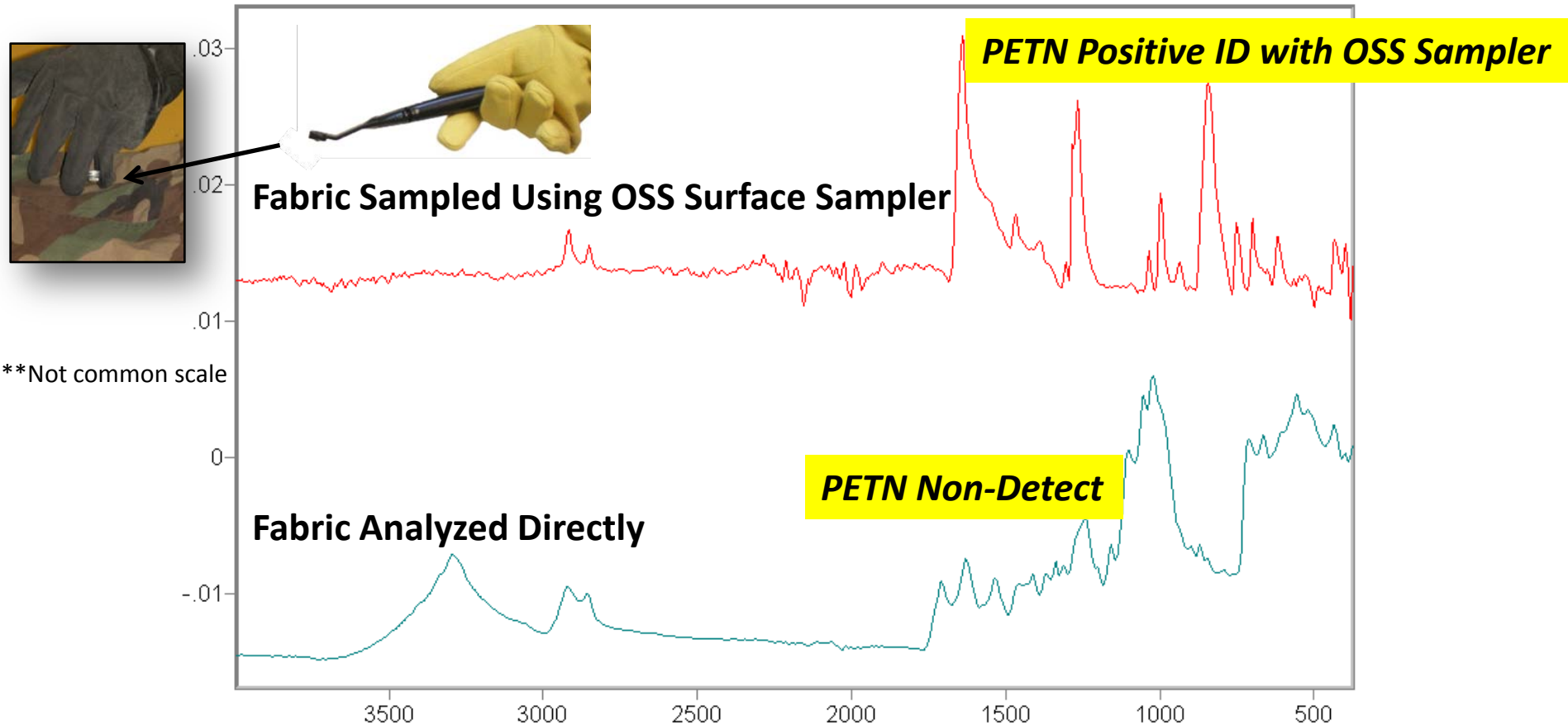
## Benefits to Warfighter/End User

- Proven technology that has been successfully tested at ECBC against live agents and NTAs on a variety of different surfaces
- Completely streamlined collection-to-identification process
- Fully integrated with known and trusted detection system hardware
- Works with any powder, liquid or chemical residue on any surface

## POC

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# Explosives on Fabric Detection



- Direct analysis of explosives on the fabric is not possible due to interferences from the fabric
- OSS Surface Sampler is capable of extracting the explosive off of the fabric and allowing for positive ID of the agent

# Live Agent Testing – ECBC



- 8 different agents *positively identified* (G, H, V, NTAs)
- 7 different surfaces (stainless steel, linoleum, drywall, Formica, asphalt, concrete)
- Current Status: Finalizing production; sale by early 2013
- Funding opportunities being sought for next-gen developments:
  - RFID tagging
  - Increased sensitivity for sub  $\mu\text{g}$  detection with HazmatID Elite
  - Single collection device for multi-instrument use (ex: Raman, IMS/JCAD, M8, pH)

# Summary

- *OSS continues to be responsive to S&T needs for new tech*
- *Alignment with S&T and JPM/JRO*  *Small Business Success Stories*

## **WHY IS THIS IMPORTANT TO THE ARMY/DOD?**

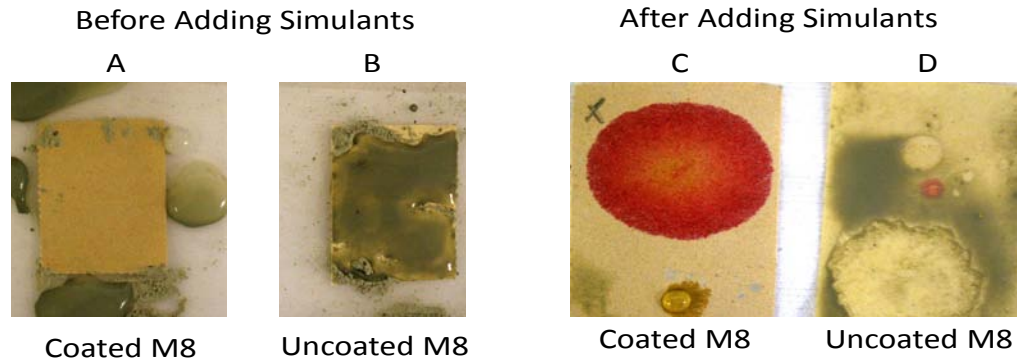
- *Respond more quickly to emerging needs/threats*  
*ex: OSS M8 developed in 6 months on a Phase I Budget!*
- *Drivers of Innovation*  
*ex: we have filed 10 patent apps. in last 5 years (6 US, 4 International)*
- *High Return on Investment (ROI)*  
*ex: basic R&D to Product ... by an 8 person company!*

# Questions?

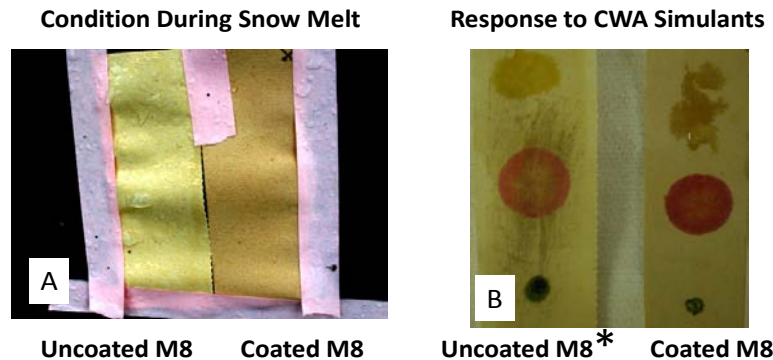
# **Back Up Slides**

# Phase I Summary: Durability Testing

## Self Cleaning Properties of OSS Coated M8



## 7 Days of Being Stuck to side of OSS facility in winter (snow melt)



\* Had to replace uncoated M8 after snow melt (paper fell apart)

## Other Tests

- 1) UV Testing: Simulated 240 hours of intense sunlight → No Change in Performance
- 2) Shelf Life: Retested First films from 13 months ago → No Change in Performance

# Phase II Planned Activities

## **Work Plan:**

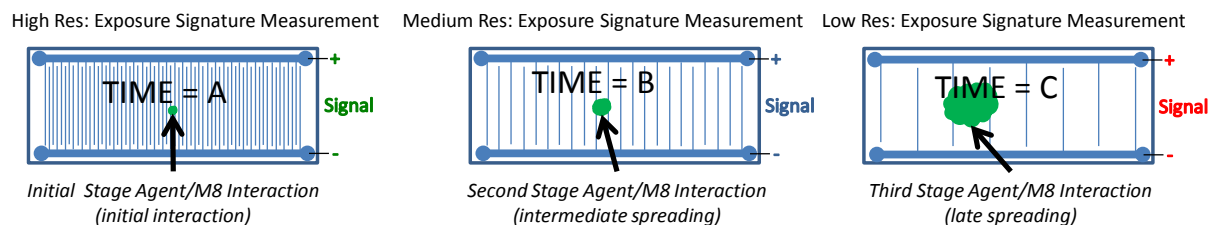
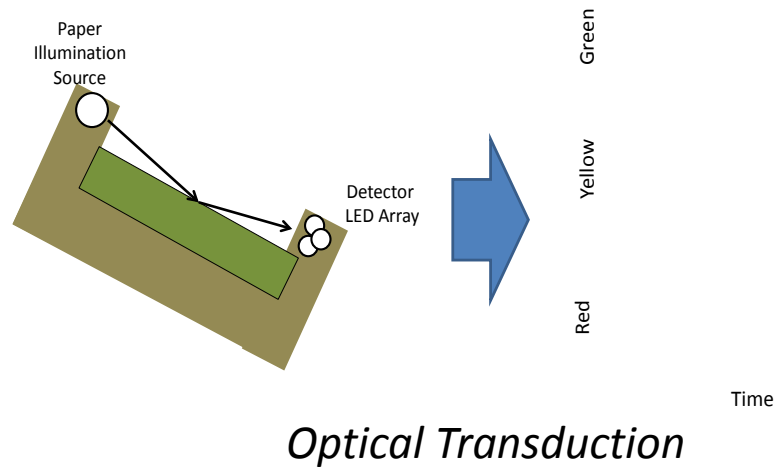
- Develop transduction system for automated reading (optical, electrical)
- Design and build automated reader for OSS M8 (single node)
- Develop wireless sensor network for self reporting (multi-node system)
- Live Agent Testing

## **Deliverables/Products:**

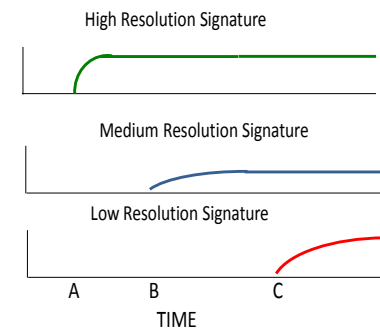
- OSS M8
- Autonomous Self Reporting CWA Detection System (Advance Force Protection)

# Phase II - Planned Activities

## Year 1: Develop Transduction Systems for Automated Reading

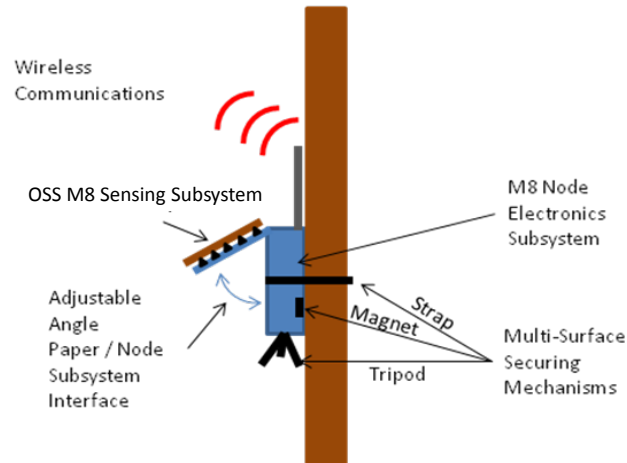


## Electronic Transduction

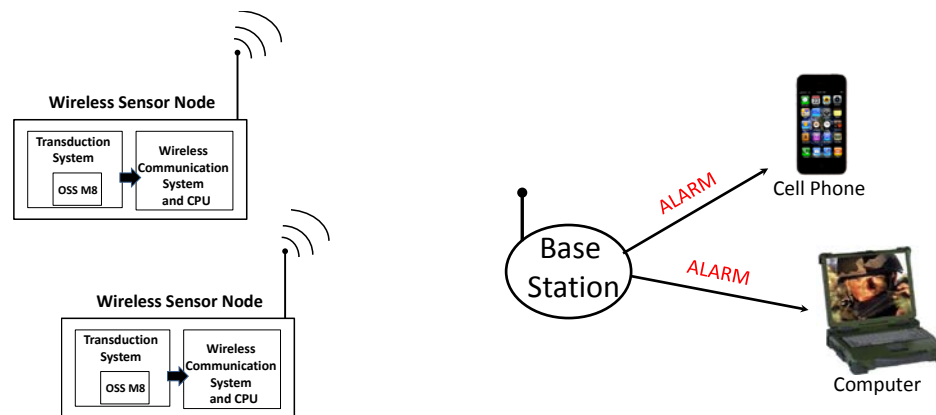


# Phase II - Planned Activities

## Year 2: Develop Wireless Sensor Network for Self Reporting



*Wireless Node Construction*



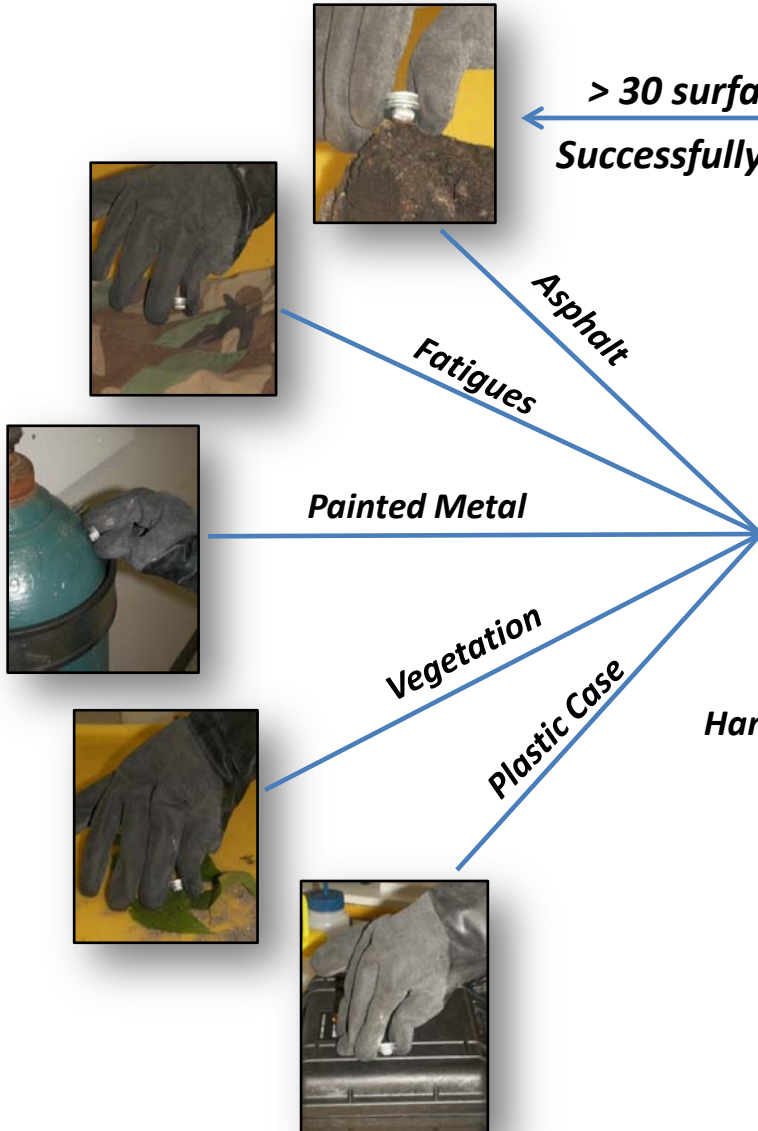
*Autonomous Network Development*

# OSS Multi-Agent Surface Sampler

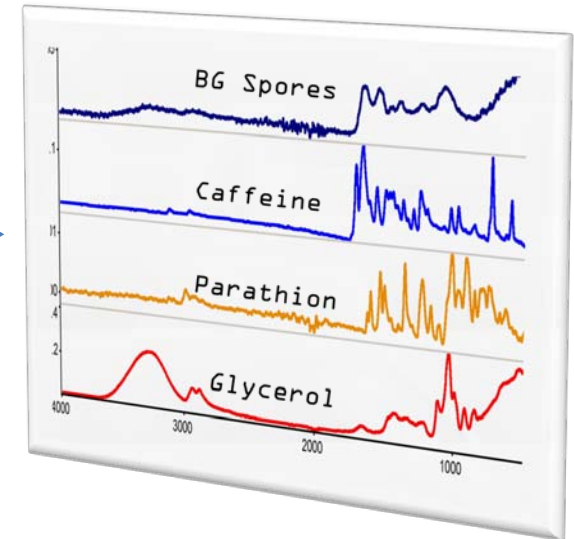


**OSS Surface Sampler**

*> 30 surfaces successfully tested  
Successfully identify all agent classes*



**HazMatID Elite  
Handheld Chemical Identifier**



**Positive ID for Chem, Bio, Narcotics,  
Explosives, TICs/TIMs, NTAs**

# Surfaces Successfully Tested



*Surface Sampler Prototype*

## **Polymers**

- Polyethylene
- Polypropylene
- Acrylic
- Polycarbonate
- Vinyl
- Polyester (Military Textile)
- Aluminized Mylar

## **Metals**

- Painted steel
- Rusted Steel
- Corrugated Steel
- Bare Steel
- Galvanized Steel
- Stainless Steel
- Powder Coated Steel
- Polished Aluminum
- Brushed Aluminum
- Bare Copper

## **Natural Products**

- Bare Wood
- Painted Wood
- Stained Wood
- Pressure Treated Wood
- Corrugated Cardboard
- Paperboard
- Cotton (Military Textile)

## **Other (porous)**

- Fiberglass
- Terra Cotta
- Concrete
- Asphalt
- Ceramic

## **Other (nonporous)**

- Glass
- Porcelain



*Surface Sampler Prototype*

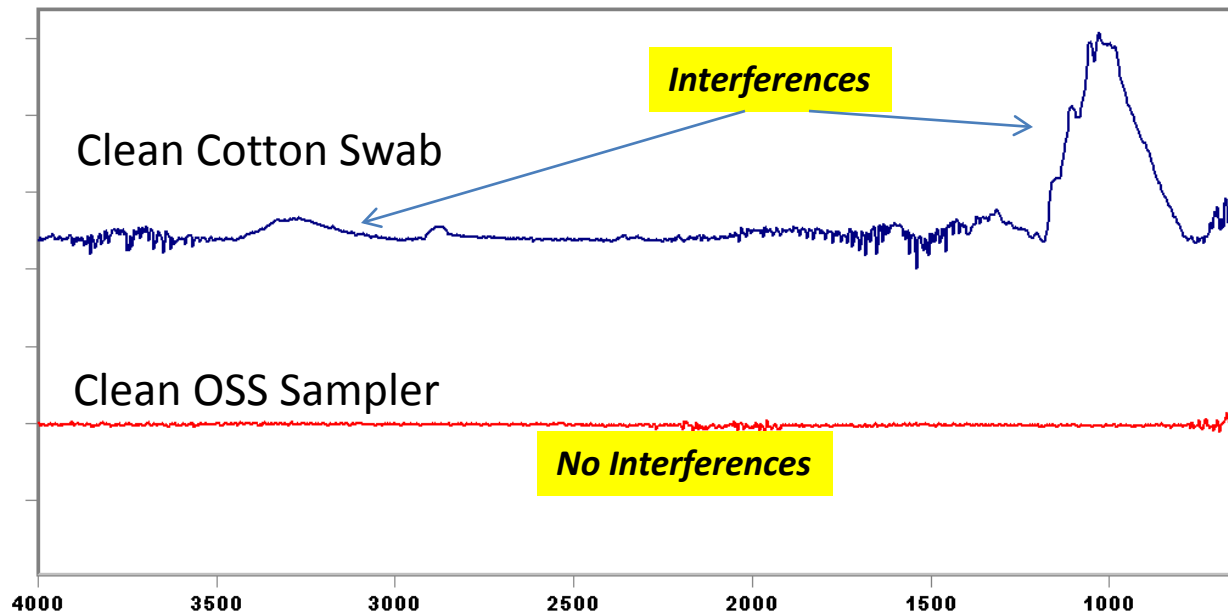
### **“White Powders”**

- Baking Soda
- Baking Powder
- Baby Powder
- Caffeine
- Corn Starch
- Sugar
- Bacterial Spores

### **Liquids**

- Parathion (pesticide)
- Malathion (pesticide)
- Glycerol
- PETN (high explosive)
- RDX (high explosive)
- Dimethyl Phosphate
- Silicone Oil
- Vegetable Oil

# Surface Sampling Comparison



**Surface Sampler Prototype**



# OSS CBD Water Extractor

*Validated through ECBC Live Agent Testing*



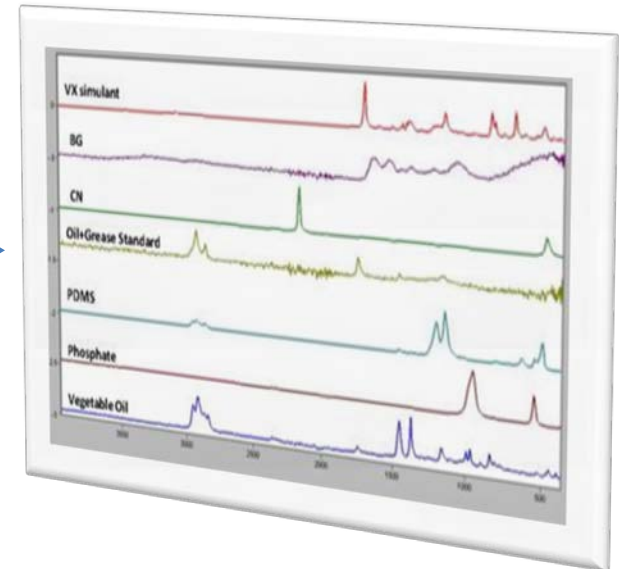
*Commercially Available  
For ASTM D7575 Testing*



*Mock Up of OSS  
Chem/Bio Sampling Kit*



*FTIR ATR Analysis*



*Positive ID for Chem/Bio  
Agents in Water*

## A photograph of various medical equipment. On the left is a small, clear plastic container with a white cap. In the center is a white rectangular device with a circular opening and a label that reads 'Oss'. To the right is a large, clear plastic syringe with a metal needle and a label that reads '100 ml'. Below the syringe is a small, cylindrical metal container with a label that reads '100 ml'.

- Hydrocarbons (ASTM D7575)
- Cyanide (ECBC Validated)
- Anthrax (ECBC Validated)
- VX (ECBC Validated)
- Phosphate
- Silicate
- Silicone Oil
- DEAET (CWA Simulant)

