
Office of Inspector General
Audit Report

*Follow-up Audit of Deployment of
Explosives Detection Equipment*

Federal Aviation Administration

Report Number: AV-2000-002

Date Issued: October 21, 1999





**U.S. Department of
Transportation**

Office of the Secretary
Of Transportation

Office of Inspector General

Memorandum

Subject: INFORMATION: Report on the Follow-up Audit
of Deployment of Explosives Detection
Equipment
Federal Aviation Administration
Report No. AV-2000-002

Date: October 21, 1999

From: Alexis M. Stefani
Assistant Inspector General for Auditing

Reply to
Attn of: JA-1:x61992

To: Federal Aviation Administrator

We are providing this report for your information and use. Your September 14, 1999 revised comments to our August 17, 1999 draft report were considered in preparing this report. A copy of your comments is included as an appendix to this report.

In your comments to our draft report, you concurred with one recommendation, and partially concurred with two recommendations. The Federal Aviation Administration (FAA) agreed to establish and issue procedures and guidance for implementing Threat Image Projection (TIP), a computer software program used to test screener performance by electronically projecting fictitious images of bags containing bombs on the screens of bulk explosives detection machines. FAA also agreed to establish controls over the use of the TIP program functions.

However, FAA responded that the September 17, 1999 target date recommended by the Office of Inspector General was not attainable. FAA proposed an alternative date of October 1, 1999, that would have met the intent of the recommendation to establish and issue procedures and guidance for implementing TIP. That alternative date was not met, and FAA did not provide a revised date. In addition, FAA did not propose an alternative date for establishing controls over the use of TIP program functions. Accordingly, we request a response from FAA within 15 working days of this report providing us with a new target date for implementing these two recommendations.

If I can answer any questions or be of further assistance, please contact me at (202) 366-1992, or Robin Hunt, Director for Aviation Security and Infrastructure, at (415) 744-0420.

Introduction

As part of our ongoing follow-up audit of the deployment of explosives detection equipment, we are assessing the FAA's progress in deploying all types of explosives detection equipment and computer-based technologies to improve aviation security. This report addresses the need for immediate improvement in FAA's implementation of the computer-based technology referred to as Threat Image Projection (TIP). We are continuing our follow-up review and will provide a report on the full audit in December 1999.

Background

TIP is installed on deployed FAA-certified bulk explosives detection machines (CTX 5500) nationwide. It is a computer software program used to test screener performance. TIP electronically projects fictitious images of bags containing bombs on the screens of bulk explosives detection machines. The TIP library, developed by CTX 5500 manufacturer InVision Technologies and approved by FAA, currently consists of 1,600 images and will eventually have 2,400 images. TIP is intended to keep equipment operators alert, provide real world conditions, and measure operator performance.

The Federal Aviation Reauthorization Act of 1996 requires FAA to certify companies providing security screening, and to develop uniform performance standards for providing security screening services. FAA is currently field testing and evaluating TIP to obtain uniform data regarding screener performance. FAA plans to require performance standards as an integral part of a proposed rule on certification of screening companies, develop and incorporate the specific standards in a security program, and measure subsequent screening company performance based on the data TIP provides.

Results in Brief

Using data derived from TIP, FAA plans to establish screener performance standards and measure screening company performance. By measuring operator performance, FAA can hold certificated screening companies and the air carriers that hire them accountable for safe, effective screening operations. However, we found that FAA has not established policies or procedures for implementing the TIP program on the CTX 5500 machines. Specifically, FAA has not:

- Provided sufficient instructions on managing the TIP program. Air carriers and their screening companies have been managing the TIP program locally according to their own initiative, or simply ignoring it altogether while waiting for further guidance.
- Established controls over the use of restricted TIP program passwords, resulting in the program being compromised because machine operators are using those passwords to access the program and disable or control it.
- Provided sufficient guidance for setting the TIP program parameters, thereby reducing both the training and performance evaluation potential of TIP.

Until FAA defines and standardizes the context within which TIP is to be used, the full value of TIP will not be realized and the agency will not have a reliable and consistent way to measure screeners' performance.

Recent Fieldwork Confirms the Need for TIP Guidance and Controls

Our recent audit fieldwork confirmed the need for FAA to establish policies and procedures for implementing TIP. As of October 14, 1999, FAA had not established or issued such policies or procedures to its personnel in the field or to the air carriers operating the CTX 5500 machines, nor had FAA established adequate controls to ensure that TIP remains a valid tool for measuring operator performance. At each of the seven major U.S. airports reviewed, we found one or more of the following conditions.

- ***Lack of Sufficient Instructions on Managing TIP.*** Although FAA instructed air carriers to "turn TIP on," it gave them no further direction on how to implement and manage the program. The carriers, lacking such direction, did not know how to use it or what was expected of them if they did. Their only source of information about TIP and its intricacies was their InVision field

service engineer, and a short descriptive section in the CTX Operator's Guide provided with each CTX 5500 machine by the manufacturer. FAA did not provide detailed instructions on managing TIP, and so air carriers and their screening companies have been managing the TIP program locally according to their own initiative, or simply ignoring it altogether while waiting for further guidance.

- ***Unauthorized Use of Restricted Passwords.*** CTX 5500 operators at two airports have learned restricted program passwords intended to be available only to supervisors and managers, and operators are using those passwords to access the TIP program and disable or control it. For example, at one airport, we found that CTX 5500 operators accessed the TIP program several times and either turned TIP off or changed the TIP insertion frequency and variance rates.¹ During one unauthorized access, CTX 5500 operators changed the insertion frequency from 1 TIP image for every 50 bags scanned to 1 TIP image for every 3 bags scanned, and the insertion variance was changed from plus or minus 100 bags scanned to zero. Changing these two insertion settings would enable operators to predetermine when a TIP image appeared.

Representatives of one of the air carriers involved and the screening company that provides operators for the machines said they believed that the equipment manufacturer's technical representatives were providing the high-level password to the operators. After discovering this condition, we alerted FAA's Federal Security Manager (FSM) at that airport, and the program password was supposed to have been changed. However, during follow-up work at that airport, we found that the password had in fact not been changed, and that on one machine, TIP had been disabled. We again alerted the FSM that the password had not been changed and operators continued to manipulate TIP. The fact that operators at two locations have access to the TIP program and can turn it off or manipulate it (e.g., change the insertion frequency rate) suggests that this can occur, or may have already occurred, elsewhere. Because it has occurred at more than one airport, the program has been compromised, and any station-to-station comparison of operator performance by FAA will be misleading and statistically invalid until performance anomalies at the compromised stations are identified and accounted for.

- ***Lack of FAA Guidance for Setting TIP Program Parameters.*** FAA has not instructed air carriers to use any particular program parameters (i.e., insertion

¹ The TIP **insertion frequency** is the rate of images projected to actual bags presented for screening. The TIP **insertion variance** is a random plus or minus number to ensure that the test images cannot be predetermined.

and variance frequency rates) for the projection of TIP images. Instead, the TIP insertion frequency and variance rate is being set by the InVision field service engineer or a management representative of the screening company. FAA has stated that TIP rates being used so far are typically 1 TIP image per 100 passenger bags, plus or minus 25 bags. However, at three airports, we found the TIP frequency rate to be much higher than that. We found one machine with a high average daily usage rate that was set for a TIP image insertion frequency of once every eight bags, plus or minus two bags. Too high an insertion frequency (short interval) of projected TIP images, or an insertion frequency rate that is seldom changed, could enable operators to detect a pattern and thus anticipate with a high degree of probability the likelihood of a test image appearing. This reduces both the training and performance evaluation aspects of the TIP program.

In our opinion, the lack of instructions and controls over TIP implementation and use raises serious questions about its usefulness as a means to obtain uniform data on screener performance and subsequently use the results to measure the performance of screening companies.

Recommendations

We recommend that, by November 30, 1999², FAA establish and issue to its personnel in the field and to the air carriers operating the CTX 5500 machines (a) policies, procedures, and guidelines on the use of TIP and TIP data; and (b) standardized internal controls on access to the TIP system and data. We also recommend that FAA not rely on any of the data produced from TIP until these procedures, guidance, and controls have been operating for a sufficient period.

Management Position

FAA, in its response of September 14, 1999, concurred with recommendations to establish and issue to its personnel in the field and to the air carriers operating the CTX 5500 machines (a) policies, procedures, and guidelines on the use of TIP and TIP data; and (b) standardized internal controls on access to the TIP system and data. FAA also concurred not to rely on any of the data produced from TIP until these procedures, guidance, and controls have been operating for a sufficient period.

² In our draft interim report, we used September 17, 1999, as the target date the recommendations should be implemented. However, based on discussions with FAA officials subsequent to issuing the draft interim report, we revised the target date to a date FAA agreed was attainable.

However, FAA stated the target date of September 17, 1999, to establish and issue procedures, guidelines, and controls was not attainable. Instead, FAA stated that a task order would be issued to a support contractor within the next 60 days to develop training materials on TIP usage for its field agents. FAA also stated that additional procedures and guidance for its field agents on the use of TIP and TIP data would be issued by October 1, 1999, and implemented by its field agents during the first quarter of Fiscal Year 2000. The Office of Civil Aviation Security Operations told us on October 7, 1999, that the additional procedures and guidance had not been issued, but expected them to be issued "within a few days." As of October 14, 1999, they had still not been issued.

FAA further stated that it would delay loading additional TIP libraries until it was convinced that the equipment manufacturer, InVision Technologies, had changed all passwords as instructed by FAA, revised its maintenance procedures, and implemented a software modification to further protect TIP passwords from being compromised.

Also, in its comments to the report finding *Lack of FAA Guidance for Setting TIP Program Parameters* FAA stated that its security field agents authorized access to TIP program parameters have, and are able to, reset these rates in response to appropriate guidance. FAA further stated that such access to TIP program parameters is not, however, available to airline or screening company personnel with the password levels assigned to their organizations within the four-tier CTX-5500 password system.

Office of Inspector General Comments

The actions taken and planned by FAA are responsive to our recommendations, and should improve FAA's implementation and oversight of the TIP program. However, FAA's alternative date of October 1, 1999, to issue guidance to its field agents was not met, and a revised target date was not provided.

In response to FAA's comment to the report finding *Lack of FAA Guidance for Setting TIP Program Parameters*, we disagree with FAA that access to those parameters by air carrier and screening company personnel is not available. In addition to finding instances of unauthorized TIP parameter access by air carrier or screening company personnel at three of the seven airports we visited from April through June 1999, we found further instances of unauthorized access at two of the additional five airports we visited in July and August.

On September 16, 1999, we revisited one of the seven airports that had provided us with one of our original examples of unauthorized air carrier or screening

company TIP parameter access levels. Despite FAA's assurances in its September 14, 1999 response to our draft report that such access was not available, we again found an air carrier employee who not only could change the TIP insertion frequency on a CTX 5500, but also already had changed it. In view of the discrepancy between what we have been told by FAA and what we have observed in the field, we will continue to monitor the actions that FAA has taken or planned as part of our ongoing follow up audit of the deployment of explosives detection equipment.

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Attachment

Audit Methodology and Scope

The audit work that initially formed the basis of this interim report was conducted from April through June 1999, and was part of a larger audit of the deployment of explosives detection equipment. We performed audit work that led to this interim report at FAA Headquarters, FAA's Security Equipment Integrated Product Team in Herndon, Virginia, and FAA's Civil Aviation Security Field Offices and Units in Honolulu, Los Angeles, Portland, San Francisco, and Seattle. We also visited Honolulu, Los Angeles, Portland, San Francisco, Seattle-Tacoma, and Washington Dulles International Airports, and Washington National Airport. We subsequently performed additional audit work in July, August, and September at Miami, Chicago O'Hare, John F. Kennedy, LaGuardia, Newark, and San Francisco International Airports.

We interviewed supervisors and employees from the air carriers and their contract security screening companies responsible for operating the CTX 5500. We also interviewed FAA special agents responsible for monitoring the CTX 5500 operations, and the vendor's field service engineers responsible for maintaining the CTX 5500.

We reviewed the CTX 5500 Operator's Guide for instructions on TIP operation. We observed CTX 5500 operations and viewed TIP parameter settings and images, and the presentation of TIP images and resolution of TIP alarms by CTX 5500 operators. We also obtained and analyzed TIP summary reports.

We conducted the audit in accordance with Government Auditing Standards prescribed by the Comptroller General of the United States and included such tests as were considered necessary under the circumstances. We designed the audit steps to provide reasonable assurance of detecting abuse or illegal acts.

Revised ACS Comments
OIG Draft Interim Report dated 8/17/99
Deployment of Explosives Detection Equipment
Project No. 99A3014A000

SEP 14 1999

FINDINGS

Lack of sufficient instructions on initiating the TIP program. (page 3)

InVision, the CTX-5500 manufacturer, provided basic instructions on how the TIP program operates at the time the software was installed. These basic operating instructions provided sufficient operating instructions for screeners to start using the TIP software on all machines. During this initial trial period, the TIP program serves the function of promoting screener vigilance and provides a familiarization period for screeners to get used to the periodic presentation of TIP threat images. The SEIPT has contracted an independent examination of the use of TIP, including the quality of its instructions to the air carriers. The examination is part of a broader effort of Operational Testing and Evaluation (OT&E) of the EDS deployment. Phase I of the OT&E effort is complete. Phase II, which includes the CTX TIP examination at issue, will be concluded at the end of December. This effort will result in improvements to the operating instructions for TIP operators.

Unauthorized Use of Restricted Passwords. (page 3)

It is accurate that FAA security field agents and the Inspector General's staff discovered through parallel investigations that technicians employed by the manufacturer, InVision Technologies, were providing maintenance "passwords" to CTX operators in the interest of affecting timely troubleshooting and maintenance. That "password" also allowed access to TIP parameters.

The SEIPT contracting officer for CTX became aware of this issue in late June 1999. On July 7, 1999, in response to additional findings, the FAA instructed InVision to initiate "password" changes and to examine their troubleshooting procedures. Seeing no change, on July 14, that instruction was repeated and, additionally, InVision was instructed to delay loading of TIP Threat Image Library #3. Further, InVision has been directed by the Contracting Officer's Technical Representative (COTR), that its technicians are never to change TIP program parameters under any circumstances without explicit directions from the FAA.

The FAA is convinced that, at this point, the only possible TIP 'compromise' involves Threat Image Library #2 (the Threat Image Library initially loaded with the TIP program software). Upon full implementation, at least 12 operational CTX Threat Image Libraries that will be used for operator testing and performance measurement. Threat Image Library #2 will be removed from the rotation of libraries for CTX screener performance measurement and used as a training tool for both off-line TIP training and future CBT programs.

Lack of FAA Guidance for Setting TIP Program Parameters (page 4)

The SEIPT installs equipment and software, assures it operates correctly, and provides information/training to screeners and airlines on how the systems operate. The SEIPT has instructed the manufacturer to use the typical TIP presentation rate cited by the Inspector General's staff of 1 TIP image per 100 passenger bags, plus or minus 25 bags. However, FAA security field agents authorized access to TIP program parameters have, and are able to, reset these rates in response to appropriate guidance. Such access to TIP program parameters is NOT available to airline or screening company personnel with the password levels assigned to their organizations within the four-tier CTX-5500 password system.

As part of its Screening Company Certification Notice of Proposed Rulemaking (NPRM) project, human factors experts on the SEIPT and Technical Center are downloading TIP data from both the CTX and standard X-rays in order to compile a data base from which several performance indicators will eventually result. At this stage, data is NOT being used to assess screener performance because a standard protocol for the collection, control and analysis of this data has not been developed. Neither does a requirement exist for the air carriers to use TIP or report TIP data to the FAA. These issues are actions to be undertaken within the NPRM project. The FAA expects to publish the NPRM by the end of this calendar year. Sufficient controls will be in place well before the final rule is implemented.

Until more extensive analysis of the TIP data is completed for the rulemaking effort, the FAA has no plans to change the default presentation rate.

RECOMMENDATIONS

That, by 9/17/99, FAA establish and issue:

(a) policies, procedures and guidelines on the use of TIP and TIP data

Partially concur, data is not attainable. The FAA acknowledges that additional operating instructions and guidelines are required for TIP to become fully operational as a tool to measure screener performance. A task order will be issued to an SEIPT support contractor within the next 60 days to develop training materials for FAA field agents that will include setting and monitoring TIP presentation parameters. Default parameter settings will continue to be used until sufficient statistical data is collected on screener performance to support adjustment guidelines and rulemaking.

Additional policies, procedures and guidelines, including assessment guidance for field agents on the use of TIP and TIP data, will be issued by October 1. FAA field agents will begin implementing this guidance for TIP-equipped CTX during the first quarter of FY-00.

(b) standardized internal controls on access to the TIP system and data

Partially concur, date is not attainable. The FAA will delay the loading of any additional TIP libraries until it is convinced that InVision has changed all "passwords" as instructed and revised their maintenance procedures and/or system software to provide additional security. Further, InVision has developed and will implement a software modification that will allow maintenance technicians to work with system operators to remotely diagnose and fix system problems without the need to disclose any maintenance level "passwords" to access the necessary diagnostics.

Also recommend that FAA not rely on TIP data until (a) and (b) are implemented for sufficient period.

Concur.