

NDIA

PROTECTING NATIONAL SECURITY SINCE 1978

2008 HOMELAND SECURITY

S&T STAKEHOLDERS CONFERENCE WEST

PUTTING FIRST RESPONDERS FIRST

► Explosives ► Chemical & Biological ► Command, Control & Interoperability
► Borders & Maritime Security ► Human Factors ► Infrastructure & Geophysical

SCIENCE AND TECHNOLOGY



LOS ANGELES CONVENTION CENTER • LOS ANGELES, CA

JANUARY 14-17, 2008
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EVENT # 5050

Transportation Security Laboratory: Overview

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Department of Homeland Security

“Putting First Responders First”



Homeland
Security
Science & Technology



FEDERAL AVIATION ADMINISTRATION
AVIATION SECURITY LABORATORY



THIS LABORATORY IS DEDICATED TO THE MEMORY OF THOSE WHO LOST THEIR LIVES IN THE TRAGIC BOMBING OF PAN AMERICAN FLIGHT 103 ON DECEMBER 21, 1988, OVER LOCKERBIE, SCOTLAND.

MAY THEIR LOSS PROVIDE THE INSPIRATION FOR NEW IDEAS AND TECHNOLOGIES TO MAKE THE SKIES SAFER AND THE WORLD MORE SECURE.



Transportation Security R&D and Test and Evaluation

- ❖ **We are a unique facility located in New Jersey**
 - **Development of next generation security**
 - **Test and evaluation of commercially available equipment, or evolving prototypes**
 - **Partnership activities with other Government Agencies, other Governments**



TSL Mission

The Transportation Security Laboratory is a Federal Laboratory with a core mission of researching, developing, and validating solutions to detect and mitigate the threat of explosives and weapons.



TSL's Core Capabilities

❖ People

- Viewed as world leader in explosives detection with over 1000 person years of experience in RDT&E in explosives detection and mitigation.

❖ Property

- Existing laboratory infrastructure within 12 acre secured RDT&E campus

❖ Processes

- 100% of all security equipment presently fielded at U.S. airports has been developed, qualified, or certified by TSL.

❖ Partnerships

- Vast network of established partners from other government agencies, foreign governments, universities and industry.



TSL's Specialized Facilities



Explosives Storage Bunker



TSL's Specialized Facilities



Baggage Storage Area





**Bulk Explosive
Detection Systems
Lab**



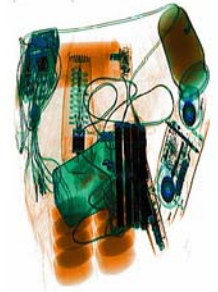
**Bulk Explosives
Research Lab**



**Trace Explosives
Research Lab**



**Trace Explosives
Detection Lab**



**Human Factors
Lab**



**EDS Certification
Lab***

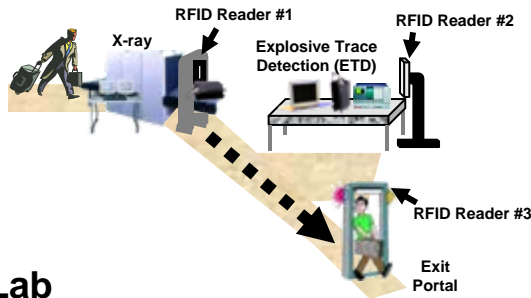
TSL Laboratories



**IED Fabrication
Lab**



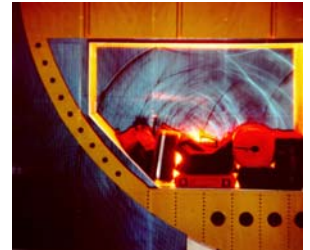
Body Imaging Lab



C4I Lab



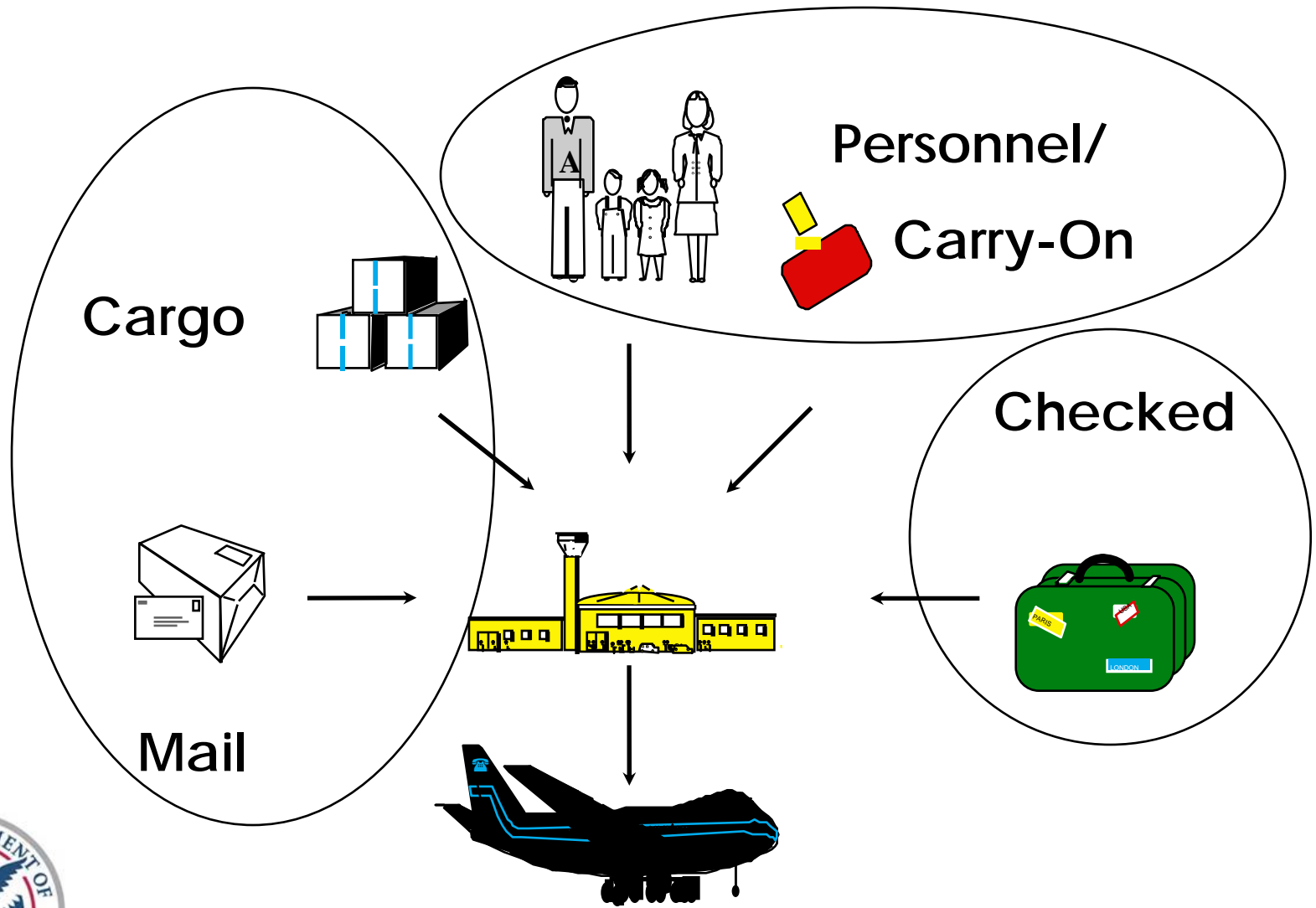
**Simulant
Development Lab**



**Explosive
Effects Lab**



Ways That Explosives Can Be Introduced into Airports



Types of Transportation Security Systems That Need Testing

Passenger Screening
Belongings Inspection
Vehicle Inspection
Cargo Inspection

Facilities Protection
Conveyance Protection
Infrastructure Protection
Personnel Protection

Explosives Detection Equipment
Video Surveillance, Tracking Equipment
Communications Equipment



What TSL Does

- Independent Test & Evaluation
- Baggage/Parcel Inspection
- Personnel Inspection
- Cargo Inspection
- Infrastructure Protection
- Conveyance Protection



Different Kinds of Test and Evaluation Activities at TSL

Developmental (DT&E) – testing in controlled environment to ensure that all system/product components meet technical specifications.

Certification Readiness – formal pre-certification tests conducted to provide quantitative evidence that system meets (or fails to meet) the performance requirements prior to certification testing.

Certification – formal testing to certify the performance requirements of a system.

Operational (OT&E) – testing conducted by representative users in real world, operational scenarios that duplicate actual use of the system or product, including realistic field conditions, and full range of climatic conditions.

Acceptance Testing – conducted to verify overall quality, correct operation, scalability, completeness, usability, portability, and robustness of the functional components supplied by the vendor. Includes SAT and FAT testing.

Assessment Testing – conducted to determine the general capability of a system.



Explosives Detection System (EDS) Certification and Independent Test and Evaluation of Detection Equipment

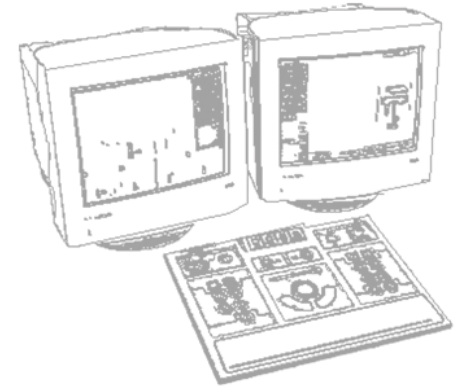
William Petracci
Test Director



EDS Certification

Definition

- **Defined by PL 101 – 604 in 1990**
 - Recognized as **World Standard for Explosives Detection**
- **Formation of Test Director's Office**
 - Independent of R&D Organization



EDS Certification

- **Requires Independent Evaluation of EDS**
 - Process Defined by **EDS Certification Management Plan - 1993**
 - Test Protocols Developed by Panel of Experts: National Academy of Sciences (NAS)
 - Test Oversight by Independent 3rd Party
- **EDS Certification Criteria Established in 1992**
 - **Exceeded Existing Performance Standards**
 - Detection: **Specific Types and Masses of Explosives**
 - False Alarm Rate
 - Throughput Rate: Automated Rate of Device
 - Other Requirements: Safety, Bag/Content Damage



EDSs Certified at TSL since 1997

- ❖ **GE (InVision): CTX 1000, CTX 2500 DS, CTX 5000 DS, CTX 5500 DS, CTX 9000 DSi, CTX 9400 DSi, YXLON XES 3000**
- ❖ **L3 Communications: eXaminer 3DX 1000, eXaminer 3DX 3000, eXaminer 3DX 6000, eXaminer 3DX 6500, VCT 30**
- ❖ **Analogic Corp. AN6400**
- ❖ **Reveal Imaging CT-80**
- ❖ **Vivid CT (ARGUS)**



Reference herein to any specific commercial products, processes, equipment, or services does not constitute or imply its endorsement, recommendation, or favoring by the United States Government or the Department of Homeland Security (DHS), or any of its employees or contractors.

Independent Test and Evaluation

Definitions

- **Certification**
 - **Evaluation of Candidate EDS in Accordance with Certification Criteria**
 - **Driven by Public Law 101-604**
 - **Currently Applies Only to Explosives Detection Systems for Checked Baggage**



Independent Test and Evaluation

Definitions

■ Qualification

- Evaluation of Candidate Security Systems in Accordance with Technical Requirements Document
- Process Modeled after Certification – Qualification Management Plan
- Requirements Typically Expanded Beyond Detection Function to Include Operational Considerations
- Result is Qualified Product List



Independent Test and Evaluation

Definitions

- **Assessment**
 - **Evaluation or Assessment of Candidate Security Systems in Accordance with Interim Performance Metrics**
 - **Results Drive Future Development Efforts or Operational Deployment/Evaluation**



Independent Test and Evaluation

Recent Activity

- Completed Qualification Tests
 - Enhanced Metal Detectors
 - Handheld Metal Detectors
 - Explosives Trace Detection Portals
 - Explosives Trace Detection Handheld & Bench top Systems
- Completed Assessment Tests
 - Shoe Metal Advisory Device
 - Shoe X-ray System
 - Advanced Technology X-ray Systems
 - Carry-on Baggage Explosives Detection
 - Explosives Detection for Rail Threats
 - Whole Body Imagers
 - Advanced Technology (AT) Displays
- Upcoming Independent Tests
 - TIP Ready X-ray (TRX) Qualification
 - Biometrics for Airport Access Control
 - QR Explosives Detection
 - Shoe Weapons Detection
 - Bottle Screeners
 - Cargo



Qualified Products

- ❖ **Enhanced Metal Detectors tested :**
 - **CEIA 02PN20**
 - **Metorex 200HDe**
 - **Garrett PD 6500*i***
- ❖ **Hand Wands qualified (pre-field OT&E):**
 - **CEIA PD140SA**
 - **Rapiscan Meteor 28**
 - **Garrett SuperScanner**
 - **Security Search Vallon MH7**
 - **Henotex SuperOmniPlus B+V**



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Qualified Products (cont'd)

- ❖ **Bench top Explosive Trace Detectors :**
 - **Smiths 400B**
 - **GE Itemiser 2**
 - **Thermo EGIS 2**
 - **Smiths 500 DT**
- ❖ **Hand Held ETDs (particle only):**
 - **Smiths Sabre 4000**
 - **GE Vapor Tracer 2**
- ❖ **Trace Portals**
 - **GE Entry Scan 3e**



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Additional Products Assessed

- **Colorimetric Test Kits**
- **Hand Held ETDs – Vapor**
- **Alternative consumable supplies for ETDs**
- **Trace Quality Control Aids for Screener and ETD performance assessment**
- **Training Aids for Canines**



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Explosive Simulants



Plastic Explosive Simulants



Preparation Area



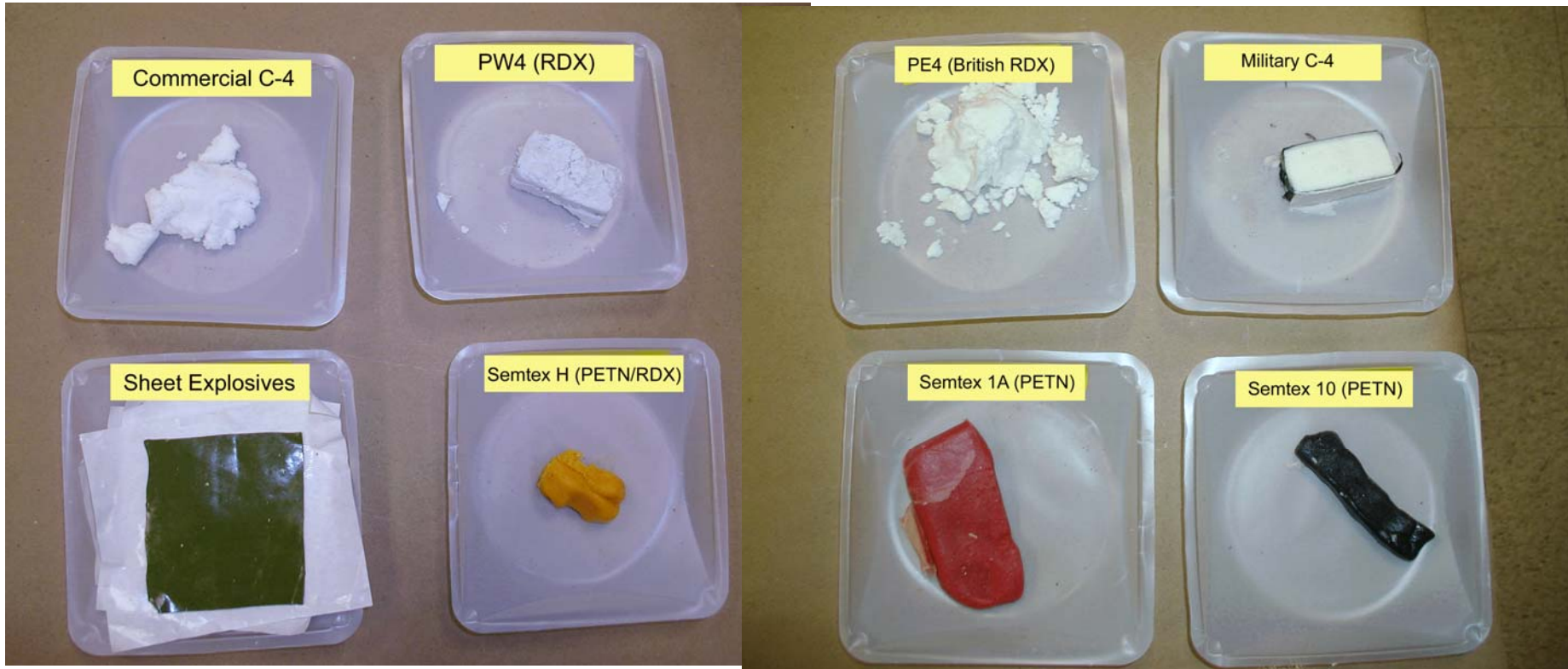
Liquid Explosive Simulants



Improvised Explosive Device (IED) Lab



TSL educational and testing material



Weapons Detection Lab

- ❖ Large collection of handguns, machine guns, & assault weapons
- ❖ Trained Handlers (Armorers)
- ❖ Images to become part of Threat Image Projection Library
- ❖ Test pieces for automatic weapons detection systems
- ❖ Test pieces for advanced walk-thru metal detectors



Selection of Security Enhancing Equipment Recently Evaluated at the Transportation Security Laboratory

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X-Ray Backscatter Whole Body Imagers

Rapiscan Secure 1000

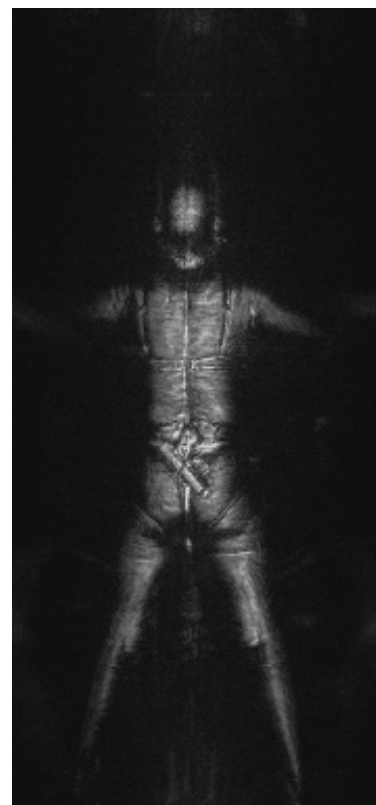


AS&E SmartCheck



X-Ray Backscatter Whole Body Imagers

L3 Pro-Vision



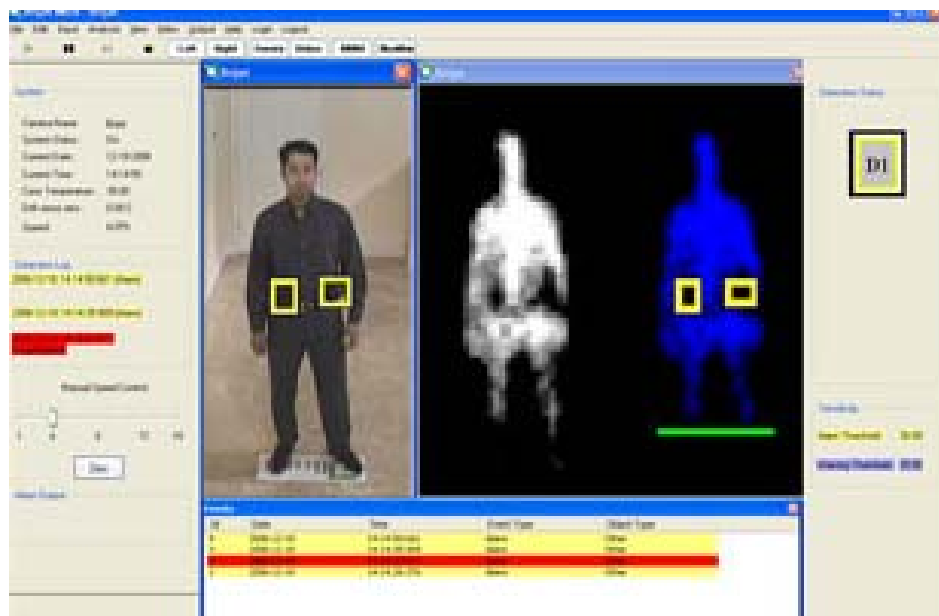
X-Ray Backscatter Whole Body Imagers

CastScope



Advanced Technology Evaluation: Passive Millimeter Wave

Brijot



Advanced Technology Evaluation: Passive Millimeter Wave Video Camera Whole Body Imager



Advanced Technology Evaluation: Passive Millimeter Wave

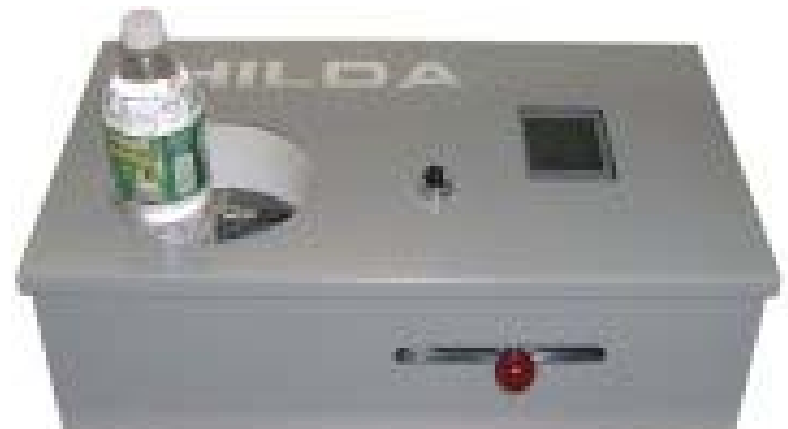
Qinetiq – Video Camera



Trex ST-150 – Still Camera



Bottle Screeners Tested and Evaluated for TSA



Shoe Scanners

Quadrupole Resonance



CEIA Shoe Scanner

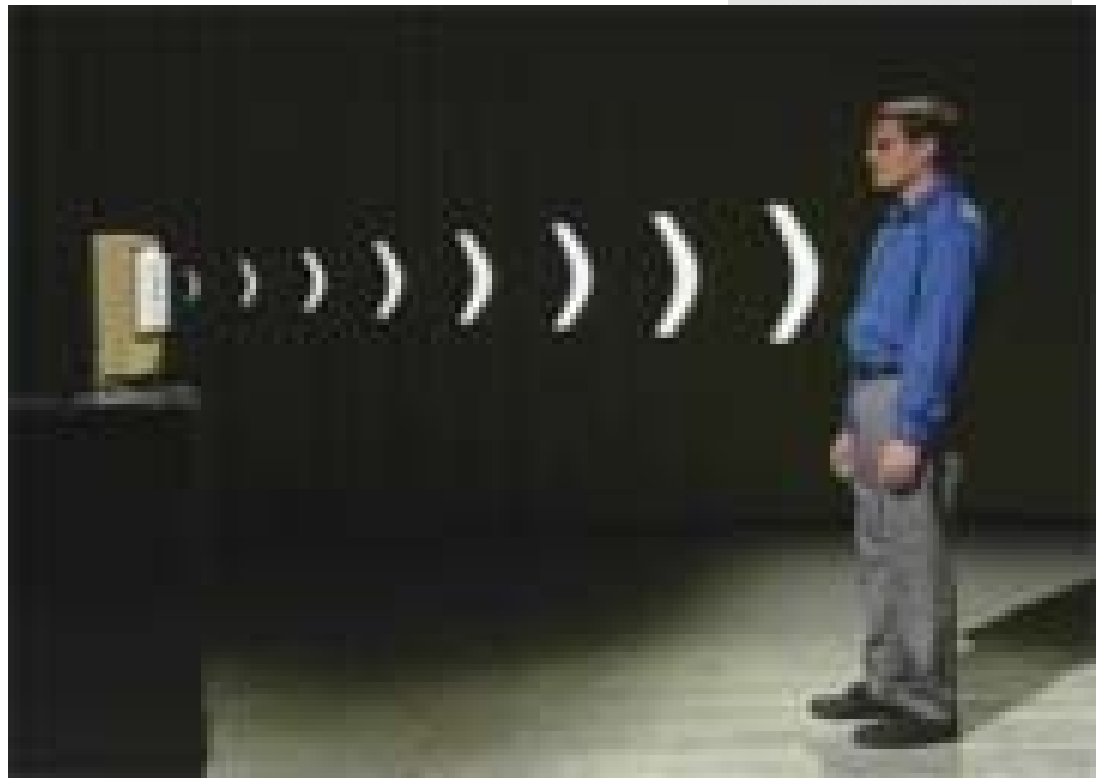


Advanced Radar Technologies



**PPT Personnel Tracker
Modified COTS Radar**

**SafeZone Concealed
Threat Detection Radar**





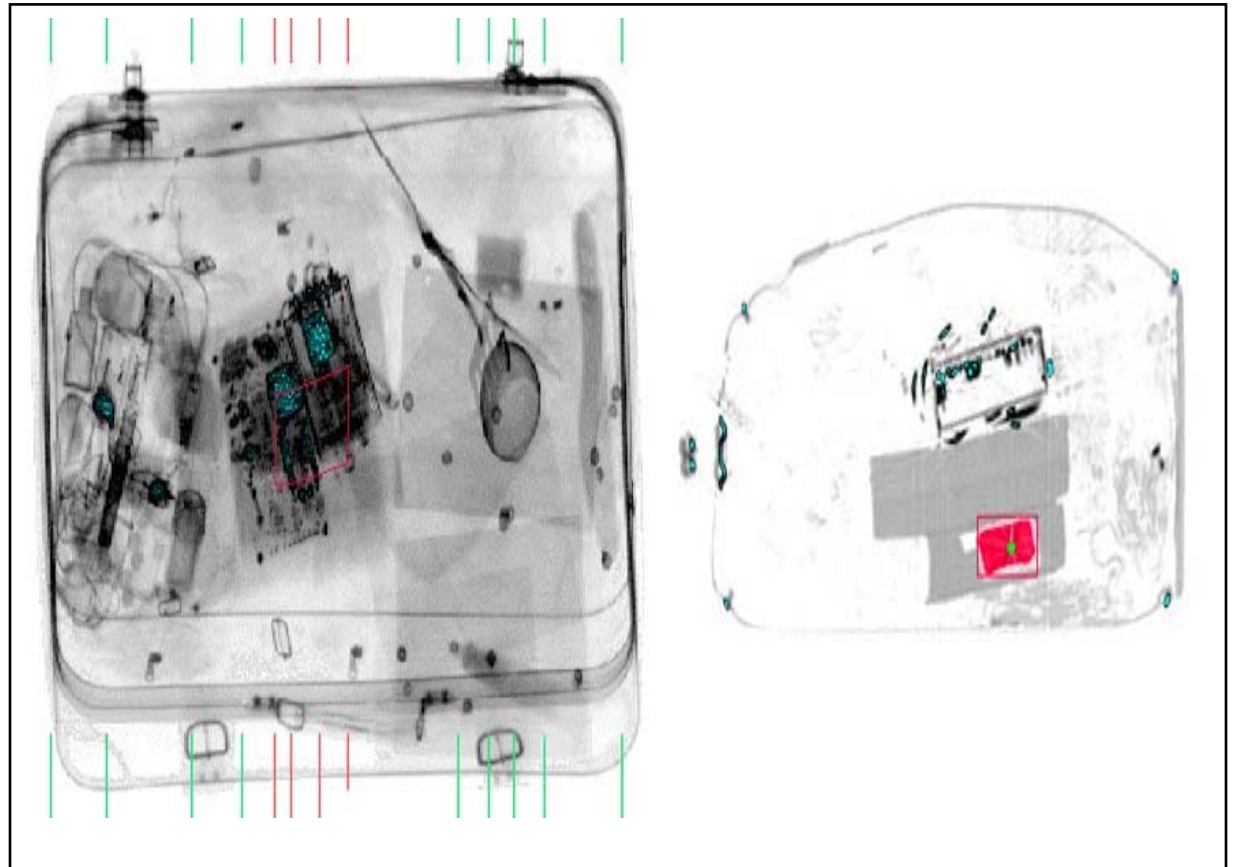
Checked Baggage





Inside an EDS

Computer Aided Tomography (CT)



Reveal: Bulk Detection



L-3 Examiner6000 CT EDS equipment



Analogic Cobra

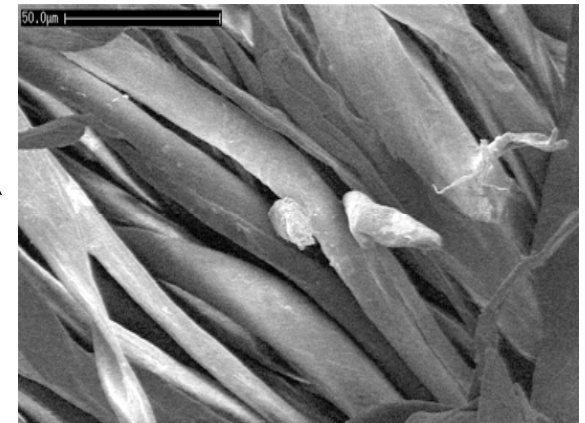
Evaluated in TSL's Bulk Detection Lab; detects automated explosives and weapons in carry-on baggage



Analysis of Trace Levels of Explosives



Trace Detector



C-4 particle on cloth at 400X

Explosives Trace Detection (ETD) Portals

Syagen MMW Portal



Smiths Sentinel II Portal



Alarm Condition



ETDs tested and evaluated at TSL

GE Itemiser FX



Smiths Ionscan 500 DT



Thermo Electron Corporation EGIS Defender



Evaluating new ITMS-MS Analysis Technology

GE Ion Track Itemiser³



Making sure equipment is ready for deployment



Trace Explosives Detection Devices



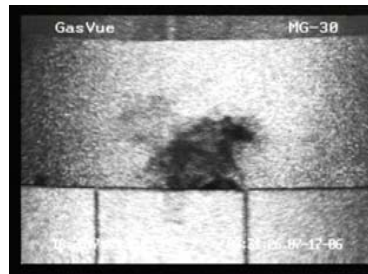


Cargo and Mail



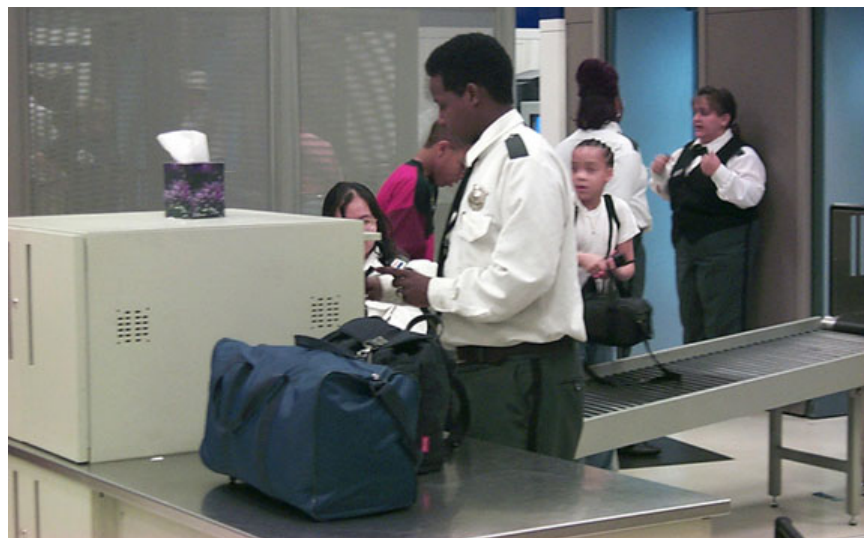
Canine Explosive Detection Optimization

- ❖ Development of training aids for K-9 teams
- ❖ Understanding of explosive vapor plume dynamics.
- ❖ Assessment of canine detection capabilities in break-bulk cargo, airline ground support equipment, and USPS rolling stock

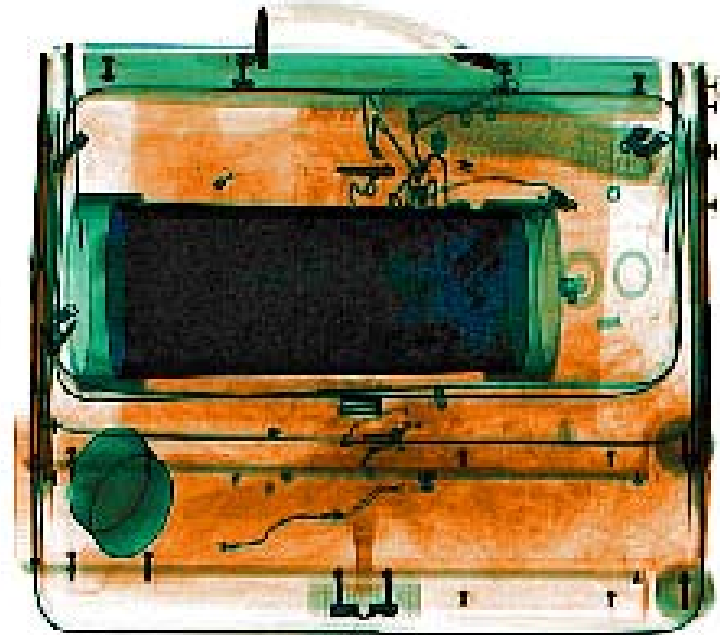




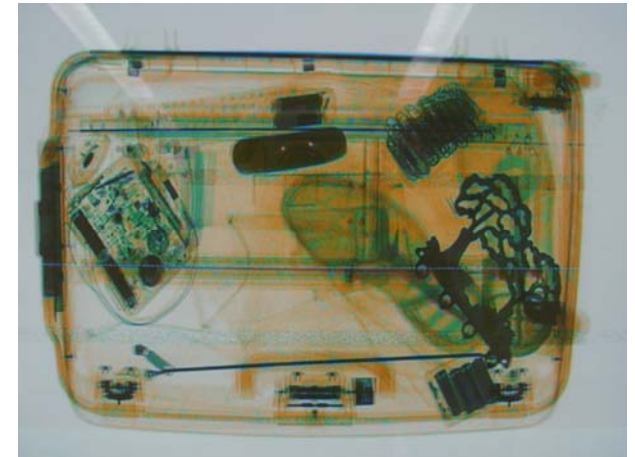
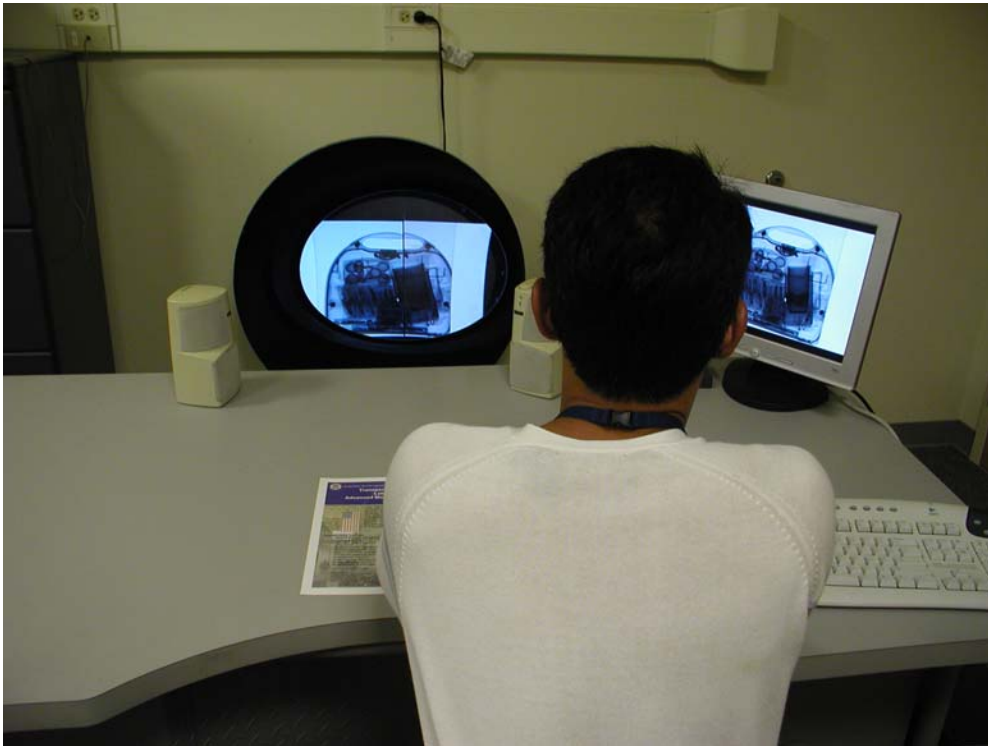
Human Factors



Human Factors – Threat Image Projection (TIP)



Human Factors Evaluation of Advanced Displays





Aircraft Hardening



Explosive Effects and Blast Mitigation: Modeling Solutions, Testing Technologies



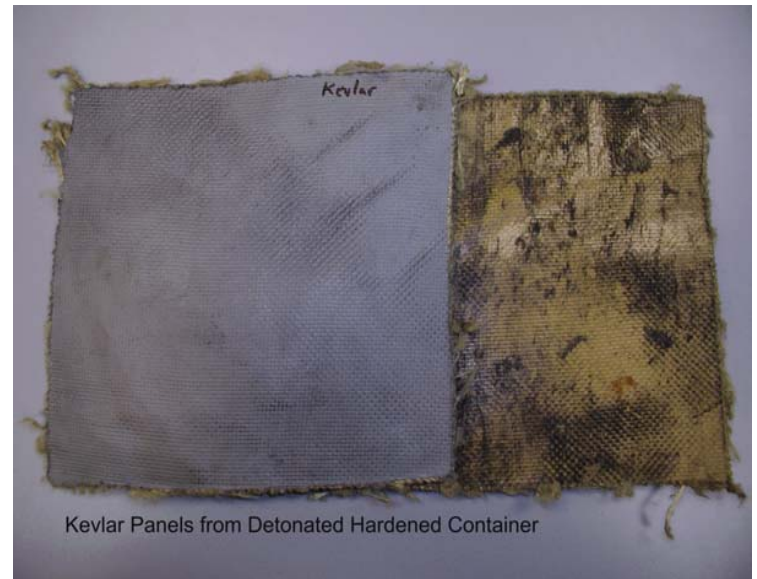
Hardened Unit Load Containers



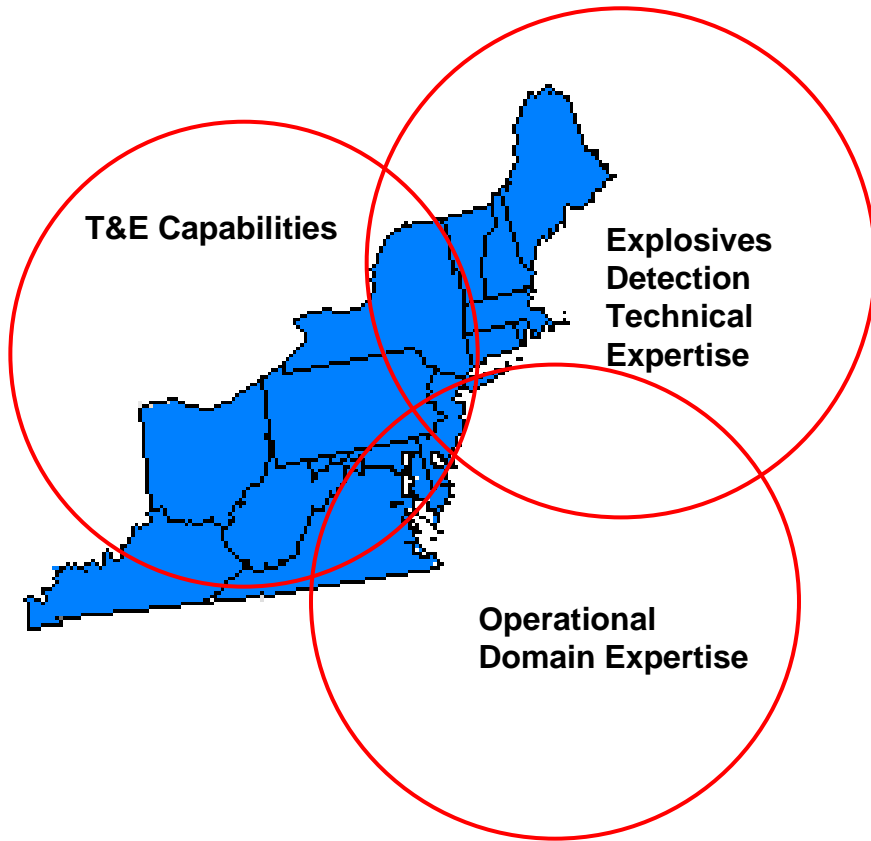
Testing hardened containers



Samples of hardening material



Transportation Security Laboratory



- ❖ **Globally recognized technical knowledge**
 - Bulk & Trace detection technologies
 - Weapons detection technologies
 - Explosives expertise
 - World-wide resource for performance data related to explosives detection and mitigation technologies
- ❖ **Outstanding operational insight**
 - Human Factors
 - Training aids
 - Quality control aids
 - CONOPS
- ❖ **Undisputable T&E expertise**
 - DT&E
 - Certification & Qualification T&E
 - Independence

TSL is a national asset: unique in its extensive library of explosives, improvised explosive devices, and its cadre of scientists, engineers, explosive handlers, and others.





Homeland Security

