



July 2018

AVIATION SECURITY

Basic Training Program for Transportation Security Officers Would Benefit from Performance Goals and Measures

GAO Highlights

Highlights of [GAO-18-552](#), a report to congressional committees

Why GAO Did This Study

TSA is responsible for ensuring that all airline passengers and their property are screened for items that could pose a threat to airplanes and passengers at 440 airports across the United States. Since 2016, TSO Basic Training—initial training for newly hired TSOs, including both TSA-employed and private screeners—has consisted of an intensive two-week course at the TSA Academy located at FLETC. TSA has obligated about \$53 million for the program from its inception through March 2018. In 2015 and 2017, the Department of Homeland Security Inspector General raised questions about the effectiveness of checkpoint screening, which prompted concerns about training.

GAO was asked to review TSA's training of new TSOs. This report (1) describes the reasons why TSA established the TSO Basic Training program; (2) discusses factors OTD considers when updating TSO Basic Training curriculum; and (3) assesses the extent to which TSA evaluates its TSO Basic Training program. GAO reviewed documents on the development and modification of TSO Basic Training curriculum; visited FLETC; interviewed TSA officials; and compared TSA's program evaluation to leading practices.

What GAO Recommends

GAO recommends that TSA establish specific goals and performance measures for the TSO Basic Training program. TSA concurred with the recommendation.

View [GAO-18-552](#). For more information, contact Nathan Anderson at (206) 287-4804 or andersonn@gao.gov.

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What GAO Found

The Transportation Security Administration (TSA) established the Transportation Security Officer (TSO) Basic Training program at the TSA Academy at the Federal Law Enforcement Training Centers (FLETC) in Glynco, Georgia to obtain benefits from centralized training. Prior to the Basic Training program, TSO training was conducted at individual airports, often by TSOs for whom instruction was a collateral duty. According to a business case developed by TSA for Congress in 2017 and TSA officials, TSA expected implementation of the TSO Basic Training program to provide efficiencies to the delivery of new-hire training for TSOs and to enhance the professionalism and morale of newly hired screeners. For example, GAO observed that TSO Basic Training facilities have airport checkpoint equipment and x-ray image simulators for students to practice skills, eliminating the challenge of finding available equipment and training times in a busy airport environment. According to program officials, centralized training also provides trainees with an increased focus on the TSA mission and instills a common culture among TSOs.

TSA's Office of Training and Development (OTD) updates and modifies the TSO Basic Training curriculum in response to evolving security threats and evaluations of effectiveness, among other factors. For example, OTD holds regular meetings with TSA's Office of Security Operations—the office responsible for managing TSO performance—to discuss issues such as imminent threats. The offices also discuss analyses of TSO effectiveness identified through covert tests, in which role players attempt to pass threat objects—such as knives, guns, or simulated improvised explosive devices—through the screening checkpoints. The two offices identify ways to address issues identified in covert testing, which are then incorporated into TSO Basic Training. OTD also gathers input from TSO Basic Training instructors and from participants to adjust training curriculum.

TSA has implemented a training evaluation model but has not yet established specific program goals and performance measures to assess TSO Basic Training. The Kirkpatrick model used by TSA is a commonly-accepted training evaluation model endorsed by the Office of Personnel Management and used throughout the federal government. While TSA reported expected benefits of TSO Basic Training in its business case and implemented the Kirkpatrick model to begin assessing training, it has not yet identified specific goals that the program is expected to achieve, nor has it developed applicable performance measures to evaluate progress toward goals, as called for by leading management practices for training evaluation. TSA officials told GAO that TSO Basic Training is a relatively new program and they planned to collect more data on TSO screening performance before further evaluating the potential impacts of the training program. However, TSO Basic Training serves as the foundation for TSOs to learn core skills and procedures, and it is important to establish goals and measures to better assess the effectiveness of the training they receive. This will help TSA determine the extent to which TSOs are able to fulfill their important role in ensuring passenger safety while also showing results for the funds spent on such training each year.

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Abbreviations

AIT	Advanced Imaging Technology
DHS	Department of Homeland Security
FLETC	Federal Law Enforcement Training Centers
NHTP	New Hire Training Program
OOI	TSA Office of Inspection
OSO	TSA Office of Security Operations
OTD	TSA Office of Training and Development
SOP	Standard Operating Procedures
SPP	Screening Partnership Program
TSA	Transportation Security Administration
TSO	Transportation Security Officer

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July 26, 2018

The Honorable Michael T. McCaul
Chairman
The Honorable Bennie G. Thompson
Ranking Member
Committee on Homeland Security
House of Representatives

The Honorable John Katko
Chairman
The Honorable Bonnie Watson-Coleman
Ranking Member
Subcommittee on Transportation and Protective Security
Committee on Homeland Security
House of Representatives

The screening of airport passengers and their property is a critical component in securing our nation's commercial aviation system. Since the terrorist attacks of September 11, 2001, the Transportation Security Administration (TSA) has been tasked with screening airline passengers and their carry-on and checked baggage for prohibited and other potentially dangerous items that could pose a threat to aircraft and passengers. According to TSA, in fiscal year 2017, more than 771 million passengers were screened at 440 airports across the United States.

Since its inception, TSA has frequently adapted its standard operating procedures (SOP) to address new and evolving threats to aviation security. For instance, after the discovery of a plot to take the ingredients for an improvised explosive device—including hydrogen peroxide disguised as soda—onto multiple aircraft, TSA limited the amount of liquids passengers could bring onto planes from outside the airport. Transportation Security Officers (TSOs) at airports follow SOPs that guide screening processes and utilize technology such as advanced imaging technology (AIT) scanners or walk-through metal detectors to screen

passengers and their accessible property.¹ TSOs have annual training requirements, which are developed and implemented by TSA's Office of Training and Development (OTD). TSOs also receive basic training upon being hired. Through 2015, basic training was provided at TSOs' home airports through TSA's New Hire Training Program (NHTP). As of January 2016, NHTP was replaced by TSO Basic Training, an intensive two-week training program at the TSA Academy (Academy) located at the Federal Law Enforcement Training Centers (FLETC) campus in Glynco, Georgia.²

In 2015 and 2017, the Department of Homeland Security (DHS) Inspector General identified vulnerabilities in TSA checkpoint screening, after agents carried metallic (inoperable handguns) and nonmetallic (simulated explosive) test items concealed on their body through TSA passenger security checkpoints and into the sterile areas of airports.³ The results of these covert tests also sparked concerns about the training of TSOs. As a result, you asked us to review TSA's training of new TSOs through the TSO Basic Training program. This report: (1) describes the reasons why TSA established TSO Basic Training; (2) discusses factors OTD considers when updating the TSO Basic Training curriculum; and (3) assesses the extent to which TSA evaluates its TSO Basic Training program.

To describe the reasons TSA established the TSO Basic Training program at the TSA Academy, we reviewed documents related to the establishment of the program, such as agency training plans, a

¹For the purposes of this report, the term TSO refers to screeners employed by private contractors at airports that participate in the Screening Partnership Program (SPP), as well as to TSOs employed by TSA. See 49 U.S.C. § 44901(a). TSA oversees the performance of screening operations at SPP airports, and the screening personnel at SPP airports must adhere to the same screening requirements applicable to TSOs at airports with TSA-administered security. See 49 U.S.C. § 44920. All TSOs, whether they are employed at airports where security is administered by TSA or at SPP airports, are required to fulfill all initial and annual training requirements.

²FLETC provides training for law enforcement officers from over 90 federal law enforcement agencies as well as state, local, tribal and international law enforcement agencies.

³Department of Homeland Security Office of Inspector General, *Covert Testing of the TSA's Passenger Screening Technologies and Processes at Airport Security Checkpoints*, OIG-15-150 (Sept. 22, 2015) and *Covert Testing of TSA's Screening Checkpoint Effectiveness*, OIG-17-112 (Sept. 27, 2017). Sterile area refers to the area of an airport that provides passengers access to boarding aircraft and to which access is generally controlled by TSA or a private screening entity under TSA oversight. See 49 C.F.R. § 1540.5.

management directive, and the business case for TSO Basic Training submitted by TSA to Congress.⁴ We also visited the Academy to better understand the benefits of establishing TSO Basic at FLETC. In addition, we interviewed OTD officials at headquarters and at the Academy, instructors at the Academy, and union officials representing TSOs employed by TSA to better understand the benefits and challenges of training all new TSOs at the Academy and how TSO Basic Training differs from NHTP in place prior to TSO Basic Training.

To discuss what factors OTD considers when updating the TSO Basic Training curriculum, we reviewed documentation from OTD regarding changes made to TSO Basic Training since its inception, including a list of changes to the curriculum and a contractor's report that recommended some of those changes.⁵ We also interviewed officials from the Office of Security Operations (OSO), the office that manages TSOs at the nation's airports, the Office of Inspection (OOI), which conducts covert testing to evaluate checkpoint effectiveness, and OTD to determine why modifications were made and how the offices communicate regarding updates to standard operating procedures and other processes that may impact TSO Basic Training.

To assess the extent to which TSA evaluates TSO Basic Training, we reviewed TSA documents used for evaluating training courses, including end-of-course surveys administered to participants and surveys distributed to participants and their supervisors approximately 3 months after course completion. We also interviewed TSA headquarters officials responsible for evaluating TSO Basic Training and for developing and implementing TSO Basic Training as well as TSO Basic Training instructors. We compared the training evaluation documentation to the Kirkpatrick Model for training evaluation, which TSA uses as the model for

⁴TSA submitted this business case pursuant to the Explanatory Statement accompanying the Consolidated Appropriations Act, 2017. See Pub. L. No. 115-31, 131 Stat. 135 (2017); 163 Cong. Rec. H3813 (daily ed. May 3, 2017). Specifically, the Explanatory Statement directed TSA to develop a business case to justify the cost of new screener training (before permanent investments in the campus are made related to this training), including metrics related to increased TSO performance, improved morale, and better managed attrition.

⁵TSA hired a government contractor to perform an analysis on the soundness of the TSO Basic curriculum. In August 2016, the contractor delivered a draft report, which included recommendations on how to improve the curriculum. TSA officials told us a final report was not provided.

its evaluations of TSO training, and to leading practices in evaluating training and development efforts.⁶

We conducted this performance audit from November 2017 through July 2018, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

After the terrorist attacks of September 11, 2001, Congress passed and the President signed the Aviation and Transportation Security Act into law on November 19, 2001, with the primary goal of strengthening the security of the nation's civil aviation system.⁷ The act established TSA as the agency with responsibility for securing all modes of transportation, including civil aviation.⁸ As part of this responsibility, TSA performs or oversees security operations at the nation's nearly 440 commercial airports, including managing passenger and checked baggage screening operations.⁹

TSOs inspect individuals and property to deter and prevent passengers from bringing prohibited items on board an aircraft or into the airport sterile area—in general, an area of an airport to which access is

⁶The Office of Personnel Management has endorsed the Kirkpatrick Model as an effective tool to help agencies evaluate their training programs. The Kirkpatrick Model consists of a four-level approach for soliciting feedback from training course participants and evaluating the impact the training had on individual development and the impact of the training program on the agency's mission. For leading practices, see GAO, *Human Capital: A Guide for Assessing Strategic Training and Development Efforts in the Federal Government*, [GAO-04-546G](#) (Washington, D.C.: March 2004).

⁷Pub. L. No. 107-71, 115 Stat. 597 (2001).

⁸See 49 U.S.C. § 114(d).

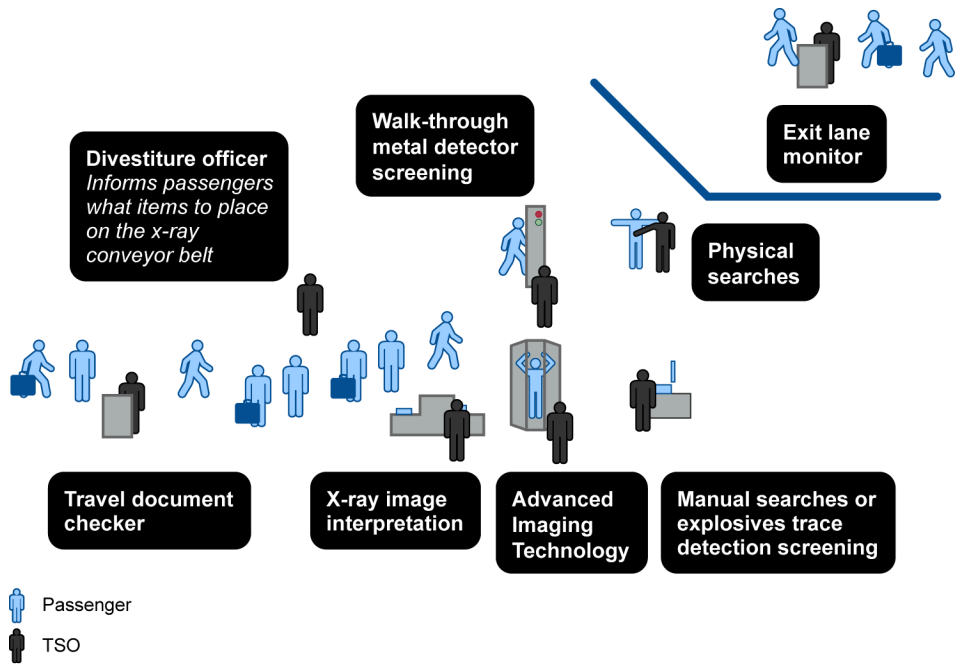
⁹For the purposes of this report, a commercial (or TSA-regulated) airport is an airport in the United States that operates under a TSA-approved security program in accordance with 49 C.F.R. part 1542 that, in general, regularly serves air carriers with scheduled passenger operations to and from that airport. In general, TSA must provide for the screening of all passengers and property that will be carried aboard a passenger aircraft operated by an air carrier or foreign aircraft operators to, from, and within the United States. See 49 U.S.C. § 44901(a).

controlled through the screening of persons and property.¹⁰ While working at an airport checkpoint as shown in figure 1, TSOs perform a variety of tasks, which include:

- Travel document verification: a TSO checks passengers' identification against the boarding pass and the individual presenting the identification.
- Divestiture: a TSO assists passengers by informing them what items need to be placed on the x-ray conveyor belt.
- X-ray interpretation: TSOs screen passengers' carry-on baggage and personal property by interpreting x-ray images to identify any prohibited items.
- Advanced imaging technology operations: Passengers are screened via advanced imaging technology (often referred to as body scanners), which identifies areas where they may be concealing prohibited items.
- Walk-through metal detector operation: a TSO operates the walk-through metal detector.
- Physical searches: Passengers can opt to be screened through a physical search, or TSOs may perform a physical search to resolve an alarm triggered by the AIT system or the walk-through metal detector, among other reasons.
- Explosive trace detection and manual searches of property: TSOs use an explosives trace detection system by swabbing carry-on baggage and testing the sample for explosive residue or vapors. This test is usually performed in conjunction with a manual search of the carry-on baggage.
- Exit lane monitoring: a TSO watches the lane through which passengers exit the sterile area to ensure that no one enters the sterile area through that passage.

¹⁰See 49 C.F.R. § 1540.5 (defining "sterile area"). TSOs must deny passage beyond the screening checkpoint to any individual or property that has not been screened or inspected in accordance with passenger screening standard operating procedures. See 49 C.F.R. § 1540.107(a); see also 49 C.F.R. §§ 1544.201(c) and 1546.201(c) (requiring, in general, that air carriers refuse to transport any individual who does not consent to a search or inspection of his or her person and property).

Figure 1: Transportation Security Officer (TSO) Tasks at Airport Checkpoints



Source: GAO analysis of Transportation Security Administration information. | GAO-18-552

Within TSA, two offices work together to manage TSOs and ensure their training is current and relevant. OSO is responsible for allocating TSO staff to airports, scheduling TSO work hours and training availability, and developing SOPs that govern how TSOs screen passengers and baggage. OTD is responsible for developing initial and ongoing training curricula for TSOs based in part on SOPs. Within OTD, a dedicated team is located at the Academy to manage updates at TSO Basic Training.

In accordance with the Aviation and Transportation Security Act, screeners must complete a minimum of 40 hours of classroom instruction, 60 hours of on-the-job training, and successfully complete an on-the-job training examination.¹¹ Until 2016, new TSOs completed these training requirements at or near their home airports through the New Hire Training

¹¹See 49 U.S.C. § 44935(g)(2). Additionally, TSOs may not use any security screening device or equipment in the scope of that individuals' employment unless the individual has been trained on that device or equipment and has successfully completed a test on the use of the device or equipment. 49 U.S.C. § 44935(g)(3).

Program (NHTP). Since TSA centralized the TSO Basic Training program in January 2016, TSOs fulfill these training requirements through classroom training at the Academy as well as training at their home airports prior to the Academy and on-the-job training after completion of TSO Basic Training. During the 2 weeks spent at the Academy, TSOs receive 80 hours of training on standard operating procedures, threat detection, and the use of screening equipment. Prior to attending TSO Basic Training, new TSOs complete computer-based prerequisite training and may shadow experienced TSOs at a checkpoint. TSO Basic Training allows for participants to be trained at a dedicated facility with more hands-on training than was possible for NHTP (see Appendix I for a comparison of the two programs).

As shown in table 1, of the \$53 million obligated from January 2016 through March 2018, TSA obligated \$18.2 million for procurement and development of the modular buildings on the FLETC campus used for TSA training, as well as associated hardware and set-up obligations such as audio/video equipment and fully operational simulated checkpoints. TSA obligated an additional \$12 million in fiscal year 2016 and \$13.7 million in fiscal year 2017 for the delivery of TSO Basic Training, including associated student travel and related equipment.¹² TSA officials told us that due to continuing budget resolutions that funded the government between October 2017 and March 2018, TSA was not able to fully fund the interagency contract between TSA and FLETC to support the TSO Basic Training course in fiscal year 2018 at the beginning of the year. For this reason, TSA does not yet have 2018 training obligations available for reporting through its accounting system. However, based on the average cost per student in fiscal year 2017 of about \$2,300 to attend TSO Basic Training, TSA estimates total training obligations of approximately \$9.1 million in the first half of fiscal year 2018.¹³

¹²For context, according to TSA officials, the agency expended approximately \$4 million in total travel and logistics support to train new hires at their home airports through NHTP in each of fiscal years 2014 and 2015. This dollar figure does not account for some related costs of the New Hire Training Program, such as training space, printing, or other shared costs borne by OSO as part of delivering training within the field airports by local personnel.

¹³According to TSA data, approximately \$1,450 of this total is comprised of meals, lodging, and related costs for training on the FLETC campus. \$834 is the average estimate per student for airfare and related travel expenses.

Table 1: Obligated Funding for the Transportation Security Officer (TSO) Basic Training Program at the Transportation Security Administration (TSA) Academy at the Federal Law Enforcement Training Centers

Cost category	Fiscal Year 2016	Fiscal Year 2017	Fiscal Year 2018 (thru March 31) Estimated
Interagency contract – New modular facilities	\$11.2M	N/A	N/A
Hardware/associated costs	\$6.9M	\$75K	N/A
Interagency contract – Training delivery	\$7.5M	\$8.5M	\$5.8M ^a
Associated travel	\$4.5M	\$5.1M	\$3.3M
Totals	\$30.1M	\$13.7M	\$9.1M

Source: Transportation Security Administration data. | GAO-18-552

Notes: M = millions; K = thousands; N/A = no funds allocated in this category.

^aAs of April 2018, the costs to deliver TSO Basic Training in fiscal year 2018 were still being finalized. Costs presented are based on the average cost per student in fiscal year 2017. TSA officials did not anticipate the average cost per student to significantly increase in fiscal year 2018.

TSA Established the TSO Basic Training Program at the Academy to Obtain Benefits from Centralized Training

According to the business case for TSO Basic Training and TSA officials, implementation of the TSO Basic Training program at the Academy was anticipated to provide a number of potential benefits. The anticipated benefits identified generally align under two distinct categories: (1) efficiencies and improvements obtained through the centralized delivery of training, and (2) enhanced professionalism and “esprit de corps” obtained through bringing newly hired screeners together for centralized training.¹⁴ Collectively, these benefits were also envisioned by TSA headquarters officials to have a positive impact on screening effectiveness and public perception of the TSA workforce.

Based on several analyses of training delivery options that TSA has conducted since 2008, TSA determined that a centralized training academy would have a number of potential benefits relative to the decentralized training previously administered at field airports through

¹⁴In this context, TSA defines professionalism as the focus on common core values and mission, as well as a sense of organizational commitment to providing a high-quality training experience for all participants across the TSO workforce. Esprit de corps is generally translated as a feeling of pride, fellowship, and common loyalty shared by the members of a particular group.

NHTP.¹⁵ Among the potential efficiencies and improvements cited by TSA are:

- Increased consistency and standardization. According to TSA documents and OTD headquarters officials, centralized training provides a standardized curriculum that serves as a foundation for the skills, knowledge, and equipment used across an array of different airport environments. The TSA business case and other supporting analyses note that such an approach offers greater consistency of training delivery and a better mechanism for developing, delivering, and evaluating course content.
- Equipment availability and expanded course content. TSO Basic Training includes a full suite of dedicated checkpoint equipment and x-ray image simulators for students to practice learned skills, eliminating the challenge of finding available equipment and training times in a busy airport environment (see figure 2). Officials told us that being more familiar with the screening equipment increases TSOs' readiness for on-the-job training when they return to their home airports. Initial test results also indicate that participants trained at the Academy receive higher pass rates on end-of course assessments of x-ray image interpretation skills than those who received their initial training at their home airports. Specifically, according to TSA data, of the 5,877 test-takers who received training at TSO Basic Training in 2016, 91.5 percent passed the Image Interpretation Test on their first attempt. In contrast, 83.2 percent of the 1,458 test-takers who received training at local airports in 2016 passed the test on their first attempt.¹⁶ In addition, the Academy curriculum incorporates new learning opportunities, including a live demonstration of improvised explosive devices and an active shooter drill, both of which would be difficult to reproduce within the airport environment, according to TSA officials.

¹⁵See, for example, TSA, *Office of Security Operations, Operational and Technical Training Division: Training Sites Alternatives Analysis*. Prepared by U.S. Department of Transportation, Research and Innovative Technologies Administration, Volpe National Transportation Systems Center (Oct. 31, 2008); and TSA, *Training Delivery Implementation of the New Hire Training Program Recommendations from the July 2011 Training Sites Business Case Analysis* (Oct. 20, 2015).

¹⁶According to officials, in fall 2016, a hurricane disrupted operations at FLETC and airports were given the option to train new TSOs on-site or to wait for FLETC to re-open. While FLETC re-initiated training operations within two weeks following the hurricane, the delay affected TSO Basic Training for over two months, during which time many TSOs were trained at their home airports.

Figure 2: Simulated Operational Checkpoints Used for Training at the TSA Academy



Source: Transportation Security Administration. | GAO-18-552

- Dedicated faculty and instructor development. TSO Basic Training offers a dedicated faculty and support staff focused exclusively on training TSOs. According to TSA officials, before TSO Basic Training, training at individual airports was often conducted by TSOs for whom instruction was a collateral duty, whereas instructors at the Academy have full-time training responsibilities and enhanced opportunities to learn from each other, increase their professional training skills, and provide feedback on the delivery of course curriculum.
- Centralized facility and shared logistics. By locating the TSA Academy at FLETC, TSA is able to take advantage of the services and logistical support that FLETC provides. Specifically, FLETC services and logistics include accommodations, meals, and transportation, thereby reducing the administrative demands on TSA personnel and allowing students a focused and efficient training experience. Additional efficiencies cited by TSA officials include lower overall costs for office space, janitorial services, and other operational costs because such costs are shared by the 96 agencies that use FLETC. According to TSA officials, conducting training at FLETC can also help TSA accommodate hiring surges and better augment future training, if needed. For example, TSA officials reported that the facility has surge capacity from its current capacity of 240 students up to 300 new students if sufficient instructors are available.

According to TSA documents and training officials, another key benefit of centralized training is the opportunity to enhance professionalism and help foster camaraderie and esprit de corps. TSA anticipates that centralized, standardized training will not only provide trainees with an

increased focus on the TSA mission and operational environment, but can serve to instill a common culture and sense of belonging among the broader community of TSOs nationwide. In its business case, TSA notes that centralized training of new recruits is a common model employed by the armed forces and other federal law enforcement agencies within DHS, such as U.S. Customs and Border Protection and the U.S. Coast Guard. According to the business case, by bringing together newly hired TSOs from around the country, TSA also hopes to inspire in its trainees a singular identity and unity of purpose, which previous analyses generally found lacking as part of the decentralized training approach.

The business case also associates such increases in professionalism and esprit de corps with greater employee satisfaction and the potential for reduced attrition. Analysis conducted by TSA in 2017 provides some initial support for positive trends in these areas. For example, results of a 2017 TSA employee engagement survey indicated that respondents who attended TSO Basic Training reported higher scores in categories including Organizational Commitment, Job Satisfaction, and Overall Morale versus respondents who did not attend.¹⁷ TSA also reported a 19 percent reduction in the attrition rate during the first 180 days of being hired for those attending TSO Basic Training at the Academy in 2016 versus those who received their initial training at field airports through the New Hire Training Program.¹⁸

¹⁷According to TSA, the comparison group was comprised of TSOs with 3 years or less experience. Respondents included 887 TSOs who had attended TSO Basic Training and 1,748 respondents who did not attend TSO Basic Training and were trained at airports within the field. The survey does not include SPP screeners, who are not TSA employees.

¹⁸According to TSA, after 180 days, these differences in attrition rates tend to normalize. TSA acknowledges that attrition is a complex problem and reports that these findings conform to expectations that other factors, outside of training, become more important the longer an employee is with the organization. However, TSA also notes that lower employee attrition has the potential for significant cost offsets. TSA officials further identified the implementation of the career progression model—whereby TSOs would remain at their home airports for 2-6 months before attending TSO Basic—as another mechanism intended to help reduce training costs and potentially address attrition among newer TSOs.

Factors Considered in Updating the TSO Basic Training Curriculum Include Evolving Security Threats and Input from Course Participants

OTD Uses Information from OSO to Update the TSO Basic Training Curriculum to Address Evolving Security Threats

OTD updates and modifies the TSO Basic Training curriculum based, in part, on regular communications from OSO, the office responsible for developing SOPs for screening operations and managing TSO performance. Officials from both offices told us that OSO provides information to OTD on changes to SOPs as soon as changes are made so they can update the TSO Basic Training curriculum.¹⁹ For instance, in 2017, when OSO began planning major changes to the SOPs, the office gave OTD information about the planned SOP revisions, as well as the airports where the new SOPs would be piloted.²⁰ In response, OTD modified its curriculum and was able to provide revised training for new TSOs based at airports that were piloting the program, while providing TSOs at all other airports the prior version of training. OTD officials noted that in some cases TSA must quickly update SOPs to reflect imminent threats. According to officials, a plan is in place to make changes to TSO Basic Training curriculum in response to emerging or imminent threats, although such threats have not been experienced since the establishment of TSO Basic Training in 2016.

In addition to changes in SOPs, OSO officials indicated they may also change the timing of when TSOs employed by TSA attend TSO Basic Training. Specifically, officials told us that OSO plans to implement a new

¹⁹According to OTD officials, the relationship between OSO and OTD is one of client and service provider. In general, OSO makes decisions regarding SOPs and TSO training availability and OTD incorporates those decisions into its curriculum and planning.

²⁰Under the new SOP, travelers are asked to remove electronics larger than a cell phone from their carry-on bags to help TSA officers obtain a clearer X-ray image of electronic devices. The new screening procedures were initially tested at 10 airports and officials told us they are currently rolling out to airports around the country.

model for TSO Basic Training in which TSOs will attend TSO Basic Training 2 to 6 months after they are hired rather than as soon as is practical. According to TSA, the agency is pursuing this change to, among other things, implement a transparent career path for TSOs employed by TSA and to encourage and reward skill development. During the 2 to 6 months prior to attending TSO Basic Training, TSOs will perform checkpoint tasks that require training that can be delivered at the airport as soon as they are hired, such as checking passengers' travel documents and helping passengers move through the checkpoint. Once TSOs are able to perform these initial tasks, they will attend TSO Basic Training at the Academy. Officials told us they are preparing for the change by modifying the TSO Basic Training curriculum to eliminate subjects that will be covered at the airports and to emphasize skills that more experienced TSOs will need, such as performing physical searches of passengers. TSA plans to implement the revised model beginning in August 2018.

Finally, OTD receives information on TSO performance and uses that information to inform TSO Basic Training curriculum. For example, two TSA offices—OSO and the Office of Inspections—perform regular effectiveness testing of airport checkpoints through covert testing and share the results with OTD.²¹ After each covert testing event, each office conducts interviews with TSOs to determine the factors that contributed to their effectiveness at identifying prohibited items. Officials told us that OSO and OTD hold regular meetings to discuss the analyses of covert testing failures and ways in which training curriculum can be modified to address the reasons for the failures, which are then incorporated into the TSO Basic Training curriculum. Office of Inspections officials noted that they participated in the development of the TSO Basic Training curriculum and provide regular reports to OTD on covert testing results.²²

²¹TSA headquarters oversees covert testing, which is implemented locally at all US airports, using unrecognizable role players who attempt to pass threat objects, such as knives, guns, or simulated improvised explosive devices, through the screening checkpoints. The tests are designed to assess various aspects of the aviation security system, including the operational effectiveness of screeners.

²²GAO is in the process of conducting research for a more detailed report on TSA's use of covert testing.

When Making Updates to TSO Basic Training Curriculum, OTD Considers Feedback from Instructors, Course Participants, and Contractors

OTD gathers input from TSO Basic Training participants, instructors, and contractors on ways to update the curriculum. For instance, TSO Basic Training instructors told us they submit “white paper proposals” to TSO Basic Training course managers detailing their suggested changes to the course. They can also provide feedback and suggestions during “train the trainer” sessions, in which all instructors participate when TSO Basic Training is updated. Instructors told us that all sessions include an opportunity for instructors to provide feedback after reviewing the new curriculum. Officials told us that they take instructors’ feedback into account when implementing new curriculum. For instance, officials told us that at the suggestion of instructors, they added time for discussion at the end of each checkpoint lab to help capture and share lessons learned.

OTD also collects feedback from TSOs who have participated in the course, both at the end of their two weeks at the Academy and several months after their completion of the course. At the end of TSO Basic Training, OTD collects feedback from participants through a survey with both multiple choice and open-ended questions. The survey includes questions on the course curriculum and instructor performance. Officials told us that they regularly review the results of the survey and consider whether it is appropriate to address the feedback by modifying TSO Basic Training. For instance, the most often provided feedback for altering the curriculum was to increase the time in hands-on training using screening equipment in the Academy’s simulated checkpoints. In response, OTD officials told us they added nearly 5 hours of hands-on training to the 80-hour program in addition to the 6 hours that had previously been a part of the curriculum.

In addition to collecting feedback from TSO Basic Training participants and instructors, TSA officials told us that TSA regularly uses a contractor to support the design and development of training courses and to assess existing courses, including TSO Basic Training. In 2016, the contractor conducted an evaluation of the instructional integrity of the TSO Basic Training curriculum. The resulting report made a number of recommendations to improve the curriculum and structure of TSO Basic Training, many of which OTD has implemented. For instance, the contractor recommended that TSO Basic Training include more opportunities for review of the material to reinforce TSOs’ understanding. In response, OTD implemented a review session at the end of the first week of training so TSOs have an opportunity to clarify information presented over the first week.

TSA Has Made Progress in Implementing a Training Evaluation Model but Has Not Established Specific Goals and Performance Measures to Assess TSO Basic Training

TSA has implemented three of the four levels of the Kirkpatrick Model, a training evaluation model that, in part, helps TSA collect feedback from course participants and evaluate the impact on individual development. However, the agency has not developed goals for the program or related performance metrics to demonstrate progress toward goals.

TSA Has Made Progress in Implementing the Kirkpatrick Model to Evaluate Its TSO Basic Training Program

To evaluate the TSO Basic Training program, TSA uses the Kirkpatrick Model, which is a commonly accepted training evaluation model endorsed by the Office of Personnel Management and used throughout the federal government. The Kirkpatrick Model consists of a four-level approach for soliciting feedback from training course participants and evaluating the impact the training had on individual development, among other things. To date, TSA has implemented the first three levels of the model by administering (1) course surveys to participants at the end of the training program; (2) an end-of-course written exam and an x-ray image interpretation test to assess achievement of learning objectives; and (3) course surveys to participants and their supervisors several months after completing training to collect information regarding how the training affected behavior or performance on the job. OTD officials told us that they have not yet implemented Level 4 of the model because they do not believe they have enough data. Table 2 provides a description of what each level within the Kirkpatrick model is to accomplish and TSA's progress in implementing the levels.

Table 2: Transportation Security Administration’s (TSA) Implementation of Kirkpatrick Training Evaluation Model

Kirkpatrick Evaluation Level Description	TSA’s Current Practices
<p>Level 1</p> <p>The first level measures the training participants’ reaction to, and satisfaction with, the training program. A level 1 evaluation could take the form of a course survey that a participant fills out immediately after completing the training.</p>	<p>TSA uses a survey at the completion of each course to obtain feedback from participants regarding the overall length and structure of the course, instructor effectiveness, and the degree to which they thought they could implement what they learned in their job.</p>
<p>Level 2</p> <p>The second level measures the extent to which learning has occurred because of the training effort. A level 2 evaluation could take the form of a written exam that a participant takes during the course.</p>	<p>After completion of the 2-week Transportation Security Officer (TSO) Basic Training program, TSA administers an end of course written exam and an x-ray image interpretation test to evaluate the extent that participants can demonstrate sufficient knowledge of course content and suitability to proceed to on-the-job training at their home airports.</p>
<p>Level 3</p> <p>The third level measures how training affects changes in behavior or performance on the job. Such an evaluation could take the form of a survey sent to participants several months after they have completed the training to follow up on the impact of the training on job performance.</p>	<p>TSA administers surveys to course participants and their supervisors several months after the participant attends TSO Basic Training to collect information on the perceived value and effectiveness of the course and the extent to which participants were able to apply specific course learning objectives during their on-the-job training duties. For instance, the survey asks supervisors to agree or disagree with statements about their employees’ preparedness to operate screening checkpoint equipment or conduct physical searches of passengers. Officials have performed one analysis of these surveys, for which the response rate for the participant surveys was 8.5 percent of the 5,948 course graduates in FY16. The supervisor response rate was 31.2 percent of the 3,353 surveys administered. OTD officials consider this a usable response rate to provide feedback on any changes that may be needed to the course curriculum.</p>
<p>Level 4</p> <p>The fourth level measures the impact of the training program on the agency’s mission or organizational results. Such an evaluation could take the form of comparing operational data before and after a training modification was made.</p>	<p>TSA has not yet implemented a Level 4 evaluation. Officials stated that they plan to do so but noted that several more years of data on TSO screening performance are likely needed to assess the broader organizational impacts of the training program.</p>

Source: GAO analysis of Transportation Security Administration information. | GAO-18-552

TSA Has Not Yet Developed Goals and Performance Measures for TSO Basic Training

While TSA reported potential benefits of TSO Basic Training in its business case and implemented the Kirkpatrick Model to assess training, it has not yet identified specific goals that the TSO Basic Training program is expected to achieve, nor has it developed performance measures to evaluate progress toward goals. The business case and the Kirkpatrick Model are positive steps and document certain benefits of TSO Basic Training, but without a set of specific training goals and associated performance measures for the program, TSA is not able to

fully evaluate the program's effectiveness and ensure accountability toward results. Such goals are important to help ensure alignment with course objectives and the end-of course examinations administered as part of Level 2 of the Kirkpatrick Model. In addition, without the development of specific goals, it is not possible to determine what types of performance measures should be used to help show progress toward such goals. For example, in its business case, TSA identified improved employee morale as one of the anticipated benefits of TSO Basic Training. However, there are no goals or metrics specifically related to this benefit. If TSA believes improved morale should be something for which TSO Basic Training aims, goals and measures could help them demonstrate the extent to which this benefit is being realized by the training program.

Leading management practices related to training evaluation guidance identifies the importance of agencies developing and using performance measures regularly to ensure accountability and assess progress toward achieving results that are aligned with the agency's mission and goals.²³ In addition, these practices highlight the importance of agencies having clear goals about what the training or development program is expected to achieve as a precursor to developing such measures. When designed effectively, performance measures help decision makers (1) determine the contributions that training makes to improve results, (2) identify potential gaps in performance, and (3) determine where to focus resources to improve results. In particular, incorporating valid measures of effectiveness into training programs can enable an organization to better ensure that desired changes occur in trainees' skills, knowledge, and abilities.²⁴

According to OTD officials, the TSO Basic Training program was established on an accelerated schedule in late 2015 as one of multiple efforts to improve training delivery and help enhance screener effectiveness. Officials stated that the program is still relatively new and they plan to collect several additional years of data on system-wide screening performance before conducting efforts to further evaluate the

²³[GAO-04-546G](#).

²⁴GAO has previously reported on the importance of developing performance metrics to assess the impact of training on improving the performance or proficiency of participants. See, for example, GAO, *Army and Marine Corps Training: Better Performance and Cost Data Needed to More Fully Assess Simulator-Based Efforts*, [GAO-13-698](#) (Washington, D.C., August 22, 2013).

impact of the training. They reported that the lack of performance measures is also due to the inherent difficulty of tying specific training initiatives to broader organizational results. Officials told us that once TSOs return to their home airports after TSO Basic Training, they are exposed to additional on-the-job training and differing airport cultures, which make it difficult to isolate the effects of TSO Basic Training. However, senior training officials agreed that establishing applicable goals and performance measures for the TSO Basic Training program would be helpful to support ongoing efforts and better measure program progress.

We recognize that developing metrics to assess the performance of training programs on broad organizational results can be challenging. However, there are additional opportunities to develop program goals and performance measures as part of the training evaluation efforts at the Academy to help ensure that participants can demonstrate proficiency in performing core technical skills before returning to their home airports. We believe that developing goals for a training program does not need to wait for years of data. Goals reflect desired results, connected to an agency's mission, which a program plans to achieve. In the over 2 years of using TSO Basic Training, TSA has not stated what results the training program is to achieve.

TSOs provide a crucial function to help ensure passenger safety, and it is important to have goals aligned with this mission, as well as associated measures of effectiveness of the training they receive at TSO Basic Training to determine the extent to which they are able to fulfill their important role. As noted by leading management practices for training evaluation, agencies need credible information to demonstrate a training program is contributing to a goal and they can develop such data through a mix of quantitative and qualitative indicators.²⁵ We found that options for assessing the effectiveness of TSO Basic Training could include measuring TSO performance by leveraging data from end of course examinations, such as the x-ray image interpretation test, and introducing similar additional tests or mechanisms to further evaluate trainees' knowledge and skills in effective screening procedures. Additional options could include measuring employee morale as indicated by TSOs on their Kirkpatrick Level 1 surveys at the completion of the training program, and comparing these results against applicable program goals for employee

²⁵[GAO-04-546G](#).

morale that TSA could establish related to TSO Basic Training. By identifying annual goals and measures for TSO Basic Training, TSA will also be better positioned to move forward with Level 4 of the Kirkpatrick Model to evaluate the impact of training on broader organizational results. Given that over \$50 million has been obligated to set up and operate the TSO Basic Training program to date, it is important that TSA incorporate annual goals and measures into the training program to be better informed when making training decisions and to help hold itself accountable for training results on a regular basis.

Conclusions

TSOs perform a critical role in securing our nation's commercial aviation system and often represent the most visible face of TSA to the public. For this reason, new hire training is an integral function to ensure that TSOs are obtaining the foundational skills and knowledge to help prepare them to perform their jobs effectively. In 2016, TSA initiated a major change to its training approach for new hires to help ensure a consistent and standardized training experience and promote enhanced camaraderie and esprit de corps. Although TSA has implemented a framework to assess participant reactions to the training and their knowledge of course content, it has not yet established goals for the TSO Basic Training program or measures to gauge effectiveness of the training TSOs receive to determine the extent to which they can fulfill their crucial role in ensuring passenger safety. By taking these steps, TSA will be better positioned to determine if the program is improving trainees' skills, knowledge, and abilities and whether additional skill development, or other training modifications, may be needed.

Recommendation for Executive Action

We are making one recommendation to the Administrator of TSA. Specifically, the Administrator of TSA should establish specific goals for the TSO Basic Training program and develop performance measures that can be used to assess if the program is achieving desired outcomes and help ensure accountability for training results on a regular basis. (Recommendation 1)

Agency Comments and Our Evaluation

We provided a draft of this report to DHS for review and comment. DHS provided written comments, which are reprinted in appendix II, and technical comments, which we incorporated as appropriate. DHS agreed with our recommendation that TSA establish specific goals for the TSO Basic Training program and develop performance measures that can be used to assess if the program is achieving desired outcomes. In addition,

in its written comments DHS outlined steps to address this recommendation.

With regard to performance goals, TSA plans to establish broad goals that include successful screening and improved morale, among others. The stated goals are an appropriate response to our recommendation that TSA develop goals specifically for TSO Basic Training. These actions, if implemented effectively, should address the intent of our recommendation.

With regard to developing performance measures that can be used to assess program outcomes, TSA intends to leverage existing mechanisms through its Kirkpatrick Model evaluations to measure program success. As we noted in the report, implementing the first three levels of the Kirkpatrick Model are positive steps that document certain benefits of TSO Basic Training, but they do not address specific goals or performance measures. Kirkpatrick Model Level 2 evaluations include proficiency exams administered prior to TSOs' departure from the Academy. Data from these evaluations, in conjunction with specific goals, may provide quantifiable metrics that could inform further refinement of the TSO Basic Training curriculum. However, the surveys being used by TSA for Level 3 of the Kirkpatrick Model do not include metrics that would allow TSA to measure the program's effectiveness and ensure accountability toward results. Specifically, the surveys do not demonstrate whether TSO Basic Training is reaching goals related to successful screening or improved morale because survey results are influenced by factors outside of the training program. We will continue to monitor TSA's efforts in this area.

We are sending copies of this report to the appropriate congressional committees, the Secretary of Homeland Security, and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (206) 287-4804 or AndersonN@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 listed in appendix III.

A handwritten signature in black ink, reading "Nathan Anderson". The signature is fluid and cursive, with the first name "Nathan" being more prominent and the last name "Anderson" following in a similar style.

Nathan Anderson
Acting Director
Homeland Security and Justice Issues

Appendix I: Comparison of New Hire Training Program and Transportation Security Officer (TSO) Basic Training

In 2016, the Transportation Security Administration (TSA) established the TSO Basic Training program at the TSA Academy, located at the Federal Law Enforcement Training Centers in Glynco, Georgia. TSO Basic Training allows new TSOs to be trained at a dedicated facility with simulated checkpoints. Previously, TSOs' initial training was delivered through the New Hire Training Program at or near their home airports, at which they were able to practice using checkpoint equipment only when the equipment was not being used, such as after hours. For further comparison of the two programs, see Table 3.

Table 3: Transportation Security Officer (TSO) New Hire Training Program vs. TSO Basic Training

	New Hire Training Program (NHTP)	TSO Basic Training
Training Environment	Local training delivery conducted within designated classrooms at the airport. Hands-on practice on checkpoint equipment possible when checkpoints are not being used.	Training conducted at the Federal Law Enforcement Training Centers (FLETC) in Glynco, Georgia in a formal/structured learning environment. The Academy provides a simulated checkpoint environment with operational equipment.
Introduction to TSA and development of professionalism	Exclusively web-based training performed on a computer.	11.5 hours of instructor-led training in a classroom setting.
Opportunities for hands-on training	5 hours of instruction, including: <ul style="list-style-type: none"> Airport visit focused on review of procedures at each checkpoint station Equipment labs held at airport checkpoints at which participant may or may not be able to practice on the equipment 	11 hours of instruction, including: <ul style="list-style-type: none"> 3-hour introduction to the screening equipment such as Advanced Imaging Technology (AIT), walk-through metal detector, x-ray, and Explosives Trace Detection (ETD) equipment 8 hours of scenario-based learning in which participants operate equipment and practice procedures in the simulated checkpoint
X-ray image interpretation training	10 hours of instruction in which participants learn to recognize improvised explosive devices.	15 hours of progressive instruction that starts with common items, builds to focus on prohibited items, then culminates in targeted training to recognize improvised explosive devices
Curriculum	Curriculum focused on procedural reviews with some time focused on practical application	Scenario-based learning with structured content targeted at skill-building and practical application for each screening process.
Demonstration of Effects of Improvised Explosive Device Detonation	None	Demonstration of improvised explosive devices that replicate actual threats
Intelligence Briefing	None	Unclassified intelligence briefing focused on the current threats to aviation security
Active Shooter Drill	None	Simulated active shooter scenario within the checkpoint setting. Participants review and discuss their reactions with a facilitator

Source: Transportation Security Administration documents. | GAO-18-552

Appendix II: Comments from the Department of Homeland Security

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



**Homeland
Security**

July 17, 2018

Nathan Anderson
Director, Homeland Security and Justice Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Re: Management's Response to Draft Report GAO-18-552: "AVIATION SECURITY: Basic Training Program for TSOs Would Benefit from Performance Goals and Measures"

Dear Mr. Anderson:

Thank you for the opportunity to review and comment on this draft report. The U.S. Department of Homeland Security (DHS) appreciates the U.S. Government Accountability Office's (GAO) work in planning and conducting its review and issuing this report.

DHS appreciates GAO's recognition of the Transportation Security Administration's (TSA's) ongoing efforts to adapt its Standard Operating Procedures (SOP) to address new and evolving threats to aviation security. The GAO accurately underscores the holistic efforts of TSA's Office of Security Operations (OSO), Office of Inspection (OOI), and Office of Training and Development (OTD) to ensure TSA training remains current, relevant, and performance-driven. For example, the draft report highlighted the importance of regular communications between OSO and OTD to ensure timely updates to Transportation Security Officer (TSO) Basic Training curriculum to address evolving security threats, particularly when SOPs change or to address imminent threats. The draft also mentioned the role OOI covert testing has in informing TSO Basic Training curriculum, and recognized that through effective collaboration between OOI, OSO, and OTD, TSA's training addresses any identified performance gaps.

Equally noteworthy, the draft report effectively summarized key benefits that TSA has already achieved by centralizing TSO Basic Training at the TSA Academy, Glynco, GA, namely: (1) increased consistency and standardization of curriculum, (2) enhanced ability for developing, delivering, and evaluating course content, (3) improved equipment availability and expanded course content, (4) a dedicated cadre of certified instructors and faculty, and (5) the establishment of a shared experience of training alongside fellow officers from around the country to build morale, create a positive culture, and ensure a collective understanding of TSA's mission and operations.

**Appendix II: Comments from the Department
of Homeland Security**

In addition, we are pleased that the draft report recognized the progress TSA has made implementing an effective evaluation model to continuously measure and improve training effectiveness. From level 1 course evaluation surveys, to TSO Basic Training instructor white papers, to checkpoint lab retrospectives and lessons learned, to contractor support, the report effectively highlighted how TSA continues to implement new and effective ways to incorporate training evaluation data into their daily operations.

It is also important to note that TSA has recognized best practices in several organizations and federal agencies that have embraced centralized training. When compared to local training, such an approach offers a greater consistency of training delivery, as well as improved overall quality of instructors and a better mechanism for developing, delivering, and evaluating curricula. In terms of the trainee experience, an academy setting encourages the development of camaraderie and esprit de corps in new employees, resulting in an increased sense of belonging with greater employee satisfaction and improved performance. Centralized training also provides an increased ability to institute training program changes in response to evolving threats or necessary changes to operations. Included with this benefit is the resourcefulness to quickly and easily develop and execute new training procedures by processing them through a single coordinating element at one location.

Additionally, organizations with a single academy can test, evaluate, and ultimately execute new curricula at one location to ensure immediate uniformity. In terms of costs, they can perform these changes more efficiently, particularly when adapting to new instructional materials, technologies, or delivery methods. Considering one example within TSA, if an emerging threat dictates a change in a specific training device, it is quicker, easier, and cheaper to effect the change at one location, with the help of a dedicated and experienced staff, rather than coordinating the same change across dozens of airports throughout the country.

The draft report contained one recommendation with which the Department concurs. Attached, our detailed response to this recommendation. Technical comments were previously provided under separate cover.

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 in the future.

Sincerely,



JMM H. CRUMPACKER, CIA, CFE
Director
Departmental GAO-OIG Liaison Office

Attachment

**Attachment: Management Response to Recommendations
Contained in GAO-18-552**

GAO recommended that the Administrator of TSA:

Recommendation: Establish specific goals for the TSO Basic Training Program [BTP] and develop performance measures that can be used to assess if the program is achieving desired outcomes and help ensure accountability for training results on a regular basis.

Response: Concur. TSA's OTD will establish the following specific goal and performance measure for the TSO Basic Training program to assess the degree to which the program is achieving the desired outcome:

Goal

The primary goal of the TSA Academy is to ensure course graduates have the basic knowledge, skills, and abilities to screen individuals and their property in order to protect our nation's transportation systems and ensure freedom of movement for people and commerce. In addition, centralized training promotes a well-trained workforce, and supports increased professionalism and higher morale, while instilling a common culture focused on defeating the threat.

Measure

OTD will use level 1, 2, and 3 surveys and assessments to measure program success and outcomes. A level 1 survey is administered to students immediately upon completion of a course to assess student satisfaction with course curriculum and instructors. The current TSO-BTP level 1 survey will be updated to include question(s) regarding student morale and mission focus.

The transfer of the knowledge, skills and abilities necessary for a TSO-BTP student to successfully screen individuals and their accessible property is measured by two level 2 assessments over the course of the two-week training. Level 2 assessments ensure knowledge transfer and require students to obtain a passing score. TSO-BTP level 2 assessments are the Checkpoint Security Screening Job Knowledge Test and Image Interpretation Test.

Level 3 surveys are typically administered six months after training completion, and are sent to both the student and their immediate supervisor to assess how well skills and knowledge obtained from a course are being implemented. Six months following completion of TSO-BTP, level 3 surveys will be sent to students and supervisors to determine the degree to which they observed that TSO who recently graduated TSO-BTP and completed on-the-job training were able to successfully screen individuals and their accessible property in accordance with the requirements of *Aviation and Transportation Security Act* and the TSA's approved SOP established by OSO. Level 3 survey results will be reported on an annual basis. OTD will ensure that the use of the quantitative and qualitative survey data from course participants and supervisors is used as input for course updates and recommended changes.

Estimated Completion Date: OTD will have the level 1, 2, and 3 survey documents and process complete by October 31, 2018.

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Nathan Anderson (206) 287-4804 AndersonN@gao.gov

Acknowledgements

In addition to the contact named above, Dawn Locke, Assistant Director; Miriam Hill, Analyst in Charge; and Ryan Lambert made key contributions to this report. Also contributing to the report were Elizabeth Dretsch, Eric Hauswirth, Susan Hsu, Heidi Nielson, and Adam Vogt.

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