TRANSPORTATION SECURITY ADMINISTRATION

Advanced Imaging Technology Safety and Health Program

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October 19, 2011

The Council on Ionizing Radiation and Measurements (CIRMS)

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.

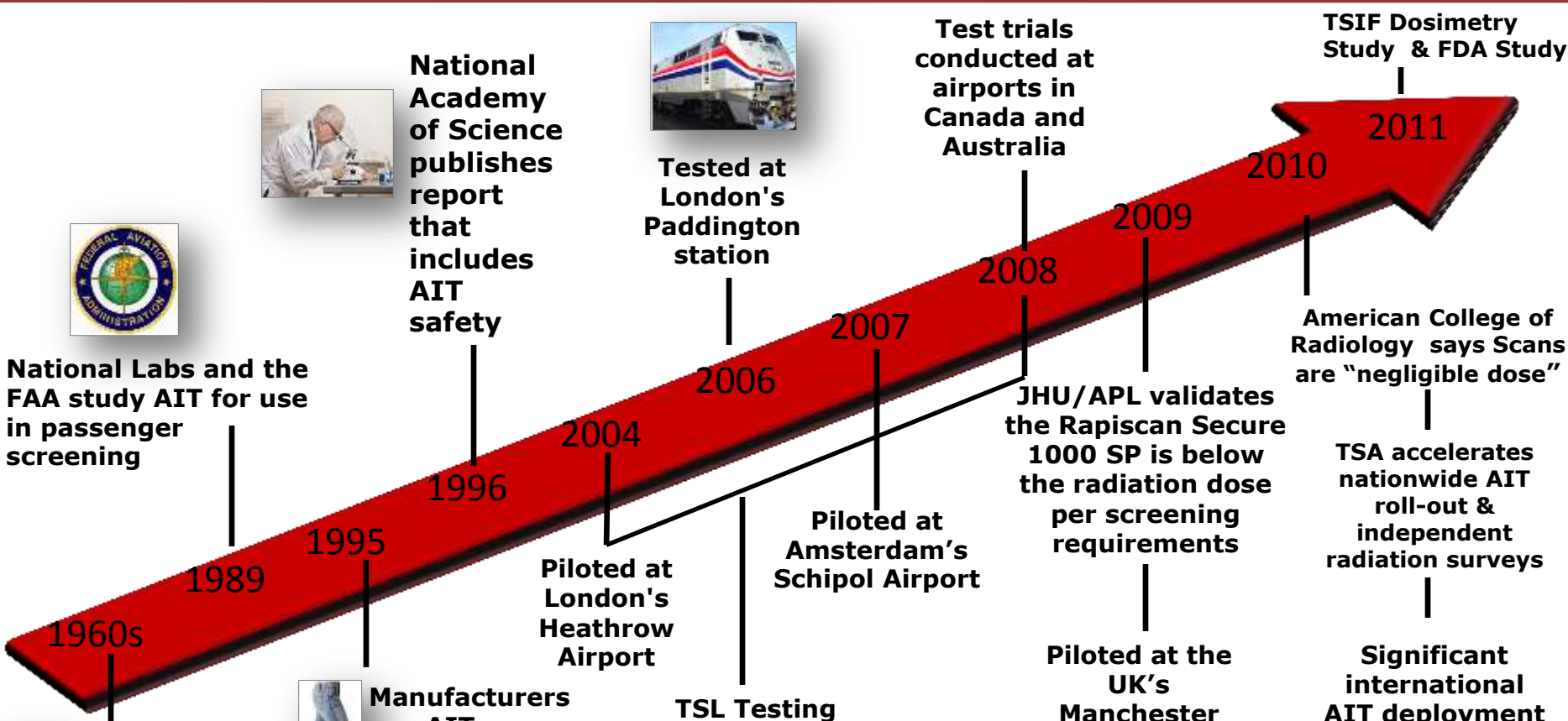
Evolving Threats

- 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



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 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 the this study confirm that the systems complies 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.

USAPHC Testing of Personnel Security Screening Systems

- Individual Screened
  - General-Use: 0.25 µSv (25 µrem) per screening
  - Limited-Use: 0.01 mSv (1 mrem) per screening
  - 0.25 mSv (25 mrem) per year
- Operator's/Bystanders Annual Limit
  - 1 mSv (100 mrem) per year
- Inspection zone – operators and bystanders outside inspection zone during screening

Background

- Purpose: Evaluate potential dose to individual being screened and operator's of personnel security screening systems (at boundary of the inspection zone)

- Field measurements
  - Short term
  - At or near background
  - Near minimum detection capability of the instrument

- Dosimeter study requires
  - Very large number of screenings
  - Automated method for initiating screenings

Test Setup – Repetitive Screening

- Robotic solution
- 93,105 screenings
- ~ 2 weeks

Test Setup – Phantom Dose to Subject

- 190 lbs. of water arranged to resemble the basic shape of a person were placed on a wooden rack for 93,105 screenings.
- OSL dosimeters were mounted on the phantom facing the radiation source

Summary

- The data show that the dose per screening is well below the maximum permitted for a general-use system under the ANSI standard (maximum of 0.045 microsieverts (or 4.5 microrem) which is well below the limit of 0.25 microsieverts (or 25 microrem)).

- Even using the maximum dose measured at any point on the phantom, a person could receive over 5,000 screenings every year without exceeding the annual radiation dose limit. This would require an average of 15 screenings every day of the year.

Dose to Operators
Entrance Side and Exit Side

Summary Deep Dose Equivalent

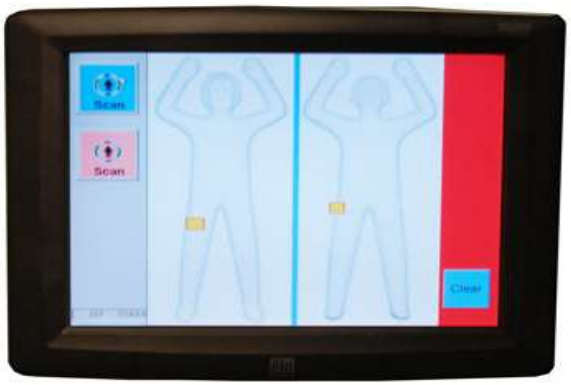
- Potential doses to operators of these systems are extremely small
- At the maximum throughput, the doses to operators are well below the public dose limits/recommendations
- Communicating these small doses to the operators is a challenge

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.

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.

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

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

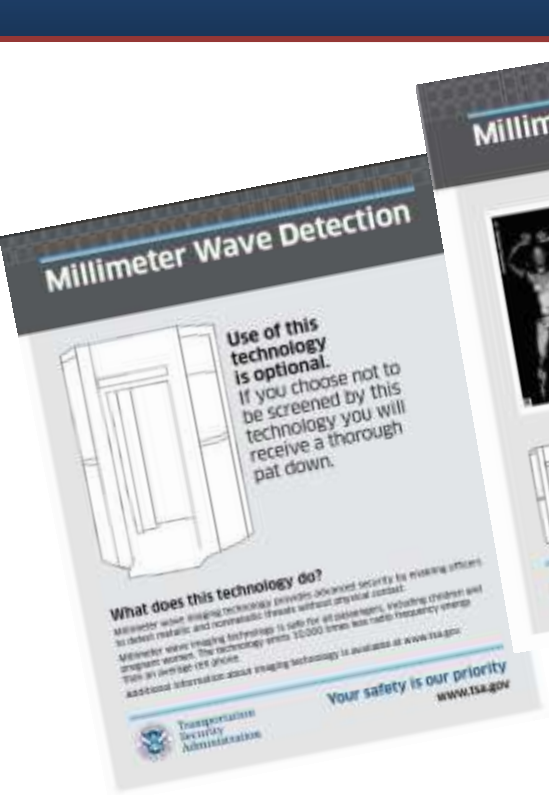
- Radiation Surveys for the Rapiscan Secure 1000 Single Pose

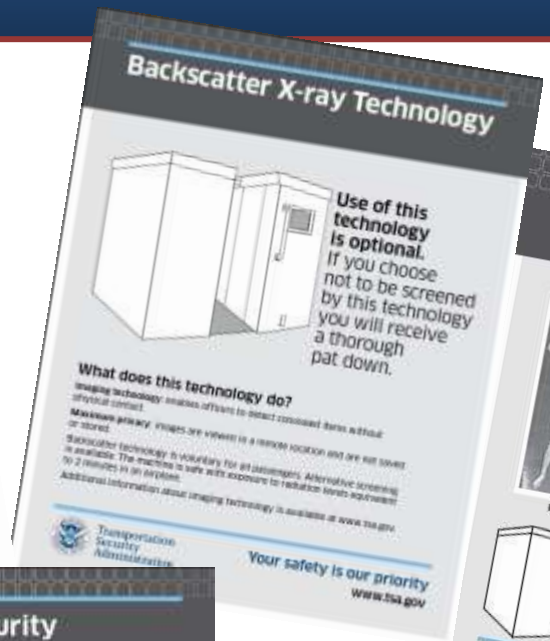
TSA - Public Communications

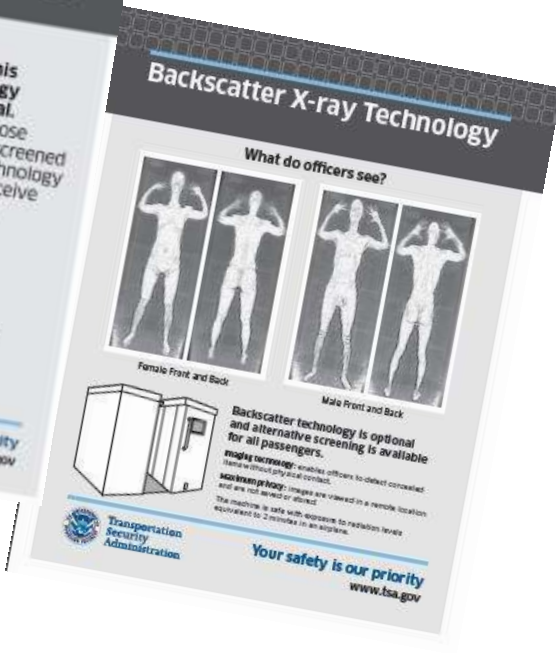
Learn more about AIT safety:

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