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AVIATION SECURITY

TSA Has Strengthened Efforts to Plan for the Optimal Deployment of Checked Baggage Screening Systems, but Funding Uncertainties Remain

Statement of Cathleen A. Berrick, Director
Homeland Security and Justice Issues

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Highlights

Highlights of GAO-06-875T, a testimony before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives

Why GAO Did This Study

The Transportation Security Administration (TSA) has deployed two types of baggage screening equipment: explosive detection systems (EDS), which use X-rays to scan bags for explosives, and explosive trace detection systems (ETD), in which bags are swabbed to test for chemical traces of explosives. TSA considers screening with EDS to be superior to screening with ETD because EDS machines process more bags per hour and automatically detect explosives without direct human involvement. In March 2005, GAO reported that while TSA had made progress in deploying EDS and ETD machines, it had not conducted a systematic, prospective analysis of the optimal deployment of these machines to achieve long-term savings and enhanced efficiencies and security. GAO's testimony today updates our previous report and discusses TSA's (1) deployment of EDS and ETD systems and the identified benefits of in-line systems, and (2) planning for the optimal deployment of checked baggage screening systems and efforts to identify funding and financing options.

What GAO Recommends

GAO previously recommended that TSA systematically evaluate checked baggage screening needs at airports, such as identifying the costs and benefits of installing in-line systems or stand-alone EDS. DHS generally concurred with our recommendations.

www.gao.gov/cgi-bin/getrpt?GAO-06-875T.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Cathleen A. Berrick at (202) 512-3404 or berrickc@gao.gov.

What GAO Found

Since its inception in November 2001 through June 2006, TSA has procured and installed about 1,600 EDS machines and 7,200 ETD machines to screen checked baggage for explosives at over 400 airports. However, initial deployment of EDS machines in a stand-alone mode—usually in airport lobbies—and ETD machines resulted in operational inefficiencies and security risks as compared with using EDS machines integrated in-line with airport baggage conveyor systems. For example, TSA's use of stand-alone EDS and ETD machines required a greater number of screeners and resulted in screening fewer bags for explosives each hour. In March 2005, we reported that at nine airports where TSA has agreed to help fund the installation of in-line EDS systems, TSA estimated that screening with in-line EDS machines could save the federal government about $1.3 billion over 7 years. In February 2006, TSA reported that many of the initial in-line EDS systems did not achieve the anticipated savings. However, recent improvements in the design of the in-line EDS systems and EDS screening technology now offer the opportunity for higher-performance and lower-cost screening systems. Finally, screening with in-line EDS systems may result in security benefits by reducing the need for TSA to use alternative screening procedures, such as screening with explosives detection canines and physical bag searches, which involve trade-offs in security effectiveness.

TSA has begun to systematically plan for the optimal deployment of checked baggage screening systems, but resources have not been made available to fund the installation of in-line EDS systems on a large-scale basis. In February 2006, TSA released its strategic planning framework for checked baggage screening aimed at increasing security through deploying more EDS machines, lowering program life-cycle costs, minimizing impacts to TSA and airport and airline operations, and providing a flexible security infrastructure. As part of this effort, TSA identified the 25 airports that should first receive federal funding for the installation of in-line EDS systems, and the optimal checked baggage screening solutions for the 250 airports with the highest checked baggage volumes. In February 2006, TSA estimated that installing and operating the optimal checked baggage screening systems will cost about $22.4 billion over 20 years and reported that under current investment levels, installation of optimal baggage screening systems would not be completed until approximately 2024. TSA is collaborating with airport operators, airlines, and other key stakeholders to identify funding and cost sharing strategies and is focusing its research and development efforts on the next generation of EDS technology.

EDS and ETD Machines Used by TSA to Screen Checked Baggage

ETD machine

Uses chemical analysis to detect traces of explosive material vapors or residues.

EDS machine

Uses computerized tomography X-rays to recognize the characteristic signatures of explosives.

Source: GAO.

Mr. Chairman and Members of the Subcommittee:

I appreciate the opportunity to participate in today's hearing on the status of the Transportation Security Administration's (TSA) efforts to deploy checked baggage screening technology to the nation's commercial airports, and to discuss our work in this area. As you know, after the terrorist attacks of September 11, 2001, which highlighted the vulnerability of U.S. aircraft to acts of terrorism, Congress passed and the President signed into law, the Aviation and Transportation Security Act (ATSA), creating the TSA and mandating, among other things, that all checked baggage at U.S. airports be screened using explosive detection systems by December 31, 2002.[1] To meet this requirement, TSA deployed two types of equipment to screen checked baggage for explosives: (1) explosives detection systems (EDS) that use specialized X-rays to detect characteristics of explosives that may be contained in baggage as it moves along a conveyor belt and (2) explosive trace detection (ETD) systems, whereby a Transportation Security Officer (TSO) swabs baggage and then inserts the swab into the ETD machine, which in turn can detect chemical residues that may indicate the presence of explosives within a bag.

In November 2002, Congress passed, and the President signed into law, the Homeland Security Act of 2002, which, in effect, extended the deadline for screening all checked baggage for explosives until December 31, 2003, for airports at which TSA was unable to meet the earlier deadline established by ATSA.[2] In March 2005, we reported that largely because of shortages of equipment and insufficient time to modify airports to accommodate EDS machines, TSA had been unable, at certain airports, to meet the 2002 congressionally established deadline to screen all checked baggage for explosives using explosive detection systems.[3] We also reported that at most smaller airports, where EDS machines are not installed, TSA screens solely with ETD machines. Further we reported that while TSA had made progress in deploying EDS and ETD machines, it had not conducted a systematic, prospective analysis of the optimal deployment of these machines to achieve long-term savings and enhanced efficiencies and

[1]Aviation and Transportation Security Act, Pub. L. No. 107-71, 115 Stat. 597 (2001). *See* 49 U.S.C. §§ 114(a), 44901(d)(1).

[2]Homeland Security Act of 2002, Pub. L. No. 107-296, 116 Stat. 2135. *See* 49 U.S.C. § 44901(d)(2).

[3]GAO, *Aviation Security: Systematic Planning Needed to Optimize the Deployment of Checked Baggage Screening Systems*, GAO-05-365 (Washington, D.C.: March 15, 2005).

security. Finally, in February 2006, we reported that TSA considers screening with EDS to be superior to screening with ETD because EDS machines process more bags per hour and automatically detect explosives without direct human involvement.[4]

My testimony today updates the information we reported in March 2005, and discusses (1) TSA's deployment of EDS and ETD systems and the identified benefits of installing in-line checked baggage screening systems at airports and (2) TSA's efforts to plan for and identify funding options for the optimal deployment of EDS and ETD equipment, including in-line checked baggage screening systems. My comments are based on issued GAO reports and testimonies addressing TSA's checked baggage screening program and our review of TSA documents related to the deployment of checked baggage screening systems, including TSA's February 2006 strategic planning framework for its checked baggage screening program.[5] We conducted our work in accordance with generally accepted government auditing standards. Appendix I contains a list of related GAO products issued on TSA's checked baggage screening program.

Summary

Since its inception in November 2001 through June 2006, TSA has procured and installed about 1,600 EDS machines and about 7,200 ETD machines to screen checked baggage for explosives at over 400 commercial airports. However, initial deployment of EDS machines in a stand-alone mode—usually in airport lobbies—and ETD machines resulted in operational inefficiencies and security risks as compared with using EDS machines integrated in-line with airport baggage conveyor systems. For example, TSA's use of stand-alone EDS and ETD machines required a greater number of screeners and resulted in screening fewer bags for explosives each hour. Additionally, because in-line EDS checked baggage screening systems can significantly reduce the need for TSOs to handle baggage, installing them may also reduce the number of TSO on-the-job injuries. In March 2005, we reported that at nine airports where TSA has agreed to help fund the installation of in-line EDS systems, TSA estimated that screening with in-line EDS machines could save the federal

[4] GAO, *Aviation Security: TSA Management of Checked Baggage Screening Procedures Could Be Improved*; GAO-06-291SU (Washington, D.C.: February 28, 2006).

[5] Although we could not independently verify the reliability of all of the information we obtained, we compared it with other supporting documents, when available, to determine data consistency and reasonableness.

government about $1.3 billion over 7 years. In February 2006, TSA reported that a savings of approximately $4.7 billion could be realized over a period of 20 years by installing optimal checked baggage screening systems, including in-line EDS machines, at the airports with the highest checked baggage volumes. However, TSA also reported in February 2006 that many of the initial in-line EDS systems did not achieve the degree of anticipated savings initially estimated. TSA has since determined that recent improvements in the design of the in-line EDS systems and EDS screening technology now offer the opportunity for higher performance and lower cost screening systems. Screening with in-line EDS systems could also result in security benefits by reducing congestion in airport lobbies and reducing the need for TSA to use alternative screening procedures, such as screening with explosives detection canines and physical bag searches. TSA's use of these procedures, which are only to be used when volumes of baggage awaiting screening pose security vulnerabilities or when TSA officials determine that there is a security risk associated with large concentrations of passengers in an area, has involved trade-offs in security effectiveness.[6]

TSA has begun to systematically plan for the optimal deployment of checked baggage screening systems, but resources have not been made available to fund the installation of in-line EDS machines on a large-scale basis. In February 2006, TSA released its strategic planning framework for checked baggage screening aimed at increasing security through deploying more EDS machines, lowering program life-cycle costs, minimizing impacts to TSA and airport and airline operations, and providing a flexible security infrastructure. According to TSA, the framework will be used to establish a comprehensive strategic plan for TSA's checked baggage screening program. TSA expects to complete the strategic plan in early fall 2006. As part of this planning effort, TSA identified, among other things, the top 25 airports that should first receive federal funding for projects related to the installation of in-line EDS systems, and the optimal checked baggage screening solutions for the 250 airports with the highest checked baggage volumes. In June 2006, TSA officials reported that if the top 25 airports do not receive in-line checked baggage screening systems, they will require additional screening equipment to be placed in airport lobbies and additional TSO staffing in order to remain in compliance with the

[6]Certain information we obtained and analyzed regarding explosives detection technologies and their effectiveness in TSA's checked baggage screening operations are classified or are considered by TSA to be sensitive security information. Accordingly, the results of our review of this information have been removed from this testimony.

mandate for screening all checked baggage using explosive detection systems. In February 2006, TSA estimated that the total cost of installing and operating the optimal checked baggage screening systems at the 250 airports is approximately $22.4 billion over 20 years, of which about $6 billion is for installation, life-cycle replacement, existing committed funding, and equipment maintenance costs. However, insufficient resources have been made available to fund in-line systems on a large scale basis. TSA currently uses annual appropriations and a mandatory appropriation from the Aviation Security Capital Fund to fund the construction of in-line baggage screening systems.[7] Further, in order to leverage federal and private sector resources, TSA has supported the construction of in-line systems at 9 airports through letter of intent agreements.[8] TSA reported that as of June 2006, 25 airports had operational in-line EDS systems and an additional 24 airports had in-line systems under development.[9] In May 2006, TSA reported that under current investment levels, installation of optimal checked baggage screening systems would not be completed until approximately 2024. TSA is currently collaborating with airport operators, airlines, and other key stakeholders to identify funding and cost-sharing strategies—an effort that TSA expects to complete by early fall 2006. TSA is also focusing its research and development efforts on the next generation of EDS technology.

Background

Prior to the passage of ATSA in November 2001, only limited screening of checked baggage for explosives occurred. When this screening took place, air carriers had operational responsibility for conducting the screening, while the Federal Aviation Administration (FAA) maintained oversight responsibility. With the passage of ATSA, TSA assumed responsibility for ensuring that all checked baggage is properly screened for explosives at airports in the United States where screening is required, and for the procurement, installation, and maintenance of explosive detection systems used to screen checked baggage for explosives. Airport operators and air

[7]Airports also rely on nonfederal sources of funding to fund in-line EDS systems.

[8]A letter of intent, though not a binding commitment of federal funding, represents an intent by TSA to provide future years funding in support of a project, contingent upon the availability of appropriated funds.

[9]The in-line systems were either airportwide (full) or at a particular terminal or terminals (partial).

carriers continued to be responsible for processing and transporting passenger checked baggage from the check-in counter to the airplane.

Explosive detection systems used to screen checked baggage include EDS and ETD machines. EDS machines, which cost between about $300,000 and $1.2 million each, use computer-aided tomography X-rays adapted from the medical field to examine the objects inside baggage to automatically recognize the characteristic signatures of threat explosives. TSA has certified, procured, and deployed EDS machines made by three manufacturers. ETD machines, which cost approximately $40,000 to $50,000 each, work by detecting vapors and residues of explosives. Because human operators collect samples by rubbing bags with swabs, which are then chemically analyzed in the ETD machines to identify any traces of explosive materials, the use of ETD is more labor-intensive and subject to more human error than the automated process of using EDS machines. ETD is used for both primary, or the initial, screening of checked baggage, and secondary screening, which resolves alarms from EDS machines that indicate the possible presence of explosives inside a bag.

As we reported in March 2005, to initially deploy EDS and ETD equipment to screen 100 percent of checked baggage for explosives, TSA implemented interim airport lobby solutions and in-line EDS baggage screening systems.[10] The interim lobby solutions involved placing stand-alone EDS and ETD machines in the nation's airports, most often in airport lobbies or baggage makeup areas where baggage is sorted for loading onto aircraft. For EDS in a stand-alone mode (not integrated with an airport's or air carrier's baggage conveyor system) and ETD, TSA TSOs are responsible for obtaining the passengers' checked baggage from either the passenger or the air carrier, lifting the bags onto and off of EDS machines or ETD tables, using TSA protocols to appropriately screen the bags, and returning the cleared bags to the air carriers to be loaded onto departing aircraft. In addition to installing stand-alone EDS and ETD machines in airport lobbies and baggage makeup areas, TSA collaborated with some airport operators and air carriers to install integrated in-line EDS baggage screening systems within their baggage conveyor systems.

In March 2005, we reported that TSA used most of its fiscal year 2002 through 2004 checked baggage screening program funding to design,

[10]GAO-05-365.

develop, and deploy interim lobby screening solutions rather than install more permanent in-line EDS baggage screening systems. We also reported that during our site visits to 22 category X, I, and II airports,[11] we observed that in most cases, TSA used stand-alone EDS machines and ETD machines as the primary method for screening checked baggage.[12] Generally, this equipment was located in airport lobbies and in baggage makeup areas. In addition, in our survey of 155 federal security directors,[13] we asked the directors to estimate, for the 263 airports included in the survey, the approximate percentage of checked baggage that was screened on or around February 29, 2004, using EDS, ETD, or other approved alternatives for screening baggage such as screening with explosives detection canines, and physical bag searches. As shown in table 1, the directors reported that for 130 large to medium-sized airports in our survey (21, 60, and 49 category X, I, and II airports, respectively), most of the checked baggage was screened using stand-alone EDS or ETD machines. On average, the percentage of checked baggage reported as screened using EDS machines at airports with partial or full in-line EDS capability ranged from 4 percent for category II airports to 11 percent for category X airports. In addition, the directors reported that ETD machines were used to screen checked baggage 93 to 99 percent of the time at category III and IV airports, respectively.

[11]TSA classifies the over 400 airports in the United States into one of five categories—X, I, II, III, and IV. Generally, category X airports have the largest number of passenger boardings and category IV airports have the smallest number.

[12]The 22 airports included 12 category X, 9 category I, and 1 category II airports. We conducted our site visits between September 2003 and March 2004.

[13] The federal security directors are the ranking TSA authorities responsible for the leadership and coordination of TSA security activities at the nation's commercial airports.

Table 1: Average Percentage of Checked Baggage Reported as Screened Using EDS, ETD, or Other Approved Method at 263 Airports on or around February 29, 2004

Airport category	X	I	II	III	IV	Total
Number of airports	21	60	49	73	60	263
Percentage of checked baggage screened using						
EDS (at airports with no in-line EDS capability)	59	59	27	6	0	25
EDS (at airports with partial or airportwide in-line EDS capability)	11	8	4	0	0	3
Totala EDS	70	67	32	6	0	28
ETD	18	33	66	93	99	69
Totala EDS and ETD	88	99	98	99	99	98
Other approved method	12	1	2	2	1	2
Totala	100	100	100	100	100	100

Source: analysis of GAO federal security director survey data.

[a]Percentages in totals may not add to 100 percent because of rounding.

The Deployment of Stand-alone Explosive Detection Systems Led to Operational Inefficiencies and Security Risks that In-Line Systems Could Address at Some Airports

Stand-alone Checked Baggage Screening Systems Created Operational Inefficiencies and Security Risks

Since its inception in November 2001 through June 22, 2006, TSA has procured and installed about 1,600 EDS machines and about 7,200 ETD machines to screen checked baggage for explosives at over 400 commercial airports. For the most part, TSA deployed EDS machines at larger airports and ETD machines at smaller airports, resulting in primary screening being conducted solely with ETD machines at over 300 airports. TSA installed ETD machines instead of EDS for primary screening at these airports because of the configuration of screening stations, the costs associated with procuring EDS, and the low passenger volume at smaller

airports. Table 2 summarizes the location of EDS and ETD equipment at the nation's airports by airport category as of June 22, 2006.

Table 2: EDS and ETD Machines Deployed at U.S. Airports as of June 22, 2006

	Number		
Airport category	**Airports**	**EDS machines**	**ETD machines**
X	27	1,019	3,439
I	55	468	1,969
II	73	104	889
III	116	29	607
IV	176	7	432
Total	447	1,627	7,336

Source: GAO analysis of TSA data.

Stand-alone EDS and ETD machines are both labor- and time-intensive to operate since each bag must be physically carried to an EDS or ETD machine for screening and then moved back to the baggage conveyor system prior to being loaded onto an aircraft. With an in-line EDS system, checked baggage is screened within an airport's baggage conveyor system, eliminating the need for a TSO or other personnel to physically transport the baggage from the check-in point to the EDS machine for screening and then to the airport baggage conveyor system. Further, according to TSA officials, ETD machines and stand-alone EDS machines are less efficient in the number of checked bags that can be screened per hour per machine than are EDS machines that are integrated in-line with the airport baggage conveyor systems. According to TSA estimates, the number of checked bags screened per hour can more than double when EDS machines are placed in-line versus being used in a stand-alone mode. Table 3 identifies TSA's estimates for bags screened per hour by EDS machines in stand-alone and in-line configurations and ETD machines.

Table 3: Estimated Bags Per Hour Screened by Stand-alone and In-line EDS Machines and ETD Machines

	Bags per hour	
Type of equipment	**Stand-alone**	**In-line**
EDS machines		
CTX 2500—stand-alone only	120	NA
CTX 5500	180	250
CTX 9000—in-line only	NA	500
L3 6000	140	500
Reveal CT-80	80	NA
ETD machines—stand-alone only	36	NA

Source: TSA.

NA: Not applicable.

In-Line Systems Have Efficiency, Safety, and Security Benefits

TSA has reported that in-line systems create significant efficiency benefits. In January 2004, TSA, in support of its planning, budgeting, and acquisition of security screening equipment, reported to the Office of Management and Budget (OMB) that the efficiency benefits of in-line rather than stand-alone EDS were significant, particularly with regard to bags per hour screened and the number of TSOs required to operate the equipment. According to TSA officials, at that time, a typical lobby-based screening unit consisting of a stand-alone EDS machine with three ETD machines had a baggage throughput (bags screened per hour) of 376 bags per hour with a staffing requirement of 19 TSOs. In contrast, TSA estimated that approximately 425 bags per hour could be screened by an in-line EDS machine with a staffing requirement of 4.25 TSOs.

In order to achieve the higher throughput rates and reduce the number of TSOs needed to operate in-line baggage screening systems, TSA (1) uses a screening procedure known as on-screen alarm resolution and (2) networks multiple in-line EDS machines together, referred to as multiplexing, so that the computer-generated images of bags from these machines are sent to a central location where TSOs can monitor the images of suspect bags centrally from several machines using the on-

screen alarm resolution procedure.[14] A TSA official estimated that the on-screen alarm resolution procedure with in-line EDS baggage screening systems would enable TSA to reduce the number of bags requiring the more labor-intensive secondary screening using ETD machines by 40 to 60 percent. In estimating the potential savings in staffing requirements, TSA officials stated that they expect to achieve a 20 to 25 percent savings because of reductions in the number of staff needed to screen bags using ETD to resolve alarms from in-line EDS machines. According to TSA officials, as of June 22, 2006, all airports with EDS equipment use on-screen alarm resolution protocols and 16 airports had networked in-line systems.

In May 2004, TSA conducted a limited, retrospective cost-benefit analysis at the nine airports that signed letter of intent (LOI) agreements and found that significant savings and other benefits could be achieved through the installation of these systems.[15] This analysis was conducted to estimate potential future cost savings and other benefits that could be achieved from installing in-line systems instead of using stand-alone EDS systems. We reported in March 2005 that, according to TSA's analysis, in-line EDS would reduce by 78 percent the number of TSA TSOs and supervisors required to screen checked baggage at these nine airports, from 6,645 to 1,477 TSOs and supervisors. The actual number of TSOs and supervisor positions that could be eliminated would be dependent on the individual design and operating conditions at each airport. TSA estimated that in-line

[14]Under the on-screen alarm resolution procedure, when an EDS machine sets off an alarm, indicating the possibility that explosive material may be contained in the bag, TSOs examine computer-generated images of the inside of a bag to determine if suspect items identified by the EDS machines are in fact suspicious. If a TSO, by viewing these images, is able to determine that the suspect item or items identified by the EDS machine are in fact harmless, the TSO is allowed to clear the bag, and it is sent to the airline baggage makeup area for loading onto the aircraft. If the TSO is not able to determine that the bag does not contain suspicious objects, the bag is sent to a secondary screening room where the bag is further examined by a TSO. TSA also uses this on-screen alarm resolution procedure with stand-alone EDS machines.

[15]We reviewed the TSA cost model showing savings expected to be achieved with in-line rather than stand-alone EDS equipment at nine airports. We assessed the model's logic to ensure its completeness and correctness of calculations. Also, as discussed in appendix IV of our March 2005 report (GAO-05-365), we conducted a Monte Carlo simulation to: (1) illustrate sensitivity of potential cost savings of replacing stand-alone with in-line EDS systems to alternative values of key cost drivers and (2) to explore the variability in the key factors used by TSA in their model. On the basis of our review of TSA's cost model, we believe that it is sufficiently reliable for the analyses we conducted and the information included in this testimony.

baggage screening systems at these airports would save the federal government about $1.3 billion[16] compared with stand-alone EDS systems and that TSA would recover its initial investment in a little over 1 year.[17] According to TSA's analysis of the nine LOI airports, in-line cost savings critically depend on how much an airport's facilities have to be modified to accommodate the in-line configuration. Savings also depend on TSA's costs to buy, install, and network the EDS machines; subsequent maintenance costs; and the number of screeners needed to operate the machines in-line instead of using stand-alone EDS systems. In its analysis, TSA also found that a key factor driving many of these costs is throughput—how many bags an in-line EDS system can screen per hour compared with the rate for a stand-alone system. TSA's analysis also provided data to estimate the cost savings resulting from installing in-line EDS checked baggage screening systems for each airport over the 7-year period. According to TSA's data, federal cost savings varied from about $50 million to over $250 million at eight of the nine airports, while at one airport, there was an estimated $90 million loss.[18]

In February 2006, TSA reported that a saving of approximately $4.7 billion could be realized over a period of 20 years by installing optimal checked baggage screening systems at the 250 airports with the highest checked baggage volumes. This savings represents the difference between TSA's compliance only strategy—which assumes minimum capital expenditures and no additional investment in in-line systems in order to comply with the mandate to screen all checked baggage using explosive detection systems—and its preferred strategy, which is based on using optimal checked baggage screening systems, including in-line EDS systems, for the 250 airports. TSA estimated that the compliance only strategy would cost

[16]This figure refers to the net present value saved over 7 years if received up front.

[17]For a basis of comparison, Office of Management and Budget Circular A-94 stipulates using a 7 percent real discount rate to compute the present value of cost savings. TSA used a 4 percent real discount rate. Following Office of Management and Budget guidance, cost savings are $1.14 billion. In addition, in TSA's analysis, the federal government does not pay for $319 million, or 25 percent, of project costs. Accounting for these costs to reflect total costs, as recommended by Circular A-94, lowers overall savings to $820 million.

[18]The relatively large costs for up-front in-line EDS at one of the nine LOI airports were not offset by the modest amount of estimated operation and maintenance cost savings; therefore, the in-line EDS system may be more costly than EDS stand-alone. By contrast, at another one of the nine LOI airports, the up-front costs of in-line EDS are lower than for stand-alone EDS, and there is a substantial amount of estimated operation and maintenance cost savings. Therefore, the in-line EDS system at this latter airport may be less costly than stand-alone EDS.

$27.05 billion and the preferred strategy would cost $22.39 billion over 20 years, creating a saving of $4.66 billion.[19]

TSA reported that many of the initial in-line systems have produced a level of TSO labor savings insufficient to offset up-front capital costs of constructing the systems. According to TSA, the facility and baggage handling system modification costs have been higher than expected, with the nine airports with LOIs having incurred or projecting to incur up to $6 million or more in infrastructure costs for every EDS machine required. TSA stated that the keys to reducing future costs are establishing guidelines outlining best practices and a set of efficient design choices, and using newer EDS technology that best matches each optimally scaled design solution. In February 2006, TSA reported that recent improvements in the design of the in-line EDS checked baggage screening systems and the EDS screening technology now offer the opportunity for higher-performance and lower-cost screening systems.

A safety benefit of in-line EDS systems is the potential to reduce on-the job injuries. TSA reported that because procedures for using stand-alone EDS and ETD machines require TSOs to lift heavy baggage onto and off of the machines, the interim lobby screening solutions used by TSA led to significant numbers of on-the-job injuries.[20] Additionally, in responding to our survey about 263 airports, numerous federal security directors reported that on-the-job injuries related to lifting heavy baggage onto or off the EDS and ETD machines were a significant concern at the airports for which they were responsible. Specifically, these federal security directors reported that on-the-job injuries caused by lifting heavy bags onto and off of EDS machines were a significant concern at 65 airports, and were a significant concern with the use of ETD machines at 110 airports. To reduce on-the-job injuries, TSA has provided training to TSOs on proper lifting procedures. However, according to TSA officials, in-line EDS screening systems would significantly reduce the need for TSOs to

[19]These estimates are in present value terms. TSA estimated that it would cost about $1.7 billion for the optimal systems at the 250 airports, and TSA would achieve savings of about $6.2 billion in TSO staff savings. Additionally, TSA's estimate identified that equipment maintenance and EDS equipment life cycle replacement costs would be lower (about $150 million) under the preferred strategy.

[20] The Occupational Safety and Health Administration has projected based on the first two quarters of fiscal year 2006 that more than 16 percent of TSA employees will report a job related injury or illness by the end of the fiscal year, the highest percentage in the federal government.

handle baggage, thus further reducing the number of on-the-job injuries being experienced by TSA TSOs.

Use of in-line EDS systems can also provide security benefits at airports where they are installed by reducing congestion in airport lobbies and reducing the need for TSA to use alternative screening procedures at airports. During our site visits to 22 large and medium-sized airports, several TSA, airport, and airline officials expressed concern regarding the security risks caused by overcrowding due to ETD and stand-alone EDS machines located in airport lobbies.[21] The location of the equipment resulted in less space available to accommodate passenger movement and caused congestion due to passengers waiting in lines in public areas to have their checked baggage screened. TSA headquarters officials reported that large groups of people congregating in crowded airport lobbies increases security risks by creating a potential target for terrorists. TSA also reported that airports favor replacing stand-alone EDS machines with in-line systems to mitigate the negative effects of increased congestion and passenger processing times. TSA further reported that in-line systems are more secure than stand-alone EDS machines because the baggage screening is performed away from passengers who otherwise could tamper with the baggage.

Another potential security benefit of in-line EDS systems is the reduction of the need for TSA to use alternative screening procedures. In addition to screening with standard procedures using EDS and ETD, which TSA had determined to provide the most effective detection of explosives, TSA also allows alternative screening procedures to be used when volumes of baggage awaiting screening pose security vulnerabilities or when TSA officials determine that there is a security risk associated with large concentrations of passengers in an area. These alternative screening procedures include the use of EDS and ETD machines in nonstandard ways,[22] and also include three procedures that do not use EDS or ETD—screening with explosives detection canines, physical bag searches, and matching baggage to passenger manifests to confirm that the passenger

[21] We conducted our site visits between September 2003 and March 2004.

[22] The nonstandard ways that the machines are used is sensitive security information.

and his or her baggage are on the same plane.[23] TSA's use of alternative screening procedures has involved trade-offs in security effectiveness. However, the extent of the security trade-offs is not fully known because TSA has not tested the effectiveness of alternative screening procedures in an operational environment.

As part of our ongoing work on TSA's use of alternative screening procedures to screen checked baggage, we found that the superior efficiency of screening with in-line EDS compared to screening with stand-alone EDS may have been a factor in reducing the need to use alternative screening procedures at airports where in-line systems were installed. After in-line EDS systems are installed and staffing reductions are achieved, redistributing the screening positions to other airports with staffing shortages may reduce airports' need to use alternative screening procedures. In addition to deploying more efficient checked baggage screening systems, TSA is pursuing other mitigating actions to reduce the need to use alternative screening procedures. These factors include strengthening its coordination with groups such as tour operators, deploying "optimization teams" to airports that were frequently using alternative screening procedures to determine why the procedures were being used so often and to suggest remedies; and deploying additional EDS machines.

Although TSA officials have estimated that a low percentage of checked baggage is currently screened using alternative screening procedures, in February 2006 TSA reported that the use of alternative screening procedures will increase at some airports because of rising passenger traffic. TSA has projected that the number of originating domestic and international passengers will rise by about 127 million passengers over current levels by 2010. If TSA's current estimate of an average of 0.76 checked bags per passenger were to remain constant through 2010, TSA would be screening about 96 million more bags that it now screens. This could increase airports' need to rely on alternative screening procedures in the future in the absence of additional or more efficient EDS machines, including in-line EDS systems.

[23]It is TSA's policy to use standard EDS and ETD screening procedures whenever possible because of legislative requirements to do so and because TSA has concluded that these procedures provide the most effective detection of explosives at a checked baggage screening station.

TSA Has Begun Systematically Planning for the Optimal Deployment of Checked Baggage Screening Systems, but It Continues to Face Funding Uncertainties

TSA Has Made Progress in Planning for the Optimal Deployment of Checked Baggage Screening Systems

TSA has made progress in its efforts to systematically plan for the optimal deployment of checked baggage screening systems, but resources have not been made available to fund these systems on a large-scale basis. In March 2005, we reported that while TSA has made progress in deploying EDS and ETD machines, it had not conducted a systematic, prospective analysis of the optimal deployment of these machines to achieve long-term savings and enhanced efficiencies and security.[24] We recommended that TSA assess the feasibility, expected benefits, and cost to replace ETD machines with stand-alone EDS machines for the primary screening of checked baggage at those airports where in-line EDS systems would not be either economically justified or justified for other reasons. In February 2006, in response to our recommendation and a legislative requirement to submit a schedule for expediting the installation and use of in-line systems and replacement of ETD equipment with EDS machines, [25] TSA completed its strategic planning framework for its checked baggage screening program. This framework introduces a strategy intended to increase security through deploying in-line and stand-alone EDS to as many airports as practicable, lower life-cycle costs for the program, minimize impacts to TSA and airport/airline operations, and provide a flexible security infrastructure for accommodating growing airline traffic and potential new

[24] GAO-05-365.

[25] Intelligence Reform and Terrorism Prevention Act of 2004, Pub. L. No. 108-458, § 4019(a)-(c), 118 Stat. 3638, 3721-22.

threats. [26] The framework is an initial step in addressing the following areas:

- Optimized checked baggage screening solutions—finding the ideal mix of higher-performance and lower-cost alternative screening solutions for the 250 airports with the highest checked baggage volumes;

- Funding prioritization schedule by airport—identifying the top 25 airports that should first receive federal funding for projects related to the installation of explosive detection systems based on quantitative modeling of security, economic, and other factors;

- Deployment strategy—developing a plan for the acquisition of next-generation EDS systems, the redeployment of existing EDS assets, and investment in life-cycle extension programs;

- EDS Life-Cycle Management Plan—structuring guidelines for EDS research and development investment, procurement specifications for next-generation EDS systems, and the redeployment of existing EDS assets and investment in life-cycle extension programs that minimize the cost of ownership of the EDS systems; and

- Stakeholder collaboration plan—working with airport operators and other key stakeholders to develop airport-specific screening solutions, refine the nationwide EDS deployment strategy, and investigate alternative funding programs that may allow for innovative as well as non-federal sources of funding or financing, including formulas for sharing costs among different government entities and the private sector.

TSA said it is continuing its efforts in these areas as it works toward completing a comprehensive strategic plan for its checked baggage screening program. TSA expects to complete the strategic plan in early fall 2006.

While TSA has begun to conduct a systematic prospective analysis to determine at which airports it could achieve long-term savings and enhanced efficiencies and security by installing in-line systems or by

[26] TSA has determined that the details of its analysis of the optimal checked baggage screening solutions are sensitive security information.

making greater use of stand-alone EDS machines in lieu of ETD machines, resources have not been made available on a large-scale basis to fund these systems. In-line baggage screening systems are capital-intensive because they often require significant airport modifications, including terminal reconfigurations, new conveyor belt systems, and electrical upgrades. According to TSA, lessons learned from the first airports where in-line systems were built identified that facilities and infrastructure modifications accounted for up to 50 percent of the total cost of in-line screening systems, and modifications and upgrades to the baggage handing system typically accounted for another 25 percent of the total cost. In February 2006, TSA estimated that the total cost of installing and operating the optimal checked baggage screening systems, including in-line EDS machines, at the 250 airports is approximately $22.4 billion over 20 years, of which about $6 billion is for installation, life-cycle replacement, existing committed funding, and equipment maintenance costs.[27] According to TSA officials, the estimated costs to install in-line baggage screening systems would vary greatly from airport to airport depending on the size of the airport and the extent of airport modifications that would be required to install the system.[28] In March 2005 we reported that while we did not independently verify the estimates, officials from the Airports Council International-North America and American Association of Airport Executives estimated that project costs for in-line systems could range from about $2 million for a category III airport to $250 million for a category X airport.[29]

TSA's February 2006 strategic planning framework identified that because many of the EDS and ETD machines were deployed in 2002 and 2003 to comply with ATSA and subsequent deadlines for achieving the 100 percent

[27]Operating costs include costs related to staffing, training, and research and development.

[28]According to TSA, a fully automated in-line screening system is not appropriate for every airport, even when security and operational benefits are considered in the analysis. Therefore, for many smaller airports or at smaller terminals or airline operational areas at larger airports, the identification of other alternative in-line solutions, such as partially automated ones, will accomplish the same goal of moving checked baggage screening out of terminal lobbies. In February 2006, TSA reported that most of these solutions also offer significant TSO savings over comparable airport lobby systems.

[29]Joint Statement of David Z. Plavin, President, Airports Council International-North America (ACI-NA) and Todd Hauptli, Senior Executive Vice President, American Association of Airport Executives (AAAE) before the House Aviation Subcommittee Hearing on Passenger and Baggage Screening Problems, February 12, 2004. GAO did not independently verify cost figures provided in this testimony.

checked baggage screening mandate, a large share of the EDS machines will incur life-cycle replacement obligations during the 2013 to 2014 time period. Although TSA has not completed its efforts to develop a life-cycle cost model,[30] TSA's February 2006 strategic planning framework identified that a substantial funding requirement for EDS equipment life-cycle replacement will compete with funding requirements for new in-line systems in approximately 8 to 9 years.[31] Further, in June 2006, as discussed in the framework, TSA officials reported that if the top 25 airports do not receive in-line checked baggage screening systems, they will require additional screening equipment to be placed in airport lobbies and additional TSO staffing in order to remain in compliance with the mandate for screening all checked baggage using explosive detection systems.

TSA Is Collaborating with Key Stakeholders to Identify Funding and Financing Strategies for Installing Optimal Baggage Screening Systems

In March 2005, we reported that TSA and airport operators were relying on several sources of funding to construct in-line checked baggage screening systems. One source of funding airport operators used was FAA's Airport Improvement Program, which traditionally funds grants to maintain safe and efficient airports. In fiscal years 2002 and 2003, 28 of the 53 airport officials we interviewed reported that their airports either had constructed or were planning to construct in-line systems relying on the Airport Improvement Program as their sole source of federal funding. With Airport Improvement Program funds no longer available after fiscal year 2003 for this purpose, airports turned to other sources of federal funding to construct in-line systems.[32] The fiscal year 2003 Consolidated Appropriations Resolution approved the use of LOIs as a vehicle to leverage federal government and industry funding to support facility modification costs for installing in-line EDS baggage screening systems.[33] Between June 2003 and February 2004, TSA issued eight LOIs to reimburse nine airports for the installation of in-line EDS baggage screening systems

[30]Life-cycle costs provide an estimate of how long the machines will be in operation and the estimated maintenance costs over this period.

[31]According to TSA, EDS machines are estimated to have a useful life of 7 years, extended to 11 years with refurbishment.

[32] The Consolidated Appropriations Act, 2004, prohibited the use of Airport Improvement Program funds for activities related to the installation of in-line explosive detection systems. See Pub. L. No. 108-199, 118 Stat. 3, 283. The Consolidated Appropriations Act, 2005, and the Department of Transportation Appropriations Act, 2006, continued this prohibition. See Pub. L. No. 108-447, 118 Stat. 2809, 3203 (2004); Pub. L. No. 109-115, 119 Stat. 2396, 2400-01 (2005).

[33]Consolidated Appropriations Resolution, 2003, Pub. L. No. 108-7, § 367, 117 Stat. 423-24.

for a total cost of $957.1 million to the federal government over 4 years. That cost represents 75 percent of the facility modification costs, with the airport funding the remaining costs.[34] TSA also uses other transaction agreements as an administrative vehicle to directly fund, with no long-term commitments, airport operators for smaller in-line airport modification projects.[35] Under these agreements, as implemented by TSA, the airport operator also provides a portion of the funding required for the modification. As of June 2006, TSA reported that about $140 million had been obligated for other transaction agreements for in-line EDS systems. To fund the procurement and installation of explosive detection systems in-line, TSA also uses annual appropriations and the $250 million mandatory appropriation of the Aviation Security Capital Fund.[36] For example, in fiscal years 2005 and 2006, TSA received appropriations of $175 million and $180 million, respectively, for the procurement of explosive detection systems and received $45 million each year for the installation of explosive detection systems. For fiscal year 2007, DHS requested $91 million for the procurement of explosive detection systems and $94 million for the installation of such systems. Of the $250 million available through the Aviation Security Capital Fund, $125 million is

[34]Under an LOI, the airport operator is responsible for providing the total funding needed to complete the project with an expectation that the federal government will reimburse the airport for a set percentage of the costs over an agreed upon period of time, contingent upon the availability of federal funds. Under all LOIs issued by TSA, the federal government bears 75 percent of the cost, while the airport operators bear 25 percent of the costs. Although the Vision 100—Century of Aviation Reauthorization Act (Vision 100), Pub. L. No. 108-176, § 605, 117 Stat. 2490, 2566-68 (2003) revised this cost share to reflect a 90 percent – 10 percent difference, subsequent appropriations acts have maintained the original 75 - 25 cost share for medium and large hub airports. See 49 U.S.C. § 44923 but see, e.g., Pub. L. No. 109-90, 119 Stat. 2070 (2005).

[35]Other transaction agreements are administrative vehicles used by TSA to directly fund airport operators for smaller airport modification projects without undertaking a long-term commitment. These transactions take many forms and are generally not required to comply with federal laws and regulations that apply to contracts, grants, or cooperative agreements; and enable the federal government and others entering into these agreements to freely negotiate provisions that are mutually agreeable.

[36]Vision 100 established the Aviation Security Capital Fund, which authorized a mandatory appropriation of $250 million for each of fiscal years 2004 through 2007 in support of airport improvement projects related to the installation of explosive detection systems. See 49 U.S.C. § 44923. In the fiscal year 2004 DHS Appropriations Act, however, Congress appropriated $250 million for the physical modification of airports to install checked baggage explosive detection systems but did so separate from the capital fund. A provision of that act precluded the use of funds to establish the capital fund in fiscal year 2004. Congress must reauthorize the capital fund for it to continue beyond fiscal year 2007.

designated as priority funding for LOIs. The remaining $125 million is to be allocated in accordance with a formula based upon the size of the airport and risks to aviation security.[37] Congress also authorized an additional appropriation of $400 million per year through fiscal year 2007 for airport security improvement projects that relate to the use of in-line EDS systems. However, appropriations have not been made under this authorization.[38]

In July 2004, as part of this subcommittee's hearing on TSA's progress in deploying in-line systems, TSA reported that there were nine in-line systems in place and an additional nine were due to be completed by 2006. In March 2005, we reported that 12 airports had operational in-line systems airportwide or at a particular terminal or terminals. As of June 2006, 25 airports had operational in-line EDS systems and an additional 24 airports had in-line systems under development. Additionally, TSA reported that it has received requests from an additional 50 airports either seeking funding to construct in-line EDS systems or reimbursement for already completed in-line systems. Table 4 provides information on the status of in-line system deployment as of February 2006.

Table 4: Airports with In-line Explosives Detection Systems That Are Operational or Under Construction by Airport Category as of June 2006

	Airport category				
Status of in-line EDS system	X	I	II	III	IV
Operational	8	11	4	2	0
Under Construction	12	12	0	0	0

Source: GAO analysis of TSA data.

In a May 2006 meeting of the Aviation Security Advisory Committee, TSA reported that under current investment levels, installation of optimal checked baggage screening systems would not be completed until

[37] The pending fiscal year DHS Appropriations Act, as passed by the House of Representatives, proposes to eliminate the funding formula as applied to the Aviation Security Capital Fund and other appropriations authorized under 49 U.S.C. § 44923. See H.R. 5441, 109th Cong. (2006).

[38] These additional authorized appropriations are to follow the same 50 percent split as mandated under the Aviation Security Capital Fund. See 49 U.S.C. § 44923(i).

approximately 2024.[39] TSA further reported that unless investment is accelerated, substantial investment will be needed to replace EDS and ETD machines at the end of their life cycles and to refurbish suboptimal systems. TSA is currently collaborating with airport operators, airlines, and other key stakeholders to develop a cost-sharing study that identifies funding and cost-sharing strategies for the installation of in-line baggage screening systems. TSA plans to use the results of this study to finalize its checked baggage screening program strategic plan, which TSA expects to complete by early fall 2006.[40] In its May 2006 report to the Aviation Security Advisory Committee, TSA outlined financing options including leasing equipment, sharing savings from in-line systems with airports, and enhancing eligibility for the Passenger Facility Charge,[41] LOIs, and tax credit bonds.[42] In this meeting, TSA reported that tax credit bonds had the most potential support among stakeholders.

As TSA moves forward with planning for the deployment of checked baggage screening systems and identifying funding and financing options, it is also important for TSA to engage in planning to focus its research and development efforts. To enhance checked baggage screening, TSA is developing and testing next-generation EDS machines. According to TSA, manufacturers have only marginally improved false alarm rates and throughput capabilities of the equipment since the large-scale deployment of EDS machines in 2002 and 2003. The maximum number of bags an EDS machine can screen per hour is 500, which can be achieved only when the machines are integrated in-line with the baggage conveyor system. New EDS equipment was certified in 2005, including a smaller EDS machine

[39]The Aviation Security Advisory Committee's mission is to examine areas of civil aviation security as tasked by TSA with the aim of developing recommendations for the improvement of civil aviation security methods, equipment, and procedures. Its membership includes government officials and private sector organizations representing key constituencies affected by aviation security requirements.

[40]Section 4019(d) of the Intelligence Reform and Terrorism Prevention Act of 2004 requires the Secretary of Homeland Security to complete a cost-sharing study in collaboration with industry stakeholders to review the benefits and cost of in-line checked baggage screening systems, innovative financing approaches, formulas for cost sharing among different government entities and the private sector, and potential cost-saving approaches.

[41]The Passenger Facility Charge (PFC) Program allows the collection of PFC fees up to $4.50 for every enplaned passenger at commercial airports controlled by public agencies. Airports use these fees to fund FAA-approved projects that enhance safety, security, or capacity; reduce noise; or increase air carrier competition.

[42] Tax credit bonds are bonds where bondholders receive credit against their federal income tax liabilities instead of cash interest.

designed to replace ETD machines used for primary screening and an upgraded large EDS machine. In September 2005, TSA entered into a $24.8 million contract to purchase 72 smaller EDS machines to be installed at 24 airports. The President's fiscal year 2007 budget request for TSA includes funding to support research and development for in-line EDS machines that can operate at up to 900 bags per hour and employ new threat detection concepts. In its February 2006 strategic framework for checked baggage screening, TSA identified the development of high-throughput in-line EDS machines and lowering of EDS false alarm rates as key areas for improving investment management of next-generation technologies. TSA reported that these performance gains would be feasible and available in the near term. TSA also reported that given that the planning, design, and construction cycle for an in-line system can be 2 to 3 years, and these high-throughput and lower false alarm rate technologies are anticipated to be deployable by about 2008, the agency is recommending that all in-line planning and design efforts consider these new technologies.

We reported in September 2004 that the Department of Homeland Security (DHS) and TSA have made some progress in managing their transportation security research and development programs according to applicable laws and R&D best practices.[43] However, we found that their efforts were incomplete in several areas, including preparing strategic plans for R&D efforts that contain measurable objectives, preparing and using risk assessments to select and prioritize R&D projects, and coordinating with stakeholders—a condition that increases the risk that their R&D resources will not be effectively leveraged. We also found that TSA and DHS delayed several key R&D projects and lacked both estimated deployment dates for the vast majority of their R&D projects and adequate databases to effectively manage their R&D portfolios. We recommended that DHS and TSA (1) conduct some basic research in the transportation security area; (2) complete their strategic planning and risk assessment efforts; (3) develop a management information system that will provide accurate, complete, current, and readily accessible project information for monitoring and managing their R&D portfolios; and (4) develop a process with the Department of Transportation to coordinate transportation security R&D efforts and share this information with transportation stakeholders. In June 2006, DHS reported several actions that it had taken to address these recommendations, including coordinating with other

[43]The DHS Science and Technology Directorate took over R&D from TSA in October 2005.

federal agencies to leverage their basic research, issuing a Science and Technology Directorate Strategic Plan, implementing a program and project management system to monitor program and project funding and milestones, and establishing a memorandum of agreement that resulted in the formation of a Mass Transit Technology Working Group to coordinate efforts across agencies and to optimize resources. DHS also reported that basic research has been limited because the majority of R&D funds have been appropriated for countermeasures for specific threat areas. We will examine these efforts to implement our recommendations as part of our ongoing review of DHS's and TSA's airport checkpoint R&D program.

Concluding Observations

TSA has made progress in installing EDS and ETD systems at the nation's airports—mainly as part of interim lobby screening solutions—to provide the capability to screen all checked baggage for explosives as mandated by Congress. With the objective of initially fielding this equipment largely accomplished, TSA has shifted its focus from equipping airports with interim screening solutions to systematically planning for the more optimal deployment of checked baggage screening systems.

TSA's February 2006 strategic planning framework for the checked baggage screening program is a positive step forward in systematically planning for the more optimal deployment of checked baggage screening systems. The completion of a strategic plan for checked baggage screening by early fall 2006 should help TSA more fully determine whether expected reduced staffing costs, higher baggage throughput, and increased safety and security will in fact justify the significant up-front investment required to install in-line baggage screening systems. TSA's retrospective analysis on nine airports installing in-line baggage screening systems with LOI funds, while limited, estimated that cost savings could be achieved through reduced staffing requirements for TSOs and increased baggage throughput. Specifically, the analysis identified that using in-line systems instead of stand-alone systems at these nine airports could save the federal government about $1.3 billion over 7 years and that TSA's initial investment would be recovered in a little over 1 year. TSA also recently estimated that a saving of approximately $4.7 billion could be realized over a period of 20 years by installing optimal checked baggage screening systems at the 250 airports with the highest checked baggage volumes. However, TSA's strategic planning framework identified that many of the initial in-line systems have produced a level of savings insufficient to offset up-front capital costs of acquiring and installing the systems. Nevertheless, TSA reported that recent improvements in the design of the systems and

EDS screening technology now offer the opportunity for higher performance and lower-cost screening systems.

In-line EDS baggage screening systems have efficiency, safety, and security benefits that have been reported on extensively by Congress, GAO, TSA, and aviation industry representatives. As part of its strategic planning efforts, TSA has identified the top 25 airports that should first receive federal funding for projects related to the installation of explosive detection systems and also identified the ideal mix of higher-performance and lower-cost alternative screening solutions for the 250 airports with the highest checked baggage volumes. With this initial planning now completed, a critical question that remains is how to fund and finance these screening systems and who should pay for them. TSA is currently working with airport and air carrier stakeholders to identify funding and financing options, an effort that is due to be completed by early fall 2006.

As TSA works toward identifying funding and financing options, it will also be important for the agency to sustain its R&D efforts and further strengthen its R&D management and planning efforts. Researching and developing technologies, such as higher-throughput EDS machines with lower false alarm rates, should help TSA to improve the security and efficiency of checked baggage screening.

Mr. Chairman, this concludes my statement. I would be pleased to answer any questions that you or other members of the subcommittee have.

Contact Information

For further information on this testimony, please contact Cathleen A. Berrick at (202) 512-3404 or berrickc@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement.

In addition to the contact named above, Kevin Copping, Katherine Davis, Michele Fejfar, Thomas Lombardi, Allison Sands, and Maria Strudwick made key contributions to this testimony.

Related GAO Products

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