TSA Needs to Improve Monitoring of the Deployed Advanced Imaging Technology System
May 8, 2020

Why We Did This Audit

Prior audit reports from both the U.S. Government Accountability Office and DHS OIG highlighted diminished detection performance and inefficient screening capabilities of TSA’s AIT system. While TSA committed to addressing these gaps, new threats continue to emerge requiring advanced security measures. We conducted this audit to determine to what extent TSA’s monitoring of the AIT addresses needed capabilities.

What We Found

The Transportation Security Administration (TSA) does not monitor the Advanced Imaging Technology system (AIT) to ensure it continues to fulfill needed capabilities for detecting non-metallic threat items concealed on air passengers. Specifically, although AIT met the requirement for system availability, TSA did not monitor the AIT system’s probability of detection rate and throughput rate requirements set forth in TSA’s operational requirements document. These issues occurred because TSA has not established comprehensive guidance to monitor performance of the AIT system.

Without continuous monitoring and oversight, TSA cannot ensure AIT is meeting critical system performance requirements — a consistent weakness found in prior DHS Office of Inspector General (OIG) reports. As a result, TSA may fund and acquire future systems without knowing whether the technology addresses new and emerging threats, potentially placing the traveling public at risk.

TSA Response

TSA concurred with our recommendations. We have included a copy of TSA’s response to our draft report in appendix A. We consider both recommendations resolved and open.

For Further Information:
Contact our Office of Public Affairs at (202) 981-6000, or email us at DHS-OIG.OfficePublicAffairs@oig.dhs.gov
MEMORANDUM FOR: The Honorable David P. Pekoske  
Administrator  
Transportation Security Administration

FROM: Joseph J. Cuffari, Ph.D.  
Inspector General

SUBJECT: TSA Needs to Improve Monitoring of the Deployed Advanced Imaging Technology System

For your action is our final report, *TSA Needs to Improve Monitoring of the Deployed Advanced Imaging Technology System*. We incorporated the formal comments provided by your office.

The report contains two recommendations aimed at improving TSA’s monitoring of the deployed Advanced Imaging Technology system. Your office concurred with both of our recommendations. Based on information provided in your response to the draft report, we consider recommendations 1 and 2 resolved and open. Once your office has fully implemented the recommendations, please submit a formal closeout letter to us within 30 days so that we may close the recommendations. The memorandum should be accompanied by evidence of completion of agreed-upon corrective actions and of the disposition of any monetary amounts. Please send your response or closure request OIGAuditsFollowup@oig.dhs.gov.

Consistent with our responsibility under the *Inspector General Act*, we will provide copies of our report to congressional committees with oversight and appropriation responsibility over the Department of Homeland Security. We will post the report on our website for public dissemination.

Please call me with any questions, or your staff may contact Sondra McCauley, Assistant Inspector General for Audits, at (202) 981-6000.
Background

The Transportation Security Administration (TSA) is responsible for conducting passenger checkpoint and checked baggage screening operations at roughly 450 airports nationwide. To achieve its mission, TSA mitigates threats to aviation security through the deployment of advanced technologies.

In 2007, TSA piloted the Advanced Imaging Technology system (AIT) to address a critical weakness in security at passenger screening checkpoints. TSA began using the AIT to detect non-metallic threats such as weapons, explosives, and other items concealed on passengers that may not be identified by a walk-through metal detector. Currently, AIT is the primary on-person screening device at passenger screening checkpoints in 340 airports nationwide. TSA has deployed 962 AIT systems totaling an estimated $126 million. Figure 1 shows an AIT deployed at an airport checkpoint.

Prior to deploying AIT, TSA tested the system in both a controlled environment and at selected airports. The purpose of the test and evaluation process was to certify the AIT system met all operational needs as intended. TSA defined these detection and performance needs in its Operational Requirements Document for Second-Generation Advanced Imaging Technology System for Checkpoint Operations. This document outlined four performance metrics the AIT system must achieve to be fully operational:

- **Probability of Detection** - AIT must identify the location of a concealed threat in any orientation on a passenger, at or greater than the defined detection rate value. TSA considers the detection rate classified.
- **Throughput** - AIT must screen an average of 150 persons per hour during continuous use.
- **Availability** - AIT shall maintain an availability rate of 98.5 percent based on a 16-hour day of operation.
- **Safety** - AIT shall not present electrical, radiation, tripping, bodily injury, or other hazards to passengers and operators due to sharp corners or edges. It also must not have adverse impact on electronic medical devices such as pacemakers. We did not include safety in the scope of our review.

Figure 1: TSA AIT System
Source: TSA.gov

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1 Calculation is based on the average procurement unit cost for AIT in TSA’s 2017 Life Cycle Cost Estimate for Passenger Screening Program.
On September 19, 2017, DHS’ Acquisition Review Board declared the AIT system at full operational capability\(^2\) and approved it to move forward as a standalone program in January 2018. As a standalone program, TSA is required to oversee all operational activities of the program as described in the *DHS Systems Engineering Life Cycle Guidebook*.\(^3\) These activities include operating and maintaining the system, performing operational analyses, conducting post-implementation reviews, and periodically reviewing the system’s performance.

The Performance Management Branch, under TSA’s Security Operations Division, oversees AIT deployed to passenger screening lanes. PMB’s main oversight responsibility is to maximize use of the AIT system. In March 2018, PMB developed a field guide, *Improving Security Effectiveness by Optimizing Utilization of Advanced Imaging Technology*, aimed at improving security effectiveness by optimizing use of AIT. The field guide provides throughput calculations and target metrics for determining the operational capacity of the AIT system. PMB collects passenger throughput data and develops reports for TSA managers responsible for monitoring AIT performance and implementing corrective action.

Over the years, TSA has received a high degree of scrutiny regarding effectiveness of the AIT system. Prior audit reports from both the U.S. Government Accountability Office and DHS Office of Inspector General (OIG) highlighted diminished detection performance and inefficient screening capabilities of the AIT system. While TSA has committed to addressing these gaps, new threats continue to emerge requiring advanced security measures. We conducted this audit to determine to what extent TSA’s monitoring of the AIT addresses needed capabilities.

### TSA Does Not Monitor AIT Operational Requirements

TSA does not monitor the AIT system to ensure it continues to fulfill needed capabilities for detecting non-metallic threat items concealed on air passengers. Specifically, although AIT met the requirement for system availability, TSA did not monitor the AIT system’s probability of detection rate and throughput rate requirements set forth in TSA’s operational requirements document. These issues occurred because TSA has not established comprehensive guidance to monitor performance of the AIT system.

Without continuous monitoring and oversight, TSA cannot ensure AIT is meeting critical system performance requirements — a consistent weakness.

\(^2\) An acquisition reaches full operational capability when there is a full deployment of capability and when the requirements established in the operational requirements document are demonstrated through test and evaluation.

found in prior DHS OIG reports. As a result, TSA may fund and acquire future systems without knowing whether the technology addresses new and emerging threats, potentially placing the traveling public at risk.

**TSA Does Not Monitor the Probability of Detection**

*Standards for Internal Control in the Federal Government* calls for agencies to continually monitor programs during the course of normal operations to help evaluate performance over time. TSA’s operational requirements document requires the AIT system to identify the location of a concealed threat at, or greater than, the (classified) defined detection rate. Although TSA certified the AIT system met the probability of detection rate during the testing and evaluation process, TSA has not conducted any further assessments of the system’s performance since deploying AIT to passenger screening lanes. The test and evaluation phase certifies the system, at a minimum, meets threshold detection requirements at the time of the test. However, this certification does not ensure the system will continue to perform at the same rate once deployed. As the AIT system ages, it is possible for performance to degrade over time. Currently, TSA does not require periodic assessments of AIT to ensure it operates as intended and identify whether the system continues to detect concealed threats at the rate it did when the system was first tested prior to deployment.

While TSA does conduct other assessments, these assessments do not ensure the AIT system continues to perform as intended. For instance, Transportation Security Officers calibrate the AIT system before each shift by placing a test object in the machine to confirm it correctly scans and displays the object on the image screen. Although daily calibration demonstrates the AIT system is operational, it does not determine the probability of detection rate.

TSA’s Office of Inspection also conducts covert tests to identify vulnerabilities in the passenger screening program. Covert testing includes on-body concealment of threat items designed to test and identify vulnerabilities in the security systems and identify corrective actions. Covert tests are conducted periodically for all types of technologies at the passenger screening checkpoint, and in only some cases include the AIT system as part of the test. However, these tests are not specifically designed with AIT detection standards in mind and are not a substitute for continual monitoring AIT detection requirements.

Further, airports conduct localized covert tests to assess the Transportation Security Officer’s ability to resolve an AIT’s alarm and not the performance of the system itself. TSA’s Office of Inspection has not reviewed the AIT system detection standards as part of its covert testing in over 5 years.
TSA Does Not Monitor Throughput Requirements

According to the operational requirements document for the system, the AIT system must be able to screen an average of 150 passengers per hour. Transportation Security Officers manually enter daily AIT throughput data into the Performance Management Information System. TSA uses the information to generate AIT utilization reports to measure throughput performance. According to TSA’s field guide, *Improving Security Effectiveness by Optimizing Utilization of Advanced Imaging Technology*, the national target for AIT utilization is greater than 95 percent. However, we found TSA’s Federal Security Directors (FSD), responsible for monitoring throughput performance, do not always review utilization reports or implement corrective action when airports do not comply with the set target.  Specifically, we contacted 10 FSDs with airports below target during an 18-month timeframe. We determined 3 of 10 (30 percent) FSDs were unaware their airports fell below the AIT utilization target and 10 of 10 (100 percent) could not provide any examples of corrective actions taken. Further, 5 of 10 FSDs responded that managing passenger wait times was a larger priority than AIT utilization.

Further, we determined TSA provided inconsistent oversight of AIT utilization. We contacted six Regional Directors responsible for reviewing utilization reports and communicating with the FSDs in their regions to determine how and when they provided oversight. We received varying responses from six Regional Directors who applied AIT utilization targets differently.  For instance, one Regional Director said he reaches out to the FSD if AIT utilization falls below 75 percent, while another has weekly meetings with FSDs but applies a goal of 87 percent. Three Regional Directors responded they review utilization reports and reach out on an “as-needed” basis. The remaining Regional Director we interviewed said he reviews utilization reports daily and reaches out to FSDs if AIT utilization falls below 95 percent. These inconsistent targets do not hold FSDs accountable for meeting AIT utilization targets and prevent corrective action to ensure the AIT is meeting critical system performance requirements.

TSA Has Not Developed Policies and Procedures to Monitor Requirements

TSA has not established comprehensive guidance to ensure adequate monitoring of AIT system performance. According to *Standards for Internal Control in the Federal Government*, agencies should periodically review policies for continued relevance and update them as needed. Although TSA established the field guide for optimizing the use of the AIT, the field guide only focuses on utilization targets and reporting requirements. The field guide provides

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4 The Federal Security Director is responsible for security operations at each federalized airport.  
5 TSA’s national operations are divided into seven geographic regions. TSA assigns a Regional Director to oversee the FSDs in each region.
throughput calculations and target metrics for determining the operational capacity of the AIT system. The Performance Management Branch collects passenger throughput data and develops reports for TSA managers responsible for monitoring AIT performance and implementing corrective action. However, the field guide does not require that TSA leadership regularly review these reports to make informed decisions on the use of the AIT machine. In addition, the field guide does not require TSA to conduct any follow-up or take corrective action once TSA leadership determines an airport has not met its target utilization rate.

TSA also lacks requirements for ensuring airports continuously monitor AIT detection rates. As of August 2019, TSA was in the process of developing draft procedures for how to monitor detection requirements. However, TSA officials we spoke with identified challenges in designing such procedures since it is not feasible to use live explosives to test AIT at airports. While using live explosives may not be possible, TSA could consider other measures such as test articles manufactured in a TSA laboratory. Further, TSA should ensure the new policy not only includes procedures for monitoring detection rates, but also requirements to monitor AIT throughput to ensure TSA is carrying out ongoing monitoring and implementing corrective actions.

Since 2007, TSA has invested about $126 million to acquire the AIT system. Given the security mission and this significant investment in technology, TSA must ensure the AIT system is fulfilling critical system performance requirements. Without adequate monitoring and oversight, TSA may continue to fund and acquire future systems without knowing whether the technology addresses new and emerging threats, potentially placing the traveling public at risk.

**Recommendations**

We recommend the TSA Administrator direct:

**Recommendation 1:** The Acquisition Program Management Assistant Administrator to develop an effective monitoring strategy and implementation plan, including necessary policies and procedures for ensuring probability of detection through defined continued monitoring and assessment of the deployed AIT system.

**Recommendation 2:** The Security Operations Executive Assistant Administrator to develop an effective monitoring strategy and implementation plan, including necessary policies and procedures for managing AIT throughput, to ensure TSA is carrying out ongoing monitoring and implementing corrective actions.
Management Comments and OIG Analysis

TSA concurred with the recommendations. Appendix A contains a copy of TSA’s management comments in their entirety. We also received technical comments from TSA and made revisions to the report where appropriate. We consider the two recommendations resolved and open. A summary of TSA’s responses and our analysis follows.

**TSA Response to Recommendation 1:** TSA concurred with the recommendation. TSA’s Assistant Administrator for Acquisition Program Management is drafting guidance for Post Implementation Reviews and recurring reviews. When completed, the guidance will provide a strategy for conducting performance reviews on transportation security equipment, including the AIT system. The guidance will provide instructions for the program to use to develop an AIT-specific plan, which will detail the activities to monitor and assess the AIT system’s performance. According to TSA, completion of the plan is highly dependent on methodologies currently under development. The estimated completion date is December 31, 2021.

**OIG Analysis:** We consider these actions responsive to the recommendation. We will close the recommendation when we receive documentation showing TSA implemented guidance for Post Implementation Reviews, and the recurring reviews include an AIT-specific plan detailing continuous and consistent monitoring and assessment of the AIT system’s performance. The recommendation is resolved and open.

**TSA Response to Recommendation 2:** TSA concurred with the recommendation. TSA’s Assistant Administrator for Aviation Operations will set national throughput targets and thresholds for the initiation of corrective actions. TSA’s Executive Directors will regularly review performance of FSDs. Also, FSDs’ annual performance evaluations will continue to include assessments of the FSDs’ management of corrective actions associated with unsatisfactory Key Performance Indicators, such as AIT throughput. The estimated completion date is December 31, 2020.

**OIG Analysis:** We consider these actions responsive to the recommendation. We will close the recommendation when we receive documentation showing that TSA implemented a monitoring process to ensure ongoing monitoring of AIT throughput and implementation of corrective actions. The recommendation is resolved and open.

We conducted this audit to determine to what extent TSA’s monitoring of AIT addresses needed capabilities. To accomplish our objective, we researched and analyzed DHS Instruction 102-01-001; DHS Guidebook, 102-01-103-01; Systems Engineering Life Cycle Guidebook; and the U.S. Government Accountability Office Standards for Internal Control in the Federal Government. We interviewed key personnel and obtained operational requirements documentation related to the AIT system’s availability, probability of detection, and passenger throughput. We did not include safety in the scope of our review.

To understand how TSA established operational requirements for the AIT program, we conducted interviews with staff at TSA’s program offices responsible for developing the AIT program requirements. We obtained relevant acquisition documents, including –

- Capability Analysis Report for Screening Traveler’s/Non-Traveling Individual’s Person;
- Passenger Screening Program Mission Need Statement;
- Passenger Screening Program Acquisition Plan;
- Operational Requirements Document for Second-Generation Advanced Imaging Technology System for Checkpoint Operations;
- Passenger Screening Program Life Cycle Cost Estimate;
- Advanced Imaging Technology System for Passenger Screening Alternatives Analysis; and
- Passenger Screening Program-Advanced Imaging Technology Updated Project Test and Evaluation Master Plan Addendum.

To assess throughput requirements, we spoke to Federal Security Directors at the Boston, Providence, and Manchester-Boston regional airports. We judgmentally selected these airports based on proximity to audit team locations. We obtained throughput data from the Performance Information Management System for fiscal year 2018 through the first two quarters of FY 2019.

To assess the reliability of TSA’s Performance Information Management System data, we reviewed documentation on how throughput information is submitted,
interviewed FSDs responsible for entering throughput data into the Performance Measurement Information System, and reviewed the Executive Summary of the Verification and Validation of performance measure data as it related to the reliability of throughput data. Although we noted some data reliability inaccuracies, we determined throughput data was sufficiently reliable for the purpose of our audit.

To evaluate whether TSA is maximizing use of the AIT system, we reviewed and analyzed AIT utilization reports to determine the number of airports not meeting the national utilization target. We also obtained and reviewed relevant guidance on AIT utilization and interviewed all Regional Directors, by phone or via email, as well as 10 FSDs based in airports that were not meeting the utilization target.

To assess probability of detection requirements, we interviewed personnel from TSA’s Acquisition Program Management Branch, Requirements and Capabilities Analysis, Office of Inspection, Office of Intelligence, and Test and Evaluation Division. We assessed pertinent documentation to review the requirements set forth for probability of detection.

To determine whether TSA provides oversight to ensure deployed AIT are meeting the availability requirement, we interviewed AIT's program manager and obtained and reviewed maintenance reports from the Federal Data Reporting System; Performance Management Review documents; and FY 2018 Transportation Security Equipment Useful Life Analysis.

To understand how the AIT program recently became a standalone Level 2 program, we obtained Acquisition Decision Memoranda indicating the AIT program had moved into the sustainment, or full operational capability phase. We met with TSA’s Portfolio Director and the Acquisition Program Management Team to understand the Passenger Screening Program’s realignment. We also reviewed the Post Implementation Review Strategy. Because the document was in draft, we did not report on its contents; instead, we verified whether implementation actions were taken.

We conducted this performance audit between April 2018 and October 2019 pursuant to the Inspector General Act of 1978, as amended, and according to generally accepted government auditing standards. Those standards require we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based upon our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based upon our audit objectives. The Office of Audits major contributors to this report are Carolyn Hicks, Audit Director; Paul Exarchos, Audit Manager; Jeff Mun, Auditor-in-Charge; Michael Levy, Auditor; Michaela Stuart, Program Analyst; Lindsey Koch, Communications Analyst; and Kendra Loper, Independent Referencer.
Appendix A
TSA Comments to the Draft Report

April 1, 2020

MEMORANDUM FOR: Sondra F. McCauley
Assistant Inspector General for Audits
Department of Homeland Security

FROM: Ryan Propis
Chief of Staff
Transportation Security Administration

SUBJECT: Management’s Response to Draft Report:
“TSA Needs to Improve Monitoring of Deployed Advanced Imaging Technology System”
(Project No. OIG-18-080-AUD-TSA)

Thank you for the opportunity to comment on this draft report. The Transportation Security Administration (TSA) appreciates the work of the Office of Inspector General (OIG) in planning and conducting its review and issuing this report.

TSA is pleased to note OIG’s positive recognition of TSA’s continuing efforts and challenges to mitigate threats to aviation security through its deployment of advanced technologies. Through powerful and adaptable detection capabilities, intelligence-driven operations, enhanced vetting, and our strong partnerships across governments and industry, TSA serves as an example of world leadership in our shared aviation and surface transportation security mission.

However, TSA objects to the unsupported statement that “without continuous monitoring and oversight...TSA may continue to fund and acquire future systems without knowing whether the technology addresses new and emerging threats, potentially placing the traveling public at risk.”

Continuous monitoring and oversight relates to measuring performance over time, after acquisition and fielding, to ensure deployed equipment meets design and operational standards of performance. While TSA agrees that progress in these areas, as outlined in the report, warrants additional effort to document and routinely adhere to standardized processes, TSA does not believe that there is any evidence that TSA’s current processes are resulting in acquisitions that put the public at risk.
TSA, in cooperation with DHS Science and Technology and industry, academia, and international partners, has demonstrated rigorous, disciplined, and agile requirements and capabilities development and acquisition and procurement processes. The research, development, testing, and procurement of transportation security equipment is intelligence-driven, risk-based, and focused on fielding the most effective security screening equipment against both current and emerging threats. In collaboration with DHS, and with the support of Congress, TSA will continue to fund and acquire transportation security equipment and systems to provide better security to the traveling public.

As OIG recognizes in its report, TSA also continually engages in intelligence-driven covert testing to identify and address vulnerabilities in its layers of security, including Advanced Imaging Technology (AIT) machines.

The draft report contained two recommendations with which TSA concurs. Attached find our detailed response to each recommendation. DHS previously submitted technical comments under a separate cover for OIG’s consideration.

Again, thank you for the opportunity to review and comment on this draft report. Please feel free to contact me if you have any questions. We look forward to working with you again in the future.

Attachment
Attachment: TSA Response to Recommendations
 Contained in OIG-18-080-AUD-TSA

OIG recommended that the TSA Administrator direct:

**Recommendation 1:** The Acquisition Program Management Assistant Administrator to develop an effective monitoring strategy and implementation plan, including necessary policies and procedures for ensuring probability of detection through defined continued monitoring and assessment of deployed AIT system.

**Response:** Concur. TSA is working with stakeholders and partners to develop a strategy and methodology that is both practical and cost effective to implement.

The Assistant Administrator for Acquisition Program Management is drafting guidance documentation for Post Implementation Reviews and recurring reviews. When completed, the guidance will provide the strategy for the conduct of performance reviews on Transportation Security Equipment, including Advanced Imaging Technology (AIT). TSA plans to complete the guidance documentation in the third quarter of fiscal year (FY) 2020. The guidance will provide instructions to the program for use in the development of an AIT-specific plan, which will detail the implementation of the activities to monitor and assess the AIT’s performance.

Completion of the plan is highly dependent on the methodologies currently under development, which include the American National Standards Institute N42.59, a *Standard for Measuring the Imaging Performance of Millimeter Wave Systems for Security Screening of Humans*, and computer-aided methods to dramatically enlarge an image dataset that could be used to accurately and quickly assess AIT performance. TSA’s collaboration on both methodologies with the primary responsible entities is ongoing; TSA expects to complete the plan the first quarter of FY 2022, based on current expectations for the completion of those methodologies.

**Estimated Completion Date (ECD):** December 31, 2021

**Recommendation 2:** The Security Operations Executive Assistant Administrator to develop an effective monitoring strategy and implementation plan, including necessary policies and procedures for managing AIT throughput, to ensure TSA is carrying out ongoing monitoring and implementing corrective actions.
Response: Concur. As referenced in the report, TSA has maintained the tracking and reporting of AIT throughput as a Key Performance Indicator, which is reported regularly to the Federal Security Directors (FSDs). Going forward, TSA’s Assistant Administrator for Aviation Operations, to whom FSDs now report through three Executive Directors, will set national targets and thresholds for the initiation of corrective actions—for example, the directing of Corrective Action Plans when performance falls below designated levels. The Executive Directors will regularly review performance of each FSD, and FSD annual Performance Evaluations will continue to include assessment of management of corrective actions associated with unsatisfactory Key Performance Indicators such as AIT throughput.

ECD: December 31, 2020
Appendix B
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