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Deployment and Use of Security Technology

Statement of
The Honorable Kenneth M. Mead
Inspector General
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Chairman Mica, Ranking Member Lipinksi, and Members of the Subcommittee:

We appreciate the opportunity to discuss the deployment and use of advanced security technologies. These technologies are comprised of state-of-the-art equipment used to screen checked and carry-on baggage; computer based programs for prescreening passengers during check-in; and computer based programs for training screeners and measuring screener performance. These technologies provide the front line of defense in aviation security—a layered system of systems that currently depends on the coordination of airport and air carrier security operations and the integration of people and technology.

The July 1996 crash of TWA Flight 800 was the catalyst for important advances in aviation security. Although the Federal Bureau of Investigations and the National Transportation Safety Board ruled out terrorist activity as a potential cause of the crash, the crash prompted the August 1996 creation of the White House Commission on Aviation Safety and Security (Gore Commission). The Gore Commission made 31 recommendations regarding aviation security, including recommendations to:

- Deploy existing technology – purchase significant numbers of advanced technology bulk detection systems, upgraded x-rays, and other innovative systems.

- Complement technology with automated passenger profiling – based on information that is already in computer databases, passengers could be separated into a very large majority who present little or no risk, and a small minority who merit additional attention.

- Certify screening companies and improve screener performance – better selection, training, and testing of the people who work at airport x-ray machines would result in a significant boost in security.

Since 1997, Congress has provided approximately $455 million for deployment of advanced security technologies, and over $258 million for aviation security research, engineering and development.

The deployment and use of security technology will require short-term and long-term actions. As we testified in a prior hearing before this Subcommittee, given the scope and complexity of the security challenge as we now know it, we believe the time has come to consider the option of vesting governance of the program and responsibility for the provision of security in one Federal organization. This entity should have security as its primary and central focus,

profession, and mission. The Federal organization would be responsible for purchasing, deploying and using the equipment to screen passengers, employees (anyone with access to the aircraft), carry-on baggage, checked baggage, and cargo.

Regardless of where and with whom governance resides, we need to focus more attention on developing new advanced security technology and increasing the use and deployment of current equipment. We have been reporting on the need to improve the deployment and use of advanced security equipment and technology since 1998. In the short term, screener proficiency needs to be improved and advanced security equipment we now have needs to be effectively deployed and utilized. In the long term, we need to develop and deploy advanced security equipment that is capable of screening all (100 percent) passengers, passenger carry-on and checked baggage, airline crews, and others with access to aircraft for all threat objects (knives, guns, bombs, etc.).

Today, we would like to discuss four issues. First, the use of bulk explosives detection systems; second, the deployment and performance issues of this equipment; third, deployment and use of equipment to enhance screener performance; and lastly, actions FAA must take to improve the deployment and use of existing security equipment and technologies.

- **Use of Bulk Explosives Detection Systems.** Bulk explosives detection systems, such as the CTX, continue to be seriously underutilized. This is a long-standing problem that we have reported on since 1998. These machines cost approximately $1 million to buy, and cost between $300,000 and $1.2 million to install. In July 2001 (the latest month available) machines systemwide are on average screening only *350 bags per day*. In an operation environment, these machines are capable of screening around *150 bags an hour*. There are various reasons why these machines continue to be underutilized. One of the overriding reasons is that until recently air carriers were only required to use the equipment to screen the baggage of passengers selected by the Computer Assisted Passenger Prescreening Systems (CAPPS). Air carriers' reluctance to increase the use is centered in their belief that passengers would not accept the inconvenience. Since September 11th, FAA now requires continuous use of deployed bulk explosives detection equipment. However, during recent visits to seven category X airports, we found most air carriers were not continuously using the CTX machines.

- **Deployment And Performance Issues of Bulk Explosives Detection Systems.** Prior to September 11th, FAA had 22 bulk explosives detection systems stored in a warehouse. Twenty of the systems, including 11 CTXs, manufactured by InVision Technologies, and 9 eXaminer 6000s, manufactured

by L-3 Communications, had been allocated to a specific air carrier and airport. It had not been decided where the remaining two InVision CTX-5500s would be installed, but FAA had at the time over 60 requests from air carriers for deployment of additional units. According to FAA, the 11 CTXs had not been installed primarily because funds were not available to pay for the installation of the equipment.

The nine L-3 machines remain in the warehouse because there have been operational problems with these machines. For example, the L-3 machine at the Dallas Ft. Worth airport (DFW) had operational problems from the day it was installed in the spring 2000. Between July 2000 and July 2001, the L-3 machine at DFW experienced a mean time between failures requiring a service call of 84 hours, and a mean time to repair of almost 6½ hours. This means that if the machine broke at the start of the day, it would be out of service for most of that day's screening operation.

FAA is in the process of conducting its own demonstration of two L-3 machines at its Technical Center in New Jersey. FAA operated the machines for a total of 900 hours during the first run of its demonstration to derive valid, independent operational data on reliability and availability. This first run resulted in high failure rates, mostly requiring software resets. There were few failures involving hardware components.

A second test run is scheduled to begin this coming Monday, October 15. For this run, the machines will be modified to incorporate ten previously identified field quality improvements (software and hardware changes). The reliability issues need to be resolved before additional L-3 eXaminer 6000 machines can be deployed.

- **Deployment and Use of Equipment to Enhance Screener Performance.** The human factor is also an important component of advanced security equipment. In our 1999 report on the security of checked baggage[1] we found the CTX was capable of identifying threat items, but operators did not look for or identify the threat object in a significant number of cases. Threat Image Projection (TIP) has been developed to keep equipment operators alert, provide real world conditions, and measure performance in identifying the threat items. TIP, a computer software program, projects fictitious images on to bags or an entire fictitious bag containing a threat onto the screener's monitor. TIP has been installed on all CTX machines used to screen checked baggage and on all

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[1] Security of Checked Baggage on Flights Within the United State, Federal Aviation Administration (Report No. AV-1999-113, July 16, 1999).

new TIP-ready x-ray machines FAA is deploying to screen carry-on baggage and items.

TIP is an important component of the FAA proposed rule on certification of screening companies. FAA will rely on TIP to measure the performance of individual screeners and certify screening companies. Also, using data derived from TIP, FAA plans to establish screener performance standards and measure screening company performance.

In the past, we have reported two concerns with FAA's deployment of TIP. First, in our October 1999 audit report[2], we reported that FAA had no internal controls over the use of TIP program functions installed on the CTX 5500. As a result, the air carriers and screening companies operating the systems had compromised the integrity and security of the TIP program. Second, we are concerned that FAA has not established the performance standards screeners must meet for a screening company to be certified or maintain its certification. For example, what percentage of time should the screener identify the threat items? Therefore, it is important for FAA to finish deployment of advanced security equipment that is capable of evaluating screener performance and establish sufficient internal controls.

- **Actions FAA Must Take.** In the immediate term FAA needs to expedite the deployment of programs used to test screener performance; establish quantity and quality parameters for measuring screener performance; and maximize the use (continuous use) of explosives detection equipment, such as the FAA-certified bulk explosives detection equipment and trace explosives detection equipment. FAA also needs to expedite the operational testing and deployment of equipment used to screen passengers for explosives carried on their body. In the long term, we need to develop and deploy advanced security equipment that is capable of screening all (100 percent) passengers, passenger carry-on and checked baggage, airline crews, and others with access to aircraft for all threat objects (knives, guns, bombs, etc.).

Background

As a result of recommendations in the Commission's Final Report, FAA is purchasing and deploying advanced security technologies as part of an 8-year, $850 million program to enhance aviation security. Since 1997, Congress has provided approximately $455 million for the purchase and deployment of advanced security technologies.

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[2] Follow-up Audit of Deployment of Explosives Detection Equipment, Federal Aviation Administration (Report No AV-2000-002, October 21, 1999).

Funding for Purchasing and Deploying Advanced Security Technologies	
Fiscal Year	**Dollars in Millions**
1997	$144.2
1998	$ 13.5
1999	$100.0
2000	$ 97.5
2001	$ 99.5

Congress has also provided, since 1997, $258 million for funding aviation system security technology research, engineering and development of aviation security programs in support of FAA's deployment of advanced security technologies.

In October 1996, FAA established the Security Equipment Integrated Product Team (Product Team) to plan, purchase, and install explosives detection equipment. In addition to FAA personnel, the Product Team includes full-time members from the airlines that operate and maintain this equipment, as well as airport authority representatives. The Product Team is responsible for developing and implementing the strategy for purchasing, installing, and maintaining explosives detection equipment, and for training equipment operators. The Product Team is also responsible for developing and implementing the allocation strategy, which identifies high-risk airports and air carriers for deployment of explosives detection equipment.

In the past, FAA has purchased advanced security technologies from multiple vendors, if available. As of September 30, 2001, the FAA has deployed:

- 142 FAA-certified[3] bulk explosives detection machines at 47 airports for screening passengers' checked baggage. Although these machines are effective in detecting explosives, each one is ultimately dependent on the human operator.

- 20 non-certified explosives detection machines at 8 airports for screening passengers' checked baggage.

- 789 explosives trace detection devices at 174 airports for screening both passengers' checked and carry-on baggage. These devices are used primarily

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[3] FAA's standards for certifying explosives detection systems for screening checked baggage are classified. The certification standards set criteria for detection, false alarm, and baggage processing rates.

as an additional security measure when the screeners cannot resolve suspect objects or items.

- 697 TIP-ready x-ray machines at screening checkpoints in 72 airports for screening passengers' carry-on baggage and items. These machines have enhanced screening capabilities for identifying threat objects and can also test screener performance.

- 452 Computer-Based Training (CBT) work stations at 37 airports for initial and recurrent training for screeners. The potential benefits of CBT are self-paced learning, enhanced opportunities for realistic practice, combined training and performance testing, and instruction that is uniform across the country.

Also, each airline has installed Computer-Assisted Passenger Prescreening systems (CAPPS) in their computer reservation systems for screening passengers during the check-in process. CAPPS is an automated passenger prescreening system that uses information in airline reservation systems to separate passengers into a very large majority who present no security risk, and a small minority (known as selectees) who merit additional attention, such as having their checked baggage screened using explosives detection equipment.

Explosives Detection Equipment Continues To Be Underutilized

Bulk explosives detection equipment such as the CTX machine was developed to assist screeners in identifying threat items in passenger baggage. In our prior reports and testimony we have reported our concerns with the deployment and use of bulk explosives detection equipment. CTX machines are underused and, at the current rate of deployment, it will be years before all CAPPS selectees' checked baggage will be screened through certified explosives detection equipment. But even more important, air carriers are still not maximizing the use of the deployed equipment even after the events of September 11.

The Gore Commission recommended that the Government purchase and widely deploy significant numbers of innovative systems to detect explosives in cargo, checked baggage, carry-on bags, and on passengers. As far back as 1998, we have been reporting our concern that deployed CTX machines continue to be underutilized, screening fewer bags in a day than the machine was capable of screening in an hour.

Congress has also recognized that bulk explosives detection equipment was being underutilized and twice has mandated that FAA increase the use. Congress

included a provision in the Omnibus Consolidated and Emergency Supplemental Appropriation Act of 1999 mandating that FAA certify to Congress, in writing, that air carriers will substantially increase the use of bulk explosives detection machines. More recently, Congress included a provision in the Airport Security Improvement Act of 2000, mandating the FAA Administrator to maximize the use of the explosives detection equipment.

Air carriers have significant influence over the types of advanced security technologies that FAA purchases. The air carriers are responsible for the cost of operating and maintaining all the advanced security technologies purchased and deployed by FAA. Air carriers are not required to accept advanced security equipment, but once accepted they must use and maintain the equipment in accordance with FAA requirements. As a result, a major U.S. air carrier had only one bulk explosives detection machine, prior to September 11th; while a small air carrier had four machines.

There has been a steady increase in the total number of bags screened across the system, as more of these machines are deployed. On the other hand, comparison of quarterly performance statistics compiled on a per machine basis in 2000 and 2001 show the machines are underutilized. In July 2001, the average usage rate per machine was 350 bags per day.

The percentage of machines averaging less than 225 bags per day decreased in 2000. In the first quarter of calendar year 2000 over half of the machines continued to average less than 225 bags per day. In contrast, by the last quarter of 2000 slightly more than a third of the machines averaged less than 225 bags per day. While the utilization has held fairly steady in the first 7 months of 2001, the equipment is still being underutilized with over a third of the deployed machines still screening less than 225 **bags per day**, on average, compared to a certified rate of 225 **bags per hour**. As shown in the chart below, during the month of July the majority of machines continue to be underutilized:

Screening Rates of 80 CTX 5500 Machines Installed in U.S Airports During July 2001	
Number of CTX Machines	**Bags Screened Per Day**
07	0-100
16	101-200
31	201-400
14	401-600
06	601-800
06	801-1200

This equipment is capable of screening between 140 and 150 bags per hour in an operational environment. FAA needs to take immediate steps to ensure that air carriers use the equipment at this level.

Use Requirements and Deployment Limit the Number of Bags Screened. Until recently FAA's requirements on the use of bulk explosives detection equipment contributed to the underutilization of the equipment. FAA only required the use of explosives detection equipment (either FAA-certified or noncertified) to clear the bags of CAPPS selectees, and only if such equipment is available. If the equipment was not available, the air carrier was required to conduct a passenger bag match for the first domestic flight segment. Air carriers were not required to continuously use the machines by increasing the number of passengers randomly selected.

The selection rate under CAPPS is low (estimated to be between 3 and 5 percent of all air travelers), and is likely to become even lower in the future as the use of electronic ticketing becomes more widespread.

FAA does not plan to require that the checked bags of all CAPPS selectees be screened by an explosives detection system until the end of calendar year 2004. At that time enough machines should be deployed. In the few cases where selectee bags are not screened by an explosives detection system, the baggage will be subject to positive bag match from origin-to-destination, not just first flight segment.

Although FAA has a goal to screen 100 percent of checked baggage, it does not expect to begin phasing this in until 2009. The expectation to be able to begin this phase-in of 100 percent checked baggage screening, however, assumes the replacement of all of the machines deployed through 2006 with a faster, better, cheaper technology. While processing less checked baggage than the U.S., the European Civil Aviation Conference has a goal of screening 100 percent of checked baggage by the end of 2002. Given the events of September 11th, the deployment should be escalated and a date established on which the screening of 100 percent of checked baggage must be *achieved*.

Low Utilization May Impact Screener Proficiency and Diminish the Deterrent Effect. According to a report by the National Research Council,[4] "Underutilization poses a potential problem for the maintenance of operator skills, particularly the skills required for resolving false alarms, because underpracticed

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[4] Assessment of Technologies Deployed to Improve Aviation Security, First Report, National Research Council, issued in 1999.

skills often deteriorate. At some locations, the throughput rate has been so low that operators could even lose their skills for operating the equipment."

In response to our prior recommendations to increase the random selection factor, FAA offered an alternative method for increasing the use by developing and implementing a nondiscriminatory random selection process on a station-by-station basis rather than a system-wide upward adjustment of the CAPPS random selection factor. While we agreed with this methodology, we did not agree with the goal FAA chose of 1,000 bags per week per machine, or a system-wide average of 2,000 bags per week. Early in our review, FAA had itself determined that random selection, which ensures that each passenger has a chance of being a selectee, had a deterrent value that would increase airline passenger security. We therefore concluded that increasing the random rate on underused machines would also increase the deterrent value of those machines, which would in turn increase aviation security.

FAA however contended that any additional increase in the random selection rate only slightly enhances security and at the same time drives up operating costs. To support this contention, FAA recently funded a study analyzing the cost of screening selectee and non-selectee baggage. The study concluded "Moreover, the marginal increase in security per security dollar spent is significantly lower when non-selectee baggage is screened versus screening only selectee baggage." However, we still believe a bulk explosives detection machine in use has an immediate, powerful, and visible deterrent effect on potential terrorists. One sitting idle does not.

Deployed Equipment Is Still Underutilized. Based on the events of September 11, 2001, FAA now requires air carriers to ensure continual use of all deployed explosives detection equipment or advanced security technologies. If there are not sufficient selectees to ensure continual use, passengers with checked baggage must be randomly selected.

To determine if air carriers are continuously using deployed bulk explosives detection equipment, in the past week we visited seven Category X airports and observed the use of deployed equipment. During recent limited visits, we were concerned to find that the majority was still not being continuously used. At some locations, the machine was not turned on; at others, the machines were on and staffed with screeners, but no baggage was being screened; and at others, baggage was being screened only sporadically. While in most cases we could not see whether the machine alarmed on a bag, at most of the machines we observed no bags were searched during our observations. Based on our past audit work we would have expected to see more bags being searched.

We are disappointed to find that despite a recognized need for heightened security, air carriers still are not fully utilizing these machines to the maximum extent possible. FAA needs to immediately enforce the continuous use requirement on the air carriers. In the longer term, FAA needs to develop and deploy advanced security equipment capable of screening 100 percent of passengers, baggage, and individuals with access to the aircraft.

Deployment Problems Persist

Threat Image Projection (TIP) Programs Are Needed to Enhance Screener Proficiency. TIP, a computer software program, projects fictitious images on to bags or an entire fictitious bag containing a threat onto the screener's monitor. TIP is intended to keep equipment operators alert, provide real world conditions, and measure performance in identifying the threat items. TIP has been installed on all CTX machines used to screen checked baggage and all new TIP-ready x-ray machines used to screen carry-on baggage and items.

TIP is an important component of the FAA proposed rule on certification of screening companies. FAA will rely on TIP to measure the performance of individual screeners and certify screening companies. Also, using data derived from TIP, FAA plans to establish screener performance standards and measure screening company performance. By measuring operator performance, FAA can hold certificated screening companies and the air carriers that hire them accountable for effective screening operations.

In the past, we have reported two concerns with FAA's deployment of TIP. First, in our October 1999 audit report,[5] we reported that FAA had no controls over the use of TIP program functions installed on the CTX 5500. As a result, the air carriers and screening companies operating the systems had compromised the integrity and security of the TIP program. For example, we found CTX 5500 operators at two airports we visited had learned restricted program passwords intended to be available only to supervisors and managers, and were using those passwords to access the TIP program and disable or control it.

In response to our report, FAA issued new guidance to air carriers in November 1999 that standardizes frequency of threat image presentation, provides better control over passwords, and requires that TIP be activated for each screening session. This should result in more consistent data on CTX screener performance. We plan to review FAA's controls over the TIP ready x-ray machines.

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[5] Follow-up Audit of Deployment of Explosives Detection Equipment, Federal Aviation Administration (Report No AV-2000-002, October 21, 1999).

Second, we are concerned that FAA has not established the performance standards screeners must meet for a screening company to be certified or maintain its certification. For example, what percentage of time should the screener identify the threat items? The performance standards will be critical to the success of the certification programs to improve security screening of passengers and their baggage. One reason that performance standards have not been established is that TIP data from the x-ray machines is limited because TIP has not been activated on all TIP-ready x-ray machines. TIP has been activated on a little more than half of the 697 installed.

The primary reason for the delay in activating TIP is the lack of a standardized TIP training program. Training had been left up to each of the TIP-ready x-ray vendors, and the quality and content varied by vendor. Training was only geared towards that vendor's specific unit.

A Variety of Barriers Have Been Encountered During the Deployment of Bulk Explosives Detection Machines. There are currently two manufacturers—InVision Technologies and L-3 Communications—whose FAA-certified machines are being deployed. Nearly all FAA-certified machines deployed to date are from InVision Technologies (CTXs).

In an effort to promote competition, FAA's Fiscal Year 2001 appropriation contained language requiring it to purchase equal amounts of bulk explosives detection equipment from both certified sources. This required FAA to purchase one L-3 eXaminer 6000 machine for every InVision Technologies CTX purchased. However, there have been problems with the L-3 Communications equipment, so the air carriers have been reluctant to accept these machines. As a result, nine machines are currently being warehoused by L-3 until the problems with the machines can be resolved.

The complexity of the installations and the number of entities involved have slowed the deployment of InVision's machines. At some airports, the machines are installed in locations not conducive to efficient and effective security operations. For example, we observed machines not secured from the public and machine operators not sufficiently insulated from noise and disruption. Other contributing factors have been the initial inexperience of the integration contractors; airline indecision on where to put the machines; and delays due to airport permits, approvals and construction. At one major airport, the airport operator would not approve a lobby installation because the machine did not fit the lobby's color scheme.

An even greater challenge faced by FAA is to fully integrate the machines into air carriers' baggage systems. This is an expensive installation that most carriers are reluctant to accept, even though FAA pays the majority of the expense to reconfigure the baggage system. At many airports, there is not enough space in the baggage area to accommodate more than one machine. At the largest airports, multiple machines would be required to handle the baggage flow of a single air carrier.

The best time for full integration is during design and construction of new terminals. However, FAA has not taken advantage of new terminal construction and require the integration of bulk explosives detection equipment into the design of the baggage handling equipment. Taking advantage of integration during new construction is the most efficient way to reach the ultimate goal of screening 100 percent of checked baggage.

One Vendors' TIP-Ready X-Rays Machines Are Not Performing to Standard. TIP-ready x-ray machines are being installed at screening checkpoint in airports nationwide. All existing machines at screening checkpoints are being replaced with TIP-ready x-ray machines. Since TIP-ready x-ray machines are replacing older x-ray machines the installations are generally trouble free. But again, not all machines are performing well in the operational environment.

FAA is purchasing these x-ray machines from three vendors and each vendor's machine was tested for its technical and operational capability. However, one vendor's machine has had problems in the airport environment, including machine reliability to perform to standard. This vendor currently has over 140 of these machines in operation. These operational problems have resulted in FAA suspending any future purchases from the vendor until the issues are resolved. These problems have also resulted in the air carriers reluctance to accept this product in the future.

Operational and Reliability Problems Associated with Trace Explosives Detection Devices Need to be Corrected. FAA is deploying trace explosives detection devices from four vendors. The majority of these devices are being deployed at screening checkpoints in airports nationwide. These devices are also being used to augment screening of checked baggage and are co-located with bulk detection systems.

Due to the smaller size and portability of trace explosives detection devices, installations for screening carry-on bags has been smoother. However, not all devices are performing well in an operational environment.

While four vendors are providing trace detection devices, one vendors device was selected, at the air carriers request, as the explosives trace detection device of choice to augment the screening of checked and carry-on bags. However, during our 2000 audit, the air carriers that were using this particular trace device provided a different perspective. We found 36 (31 percent) of the 116 machines we observed were not operational, mostly because of maintenance-related problems. More troubling still, we received complaints about the availability and reliability of the equipment, the intense maintenance effort required to keep it operating, lack of vendor support, inadequate training, and the high cost of consumable items, from air carrier and screening company representatives and operators at 27 (69 percent) of the 39 screening locations we visited.

We recommended that FAA take prompt action to ensure that deployed explosives trace detection devices are properly used and maintained. In response to our recommendation, FAA stated that its latest procurement of trace detection devices, included more stringent contractual requirements were in place pertaining to reliability, maintainability, and availability of the devices. FAA also stated that a monitoring system, including FAA field audits and required air carrier maintenance reporting, is in place to provide early problem identification and response. FAA further stated that enforcement actions would be taken against air carriers found not complying with usage requirements for trace detection devices.

This concludes my statement. I would be pleased to answer any questions.