
July 2006

TRANSPORTATION SECURITY ADMINISTRATION

Oversight of Explosive Detection Systems Maintenance Contracts Can Be Strengthened

**G A O**Accountability * Integrity * Reliability



Highlights of [GAO-06-795](#), a report to Congressional Committees

Why GAO Did This Study

Mandated to screen all checked baggage by using explosive detection systems at airports by December 31, 2003, the Transportation Security Administration (TSA) has deployed two types of screening equipment: explosive detection systems (EDS), which use computer-aided tomography X-rays to recognize explosives, and explosive trace detection (ETD) systems, which use chemical analysis to detect explosive residues. This report discusses (1) EDS and ETD maintenance costs, (2) factors that played a role in these costs, and (3) the extent to which TSA conducts oversight of maintenance contracts. GAO reviewed TSA's contract files and processes for reviewing contractor cost and performance data.

What GAO Recommends

GAO recommends that the Secretary of Homeland Security direct TSA to (1) establish a timeline to close out the contract with Boeing Service Company (Boeing) and report to congressional committees on actions to recover any excessive fees awarded to Boeing, (2) establish a timeline to complete the EDS life-cycle model, and (3) revise policies to require documentation for monitoring EDS and ETD maintenance contracts. The Department of Homeland Security concurred with GAO's recommendations and described actions TSA had taken or planned to take to implement them.

www.gao.gov/cgi-bin/getrpt?GAO-06-795.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Cathleen A. Berrick at (202) 512-8777 or berrickc@gao.gov.

TRANSPORTATION SECURITY ADMINISTRATION

Oversight of Explosive Detection Systems Maintenance Contracts Can Be Strengthened

What GAO Found

TSA obligated almost \$470 million from fiscal years 2002 through 2005 for EDS and ETD maintenance, according to TSA budget documents. In fiscal year 2006, TSA estimates it will spend \$199 million and has projected it will spend \$234 million in fiscal year 2007. TSA was not able to provide GAO with data on the maintenance cost per machine before fiscal year 2005 because, according to TSA officials, its previous contract with Boeing to install and maintain EDS and ETD machines was not structured to capture these data.

Several factors have played a role in EDS and ETD maintenance costs. According to a September 2004 Department of Homeland Security's Office of Inspector General report, TSA did not follow sound contracting practices in administering the contract with Boeing, and TSA paid provisional award fees totaling \$44 million through December 2003 without any evaluation of Boeing's performance. TSA agreed to recover any excessive award fees paid to Boeing if TSA determined that such fees were not warranted. In responding to our draft report, DHS told us that TSA and Boeing had reached an agreement in principle on this matter and that documentation was in the approval process with closure anticipated in July 2006. Moreover, TSA did not develop life-cycle cost models before any of the maintenance contracts were executed and, as a result, TSA does not have a sound estimate of maintenance costs for all the years the machines are expected to be in operation. DHS also stated in its comments on our draft report that a TSA contractor expected to complete a prototype life-cycle cost model by September 2006 and that TSA anticipated that the EDS model would be completed 12 months after the prototype was approved. Without such an analysis, TSA may not be identifying cost efficiencies and making informed procurement decisions on future purchases of EDS and ETD machines and maintenance contracts. TSA has taken actions to control costs, such as entering into firm-fixed-price contracts for maintenance starting in March 2005, which have advantages to the government because price certainty is guaranteed. Further, TSA incorporated standard performance requirements in the contracts including metrics related to machine reliability and monthly performance reviews. For EDS contractors, TSA has specified that the full agreed price would be paid only if mean downtime (i.e., the number of hours a machine is out of service in a month divided by the number of times that machine is out of service per month) requirements are met.

Although TSA has policies for monitoring contracts, TSA officials provided no evidence that they are reviewing required contractor-submitted performance data, such as mean downtime data. TSA officials told GAO that they perform such reviews, but do not document their activities because there are no TSA policies and procedures requiring them to do so. As a result, without adequate documentation, TSA does not have reasonable assurance that contractors are performing as required and that full payment is justified based on meeting mean downtime requirements.

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United States Government Accountability Office
Washington, DC 20548

July 31, 2006

The Honorable Judd Gregg
Chairman
The Honorable Robert C. Byrd
Ranking Member
Subcommittee on Homeland Security
Committee on Appropriations
United States Senate

The Honorable Harold Rogers
Chairman
The Honorable Martin Olav Sabo
Ranking Member
Subcommittee on Homeland Security
Committee on Appropriations
House of Representatives

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), 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, the Transportation Security Administration (TSA) deployed two types of equipment to screen checked baggage for explosives: (1) explosive 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) machines, whereby an individual (i.e., a baggage screener, or transportation security officer) swabs baggage and then

¹Aviation and Transportation Security Act, Pub. L. No. 107-71, § 110(b), 115 Stat. 597, 615 (2001). Section 425 of the subsequently enacted Homeland Security Act of 2002, Pub. L. No. 107-296, 116 Stat. 2135, 2185-86, in effect, extended this mandate to December 31, 2003. See 49 U.S.C. § 44901(d).

inserts the swab into the ETD machine, which in turn can detect chemical residues that may indicate the presence of explosives within a bag.²

Pursuant to ATSA, TSA assumed operational responsibility for conducting the screening of checked baggage, which includes the procurement, installation, and maintenance of EDS and ETD machines. By the end of fiscal year 2006, TSA will have deployed over 1,400 EDS and 6,600 ETD machines at baggage-screening locations in over 400 airports nationwide, according to TSA budget documents. TSA has used contractors to perform preventative and corrective maintenance on these EDS and ETD machines.

House Conference Report 109-241, which accompanied the Department of Homeland Security Appropriations Act, 2006 (Public Law 109-90) directed that we report on the reasons for cost increases in maintaining TSA's explosive detection systems, including TSA's contracting practices that may have affected cost increases.³ With regard to this requirement, on April 19, 2006, we provided you with information on the results of our review (see app. I), which has been updated as appropriate in this report. Subsequently, in May 2006, the House Appropriations Committee stated in its report accompanying the Department of Homeland Security Appropriations Bill for fiscal year 2007 its long-standing concerns about the increasing costs for EDS and ETD maintenance and specifically, TSA's recovery of any excess award fees from a previous EDS and ETD contractor.⁴ Further, the report stated that TSA should submit a report to the House Appropriations Committee on any actions it has taken to collect excessive award fees, how much has been received to date, and specific plans to obligate these collections.

This report addresses the following questions:

- What are the historical, current, and projected costs for the maintenance of EDS and ETD machines?

²To satisfy the ATSA mandate, TSA interpreted the term explosive detection system to include both explosive detection systems (EDS) and explosive trace detection (ETD) machines.

³ See H.R. Conf. Rep. No. 109-241, at 52 (2005).

⁴Department of Homeland Security Appropriations Act, 2007, H.R. 5441, 109th Cong. (2006); H.R. Rep. No. 109-476, tit. II, at 49-50 (2006).

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- What factors played a role in EDS and ETD maintenance costs, and what factors could affect future costs?
 - What has TSA done to control EDS and ETD maintenance costs?
 - To what extent does TSA oversee the performance of EDS and ETD maintenance contractors?

To address our objectives, we reviewed TSA contract files and related cost data, TSA processes for reviewing contract performance data, budget documents for fiscal years 2003 through 2007, acquisition and strategic plans, a Department of Homeland Security's Office of the Inspector General (DHS OIG) report,⁵ GAO standards for internal controls,⁶ and our previous work on TSA's acquisition function.⁷ We interviewed TSA headquarters officials, DHS OIG officials, and EDS and ETD contractor representatives. For purposes of our review, we focused on amounts obligated under contracts to maintain the machines. We did not review TSA's negotiations for maintenance services or the process for awarding contracts. Nor did we assess other direct or indirect costs that may have been related to TSA or DHS employees engaged in contract administration or other related items.

We performed our work from January 2006 through July 2006 in accordance with generally accepted government auditing standards.

Results in Brief

According to TSA budget documents, TSA obligated almost \$470 million from fiscal year 2002 through fiscal year 2005 for EDS and ETD maintenance. In fiscal year 2006, TSA estimates it will spend \$199 million

⁵U.S. Department of Homeland Security, Office of Inspector General, *Evaluation of TSA's Contract for the Installation and Maintenance of Explosive Detection Equipment at United States Airports*, [OIG-04-44](#) (Washington, D.C.: September 2004).

⁶GAO, *Standards for Internal Control in the Federal Government*, [GAO/AIMD-00-21.3.1](#) (Washington, D.C.: November 1999).

⁷GAO, *Transportation Security Administration: High-Level Attention Needed to Strengthen Acquisition Function*, [GAO-04-544](#) (Washington, D.C.: May 2004).

and has projected it will spend \$234 million in fiscal year 2007.⁸ TSA did not provide us with projections of EDS and ETD maintenance costs beyond 2007. TSA officials told us that future EDS and ETD maintenance costs will be influenced by the number, type, quantity, and locations of machines necessary to support system configurations at airports and on decisions related to the deployment of new technologies and the refurbishment of existing equipment, among other things. The current contracts have negotiated maintenance prices per machine through March 2009, if TSA decides to exercise option years in the contracts.

Different factors played a role in EDS and ETD maintenance costs. According to a September 2004 DHS OIG report,⁹ TSA did not follow sound contracting practices in administering the contract with Boeing Service Company (Boeing) that was primarily for the installation and maintenance of EDS and ETD machines from June 2002 through March 2005. According to DHS OIG officials, TSA's failure to control costs under the Boeing contract contributed to increases in maintenance costs. Among other things, the DHS OIG report stated that TSA has paid provisional award fees totaling \$44 million through December 2003 without any evaluation of Boeing's performance. In response to the DHS OIG, TSA agreed to recover any excessive award fees paid to Boeing, if TSA determined that such fees were not warranted. In responding to our draft report, DHS told us that TSA and Boeing have reached an agreement in principle on this matter and the documentation is in the approval process with closure anticipated in July 2006. Moreover, TSA did not develop life-cycle cost estimates before any of the maintenance contracts were executed, and, as a result, TSA did not have a sound estimate of maintenance costs for all the years the machines are expected to be in operation. DHS also stated in its comments on our draft report that a TSA contractor expects to complete a prototype life-cycle cost model by September 2006 and that TSA anticipated that the EDS model would be completed 12 months after the prototype was approved. Without such an analysis, TSA may not be identifying cost efficiencies and making

⁸ Amounts attributed to maintenance also include utility costs, such as electricity, that generally amount to less than 10 percent of the overall amount allocated for maintenance each fiscal year, according to TSA officials. Further, TSA officials told us they could provide us with amounts obligated for fiscal years 2005 and 2006, but could not provide us with the amounts expended for this time period.

⁹ [OIG-04-44](#).

informed procurement decisions on future purchases of EDS and ETD machines and maintenance contracts.

TSA has taken several actions to control EDS and ETD maintenance costs, such as entering into firm-fixed-price contracts starting in March 2005, which have certain advantages to the government because price certainty is guaranteed. Also, TSA included several performance requirements in the current contracts, including metrics related to machine reliability, maintainability, and availability, and specific cost data related to maintenance and repair, and required monthly performance reviews. For EDS contractors, TSA also incorporated provisions to specify that the full agreed price will be paid only if mean downtime requirements¹⁰ are met.

Although TSA has policies for monitoring contracts, TSA officials provided no evidence that they are reviewing required contractor-submitted performance data, such as mean downtime data. TSA officials told GAO that they perform such reviews, but do not document their activities because there are not TSA policies and procedures requiring them to do so. As a result, without adequate documentation, TSA does not have reasonable assurance that contractors are performing as required and that full payment is justified based on meeting mean downtime requirements.

We are recommending that the Secretary of Homeland Security direct TSA to establish a timeline to close out the Boeing contract and report to congressional committees on its actions to recover any excessive fees awarded to Boeing; establish a timeline for completing life-cycle cost models for EDS, which TSA recently began; and revise policies and procedures to require documentation of the monitoring of EDS and ETD maintenance contracts to provide reasonable assurance that contractor maintenance cost data and performance data are recorded and reported in accordance with TSA contractual requirements and that self-reported contractor mean downtime data are valid, reliable, and justify the full payment of the contract amount.

We provided a draft of this report to DHS for review. DHS, in its written comments, concurred with our findings and recommendations and

¹⁰Mean downtime is a performance requirement in EDS and ETD maintenance contracts. Mean downtime is calculated by the number of hours a machine is out of service in a month divided by the number of times that machine is out of service per month. For example, if a machine has a total downtime of 50 hours per month and is out of service 5 times in that month, the MDT would be equal to 50 divided by 5, which is 10 hours.

described actions that it has initiated or plans to take to address the issues identified. For a reprint of DHS's comments, see appendix II.

Background

With the passage of the Aviation and Transportation Security Act (ATSA) in November 2001, TSA assumed from the Federal Aviation Administration (FAA) the majority of the responsibility for civil aviation security, including the commercial aviation system.¹¹ ATSA required that TSA screen 100 percent of checked baggage using explosive detection systems by December 31, 2002. As it became apparent that certain airports would not meet the December 2002 deadline, the Homeland Security Act of 2002 in effect extended the deadline to December 31, 2003, for noncompliant airports.¹² Under ATSA, TSA is responsible for the procurement, installation, and maintenance of explosive detection systems used to screen checked baggage for explosives. Airport operators and air carriers continued to be responsible for processing and transporting passengers' checked baggage from the check-in counter to the airplane.

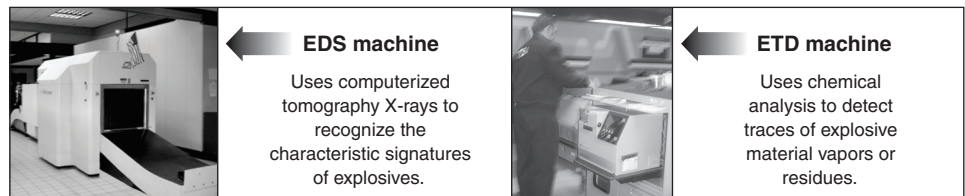
Explosive detection systems include EDS and ETD machines (fig. 1). EDS uses computer-aided tomography X-rays adapted from the medical field to automatically recognize the characteristic signatures of threat explosives. By taking the equivalent of hundreds of X-ray pictures of a bag from different angles, EDS examines the objects inside of the baggage to identify characteristic signatures of threat explosives. TSA has certified, procured, and deployed EDS manufactured by three companies—L-3 Communications Security and Detection Systems (L-3); General Electric InVision, Inc.¹³ (GE InVision); and Reveal Imaging Technologies, Inc. (Reveal). In general, EDS is used for checked baggage screening. ETD machines work by detecting vapors and residues of explosives. Human operators collect samples by rubbing bags with swabs, which are then chemically analyzed in the ETD machine to identify any traces of explosive materials. ETD machines are used for both checked baggage and passenger carry-on baggage screening. TSA has certified, procured, and deployed ETD machines from three manufacturers, Thermo Electron Corporation, Smiths Detection, and General Electric Company.

¹¹Pub. L. No. 107-71, § 101, 115 Stat. at 597. See 49 U.S.C. § 114(d).

¹²Pub. L. No. 107-296, § 425, 116 Stat. at 2185-86. See 49 U.S.C. § 44901(d).

¹³ General Electric InVision, Inc. is an entity of General Electric Company.

Figure 1: EDS and ETD Machines Used by TSA to Screen Checked Baggage



Source: GAO.

TSA's EDS and ETD maintenance contracts provide for preventative and corrective maintenance. Preventative maintenance includes scheduled activities, such as changing filters or cleaning brushes, to increase machine reliability and are performed monthly, quarterly, or yearly based on the contractors' maintenance schedules. Corrective maintenance includes actions performed to restore machines to operating condition after failure, such as repairing the conveyor belt mechanism after a bag jams the machine. TSA is responsible for EDS and ETD maintenance costs after warranties on the machines expire.¹⁴

From June 2002 through March 2005, Boeing was the prime contractor primarily for the installation and maintenance of EDS and ETD machines at over 400 U.S. airports. TSA officials stated that the Boeing contract was awarded at a time when TSA was a new agency with many demands and extremely tight schedules for meeting numerous congressional mandates related to passenger and checked baggage screening. The cost reimbursement contract¹⁵ entered into with Boeing had been competitively bid and contained renewable options through 2007. Boeing subcontracted for EDS maintenance through firm-fixed-price contracts¹⁶ with the original

¹⁴ A TSA official told us that typical EDS warranties are one year and ETD warranties are for 2 years.

¹⁵ Cost-reimbursement contracts provide for payment of allowable incurred costs, to the extent prescribed in the contract. These contracts establish an estimate of total cost for the purpose of obligating funds and establishing a ceiling that the contractor may not exceed (except at its own risk) without the approval of the contracting officer.

¹⁶ Firm-fixed-price contracts provide for a price that is not subject to any adjustment on the basis of the contractor's cost experience in performing the contract. This contract type places upon the contractor maximum risk and full responsibility for all costs and resulting profit and loss. It provides maximum incentive for the contractor to control costs and perform effectively and imposes a minimum administrative burden upon the contracting parties.

EDS manufacturers, GE InVision and L-3, which performed the maintenance on their respective EDS. Boeing subcontracted for ETD maintenance through a firm-fixed-price contract with Siemens. Consistent with language in the fiscal year 2005 House Appropriations Committee report and due to TSA's acknowledgment of Boeing's failure to control costs, TSA received DHS authorization to negotiate new EDS and ETD maintenance contracts in January 2005.

In March 2005, TSA signed firm-fixed-price contracts for EDS and ETD maintenance. TSA awarded a competitively bid contract to Siemens to provide maintenance for ETD machines. According to TSA, it negotiated sole source contracts with L-3 and GE InVision for maintaining their respective EDS because they are the original equipment manufacturers and owners of the intellectual property rights of their respective EDS. In September 2005, TSA awarded a competitively bid firm-fixed-price contract to Reveal for both the procurement and maintenance of a reduced size EDS.

Results

TSA obligated almost \$470 million from fiscal year 2002 through fiscal year 2005 for EDS and ETD maintenance, according to TSA budget documents. In fiscal year 2006, TSA estimates it will spend \$199 million and has projected it will spend \$234 million in fiscal year 2007.¹⁷ According to TSA officials, in fiscal year 2004, TSA requested and received approval to reprogram about \$32 million from another account to EDS/ETD maintenance due to higher levels of maintenance costs than expected. Similarly, in fiscal year 2005, TSA requested and received approval to reprogram \$25 million to fund the L-3 contract and to close out the Boeing contract.¹⁸ TSA was not able to provide us with data on the maintenance cost per machine before fiscal year 2005 because, according to TSA officials, TSA's previous contract with Boeing to maintain EDS and ETD machines was not structured to capture these data. Table 1 identifies the

¹⁷ Amounts attributed to maintenance also include utility costs, such as electricity, that generally amount to less than 10 percent of the overall amount allocated for maintenance each fiscal year, according to TSA officials. Further, TSA officials told us they could provide us with amounts obligated for fiscal years 2005 and 2006, but could not provide us with the amounts expended for this time period.

¹⁸ As of April 2006, the Boeing contract had yet to be closed out, according to TSA officials.

maintenance costs¹⁹ by type of EDS and ETD machine for fiscal years 2005 and 2006.

Table 1: Number of EDS and ETD Machines and Annual Per-Machine Maintenance Cost, Fiscal Year 2005 and Fiscal Year 2006

Type of machine	FY 2005 ^a		FY 2006	
	Number of machines	Cost per unit	Number of machines	Cost per unit
EDS				
GE CTX 2500	140	\$61,587	151	\$ 63,590
GE CTX 5500	512	71,549	547	73,876
GE CTX 9000	172	93,286	231	96,320
L-3 ex6000	508	97,837	550	101,000
Reveal CT-80 ^b	n/a	n/a	16	n/a
ETD				
Smiths Ionscan 400A	241	10,525	336	10,974
Smiths Ionscan 400AE	5	10,525	6	10,974
Smiths Ionscan 400B	3,038	8,580	3,035	8,946
Thermo EGIS 3000	2	12,899	2	13,526
Thermo EGIS II	425	13,134	545	13,695
GE Iontrack Itemiser-W	2,302	\$ 7,727	2,322	\$ 8,057

Source: TSA.

NOTE: Maintenance costs represent the negotiated prices in the maintenance contracts for EDS and ETD machines.

^aFiscal year 2005 per-machine maintenance costs were in effect from March through September 2005. TSA could not provide per-machine maintenance costs before March 2005.

^bReveal's EDS machines were installed in fiscal year 2006 and were still under the manufacturer's warranty.

TSA did not provide us with projections of EDS and ETD maintenance costs beyond 2007. TSA officials told us that future costs will be influenced by the number, type, quantity, and locations of machines necessary to support system configurations at airports, such as the extent to which EDS are integrated with airport baggage conveyor systems or are operated in stand-alone modes. Further, TSA officials told us that future EDS and ETD maintenance costs are dependent on decisions related to the deployment of new technologies and the refurbishment of existing equipment, among other things. The current contracts would have

¹⁹Represents the negotiated prices for the maintenance of EDS and ETD machines.

negotiated maintenance prices per machine through March 2009, if TSA decides to exercise option years in the contracts.

We identified different factors that have played a role in costs to date and that will influence future maintenance costs for EDS and ETD machines. According to a September 2004 DHS OIG report, TSA did not follow sound contracting practices in administering the Boeing contract, which was primarily for the installation and maintenance of EDS and ETD machines.²⁰ According to DHS OIG officials, TSA's failure to control costs under the Boeing contract, including the lack of sound contracting practices, contributed to increases in maintenance costs. Among other things, the DHS OIG report stated that TSA had paid provisional award fees totaling \$44 million through December 2003 without any evaluation of Boeing's performance.²¹ In response to the DHS OIG, TSA agreed to recover any excessive award fees paid to Boeing, if TSA determined that such fees were not warranted. In commenting on our draft report in July 2006, DHS stated that TSA has conducted a contract reconciliation process to ensure that no fees would be paid on costs that exceeded the target due to poor contractor performance. Further, DHS stated that TSA and Boeing had reached an agreement in principle on this matter and that the documentation was in the approval process with closure anticipated in July 2006. In its report accompanying the DHS Appropriations Bill for fiscal year 2007, the House Appropriations Committee stated its need for a report from TSA on any actions it has taken to collect excessive award fees, how much of the fees have been received to date, and specific plans to obligate these collections and cited TSA's plans to use any cost recoveries to purchase and install additional EDS. These actions were based on the committee's long-standing concerns about the increasing costs for EDS and ETD maintenance.²² In addition to matters related to the Boeing contract, TSA officials stated that another factor contributing to cost increases were the larger than expected number of machines that came out of warranty and their related maintenance costs. According to TSA officials, they were not able to determine the cost impact of these

²⁰ [OIG-04-44](#).

²¹ GAO has identified similar instances of agencies' failure to properly use incentives in making award fees. See GAO, *Defense Acquisitions: DOD Has Paid Billions in Award and Incentive Fees Regardless of Acquisition Outcomes*, [GAO-06-66](#) (Washington D.C.: December 2005).

²² See H.R. Rep. No. 109-479, at 49-50.

additional machines because the Boeing contract was not structured to provide maintenance costs for individual machines.

With regard to future EDS and ETD maintenance costs under firm-fixed-price contracts, maintenance costs per machine will increase primarily by an annual escalation factor in the contracts that takes into account the employment cost index and the consumer price index,²³ if TSA decides to exercise contract options. In addition, future maintenance costs may be affected by a range of factors, including the number of machines deployed and out of warranty, conditions under which machines operate, contractor performance requirements, the emergence of new technologies or improved equipment, and alternative screening strategies. Lastly, life-cycle cost estimates were not developed for the Boeing, Siemens, L-3, and GE InVision contracts before the maintenance contracts were executed, and, as a result, TSA did not have a sound estimate of maintenance costs for all the years the machines are expected to be in operation. In August 2005, TSA hired a contractor to define parameters for a life-cycle cost model, among other things. This contract states that TSA and the contractor will work together to ensure that the full scope of work is planned, coordinated, and executed according to approved schedules. In commenting on our draft report in July 2006, DHS stated that the TSA contractor estimated completing a prototype life-cycle cost model by September 2006. Further, DHS stated that TSA's evaluation of the prototype would begin immediately upon delivery and that full implementation of an EDS life-cycle cost model would be completed within 12 months after the prototype had been approved. According to a TSA official, the life-cycle cost model would be useful in determining machine reliability and maintainability and to inform future contract negotiations, such as when to replace a machine versus continuing to repair it.

We identified several actions TSA has taken to control EDS and ETD maintenance costs. First, TSA entered into firm-fixed-price contracts starting in March 2005 with maintenance contractors, which offer TSA

²³ For EDS contracts, future labor and material costs could not be determined, so TSA negotiated an escalation factor to be used to determine pricing for the contract option years. For the ETD contracts, TSA determined after a review of cost data, that it would apply a 4 percent escalation factor to prices in the contract option years. The employment cost index is a measure of the change in the cost of labor, free from the influence of employment shifts among occupations and industries. The consumer price index is a measure of the average change in prices over time of goods and services purchased by households.

certain advantages over cost reimbursement contracts because price certainty is guaranteed for up to 5 years if TSA exercises options to 2009. Also, TSA included several performance requirements in the Siemens, L-3, GE InVision, and Reveal contracts, including the collection of metrics related to machine reliability, maintainability, and availability²⁴ and required specific cost data related to maintenance and repair. TSA officials told us that these data will assist them in monitoring the contractor performance as well as informing future contract negotiations for equipment and maintenance. These contracts also stipulate that maintenance contractors meet monthly with TSA to review all pertinent technical schedules and cost aspects of contracts. TSA also incorporated provisions in the L-3 and GE InVision contracts to specify that the agreed price for maintaining EDS would be paid only if the contractor performs within specified mean downtime (MDT) requirements.²⁵ Contractors submit monthly invoices for 95 percent of the negotiated contract price for the month and then submit a MDT report to justify the additional 5 percent. Consequently, if the contractor fails to fulfill the MDT requirements, it is penalized 5 percent of the negotiated monthly maintenance price. As of February 2006, neither GE InVision nor L-3 had been penalized for missing their MDT requirements. The allowable MDT is lowered from 2005 to subsequent renewable years in the contract, as shown in table 2.

Table 2: Mean Downtime Requirement for EDS Contractors, 2005 through 2009

2005	2006	2007	2008	2009
24 hours	20 hours	18 hours	14 hours	12 hours

Source: TSA.

²⁴ Includes metrics such as mean time between failures (generally the total time a machine is available to perform its required mission divided by the number of failures over a given period of time) and operational availability (generally the percentage of time, during operational hours, that a machine is available to perform its required mission). Such reliability, maintainability, and availability data are standard and appropriate performance requirements for maintenance contracts.

²⁵ As noted in footnote 10, mean downtime is a performance requirement in EDS and ETD maintenance contracts. Mean downtime is calculated by the number of hours a machine is out of service in a month divided by the number of times that machine is out of service per month. For example, if a machine has a total downtime of 50 hours per month and is out of service 5 times in that month, the MDT would be equal to 50 divided by 5, which is 10 hours.

With regard to TSA's oversight of EDS and ETD contractor performance, TSA's acquisition policies²⁶ and GAO standards for internal controls²⁷ call for documenting transactions and other significant events, such as monitoring contractor activities. The failure of TSA to develop internal controls and performance measures has been recognized by other GAO²⁸ and DHS OIG reviews.²⁹ TSA has policies and procedures for monitoring its contracts and has included contractor performance requirements in the current EDS and ETD maintenance contracts. However, TSA officials provided no evidence that they are reviewing maintenance cost data provided by the contractor because they are not required to document such activities. For example, even though TSA officials told us that they are reviewing required contractor data, including actual maintenance costs related to labor hours and costs associated with replacing and shipping machine parts, they did not have any documentation to support this. TSA officials told us that they have begun to capture these data to assist them in any future contract negotiations.

Further, TSA officials provided no evidence that performance data for corrective and preventative maintenance required under contracts are being reviewed. TSA officials told us that they perform such reviews, but do not document their activities since there are no TSA policies or procedures requiring them to do so. Therefore, TSA could not provide assurance that contractors are complying with contract performance requirements. For example, although TSA documents monthly meetings with contractors to discuss performance data, TSA officials did not provide evidence that they independently determine the reliability and validity of data required by the contracts, such as mean time between failures and mean time to repair, which are important to making informed decisions about future purchases of EDS and ETD equipment and their associated maintenance costs. Further, TSA officials provided no evidence

²⁶ TSA uses the Federal Aviation Administration (FAA) Acquisition Management System which, as adopted by TSA, requires contractors to act on contractual quality assurance commitments and ensure that government quality and reliability needs are met (FAA Acquisition Management Policy 3.10.4.2).

²⁷ [GAO/AIMD-00-21.3.1](#).

²⁸ GAO has identified contract surveillance issues in other agencies, such as the Department of Defense. See GAO, *Contract Management: Opportunities to Improve Surveillance on Department of Defense Service Contracts*, [GAO-05-274](#) (Washington, D.C.: March 2005).

²⁹ OIG-04-44.

that they ensure that contractors are performing scheduled preventative maintenance. TSA officials told us that they review the contractor-submitted data to determine whether contractors are fulfilling their contractual obligations, but do not document their activities because there are no TSA policies or procedures to require such documentation.

Additionally, for EDS contracts with possible financial penalties, TSA officials told us that they review contractor-submitted mean downtime data on a monthly basis to determine the reliability and validity of the data and to determine whether contractors are meeting contract provisions or should be penalized. However, TSA officials do not document these activities because there are no TSA policies or procedures requiring them to do so. As a result, without adequate documentation, there is no assurance as to whether or not contractors are meeting contract provisions or that TSA has ensured that it is making appropriate payments for services provided.

Conclusions

The cost of maintaining checked baggage-screening equipment has increased as more EDS and ETD machines have been deployed and warranties expire. TSA's move in March 2005 to firm-fixed-price maintenance contracts for EDS and ETD maintenance was advantageous to the government in that it helps control present and future maintenance costs. Firm-fixed-price contracts also help ensure price certainty and therefore are more predictable. However, unresolved issues remain with the past contractor, specifically fees awarded to former contractor Boeing that may have been excessive due to a lack of timely evaluation of the contractor's performance. The House Appropriations Committee has expressed concern about these unresolved issues; specifically, what actions TSA has taken to recover these excessive fees, and the extent to which any collections might impact future TSA obligations. Closing out the Boeing contract is essential to resolving these issues. In responding to our draft report, DHS stated that the completion of an EDS life-cycle cost is over a year away. Absent such a life-cycle cost model, TSA may not be identifying cost efficiencies and making informed procurement decisions regarding the future purchase of EDS and ETD machines and maintenance contracts. Further, TSA must provide evidence of its reviews and analyses of contractor-submitted data and perform analyses of contractor data to determine the reliability and validity of the data and to provide assurance of compliance with contract performance requirements and internal control standards. Without stronger oversight, TSA will not have reasonable assurance that contractors are performing as required and that full payment is justified based on meeting mean downtime requirements.

Recommendations

To help improve TSA's management of EDS and ETD maintenance costs and strengthen oversight of contract performance, we recommend that the Secretary of Homeland Security instruct the Assistant Secretary, Transportation Security Administration, to take the following three actions:

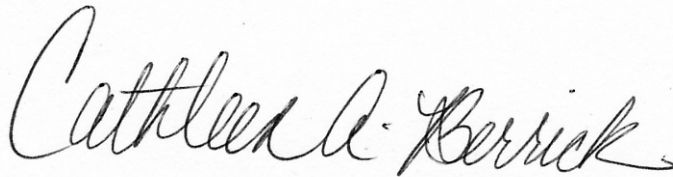
- establish a timeline to complete its evaluation and close out the Boeing contract and report to congressional appropriations committees on its actions, including any necessary analysis, to address the Department of Homeland Security Office of Inspector General's recommendation to recover any excessive fees awarded to Boeing Service Company;
- establish a timeline for completing life-cycle cost models for EDS, which TSA recently began; and
- revise policies and procedures to require documentation of the monitoring of EDS and ETD maintenance contracts to provide reasonable assurance that
 - contractor maintenance cost data and performance data are recorded and reported in accordance with TSA contractual requirements and
 - self-reported contractor mean downtime data are valid, reliable, and justify the full payment of the contract amount.

Agency Comments and Our Evaluation

We provided a draft of this report to DHS for its review and comment. On July 24, 2006, we received written comments on the draft report. DHS, in its written comments, concurred with our findings and recommendations, and agreed that efforts to implement these recommendations are essential to a successful explosive detection systems program. DHS stated that it has initiated efforts to improve TSA's management of EDS and ETD maintenance costs and strengthen oversight of contract performance. Regarding our recommendation that TSA establish a timeline to close out the Boeing contract and report to congressional committees on its actions to recover any excessive fees, DHS stated that TSA has conducted a contract reconciliation process to ensure that no fees would be paid on costs that exceeded the target due to poor contractor performance and that Boeing and TSA have reached an agreement in principle on this matter and the documentation is in the approval process with closure anticipated in July 2006. Regarding our recommendation to establish a timeline for completing the EDS life-cycle cost model, DHS stated that TSA expects to complete its prototype evaluation in September 2006 and that the EDS life-cycle cost model will be completed 12 months after the prototype has been approved. Regarding our recommendation to revise TSA policies and procedures to require documentation of its monitoring of

EDS and ETD maintenance contracts, DHS stated that a TSA contractor is developing automated tools to perform multiple analyses of contractor-submitted data that DHS said would allow TSA to accurately and efficiently certify the contractors' performance against their contractual requirements and would allow TSA to independently validate and verify maintenance and cost data. The department's comments are reprinted in appendix II.

We will send copies of this report to the Secretary of Homeland Security and the Assistant Secretary, Transportation Security Administration, and interested congressional committees. We will also make copies available to others upon request. In addition, the report will be available at no charge on GAO's Web site at <http://www.gao.gov>. If you or your staffs have any questions or need additional information, please contact me at (202) 512-8777 or berrickc@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are acknowledged in appendix III.

A handwritten signature in black ink, reading "Cathleen A. Berrick". The signature is written in a cursive style with a large initial "C".

Cathleen A. Berrick
Director, Homeland Security and Justice Issues

Appendix I: Information for Congressional Committees



Transportation Security Administration Explosive Detection Systems Maintenance Costs

**Information for Congressional Committees
April 19, 2006**



Introduction

House Conference Report 109-241—which accompanied the Department of Homeland Security Appropriations Act, 2006 (Public Law 109-90)¹—directed GAO to report on the reasons for cost increases in maintaining TSA’s explosive detection systems,² including TSA’s related contracting practices. In February 2006, a House Appropriations staffer told us that this information would assist in the committee’s budget deliberations.

¹H.R. Conf. Rep. No. 109-241, at 52 (2005).

²TSA interprets the term explosive detection system to include both explosive detection systems (EDS) and explosive trace detection (ETD) machines.



Objectives

- What are the historical, current, and projected costs for the maintenance of explosive detection systems (EDS) and explosive trace detection (ETD) machines?
- What factors played a role in EDS and ETD maintenance costs and what factors could affect future costs?
- What has TSA done to control EDS and ETD maintenance costs?
- To what extent does TSA oversee the performance of EDS and ETD maintenance contractors?



Scope and Methodology

- To determine TSA costs to maintain EDS and ETD machines we
 - reviewed TSA contract files and budget documents for fiscal years 2003 through 2007, and
 - interviewed TSA headquarters officials, Department of Homeland Security Office of the Inspector General (DHS OIG) officials, and EDS and ETD contractor representatives. For purposes of our review, we focused on the amounts obligated under contracts to maintain the machines. We did not review TSA's negotiations for maintenance services or the process for awarding contracts, nor did we assess other direct or indirect costs related to TSA or DHS employees engaged in contract administration or other related items.
- To determine what factors played a role in maintenance costs and what TSA has done to control costs, we:
 - reviewed TSA contract files, acquisition and strategic plans, budget documents, TSA processes for reviewing contract cost and performance data, and a DHS OIG report;¹ and
 - interviewed TSA headquarters officials, DHS OIG officials, and EDS and ETD contractor representatives.
- To determine the extent of TSA contract oversight, we:
 - reviewed TSA contract files and processes for reviewing contract performance data,
 - interviewed TSA headquarters officials and EDS and ETD contractor representatives, and
 - reviewed GAO standards for internal controls² and our previous work on TSA's acquisition function.³
- We performed our work from January 2006 through June 2006 in accordance with generally accepted government auditing standards.

¹U.S. Department of Homeland Security, Office of Inspector General, *Evaluation of TSA's Contract for the Installation and Maintenance of Explosive Detection Equipment at United States Airports*, OIG-04-44 (Washington, D.C.: September 2004).

²GAO, *Standards for Internal Control in the Federal Government*, GAO/AIMD-00-21.3.1 (Washington, D.C.: November 1999).

³GAO, *Transportation Security Administration: High-Level Attention Needed to Strengthen Acquisition Function*, GAO-04-544 (Washington, D.C.: May 2004).



Results in Brief

- According to TSA budget documents, TSA has obligated almost \$470 million from fiscal year 2002 through fiscal year 2005 for EDS and ETD maintenance. In fiscal year 2006, TSA estimates it will spend \$199 million and has projected it will spend \$234 million in fiscal year 2007.¹
 - TSA was unable to provide us data on maintenance cost per machine prior to fiscal year 2005 because, according to TSA officials, its previous contract with Boeing Service Company (Boeing) to maintain EDS and ETD machines was not structured to capture these data.
 - TSA did not provide us with projections of EDS and ETD maintenance costs beyond fiscal year 2007, although TSA has negotiated maintenance prices per machine through fiscal year 2009.

¹Amounts attributed to maintenance also include utility costs, such as electricity, that generally amount to less than 10 percent of the overall amount allocated for maintenance each fiscal year, according to TSA officials. Further, TSA officials could provide us with amounts obligated for fiscal years 2005 and 2006, but could not provide us with the amounts expended for this time period.



Results in Brief

- Different factors have played a role in costs to date and will influence future maintenance costs:
 - According to the DHS OIG, TSA had awarded excessive fees under the Boeing contract, which ran from June 2002 to March 2005. TSA agreed to recover any excessive fees paid to Boeing, if TSA determines that such fees are not warranted. However, as of April 2006, TSA had not yet completed its evaluation of Boeing's performance and thus had not yet determined if there are any fees to recover. TSA officials stated that they did not know when TSA would make a final determination on this matter.
 - TSA officials stated that cost increases were due, in part, to the larger than expected number of machines that came out of warranty.
 - Lifecycle cost estimates were not developed for Boeing, or for Siemens Maintenance Services (Siemens), L-3 Communications Security and Detection Systems (L-3), and General Electric InVision, Inc. (GE InVision), which also have maintenance contracts with TSA. However, in August 2005, TSA contracted for the development of a lifecycle cost model, including cost estimates, which TSA officials say will assist them in managing future maintenance costs. In February 2006, the contractor had begun work on the model, however, TSA did not know when the model would be completed.



Results in Brief

- TSA's move to firm fixed price contracting in March 2005 provided advantages over cost-reimbursement type contracts, such as price certainty. Additionally, TSA included performance requirements in contracts, including financial penalties in some contracts.
 - Although TSA has included contractor performance requirements in the EDS and ETD maintenance contracts, some oversight issues remain. For example, although TSA officials told us that they review the contractor-submitted data to determine whether contractors are fulfilling their contractual obligations, such as mean downtime data, they do not document their activities because there are no TSA policies or procedures to require such documentation. As a result, there is no assurance as to whether or not contractors are meeting contract provisions or should be penalized.
-



Results in Brief

- We are making three recommendations to the Secretary of Homeland Security to help improve TSA's management of EDS and ETD maintenance costs and oversight of contractor performance. We are recommending that:
 - TSA report to the congressional appropriations committees on its actions, including any necessary analysis, to address the DHS OIG recommendation to recover any excessive fees awarded to Boeing;
 - TSA establish a timeline to complete lifecycle cost models for EDS and ETD machines, which TSA recently began; and
 - TSA revise its policies and procedures to document its monitoring of EDS and ETD maintenance contracts to provide reasonable assurance that contractor performance data are recorded and reported in accordance with TSA contractual requirements and self-reported contractor mean downtime is valid, reliable and justify the full payment of the contractor amount.
- TSA reviewed these slides in their entirety and provided several technical comments, which we incorporated as appropriate.



Background

- TSA was mandated to screen all checked baggage using explosive detection systems at airports by December 31, 2003.¹
- Explosive Detection Systems (EDS) use computer-aided tomography X-rays to recognize the characteristics of explosives. In general, EDS are used for checked baggage screening.
- Explosive Trace Detection (ETD) machines use chemical analysis to detect traces of explosive material vapors or residues. ETD machines are used for both passenger carry-on baggage and checked baggage screening.
- According to TSA budget documents, TSA will have deployed over 1,400 EDS and 6,600 ETD machines at baggage screening locations in over 400 airports nationwide by the end of fiscal year 2006.

¹The Aviation and Transportation Security Act, Pub. L. No. 107-71 § 110(b), 115 Stat. 597, 615 (2001) mandated, among other things, that all checked baggage at U.S. airports be screened using explosive detection systems by December 31, 2002. Section 425 of the subsequently enacted Homeland Security Act of 2002, Pub. L. No. 107-296, 116 Stat. 2135, 2185-86, in effect, extended this mandate to December 31, 2003. See 49 U.S.C. § 44901(d).



Background

- TSA is responsible for the EDS and ETD maintenance costs after their warranties expire.¹
- EDS and ETD maintenance includes preventative maintenance—scheduled activities to increase machine reliability that are performed monthly, quarterly, and yearly based on the contractors’ maintenance schedules and corrective maintenance—actions performed to restore machines to operating condition after failure.

¹A TSA official told us that typical EDS warranties are for one year and that ETD warranties are for 2 years.



Background—TSA Cost Reimbursement Contract with Boeing

- From June 2002 through March 2005, Boeing was the prime contractor for the installation and maintenance of EDS and ETD machines at over 400 U.S. airports. TSA officials stated that the Boeing contract was awarded at a time when TSA was a new agency with many demands and extremely tight schedules for meeting numerous congressional mandates related to passenger and checked baggage screening. Boeing had a cost reimbursement contract¹ with TSA, which was competitively bid and contained renewable options to 2007.
 - Boeing subcontracted EDS maintenance through firm fixed price contracts² with the original EDS manufacturers, GE InVision and L-3, which performed maintenance on their respective EDSs.
 - Boeing subcontracted ETD maintenance through a firm fixed price contract with Siemens.
 - Consistent with language in the fiscal year 2005 DHS House Appropriations Committee report and due to TSA's acknowledgment of Boeing's failure to control costs, TSA received DHS authorization to negotiate new EDS and ETD maintenance contracts in January 2005.

¹Cost reimbursement contracts provide for payment of allowable incurred costs, to the extent prescribed in the contract. These contracts establish an estimate of total cost for the purpose of obligating funds and establishing a ceiling that the contractor may not exceed (except at its own risk) without approval of the contracting officer.

²Firm fixed price contracts provide for a price that is not subject to any adjustment on the basis of the contractor's cost experience in performing the contract. This contract type places upon the contractor maximum risk and full responsibility for all costs and resulting profit and loss. It provides maximum incentive for the contractor to control costs and perform effectively and imposes a minimum administrative burden upon the contracting parties.



Background—TSA Firm Fixed Price Contracts with Siemens, L-3, and GE InVision

- In March 2005, TSA signed firm fixed price contracts for EDS and ETD maintenance.
 - TSA awarded a competitively bid contract to Siemens to provide maintenance for ETD machines.
 - TSA negotiated sole source contracts with L-3 and GE InVision because they are the original equipment manufacturers and owners of the intellectual property of their respective EDS.
 - TSA can exercise 4 1-year options on all three contracts through March 2009.
- In September 2005, TSA awarded a competitively bid firm fixed price contract to Reveal Imaging Technologies, Inc., (Reveal) for both the procurement and maintenance of a reduced-size EDS.



Historical, Current, and Projected Costs for EDS and ETD Maintenance

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EDS and ETD Maintenance Costs

- According to TSA budget documents, TSA has obligated almost \$470 million for EDS and ETD maintenance from fiscal years 2002 through 2005.
- Overall, costs for EDS and ETD maintenance grew from \$14 million in fiscal year 2002 to an estimated \$199 million in fiscal year 2006. In fiscal year 2007, TSA projects it will spend \$234 million.
- TSA was not able to provide us data on the maintenance cost per machine prior to fiscal year 2005 because, according to TSA officials, its previous contract with Boeing to maintain EDS and ETD machines was not structured to capture these data.
- According to TSA officials, in fiscal year 2004, TSA requested and received approval to reprogram about \$32 million due to higher levels of maintenance costs than expected.
- In fiscal year 2005, TSA requested and received approval to reprogram \$25 million to fund the L-3 contract (\$16.6 million) and to closeout the Boeing contract (\$8.4 million), which has yet to be closed.

EDS and ETD Machine Maintenance Budget Amounts, Fiscal Years 2002 through 2007 (In millions)

Fiscal year	Amount Requested	Appropriated (as revised)	Prior year carry over	Re-programmed	Total available	Amount Obligated
2002 ^a						14
2003	75	75	25		100	93
2004	100	75	61	32	168	168
2005	205	175	5	25	205	195
2006 ^b	200	199			199	199
2007	234					

Source: TSA.

Note: TSA's budgeted amounts for EDS and ETD maintenance include utility costs for the operation of the machines. Such costs comprise less than 10 percent of the total amounts budgeted for maintenance each fiscal year. According to TSA, in fiscal year 2002 and fiscal year 2003, the amount for utilities was negligible. GAO did not independently verify budget amounts.

^aAccording to TSA officials, in fiscal year 2002, TSA was budgeted approximately \$527 million for EDS equipment installation and maintenance, of which \$14 million was expended for maintenance. TSA carried forward fiscal year 2002 funding for EDS and ETD maintenance to fiscal year 2003 and fiscal year 2004.

^bFiscal year 2006 obligations are estimated.



EDS and ETD Maintenance Costs

- TSA officials did not provide us with projections of costs beyond 2007. However, current contracts have negotiated maintenance prices per machine through March 2009, if TSA decides to exercise option years in the contracts.
- Future EDS and ETD maintenance costs depend on decisions made as outlined in a February 2006 TSA strategic planning framework for screening checked baggage using EDS and ETD. Among other things, the plan discusses options for the deployment of new technologies and refurbishment of existing equipment.



Factors That Played a Role in EDS and ETD Maintenance Costs

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Factors That Played a Role in Maintenance Costs and Could Impact Future Costs

- Different factors have played a role in costs to date and will influence future maintenance costs for EDS and ETD machines:
- According to a September 2004 DHS OIG report, TSA did not follow sound contracting practices in administering the Boeing contract, which was primarily for the installation and maintenance of EDS and ETD machines.¹
 - Among other things, the DHS OIG found that TSA had paid provisional award fees totaling \$44 million through December 2003 without any evaluation of Boeing's performance.²
 - In response to the DHS OIG, TSA agreed to recover any excessive award fees paid to Boeing if TSA determines that such fees are not warranted. However as of April 2006, TSA had not yet completed its evaluation of Boeing's performance and thus had not yet determined if there were any fees to recover.
 - TSA officials told us that they did not know when TSA would make a final determination on this matter.
- TSA officials stated that cost increases were also due to the larger than expected number of machines that came out of warranty.

¹OIG-04-44.

²GAO has identified similar instances of agencies' failure to properly use incentives in making award fees. See GAO, *Defense Acquisitions: DOD Has Paid Billions in Award and Incentive Fees Regardless of Acquisition Outcomes*, GAO-06-66 (Washington, D.C.: December 2005).



Factors That Played a Role in Maintenance Costs and Could Impact Future Costs

- Under the current firm fixed price contracts, if TSA exercises 4 1-year options through March 2009, maintenance costs per machine would increase primarily by an annual escalation factor in the contracts that takes into account the employment cost index and the consumer price index.¹

¹For EDS contracts, future labor and material costs could not be determined, so TSA negotiated an escalation factor to be used to determine pricing for the contract option years. For the ETD contracts, TSA determined after a review of cost data, that it would apply a 4 percent escalation factor to prices in the contract option years. The employment cost index is a measure of the change in the cost of labor, free from the influence of employment shifts among occupations and industries. The consumer price index is a measure of the average change in prices over time of goods and services purchased by households.



Factors That Played a Role in Maintenance Costs and Could Impact Future Costs

- Future maintenance costs will be impacted by a range of factors, including the number of machines deployed and out of warranty, conditions under which machines operate, mean downtime requirements, the emergence of new technologies or improved equipment, and alternative screening strategies.
 - TSA's February 2006 strategic plan framework for screening checked baggage over the next 20 years discusses factors that may impact future maintenance costs. For example, the framework discusses the refurbishment of existing machines and the deployment of new technologies, but does not outline the number of machines or specific time frames for implementation. Additionally, the impact of these strategies on future maintenance costs is unknown.¹
 - If no new equipment or maintenance providers emerge, TSA may pay a premium in future sole source contracts where intellectual property rights are involved. For example, because L-3 and GE InVision had intellectual property rights on their machines, their maintenance contracts were not bid competitively and therefore prices were not subject to the benefits of market forces.

¹TSA issued its strategic plan framework for screening checked baggage using EDS and ETD machines in response to various congressional mandates, congressional committee directives, and GAO recommendations.



Factors That Played a Role in Maintenance Costs and Could Impact Future Costs

- Lifecycle cost estimates were not developed for the Boeing, Siemens, L-3, and GE contracts before the maintenance contracts were executed and, as a result, TSA did not have a complete picture of all maintenance costs. In August 2005, TSA hired a contractor to define parameters for a lifecycle cost model. A TSA official told us that the contractor began work on a lifecycle cost model for EDS in February 2006 and did not know when the model would be completed.



TSA Actions to Control EDS and ETD Maintenance Cost Increases

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TSA Actions to Control EDS and ETD Maintenance Cost Increases

- Firm fixed price contracts starting in March 2005 offer TSA certain advantages over cost reimbursement type contracts:
 - Price certainty is guaranteed for up to five years if TSA exercises options to 2009.
 - Siemens and Reveal contracts were competitively bid, although the GE InVision and L-3 contracts were sole source contracts.
- TSA did not provide per-unit maintenance costs prior to March 2005 because the Boeing contract was not structured to capture these data.

Number of EDS and ETD Machines and Annual Per Machine Maintenance Cost, Fiscal Year 2005 and Fiscal Year 2006

Type of machine	FY 2005 ^a		FY 2006	
	Number of machines	Cost per unit	Number of machines	Cost per-unit
EDS				
GE CTX 2500	140	\$61,587	151	\$ 63,590
GE CTX 5500	512	71,549	547	73,876
GE CTX 9000	172	93,286	231	96,320
L-3 ex6000	508	97,837	550	101,000
Reveal CT-80 ^b	n/a	n/a	16	n/a
ETD				
Smiths Ionscan 400A	241	10,525	336	10,974
Smiths Ionscan 400AE	5	10,525	6	10,974
Smiths Ionscan 400B	3,038	8,580	3,035	8,946
Thermo EGIS 3000	2	12,899	2	13,526
Thermo EGIS II	425	13,134	545	13,695
GE Iontrack Itemiser-W	2,302	\$ 7,727	2,322	\$ 8,057

Source: TSA.

NOTE: Maintenance costs represent the negotiated prices in the maintenance contracts for EDS and ETD machines.

^aFiscal year 2005 per-machine maintenance costs were in effect from March through September 2005. TSA could not provide per machine maintenance costs prior to March 2005.

^bReveal EDS were installed in fiscal year 2006 and were still under the manufacturer's warranty.



TSA Actions to Control EDS and ETD Maintenance Cost Increases

- TSA included several contractor performance requirements in the Siemens, L-3, GE InVision, and Reveal contracts.
 - Metrics related to Reliability, Maintainability, and Availability (RMA) of the machines must be reported to TSA.¹
 - Specific cost data related to maintenance and repair must be reported to TSA.
 - Contractors are required to meet monthly with TSA to review all pertinent technical, schedule, and cost aspects of the contract, including an estimate of the work to be accomplished in the next month; performance measurement information; and any current and anticipated problems.

¹Includes metrics such as mean time between failures (generally the total time a machine is available to perform its required mission divided by the number of failures over a given period of time) and operational availability (generally the percentage of time, during operational hours, that a machine is available to perform its required mission). Such reliability, maintainability, and availability data are standard and appropriate performance requirements for maintenance contracts.



TSA Actions to Control EDS and ETD Maintenance Cost Increases

- Provisions in the L-3 and GE InVision contracts specify that the agreed price for maintaining EDS will be paid only if the contractor performs within specified mean downtime (MDT) requirements.
 - MDT is calculated by the number of hours a machine is out of service in a month divided by the number of times that machine is out of service per month.¹
 - Contractors submit monthly invoices for 95 percent of the negotiated contract price for the month and then submit an MDT report to justify the additional 5 percent. Consequently, if the contractor fails to fulfill the MDT requirements, it is penalized 5 percent of the negotiated monthly maintenance price.
 - As of February 2006, neither GE InVision nor L-3 have been penalized for missing their MDT.
 - The allowable MDT is lowered from 2005 to subsequent renewable years in the contract, as shown in the table below.

Mean Downtime Requirement for EDS Contractors, 2005 through 2009

2005	2006	2007	2008	2009
24 hours	20 hours	18 hours	14 hours	12 hours

Source: TSA

¹For example, if a machine has a total downtime of 50 hours per month and is out of service 5 times in that month, the MDT would be equal to 50 divided by 5, which is 10 hours.



TSA Oversight of EDS and ETD Contractor Performance

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TSA Oversight of EDS and ETD Contractor Performance

- TSA's acquisition policies¹ and GAO's standards for internal controls² call for documenting transactions and other significant events, such as monitoring contractor activities. Although TSA has policies and procedures for monitoring their contracts and TSA has included contractor performance requirements in the current EDS and ETD maintenance contracts, some oversight issues remain. The failure of TSA to develop internal controls and performance measures has been recognized by other GAO and DHS OIG reviews.³
 - TSA officials provided no evidence that they are reviewing maintenance cost data provided by the contractor because they are not required to document such activities. For example, even though TSA officials told us they are reviewing required contractor data, including actual maintenance costs related to labor hours, costs associated with replacement parts, and the costs of shipping machine parts, they did not have any documentation to support this. TSA officials told us that they have begun to capture these data to assist them in any future contract negotiations.
 - TSA officials provided no evidence that performance data for corrective and preventative maintenance required under the contract is being reviewed. TSA officials told us that they perform such reviews, but do not document their activities since there are no TSA policies or procedures requiring them to do so. Therefore, TSA could not provide assurance that contractors are complying with contract performance requirements. For example, although TSA documents monthly meetings with contractors to discuss performance data, TSA did not provide evidence that it independently determines the reliability and validity of data required by the contracts, such as mean time between failures and mean time to repair, which are important to making informed decisions about future purchases of EDS and ETD equipment and their associated maintenance costs.

¹TSA uses the Federal Aviation Administration (FAA) Acquisition Management System which, as adopted by TSA, requires contractors to act on contractual quality assurance commitments and ensure that government quality and reliability needs are met (FAA Acquisition Management Policy 3.10.4.2).

²GAO/AIMD-00-21.3.1.

³GAO has identified contract surveillance issues in other agencies, such as the Department of Defense. See GAO, *Contract Management: Opportunities to Improve Surveillance on Department of Defense Service Contracts*, GAO-05-274 (Washington, D.C.: March 2005). See also OIG-04-44.



TSA Oversight of EDS and ETD Contractor Performance

- For EDS contracts with possible financial penalties, TSA officials told us that they review contractor-submitted mean downtime data on a monthly basis to determine the reliability and validity of the data and to determine whether contractors are meeting contract provisions or should be penalized. However, TSA officials said they do not document these activities because there are no TSA policies or procedures to do so.
- As a result, without adequate documentation, there is no assurance on whether contractors are meeting contract provisions that TSA has ensured that it is making appropriate payments for services provided.



Conclusions

- TSA's move to firm fixed price maintenance contracts was advantageous to the government in that it helps control present and future maintenance costs. Firm fixed price contracts also help ensure price certainty and therefore are more predictable.
- Unresolved issues remain with the past contractor, specifically fees awarded to former contractor Boeing that may have been excessive due to a lack of timely evaluation of the contractor's performance.
- Although TSA has begun to develop a lifecycle cost model in order to control costs and negotiate future contracts, TSA has not set a timeframe to complete this model. Without such a time frame, TSA may not be identifying cost efficiencies and making informed procurement decisions.
- Further, TSA must provide evidence of its reviews and analyses of contractor-submitted data and perform analyses of contractor data to determine the reliability and validity of the data and to provide assurance of contractor compliance with contract performance requirements and internal control standards. Without stronger oversight, TSA will not have reasonable assurance that contractors are performing as required and that full payment is justified based on meeting mean downtime requirements.



Recommendations

- To help improve TSA's management of EDS and ETD maintenance costs and strengthen oversight of contract performance, we recommend that the Secretary of Homeland Security instruct the Assistant Secretary, Transportation Security Administration to take the following three actions
- report to the congressional appropriations committees on its actions, including any necessary analysis, to address the DHS OIG recommendation to recover any excessive fees awarded to Boeing;
- establish a time line for completing a lifecycle cost model for EDS, which TSA recently began; and
- revise its policies and procedures to require documentation of its monitoring of EDS and ETD maintenance contracts to provide reasonable assurance that
 - contractor maintenance cost data and performance data are recorded and reported in accordance with TSA contractual requirements and
 - self-reported contractor mean downtime data are valid, reliable, and justify the full payment of the contract amount.



Agency Comments

-
- TSA reviewed these slides in their entirety and provided several technical comments, which we incorporated as appropriate. TSA officials told us that they are not making formal comments on our recommendations.

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Appendix II: Agency Comments

U.S. Department of Homeland Security
Washington, DC 20528



**Homeland
Security**

July 24, 2006

Ms. Cathleen A. Berrick
Director, Homeland Security and Justice Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Berrick:

Thank you for the opportunity to comment on draft report GAO-06-795, "Oversight of Explosive Detection Systems Maintenance Contracts Can Be Strengthened." The Department of Homeland Security (DHS) concurs with the recommendations, and appreciates the time and resources that GAO has devoted to this important review. The findings of this report will help improve TSA's management of Explosives Detection Systems (EDS) and Explosives Trace Detection (ETD) maintenance costs and strengthen oversight of contract performance. TSA believes that these recommendations are essential to a successful EDS maintenance program and has already initiated efforts in response to the recommendations outlined in the audit. In addition, we have comments in a few areas.

In March 2005, TSA entered into firm fixed price contracts for maintenance of EDS and ETD machines. This method of contracting is highly advantageous to the government because price certainty is guaranteed. Firm fixed price contracts help control present and future maintenance costs and ensure that costs are more predictable. This method of contracting will assist TSA in controlling costs. An additional method for controlling cost is the life cycle cost model. TSA has begun to develop a life cycle cost model in order to control costs and negotiate future contracts. The life cycle cost model will be used to determine machine reliability and maintainability and influence future contract negotiations, such as when to replace a machine versus continuing to repair it. The prototype Life Cycle Cost Model is estimated to be completed by September 2006.

The report states that TSA was unable to provide GAO with data on the per machine maintenance costs prior to fiscal year 2005. The Boeing contract was not structured to capture this data. While the Boeing contract did not require submission of data deliverables that identified the costs per machine, TSA did receive cost data during the course of the contract to support the negotiations and develop a follow-on strategy.

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Regarding the Boeing contract, TSA reaffirms that the total potential fee was awarded to Boeing under a competitive environment and determined it to be fair and reasonable for the work performed. The requirement to deploy electronic screening equipment to 440+ airports in an abbreviated timeframe set forth an extremely challenging environment for the contractor. Cost, schedule, and performance parameters were hurried and lacked significant definition. TSA does not intend to seek reimbursement of fees associated with the total fee percentage. TSA conducted a contract reconciliation process to ensure that no fees would be paid on costs that exceeded the target due to poor contractor performance (i.e. cost overrun). Boeing and TSA have reached an agreement in principle on this matter and the documentation is in the approval process with closure anticipated in July 2006.

Finally, TSA established contract performance requirements in March 2005 to evaluate and monitor contractor performance regarding EDS and ETD maintenance. These requirements are included in the current maintenance contracts with Siemens, L-3, GE InVision, and Reveal: 1) metrics related to Reliability, Maintainability, and Availability (RMA) of the machines must be reported to TSA; 2) specific cost data related to maintenance and repair must be reported to TSA; 3) contractors are required to meet monthly with TSA to review all pertinent technical, schedule, and cost aspects of the contract, including an estimate of the work to be accomplished in the next month, performance measurement information, and any current and anticipated problems.

This information is stored in the RMA database which tracks RMA and data requirements for all maintenance contracts. TSA is developing automated tools to perform multiple analyses of maintenance data which will allow TSA to spot and track cost and performance trends as they occur. TSA's independent validation and verification of maintenance and cost data will allow it to accurately and efficiently assess the maintenance contractors' performance against contract requirements.

TSA appreciates your review of the EDS maintenance program and thanks GAO for the thorough analysis and discussion that comprises this report. We will continue to re-evaluate our processes in line with best business practices and use the findings and recommendations of this report as a reminder of the task before us.

The following represents our responses to the recommendations.

Recommendation 1: Establish a timeline to close out the Boeing contract and report to congressional committees on its actions, including any necessary analysis, to address the DHS OIG recommendation to recover any excessive fees awarded to Boeing.

Concur. TSA awarded the total potential fee to Boeing under a competitive environment determined to be fair and reasonable for the work performed. The requirement to deploy electronic screening equipment to 440+ airports in an abbreviated timeframe set forth an extremely challenging environment for the contractor. Cost, schedule, and performance parameters were hurried and lacked significant definition. While the Boeing contract did not require submission of data deliverables that identified the costs per machine, TSA did receive

cost data to support the negotiations and development of a follow-on strategy. TSA does not intend to seek reimbursement of fees associated with the total fee percentage. TSA conducted a contract reconciliation process to ensure that no fees would be paid on costs that exceeded the target due to poor contractor performance. Boeing and TSA have reached an agreement in principle on this matter and the documentation is in the approval process with closure anticipated in July 2006.

Recommendation 2: Establish a timeline for completing the lifecycle cost model for Explosive Detection Systems.

Concur. TSA has begun to develop a life cycle cost model in order to control costs and negotiate future contracts. The life cycle cost model will be used to determine machine reliability and maintainability and inform future contract negotiations, such as when to replace a machine versus continuing to repair it. The prototype Life Cycle Cost Model is in development, with an estimated completion date of September 2006. Prototype evaluation will begin immediately upon delivery. Full implementation of an EDS Life Cycle Cost Model will be completed within 12 months after the prototype has been approved.

Recommendation 3: Revise the policies and procedures to require documentation of its monitoring of EDS and ETD maintenance contracts to provide reasonable assurance that contractor maintenance cost data and performance data are recorded and reported in accordance with TSA contractual requirements and self reported contractor mean downtime data are valid, reliable, and justify the full payment of the contract amount.

Concur. In March 2005, TSA established specific procedures, which are included in all maintenance contracts, to evaluate and monitor contractor performance with regard to EDS and ETD maintenance. There are three specific contractor performance requirements that are included in the Siemens, L-3, GE InVision, and Reveal contracts: 1) metrics related to Reliability, Maintainability, and Availability (RMA) of the machines must be reported to TSA; 2) specific cost data related to maintenance and repair must be reported to TSA; 3) contractors are required to meet monthly with TSA to review all pertinent technical, schedule, and cost aspects of the contract, including an estimate of the work to be accomplished in the next month, performance measurement information, and any current and anticipated problems.

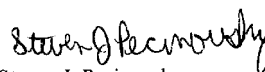
TSA established the RMA database, simply called RMA. This system tracks RMA and data requirements for all maintenance contracts. In addition, TSA has tasked its Integrated Logistics Support (ILS) contractor to track and review all reporting and data deliveries from the maintenance contractors. The ILS contractor has developed software tools for tracking and managing all deliverable products, to include submission dates and completeness of submission. The ILS contractor is developing automated tools to perform multiple analyses of the digital data delivered by the maintenance contractors, to include a visual dashboard that will allow TSA to spot and track cost and performance trends as they occur. This independent validation and

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verification of maintenance and cost data will allow TSA to accurately and efficiently certify the maintenance contractors' performance against their contract requirements.

Thank you for the opportunity to review and provide comments to the draft report.

Sincerely,



Steven J. Pecinovsky
Director Departmental GAO/OIG Liaison Office

Appendix III: GAO Contact and Staff Acknowledgements

GAO Contact

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Staff Acknowledgements

In addition to the individual names above, Charles Bausell, R. Rochelle Burns, Glenn Davis, Katherine Davis, Michele Fejfar, Richard Hung, Nancy Kawahara, Dawn Locke, Thomas Lombardi, Robert Martin, and William Woods.

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