

TRANSPORTATION SECURITY ADMINISTRATION




**Advanced Imaging Technology  
Safety and Health Program**  
\*\*\*\*\*

August 3, 2011  
2011 Joint Meeting of American Association of Medical Physicists  
And  
Canadian Organization of Medical Physicists  
Vancouver, British Columbia

TSA Mission & Vision


**Mission:** The Transportation Security Administration protects the Nation's transportation systems to ensure freedom of movement for people and commerce.

**Vision:** The Transportation Security Administration will continuously set the standard for excellence in transportation security through its people, processes, and technology.





Evolving Threats

- TSA has continuously enhanced layers of security since 9/11:
  - Cockpit doors
  - Improved baggage, carry-on, and passenger screening procedures and technologies
  - Behavior detection programs
- As a result, the threat is being driven to smaller items artfully concealed on persons with informed adversaries exploiting our social norms
- Home-made explosives
- Non-metallic threats



The Benefits of Advanced Imaging Technology

- *Improves security effectiveness by displaying metallic and non-metallic anomalies.*
- *Enhances passenger experience by minimizing need for physical pat-downs.*
- *Ensures privacy by placing the security officer viewing the image in a remote location, using privacy filters, and not having capability to store or transfer images.*
- *Improves security effectiveness by reducing physical fatigue of security personnel and improving their effectiveness through training and image detection technique.*
- *Is a highly effective security tool. In fact, the technology has led to the detection of more than 300 prohibited, illegal or dangerous items at checkpoints nationwide since January 2010.*

## 50 Years of Advanced Imaging Technology

The timeline shows the evolution of Advanced Imaging Technology (AIT) from the 1960s to 2011. Key milestones include:

- 1960s:** National laboratories pioneer optical holography—the foundation of AIT.
- 1989:** National Labs and the FAA study AIT for use in passenger screening.
- 1995:** National Academy of Science publishes report that includes AIT safety.
- 1996:** Manufacturers use AIT technology to create custom fit jeans.
- 2004:** Piloted at London's Heathrow Airport.
- 2006:** TSL Testing.
- 2007:** Tested at London's Paddington station.
- 2008:** Piloted at the UK's Manchester Airport.
- 2008:** JHU/APL validates the Rapiscan Secure 1000 SP is below the radiation dose per screening requirements.
- 2009:** Test trials conducted at airports in Canada and Australia.
- 2010:** TSA accelerates nationwide AIT roll-out & independent radiation surveys.
- 2010:** American College of Radiology says Scans are "negligible dose".
- 2011:** Significant international AIT deployment.
- 2011:** TSIF Dosimetry Study & FDA Study.

## Active Millimeter Wave Technology

**L-3 Provision (Active Millimeter Wave)**

- Uses non-ionizing electromagnetic radiation to generate an image based on the energy reflected from the body.
- The three-dimensional image of the body is displayed on a remote monitor for analysis.
- Ideal for identifying both metallic and non-metallic threats.
- TSA has deployed nearly 250 systems.
- Millimeter wave technology that TSA uses is safe for passengers. In fact, the energy emitted is 1000 times less than limits set by the International Commission on Non-ionizing Radiation Protection (ICNIRP).

## General-Use Backscatter X-ray

**Rapiscan Secure 1000 SP (Backscatter)**

- Relies on a narrow, X-ray beam scanned over the body's surface at high speed. X-rays that are reflected back from the body and other objects placed or carried on the body, is converted into a computer image of the subject and displayed on a remote monitor.
- TSA has deployed approximately 250 systems.
- Various independent evaluations determine the reference effective dose below 0.05 microSv (5 microrem) per screening.
- At a minimum, radiation surveys are conducted in accordance with ANSI/HPS N43.17-2009.

## General-Use Backscatter X-ray

**Rapiscan Secure 1000 SP (Backscatter)**

- U.S. Army Public Health Command performs ANSI/HPS N43.17 complaint radiation safety surveys.
- All systems surveyed to date are in compliance with the dose limits specified in ANSI/HPS N43.17-2009.
- The U.S. Army Public Health Command certified health physicists have performed a dosimetry study to evaluate radiation doses to both passengers and system operators. The results of this study confirm that the systems comply with the radiation dose requirements of the ANSI/HPS N43.17 standard and that radiation doses, to both the passenger being screened and the system operators, are in compliance with N43.17-2009 and are extremely small.

## Automatic Target Recognition (ATR)

TSA recently began installing new software, also referred to as Automated Target Recognition (ATR) on every millimeter wave machine in U.S. airports. The software is designed to enhance privacy by eliminating passenger-specific images and instead depicting anomalies detected during the screening process on a generic outline of a person that is identical for all passengers.

By eliminating the image of an actual passenger and replacing it with a generic outline of a person, passengers are able to view the same outline that the TSA officer sees. Further, a separate TSA officer will no longer be required to view the image in a remotely located viewing room. By removing this step of the process, AIT screening will become more efficient, expanding the throughput capability of the technology.

Operators are presented with a screen signifying specific location(s) on the passenger when anomalies **ARE** detected.



Operators are presented with a clear message when anomalies are **NOT** detected.



9

## Qualified Technology

- Before TSA purchases technology, TSA communicates safety and health requirements to manufacturers through procurement specifications and engineering reviews.
- The advanced imaging technology (AIT) meets national safety and consensus standards and has been validated by third parties.
- Systems are tested prior to deployment, upon installation, and while deployed, tested in accordance with applicable standards.



10

## Operations and Maintenance

- Once installed, TSA ensures the required manufacturer's preventive maintenance is performed by qualified personnel
- Only trained operators are authorized to perform AIT screening functions
- System and Image quality checks are performed:
  - Daily
  - After power is restored
  - After system maintenance



11

## TSA - Public Communications

AIT safety related information is posted to the TSA public website at:  
<http://www.tsa.gov/research/reading/index.shtm>

• Response to Center for Study of Responsive Law inquiry on people screening, Center for Devices and Radiological Health, Food and Drug Administration, November 5, 2010

• White House Office of Science and Technology Policy Statement on AIT Safety

• TSA AIT Safety Study Memo

• Johns Hopkins University Applied Physics Laboratory, *Radiation Safety Engineering Assessment Report for the Rapiscan Secure 1000 in Single Pose Configuration*, October 2009 and August 2010

• Assessment of the Rapiscan Secure 1000 Body Scanner for Conformance with Radiological Safety Standards, July 21, 2006

• Radiation Surveys for the Rapiscan Secure 1000 Single Pose



12

## TSA - Public Communications

Learn more about AIT safety:  
<http://www.tsa.gov/approach/tech/ait/safety.shtm>



## Security Screening Checkpoint Signage



## Passenger Acceptance



Since TSA began using imaging technology over 98 percent of passengers have chosen to be screened by the technology over alternative procedures.



## Questions

