United States General Accounting Office

GAO

Report to the Honorable Collin C. Peterson, House of Representatives

September 1996

AVIATION SAFETY

FAA Generally Agrees With but Is Slow in Implementing Safety Recommendations

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GAO

United States
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Resources, Community, and
Economic Development Division

B-261918

September 23, 1996

The Honorable Collin C. Peterson
House of Representatives

Dear Mr. Peterson:

In response to your request, this report examines the Federal Aviation Administration's (FAA) responsiveness to recommendations concerning aviation safety made by us, the National Transportation Safety Board, and the Department of Transportation's Office of Inspector General. This report contains recommendations to the Secretary of Transportation for improving FAA's responsiveness.

As you requested, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. We will then send copies to the Secretary of Transportation; the Director, Office of Management and Budget; and other interested parties. We will make copies available to others upon request.

If you or your staff have any questions, please call me at (202) 512-2834. Major contributors to this report are listed in appendix III.

Sincerely yours,

John H. Anderson, Jr.
Director, Transportation and
Telecommunications Issues

Executive Summary

Purpose

The Federal Aviation Administration (FAA), within the Department of Transportation (DOT), is responsible for promoting safety in civil air transportation. GAO and DOT's Office of Inspector General review FAA's safety programs, and the National Transportation Safety Board (NTSB) investigates aviation accidents. The three organizations make recommendations to FAA aimed at improving the efficiency and effectiveness of FAA's activities and functions and at improving aviation safety. Representative Collin C. Peterson asked GAO to determine FAA's responsiveness to such recommendations. Specifically, this report focuses on two questions.

- What has FAA's overall record been in responding to, agreeing with, and implementing significant recommendations concerning aviation safety made by GAO and DOT's Inspector General from 1990 through 1994, as well as recommendations made by NTSB or added to NTSB's "Most Wanted" lists of safety recommendations from 1990 through 1994?
- To what extent have GAO's specific recommendations in the areas of aircraft certification, airline inspections, and oversight of foreign carriers and NTSB's recommendations concerning safety on runways been fully implemented?

Background

To promote aviation safety, FAA is responsible for, among other things, certifying that aircraft are properly designed, conducting periodic inspections of airlines to ensure their continued compliance with safety regulations, operating the nation's air traffic control system, and ensuring that airports provide a safe operating environment. FAA is subject to legislative and administrative requirements for responding to and implementing recommendations made by the three aforesaid organizations in a timely manner. FAA is required by law to initially respond to (1) congressional committees on its planned actions on GAO's recommendations within 60 days and (2) NTSB on its recommendations within 90 days. DOT's policies and procedures require FAA to respond to the Inspector General's recommendations within 60 days. In addition, FAA is required to establish time frames for implementing the recommendations of all three organizations.

The three organizations, as well as FAA, maintain systems for tracking FAA's response to and disposition of each recommendation. GAO's review focused on the implementation status of 256 recommendations related to aviation safety that the three organizations had identified as particularly significant. For example, NTSB's recommendations that GAO reviewed were

classified by NTSB as "Most Wanted." The recommendations were made from 1990 through 1994 by GAO, DOT's Inspector General, or NTSB, or were added by NTSB to its "Most Wanted" list of safety recommendations during this period. In addition, GAO conducted detailed field work on 18 of GAO's and NTSB's recommendations concerning aircraft design, airline inspections, and airport runways to ascertain whether or to what extent they had actually been carried out in the field.

Results in Brief

FAA generally concurred with the recommendations made by GAO, NTSB, and DOT's Inspector General and had implemented the majority (64 percent) of them as of October 1995. However, FAA met the established implementation time frames only about one-third of the time for GAO's and the DOT Inspector General's recommendations. GAO could not readily measure FAA's on-time performance for NTSB's recommendations because FAA had not included in most of its initial responses to NTSB the estimated time frames for implementing most of NTSB's recommendations that GAO reviewed.

While FAA's initial responses to NTSB's and the DOT Inspector General's recommendations were almost always made within the required time frames, FAA never met the statutory time frames for responding to the congressional committees on GAO's recommendations included in this review, nor did it establish the required completion dates for some of GAO's and the majority of NTSB's recommendations included in this review. Delays in initially responding to recommendations may slow FAA's progress in taking actions to resolve the issues that led to the recommendations, and without estimated completion dates, there are no milestones against which implementation progress can be measured.

For the 18 specific recommendations on which GAO conducted detailed field work, FAA has taken actions on or had actions in process on 17 of them to improve its aircraft certification process, its airline inspections, its oversight of foreign carriers, and the safety of airport runways. However, GAO found that the status shown in the tracking systems for some of NTSB's recommendations did not reflect the actual status of on-the-ground actions. Of the seven recommendations by NTSB that GAO reviewed in the field, five were listed in the tracking systems as closed (i.e., implemented by FAA). But GAO found that for four of these five recommendations, actions remained to be completed, primarily by affected airports, to fully resolve the problems that gave rise to the recommendations.

Principal Findings

FAA Generally Agrees With and Implements Recommendations but Often Does Not Meet Established Time Frames

FAA agreed with about 90 percent of the 256 significant safety-related recommendations made by the three organizations. Specifically, FAA agreed with 90 percent of GAO's 113 recommendations, 97 percent of NTSB's 29 recommendations, and 89 percent of the DOT Inspector General's 114 recommendations. FAA's on-time implementation of recommendations was 55 percent for GAO's recommendations and 13 percent for the DOT Inspector General's recommendations. NTSB's legislation requires that FAA's responses to NTSB's recommendations include a time table for completing the procedures for adopting the recommendations, and DOT and FAA orders reinforce this requirement. GAO found, however, that FAA had not fully complied with this requirement. Specifically, of NTSB's 29 "Most Wanted" recommendations that GAO reviewed, FAA had not included time frames for 24 of them in its initial responses to NTSB. In the absence of such time frames, GAO was unable to readily measure FAA's timeliness in implementing NTSB's recommendations. In addition, FAA had not set completion dates for 18 of GAO's recommendations, and FAA averaged 214 days to respond to congressional committees on GAO's recommendations rather than the 60 days mandated by law. In contrast, FAA's initial responses were on time 93 percent of the time for NTSB's recommendations and 88 percent of the time for the DOT inspector General's recommendations.

FAA's Actions to Implement Recommendations on Aircraft Certification, Airline Inspection, Oversight of Foreign Carriers, and Safety on Airport Runways

Before introducing an aircraft into commercial service in the United States, the manufacturers must obtain FAA's certification that the aircraft and its systems meet the agency's standards. In 1993, GAO reported that FAA had not ensured that its staff were effectively involved in the certification process because FAA delegated up to 95 percent of the certification activities to FAA-approved persons employed or retained by aviation industry companies. These designated engineering representatives act as FAA's surrogates in analyzing, testing, and examining aircraft designs and systems. In response to a number of GAO's recommendations, FAA has better defined the role of its certification staff and improved its oversight of the designated engineering representatives. In addition, FAA has identified technical areas, such as crash dynamics and advanced avionics, in which FAA needs technical specialists to maintain leadership and identified key points when these technical specialists should be involved in the certification process.

FAA regularly inspects air carriers to help ensure that their operations comply with federal aviation safety regulations. In 1991 and 1992 reports, GAO made a number of recommendations intended to improve the efficiency and effectiveness of FAA's inspection program. Since that time, FAA has taken actions to address the majority of the problems identified in those reports. For example, FAA has taken steps to better target its inspection resources to areas posing the greatest safety risks by developing and deploying a risk assessment system. However, GAO reported in 1995 that data problems threatened the effectiveness of this system, and FAA still has not completed a strategy to address the data problems. As recommended by GAO, FAA has increased its oversight of foreign carriers flying into the United States and improved its program for assessing foreign countries' compliance with international aviation standards.

The vast majority of serious commercial aviation accidents occur during takeoff and landing. To improve safety on airport runways, NTSB has made several recommendations to FAA over the years. NTSB considered runway safety issues so important that since 1990, it has placed recommendations addressing them on its "Most Wanted" list of critical safety recommendations. Of the seven recommendations by NTSB on runway safety that GAO examined, five are listed as having been implemented by FAA in both NTSB's and FAA's tracking systems. However, GAO found that in four of the five cases, the actions necessary to address the problems that gave rise to the recommendations had not been completed by all of the affected airports. For example, in 1991 NTSB recommended that FAA improve its standards for airport marking and lighting when visibility is low; in 1993, NTSB classified the recommendation as "closed" because of an "acceptable action" when FAA issued new standards and guidance that called for airports to develop plans for operating in low visibility by January 1995. However, GAO found that as of July 1996, only 19 of 77 airports that need such plans under these standards had plans that had been approved by FAA, while 23 others had not even formed a working group to develop such a plan.

Recommendations

To enhance the timeliness of the implementation of recommendations and to better track the actual implementation of all recommendations relating to safety, GAO recommends that the Secretary of Transportation direct the Administrator of FAA to

- ensure that FAA's initial responses to GAO's and NTSB's recommendations include target dates for completing actions on them, as called for in legislation and DOT's policies;
- respond to congressional committees on GAO's recommendations within 60 days, as required by law; and
- for critical safety recommendations, periodically monitor their implementation and the actions needed to fully resolve, at the field level, the problems that gave rise to the recommendations and report the status to the Congress and the agency that made the recommendations.

Agency Comments

GAO provided DOT with copies of a draft of this report for DOT's review and comment. GAO met with agency officials from FAA offices responsible for the programs and activities discussed in this report, including the managers of the Recommendation Branch, Office of Accident Investigation; Evaluation and Analysis Branch, Flight Standards Service; National Runway Incursion Program, Air Traffic Operations Service; and Airport Safety and Operations Division, Office of Airport Safety and Standards; and the Chief of DOT's Audit Liaison Division, Office of the Assistant Secretary for Administration. DOT generally agreed with GAO's findings and conclusions. However, DOT officials expressed concern about their ability to monitor in-the-field implementation of all recommendations, primarily because of insufficient resources, as GAO was suggesting in its proposed recommendation.

GAO recognizes that resource and other constraints can limit the amount of in-depth verification FAA can perform to assess the implementation of all recommendations. However, GAO believes that at a minimum, FAA should monitor the in-the-field implementation of critical safety recommendations and report the results to the Congress and the agency that made the recommendations. Thus, GAO has modified its recommendation to allow flexibility on how FAA monitors the implementation of actions in the field to address the problems that gave rise to the recommendations. In addition, while FAA officials acknowledged that time frames for implementing NTSB's recommendations have not always been appropriately documented, they stated that frequent dialogue occurs between FAA and NTSB on the progress made in implementing NTSB's recommendations and that FAA program offices establish internal target dates for implementing them. While frequent communications between FAA and NTSB and internal target dates are certainly useful, the absence of documented time frames in FAA's initial responses to recommendations does not meet established legislative and administrative requirements and limits the ability of

appropriate oversight entities, including the Congress, to monitor the timeliness of FAA's implementation progress. DOT also provided GAO with technical comments and updates on the status of specific actions relating to the recommendations reviewed, which have been incorporated into the report as appropriate.

Contents

Abbreviations

AMASS	Airport Movement Area Safety System
ASDE	Airport Surface Detection Equipment
DOT	Department of Transportation
FAA	Federal Aviation Administration
GAO	General Accounting Office
NTSB	National Transportation Safety Board
PTRS	Program Tracking and Reporting Subsystem
RIAT	Runway Incursion Action Teams
SPAS	Safety Performance and Analysis System

Introduction

The Federal Aviation Administration (FAA), within the Department of Transportation (DOT), is responsible for promoting safety in air transportation and air commerce. To help ensure the safety of the more than 1 million people who travel on thousands of flights throughout the United States and to and from other countries each day, FAA, among other things, inspects and certifies the aviation community's compliance with FAA's regulations. GAO and the Department of Transportation's Office of Inspector General review FAA's implementation of safety programs, and the National Transportation Safety Board (NTSB) investigates aviation accidents and performs special studies on aviation safety. The reports prepared by these three organizations often contain recommendations to FAA aimed at improving the efficiency and effectiveness of its activities and functions and at improving aviation safety. This report discusses FAA's actions to respond to and implement these recommendations.

FAA's Responsibilities in Aviation Safety

Section 44701 of Title 49 of the United States Code requires FAA to promote the safety of civil aircraft in air commerce. The United States Code establishes that the safety of air passengers is a responsibility of airlines, aircraft manufacturers, airports, and ultimately, FAA. The airlines are responsible for operating their aircraft safely, aircraft manufacturers are responsible for designing and building aircraft that meet FAA's regulations, and airports are responsible for providing a safe operating environment. FAA is responsible for, among other things, certifying that aircraft and airlines are ready to operate safely and conducting periodic inspections to ensure their continued compliance with safety regulations. FAA conducts these periodic inspections of both domestic and foreign airlines. FAA is also responsible for operating the nation's civilian air traffic control system. An essential factor in aviation safety is the ability of the air traffic control system to efficiently route aircraft in the air. FAA also fosters the safe and efficient movement of aircraft on airport surfaces. To carry out the above and other activities, FAA has about 47,000 employees.

Roles of GAO, NTSB, and DOT's Inspector General

As the legislative branch agency responsible for carrying out independent audits and evaluations of the programs, activities, and financial operations of executive branch departments and agencies, GAO audits and evaluates FAA's aviation safety programs and makes recommendations intended to help FAA carry out its responsibilities in a more efficient, effective, and economical manner. By law, executive agencies are required to respond to GAO's recommendations within 60 days to congressional committees, but implementation of GAO's recommendations is not mandatory. GAO has a

follow-up system to track agencies' actions on its recommendations and reports annually to the Congress on open recommendations.

DOT's Inspector General audits the programs and operations of DOT. The results of the Inspector General's audits of FAA's aviation safety programs are contained in reports to FAA, which usually contain recommendations. FAA is required by DOT guidance to respond to the Inspector General's final reports within 60 days, but implementation of the recommendations is not mandatory. The Inspector General has established a system for following up on recommendations made to FAA until final actions are completed. The Secretary of Transportation sends to the Congress semiannual reports that include recommendations that have not been resolved or on which corrective actions have not been completed.

NTSB is an independent agency that investigates transportation accidents and promotes transportation safety through recommendations. NTSB investigates all civilian aviation accidents, conducts studies on safety, and evaluates the effectiveness of government agencies' safety programs. NTSB's recommendations can be made to FAA and to other parties, including federal, state, and local governments and private aviation companies, but most of NTSB's recommendations concerning air safety are directed at FAA. According to NTSB, recommendations on safety are NTSB's most important product. Although the implementation of NTSB's recommendations is not mandatory, the Congress has required that DOT send its response to each recommendation to NTSB within 90 days. NTSB has established an Office of Safety Recommendations and a follow-up program to track the implementation of its recommendations. In addition, NTSB developed in 1990 a "Most Wanted" list of important safety recommendations identified for special attention and intensive follow-up; this list is revised annually. NTSB reports on the safety recommendations made and the Secretary of Transportation's responses to its recommendations annually to the Congress.

DOT's and FAA's Policies and Procedures for Responding to Aviation Safety Recommendations

The Office of Management and Budget's Circular A-50, Revised, provides the policies and procedures that all executive agencies are to use when considering reports issued by GAO and the Inspectors General when follow-up is necessary. The circular requires agencies' responses to audit reports to include planned corrective actions, and, where appropriate, dates for achieving those actions. The circular also requires executive agencies to establish a follow-up system to ensure the prompt and proper resolution and implementation of recommendations. Section 1135 of Title

49 of the United States Code requires that DOT respond to NTSB's recommendations. DOT and FAA have established policies and procedures for tracking, responding to, and implementing the recommendations made by GAO, NTSB, and the Inspector General.[1]

DOT's Office of the Assistant Secretary for Administration has responsibility for ensuring that departmental commitments to GAO and the Inspector General are implemented promptly and effectively. Within FAA, the Office of the Associate Administrator for Administration serves as the control point for FAA's relationships with GAO and DOT's Inspector General on audit matters. This office is also responsible for administering a follow-up system to ensure that FAA's commitments to GAO and the Inspector General are promptly and effectively carried out.

DOT's Office of the Assistant Secretary for Transportation Policy ensures that DOT and its agencies respond to and act on NTSB's recommendations in accordance with DOT's policies and procedures. Within FAA's Office of the Associate Administrator for Regulation and Certification, the Office of Accident Investigation serves as the control point for all NTSB recommendations on aviation and is responsible for following up on NTSB's recommendations until appropriate action has been taken.

Objectives, Scope, and Methodology

At the request of Representative Collin C. Peterson, we examined FAA's responsiveness to recommendations concerning aviation safety from GAO, NTSB, and DOT's Inspector General. This report focuses on two questions.

- What has FAA's overall record been in responding to, agreeing with, and implementing significant recommendations concerning aviation safety made by GAO and DOT's Inspector General from 1990 through 1994 as well as recommendations made by NTSB or added to NTSB's "Most Wanted" list of safety recommendations from 1990 through 1994?
- To what extent have GAO's specific recommendations made on aircraft certification, airline inspections and oversight of foreign carriers, and NTSB's recommendations concerning safety on runways been fully implemented?

To address these questions, we first established a universe of significant recommendations related to aviation safety made by GAO, NTSB, and DOT's

[1]These policies and procedures implement provisions found in applicable laws and circulars, such as 49 U.S.C. § 1101 et seq., the "Inspector General Act Amendments of 1988" (P.L. 100-504), the "Legislative Reorganization Act of 1970" (P.L. 91-510), and the Office of Management and Budget Circular A-50, Revised.

Inspector General primarily from 1990 through 1994. We selected this period in accordance with Representative Peterson's request and also because some recommendations, such as those dealing with regulatory change and new equipment, cannot normally be implemented in a short time frame because they often require thorough study as well as extensive consultation with the aviation community and cost-benefit analyses. For this reason, we did not review the implementation of recommendations made in calendar years 1995 and 1996. We also included 10 recommendations dating from 1986 that NTSB considered particularly significant and added to its "Most Wanted" list during the 1990-94 period. We reviewed listings of aviation safety reports and recommendations on aviation safety by GAO, NTSB, and DOT's Inspector General for the period 1990 through 1994. To determine the major areas in which GAO, NTSB, and the DOT Inspector General had made significant recommendations, we consulted with the officials who were responsible for these reports and recommendations and reviewed various agency documents that identified and discussed significant reports and recommendations, including NTSB's "Most Wanted" lists from 1990 through 1994. Through this process, we identified 256 significant recommendations (113 from GAO; all 29 of the aviation safety recommendations included in NTSB's 1990-1994 "Most Wanted" lists, including the 10 recommendations dating back to 1986; and 114 from DOT's Inspector General). We gathered data on their status from the tracking systems maintained by GAO, NTSB, DOT's Inspector General and FAA. We did not verify the accuracy of the overall data in the tracking systems.

We then selected from this list 11 GAO and 7 NTSB recommendations for which we conducted detailed audit work and determined the status of the recommendations' actual implementation, including the status of actions necessary to fully correct the problems that gave rise to the recommendations, at specific FAA locations and airports. We did not perform any such detailed field work on recommendations by DOT's Inspector General because that office was performing a similar audit of the implementation of several of its recommendations on aviation safety that were classified as "closed and fully implemented" because of concerns about the actual implementation of the recommendations in the field offices. A more detailed discussion of our objectives, scope, and methodology is presented in appendix I, and the list of locations where we performed detailed field work is presented in appendix II.

We discussed a draft of this report with officials from FAA offices responsible for the programs and activities discussed in this report. We

have incorporated their comments where appropriate. Additional details on their comments and our response appear at the end of chapters 2 and 5. We conducted our review from January 1995 through August 1996 in accordance with generally accepted government auditing standards.

FAA's Responsiveness to Significant Recommendations Concerning Safety

FAA generally concurred with the recommendations on aviation safety made by GAO, NTSB and DOT's Inspector General and has implemented the majority of them. These recommendations were made by GAO and DOT's Inspector General from 1990 through 1994. These recommendations were also made by NTSB or were added to NTSB's "Most Wanted" lists of safety recommendations from 1990 through 1994. Nevertheless, FAA often did not meet the time frames established for implementing these recommendations. FAA implemented 55 percent of GAO's recommendations and 13 percent of the DOT Inspector General's recommendations as of October 1995. We were unable to readily measure FAA's timeliness in implementing NTSB's recommendations because FAA had not established time frames in its initial responses to NTSB for implementing 24 of NTSB's 29 "Most Wanted" recommendations that we reviewed. In addition, FAA had not established completion dates for implementing 18 of GAO's recommendations.

The first step toward the timely implementation of recommendations is for FAA to make its initial response to agencies' recommendations within the time required. However, while FAA usually met the statutory requirement to make an initial response to NTSB's recommendations within 90 days and DOT's requirement to respond to the DOT Inspector General's recommendations within 60 days, FAA did not meet the statutory requirement to respond to GAO's recommendations within 60 days for any of the recommendations included in this review.

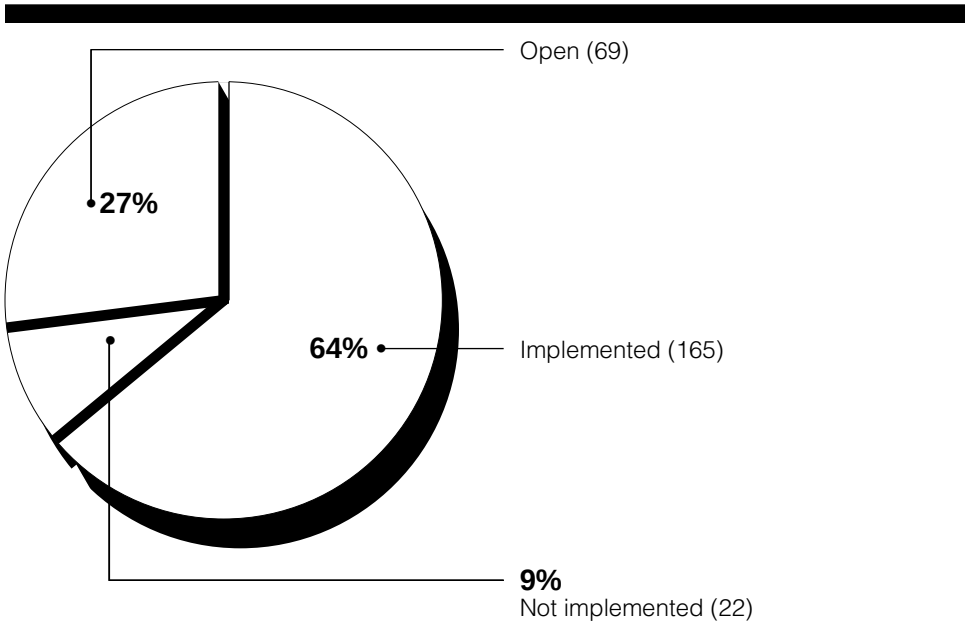
FAA Generally Concurred With Recommendations and Has Implemented the Majority of Them

FAA usually agreed with the recommendations made by the three organizations (GAO, NTSB, and DOT's Inspector General). For the recommendations we reviewed, FAA either concurred with or concurred in part with 90 percent of GAO's 113 recommendations, concurred with 97 percent of NTSB's 29 "Most Wanted" recommendations, and concurred with 89 percent of the DOT Inspector General's 114 recommendations.

FAA had implemented 64 percent of the 256 recommendations that we reviewed, according to the information in the three organizations' tracking systems as of October 1995. However, FAA had not completed actions to implement the remaining 36 percent of the recommendations. (See fig. 2.1.) "Implemented" means that GAO, NTSB, or DOT's Inspector General has classified the recommendation as closed because action on the recommendation is considered complete. "Not implemented" means that the organization closed the recommendation because (1) FAA disagrees with the recommendation and does not intend to implement it or (2) the

recommendation is no longer applicable. Recommendations are classified as "open" if actions to implement the recommendation have not been initiated or are in process, or intended actions are not fully resolved.

Figure 2.1: FAA's Implementation Rate for GAO's, NTSB's, and the DOT Inspector General's Aviation Safety Recommendations Included in This Review, as of October 1995



Note: The total number of recommendations is 256.

The percentage of recommendations that had been implemented varies somewhat by agency. Specifically,

- of GAO's 113 recommendations, 61 percent had been implemented, 15 percent had not been implemented, and 24 percent were considered open;
- of NTSB's 29 "Most Wanted" recommendations, 59 percent had been implemented, 17 percent had not been implemented, and 24 percent were considered open; and
- of the DOT Inspector General's 114 recommendations, 69 percent had been implemented, and 31 percent were considered open.

Recommendations that deal with issues such as regulatory changes, developing and acquiring new equipment, and providing needed training cannot be accomplished in a short time frame by FAA because they often require thorough study, extensive consultation with the aviation community, and cost-benefit analyses. Therefore, the implementation rates cited here would be expected to increase as time goes by. In fact, FAA's implementation rate for GAO's and the DOT Inspector General's recommendations is higher for those issued early in the 1990-94 period than in the later years. FAA's implementation rate for GAO's recommendations ranged from 87 percent for those made in 1990 to 24 percent for those made in 1994; for the DOT Inspector General's recommendations, the rate ranged from 100 percent for those made in 1990 to 23 percent for those made in 1994. All of NTSB's 29 recommendations were added to the "Most Wanted" list from 1990 through 1992. FAA's implementation rate was highest for the recommendations added in 1990—82 percent.

FAA Often Did Not Meet Established Times for Implementing Recommendations

DOT's orders call for FAA to establish estimated time frames for implementing recommendations in FAA's initial response to the recommendations made by GAO and the DOT's Inspector General. NTSB's legislation requires that FAA's initial responses to NTSB's recommendations include a time table for completing the procedures to adopt NTSB's recommendations, and DOT's and FAA's orders reinforce this requirement. Our comparison of estimated and actual dates for completing actions on recommendations showed that FAA usually did not meet its estimated time frames for implementing these recommendations. FAA's record in meeting these implementation goals varied significantly—55 percent for GAO and 13 percent for the DOT Inspector General's recommendations.

FAA had not established time frames in its initial responses for 24 of NTSB's 29 recommendations that we reviewed, and thus we could not readily measure the timeliness of FAA's implementation actions. In addition, FAA had not set implementation dates for 18 of GAO's recommendations.

Completion Dates Were Sometimes Not Established and Often Were Not Met for GAO's Recommendations

DOT's order for following up on GAO's recommendations states that if action has not been completed at the time that DOT replies to recommendations in a GAO report, estimated target completion dates are to be included in DOT's response. However, we found that of GAO's 113 recommendations, FAA provided completion dates for only 45. No dates were provided for 18, for

which DOT and FAA officials agreed that completion dates should have been established. FAA did not provide estimated completion dates for the 50 final recommendations because the agency either considered implementation already completed or did not agree with the recommendation or because establishing a date would not be expected owing to the continuous nature of the implementation action. In our May 1992 report to DOT,[1] we stated that DOT's modal administrations had not included estimated completion dates for about one-fourth of the recommendations included in that review. DOT replied that corrective actions were being taken to ensure that completion dates were included, where necessary.

Implementation had slipped for some of the 45 recommendations for which estimated completion dates had been established in the initial response. Only 25 of these recommendations had an actual completion date in the FAA tracking information system that could be compared with the original estimated completion date. Of these, only seven met their original estimated completion date—slippage ranged from 1 to 26 months. Of the 69 recommendations that were implemented and closed, 7 met their original completion date, and FAA reported in its initial response that 31 other recommendations had already been implemented. Thus, 55 percent of the recommendations were implemented on time.

Completion Dates Were Established but Not Usually Met for Recommendations From DOT's Inspector General

DOT's policy guidance calls for the Department's management officials to provide the Inspector General with estimated target dates for completing actions on recommendations that they agree with. The guidance also calls for the Inspector General to maintain a database of recommendations and to track both the planned and the actual completion dates. This automated database is used by both the Inspector General and FAA to track the status of recommendations. For recommendations that FAA does not implement within 1 year after agreement was reached between FAA and the Inspector General's staff regarding the implementation actions, the Secretary of Transportation is required to report semiannually to the Congress. The Secretary's report also includes information on final actions taken by DOT to implement the Inspector General's recommendations during the reporting period.

While data from the Inspector General's tracking system show that target dates for completion were established by FAA for the recommendations covered in this review, those target dates were seldom met. Of the 79

[1]DOT's Recommendation Response System (GAO/RCED-92-164R, May 5, 1992).

recommendations that were implemented and closed, only 10 (or 13 percent) met their original or revised target dates for implementation. The slippage for implementing the other 69 recommendations ranged up to 18 months; 3 of these slipped from 12 to 18 months. Most of the others were behind their implementation schedule by 6 months or less, according to the tracking data.

Audit liaison officials at FAA headquarters pointed out that after a year passes, contacts will be made with the field program offices about the status of corrective actions. FAA's and the Inspector General's field staff who are closest to the work are the ones to whom the headquarters staff look to for both the completion and interpretation of the tracking information.

Implementation Time Frames for NTSB's Recommendations Often Not Documented in Initial Responses

Section 1135 of Title 49 of the United States Code provides for a 90-day response period for NTSB's recommendations addressed to the Department of Transportation. This legislation also requires that the response include a time table for adopting NTSB's recommendations, and DOT and FAA orders reinforce this requirement. We found, however, that FAA had not fully complied with this requirement. Specifically, of NTSB's 29 "Most Wanted" recommendations that we reviewed, FAA had not included time frames for 24 of them in its initial response to NTSB. In the absence of such time frames, we were unable to readily measure FAA's timeliness in implementing NTSB's recommendations. FAA and NTSB officials told us that the dates for taking action on NTSB's recommendations are often discussed between FAA and NTSB staff. In addition, FAA officials stated that they maintain internal target dates for completing actions on NTSB's recommendations. However, these dates were seldom documented in correspondence between FAA and NTSB. Our review of correspondence between FAA and NTSB revealed that for the 29 recommendations, 21 did not have documented implementation time frames in either the initial response or any subsequent correspondence.

NTSB officials were concerned about the length of time that FAA takes to implement some of NTSB's recommendations. These officials acknowledge that because of such things as regulatory rule making and purchasing new equipment along with training for its use, implementation can take years. Nevertheless, because of their concerns over timeliness of implementation, they are considering revising the NTSB internal order for following up on and closing recommendations. The proposed changes would require NTSB staff to review actions taken on recommendations at

1-, 3-, and 5-year intervals and determine if the required action could have been completed within those time frames. If so, the recommendation may be classified as a "Closed-Unacceptable Action" because its implementation was not timely.

On the basis of NTSB's internal guidelines for timeliness, our analysis of FAA's timeliness for implementing NTSB's 29 "Most Wanted" recommendations included in this report helps explain NTSB's concern about the time that FAA takes to implement some NTSB recommendations. While not required of or used by FAA, the following timeliness goals are used by NTSB for following up on and closing its recommendations in effect during the 5-year period covered by our review.

- Class I, urgent actions, to be closed in 1 year on the basis of the response provided.
- Class II, priority actions, to be closed in 2 years on the basis of the response provided.
- Class III, longer-term actions, to be closed in 5 years on the basis of the response provided.

Twenty-seven of the 29 "Most Wanted" recommendations are in the Class II category and two are in the Class III category.

We determined that as of October 1995, of the 17 recommendations closed by NTSB as having acceptable actions taken by FAA, only 6 were implemented within NTSB's timeliness goals of 2 to 5 years as stated above. The other 11 significantly missed NTSB's goals; the time taken ranged up to 5 years behind NTSB's goals. The average time was 2.1 years behind these time frames for completion.

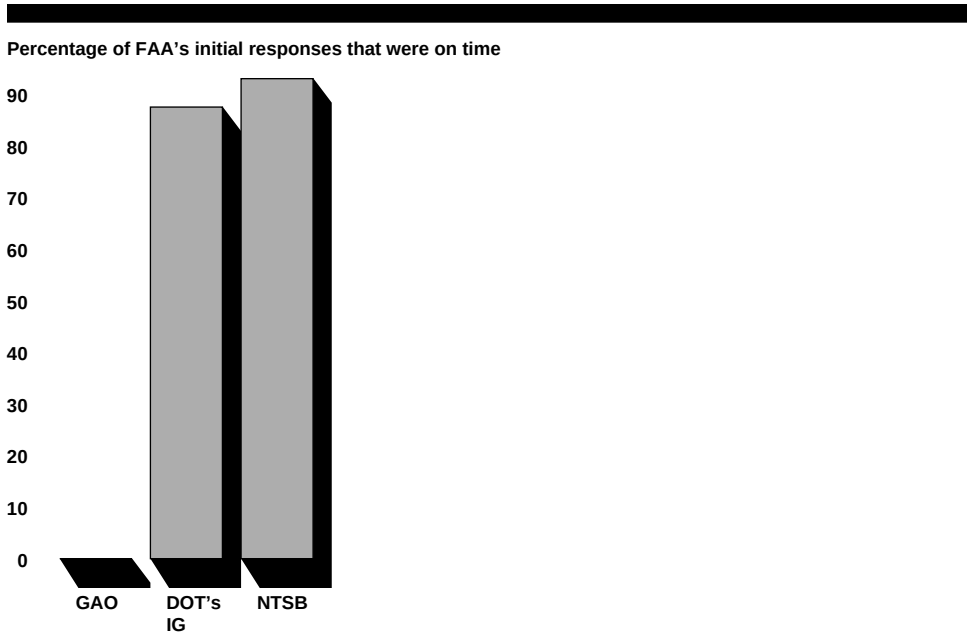
All of the remaining 12 recommendations not closed with acceptable actions had also missed NTSB's 2- 5-year timeliness goals. For example, of the seven recommendations that were still open, (1) five with acceptable responses were open an average of 3 years after their Class II goal of 2 years; (2) an open Class III recommendation with an acceptable response was open more than 3 years after its 5-year time goal; and (3) an open Class II recommendation with an unacceptable response was open nearly 2 years after the Class II goal of 2 years. The remaining five Class II recommendations were ultimately closed by NTSB, which considered the alternative actions taken by FAA to be unacceptable.

FAA Did Not Meet Established Time Frames for Initial Response to GAO's Recommendations

FAA is required to make timely initial responses to recommendations from all three organizations. Section 1135 of Title 49 of the United States Code requires the Secretary of Transportation to make its initial response to NTSB's recommendations within 90 days, and the Legislative Reorganization Act of 1970 requires FAA to report to congressional committees on actions taken or actions it plans to take on GAO's recommendations within 60 days. For the DOT Inspector General recommendations, DOT and FAA orders call for FAA to respond to recommendations within 60 days. For NTSB's "Most Wanted" recommendations that we reviewed, FAA met NTSB's time frames for 93 percent of the 29 recommendations and met the DOT Inspector General's time frames for 88 percent of the 16 reports that contained the 114 recommendations; however, FAA did not meet the time frames for responding to any of GAO's 34 products that contained the 113 recommendations.[2] (See fig. 2.2.) FAA's lack of timeliness in making an initial response to GAO's recommendations may slow progress in taking actions to resolve the problems that led to the recommendations.

[2]For GAO's and the DOT Inspector General's recommendations, FAA responds in a single reply to the report or product containing the recommendations. For NTSB's recommendations, FAA may respond separately to individual recommendations or all the recommendations contained in an accident or special report.

Figure 2.2: Comparison of the Timeliness of FAA's Initial Responses to GAO, NTSB and DOT's Inspector General



FAA officials told us that a number of factors can help explain the difference in the time that FAA took to respond to the three organizations. According to these officials, FAA's process for responding to GAO's recommendations is lengthy and cumbersome, requiring comments and approval at the program level and approval from the Office of the FAA Administrator. By contrast, DOT expects early consultation between its agencies and its Inspector General on draft reports, and agreement is often reached at this stage on the action that FAA will take. When such agreements are reached at this draft stage they become part of the Inspector General's final report. Regarding NTSB's recommendations, FAA often works closely with NTSB during an accident investigation and is therefore already familiar with the resulting recommendations when they are made.

In a 1992 report, we brought to DOT's attention the fact that FAA and other DOT administrations were not meeting the requirement to make an initial response to GAO's products within 60 days.[3] We reported that FAA's response time was averaging 219 days for recommendations in products issued from January 1985 through October 1990. To address this problem,

[3]DOT's Recommendation Response System (GAO/RCED-92-164R, May 5, 1992).

DOT began in 1994 to conduct concurrent reviews of GAO's products and their recommendations within the Office of the Secretary and the FAA Administrator whenever possible. However, the problem has not been resolved. FAA averaged 214 days to respond to the 34 GAO products included in this review. Because the concurrent policy review was implemented near the end of our 1990-94 analysis period, we also reviewed 12 other reports, not included in our initial universe, issued to FAA from February 1994 through February 1996. FAA averaged 177 days to respond to the recommendations in these products, and during this period, FAA only met the requirement to respond within 60 days for two of these products.

Conclusions

The establishment of estimated completion dates brings a certain rigor to the implementation of recommendations and provides milestones against which progress can be measured; the absence of milestones can hinder the timely implementation of recommendations. However, FAA has not consistently established in its initial responses estimated completion dates for implementing GAO's and NTSB's recommendations with which it agrees. Furthermore, FAA rarely meets the legislatively mandated requirement to respond to congressional committees on recommendations in GAO products within 60 days. FAA's lack of timeliness in making an initial response to GAO's recommendations may slow progress in taking actions to resolve the problems that led to the recommendations.

Recommendations

To enhance the timeliness of FAA's implementation of GAO's and NTSB's recommendations, we recommend that the Secretary of Transportation (1) direct the Administrator, FAA, to ensure that initial responses to GAO and NTSB include the expected target dates for completion of actions to implement recommendations with which FAA agrees and (2) take the necessary steps, in conjunction with the Office of the Secretary, to ensure that responses to congressional committees on GAO products are made within the 60 day time frame required by law.

Agency Comments and Our Evaluation

In commenting on a draft of this report, DOT officials—including the Chief of the Audit Liaison Division, Office of the Assistant Secretary for Administration, and the Manager of the Recommendation Branch, Office of Accident Investigation—generally agreed with the above recommendations. However, they disagreed with our statement that we could not readily measure FAA's on-time performance for implementing

NTSB's recommendations because there were no dates in most of FAA's initial responses to NTSB. They stated that FAA's tracking system contains dates for virtually all of the recommendations and that this information was available to GAO. They added that FAA's program offices establish internal target dates for implementing NTSB's recommendations.

We recognized in our draft report that FAA's target dates are often discussed with NTSB officials. However, the dates in the tracking system can be periodically changed by the program offices. Thus, they do not constitute a benchmark against which on-time implementation can be measured. As discussed in the draft report, target dates were not included in the initial responses for 24 of the 29 recommendations that we reviewed. Thus, we were not able to readily measure FAA's on-time performance using an established benchmark. While frequent communications between FAA and NTSB and internal target dates are certainly useful, the absence of documented time frames in FAA's initial responses to recommendations does not meet established legislative and administrative requirements and limits the ability of appropriate oversight entities, including the Congress, to monitor the timeliness of FAA's implementation progress.

FAA Has Taken Steps to Improve Aircraft Certification

Aviation safety begins with the design and certification of new aircraft. Before introducing a new aircraft into commercial service in the United States, aircraft manufacturers must obtain FAA's certification that the aircraft and its systems meet the agency's standards. FAA has taken several actions to address the recommendations made in our 1993 report relating to its aircraft certification program.[1] Specifically, FAA has better defined the of role of its certification staff, improved its oversight of designated engineering representatives, reassessed the need for technical specialists and begun hiring them, issued guidance on the involvement of these specialists, and improved the technical training of its certification staff.

GAO's Recommendations Concerning Aircraft Certification

Section 44701 of Title 49 of the United States Code requires FAA to promote the safety of civil aircraft in air commerce. The United States Code mandates that FAA certify aircraft as meeting minimum safety standards before the aircraft can be operated in the United States. FAA carries out this mandate by setting standards and certificating manufacturers and by verifying that aircraft conform to certified designs and production processes.

Recognizing that with limited resources, FAA could not fulfill this mission alone, the United States Code also authorizes the agency to delegate certification activities, as necessary, to FAA-approved persons appointed as either company- or consultant-designated engineering representatives. These designated engineering representatives act as FAA's surrogates in analyzing, testing, and examining aircraft designs and systems. The company-designated engineering representatives are permanently employed as part of a company, while consultant engineering representatives are outside representatives hired by the company. FAA staff are responsible for overseeing the engineering representatives' activities and making the final determination as to whether a design meets FAA's safety requirements. For aircraft imported into the United States, FAA relies on foreign authorities to conduct many of the necessary certification activities, but FAA is responsible for certifying that the aircraft meet its requirements.

In our 1993 report, we concluded that FAA had not ensured that its staff were effectively involved in the certification process. We reported that FAA had delegated up to 95 percent of the certification activities to manufacturers without defining (1) critical activities in which FAA staff

[1]Aircraft Certification: New FAA Approach Needed to Meet Challenges of Advanced Technology (GAO/RCED-93-155, Sept. 16, 1993).

should be involved and (2) guidance on the necessary level and quality of the oversight of the engineering representatives. We also reported that FAA had neither provided its staff with the technical assistance and training needed to ensure competence in new technologies nor identified critical points in the certification process that required specialists' involvement.

To address these concerns, we recommended that FAA

- define a minimum effective role in the certification process for its work force by identifying critical activities requiring the agency's involvement or oversight,
- establish guidance on the necessary level and quality of the oversight of the engineering representatives and develop measures through which staff members' performance and effectiveness could be evaluated,
- formally examine the need to hire specialists in areas of advanced technology,
- require specialists' involvement early in the certification process and at other key junctures, and
- establish specific training requirements for its certification staff and identify training in new technologies that is available at universities, companies in private industry, and other government agencies.

FAA's Actions to Implement Recommendations

FAA has taken actions to implement all of the above recommendations. Specifically, FAA has better defined the role of its certification staff, improved its oversight of designated engineering representatives, reassessed the need for technical specialists and begun hiring them, issued guidance on the involvement of these specialists, and improved the technical training of its certification staff. As discussed below, many of these actions were recently taken, and it is too early to determine how effectively they will be implemented. Also, funding constraints could limit FAA's ability to provide its certification staff with the planned technical training.

FAA Has Better Defined Its Role in the Certification Process

We reported that in response to a dramatically escalating work load, FAA had delegated certification duties without defining a clear role for its staff to ensure that they were effectively involved in the certification process. As a result, FAA's involvement in the process had diminished to the point where the agency's ability to understand and certify new technologies was threatened. We reported that although FAA had developed general guidance

defining its directorate structure,[2] the agency had not established guidance to ensure its effective involvement in the process. To ensure that FAA staff were effectively involved in the certification process, we recommended that FAA define a minimum effective role for its staff by identifying critical activities requiring FAA's involvement or oversight.

In its April 1994 reply to our recommendation, FAA stated that it did not fully concur because a structured approach to the certification process was already defined in FAA's orders, notices, and other guidance material. Nevertheless, during our current review, we found that FAA has issued additional guidance clarifying its role and degree of involvement in the certification process. In May 1995, FAA revised its handbook containing guidance, procedures, technical guidelines, and limitations of authority for designated engineering representatives. The handbook establishes a framework for delegating functions to these representatives. Among other things, the handbook lists typical functions that designated engineering representatives may approve and functions to be referred to FAA for approval. FAA also issued a job aid in May 1996 that describes the roles and responsibilities and critical steps in the certification process. The job aid also lays out functions that must be carried out by FAA and cannot be delegated. Taken together, these actions address the thrust of our recommendation.

FAA Has Established a System to Oversee Activities of Designated Engineering Representatives

We reported that the rapid increase in the number of engineering representatives and in the number of duties delegated to them had reduced the amount of supervision that FAA could provide and may have reduced the quality of that supervision. We recommended that FAA establish guidance on the necessary level and quality of the oversight of the representatives and develop measures through which staff members' performance and effectiveness can be evaluated. In response, FAA developed guidance on a standardized process for overseeing the representatives and for annually renewing their appointments. The new process (effective, Oct. 1995) is intended to ensure that (1) FAA directly contacts every representative, (2) FAA's accountability for making that contact is tracked, (3) the representatives' performance is acceptable, and (4) the quality of FAA's oversight is measured. FAA's actions appear to fully address the intent of our recommendation.

[2]FAA manages its certification activities through its Aircraft Certification Service in Washington, D.C. The service comprises four directorates that certify the airworthiness of transport airplanes, small airplanes, engines, and rotorcraft.

FAA Has Reassessed the Need to Hire Technical Specialists

We reported that FAA had not fully implemented its National Resource Specialist Program, whereby recognized experts provide FAA's certification staff with technical assistance and advice. Specifically, FAA had identified a need for expertise in 23 areas, including crash dynamics, fuel and landing gear systems, advanced materials, and advanced avionics. However, only 11 positions were authorized, and only 8 of them were actually filled. We recommended that FAA formally examine the need to hire specialists in areas of advanced technology. FAA completed a formal assessment of this program in January 1995 and identified the need for 18 such specialists. FAA was authorized to begin recruiting qualified specialists in early 1996 to fill vacant positions, and as of July 1996, it had hired two additional specialists.

FAA Has Issued Guidance Emphasizing the Use of Specialists

We reported that FAA's guidance was silent on when and to what extent specialists should be involved in the certification process and that this lack of direction had limited the potential of the National Resource Specialists Program. The specialists were not required to involve themselves in the certification process nor were certification staff required to use them, even though the specialists are full-time FAA employees. Rather, decisions about involvement were left to the discretion of the staff and specialists involved. We found that the staff sometimes did not seek the specialists' advice and that the specialists were often involved in the process too late to be most effective. For example, during FAA's certification of the Airbus A330 and A340 aircraft, participation by the specialist on composite materials apparently came too late for his concerns to be addressed. According to the specialist, FAA staff said they considered the composite materials technology being used on these aircraft to be "old technology," and therefore they did not need his involvement. When he pressed to be involved and eventually examined the plans, he found that Airbus's use of composites was at the highest stage of technological advancement. He stated that his review of the plans and Airbus's testing came too late, however, for the company to take his concerns into account in its testing for compliance with safety standards.

On the basis of these findings, we recommended that FAA require the specialists' involvement early in the certification process and at other key junctures. While FAA agreed that specialists should be involved at appropriate junctures in the certification process, FAA disagreed with the need for further guidance on their involvement. During our current work, we found that while there is no formal requirement to involve the specialists early in the certification process, FAA Aircraft Certification

Service officials said that management has reemphasized to Aircraft Certification office managers the need to involve the specialists early in the certification process and to make arrangements for using their skills. Specifically, in May 1996, FAA issued a job aid that sets out the role of the specialists and points when the specialists should be involved in the process, such as at early meetings. FAA's Aircraft Certification Services officials added that the specialists are to be notified at the start of a new certification and that the specialists can determine the extent of their involvement. These actions address the thrust of our recommendation, and FAA officials stated that they plan to monitor the new procedures to ensure that specialists are effectively involved in the certification process.

FAA Has Taken Action to Improve Staff's Technical Training

We reported that (1) most training courses taken by certification staff dealt with such nontechnical subjects as supervision and writing or with subjects that were outside their certification responsibilities and (2) the lack of technical training was accompanied by a declining level of experience among the certification staff as a whole. We recommended that FAA establish specific training requirements for each certification discipline, ensure that each staff member meets those requirements, and keep the training as current as possible by identifying the training in new technologies that is available at universities, companies in private industry, and other government agencies.

At the time of our 1993 audit work, FAA had efforts under way to improve training. Since then, FAA has (1) issued a strategic plan for certification training that describes how the agency will develop and carry out its training program, (2) developed training profiles for all disciplines among the certification staff, (3) developed and offered several new training courses, and (4) developed a technical training catalog to inform the certification work force about the technical training available outside FAA. FAA also established a technical career path for nonsupervisory engineers in order to have a core group of individuals with in-depth technical knowledge and to retain competent engineers. Budget reductions, however, could affect the implementation of some of these initiatives. For example, FAA's fiscal year 1996 training budget is less than the amount the agency said it needed for operationally essential training, and the budget shortfall could delay initial and recurrent training for the test pilots who certify new aircraft.

Conclusions

Since we issued our report in September 1993, FAA has taken actions to implement all of our five recommendations. FAA's actions address the problems that we previously reported and should improve the agency's certification process. However, it is too early to determine how effective these actions will be because many of FAA's actions have occurred too recently to evaluate their actual implementation. In addition, funding constraints could limit FAA's ability to provide its certification staff with planned technical training.

FAA Has Taken Several Actions to Improve Its Inspection Program, but Resource Targeting System Is Not Complete

FAA inspects domestic and foreign air carriers that fly into the United States to help ensure that their operations comply with federal and international aviation safety regulations. In response to recommendations made in GAO reports issued in November 1991 and November 1992,[1] FAA has taken several steps to make its inspection program more effective and efficient. However, some of FAA's actions have not yet been fully implemented. Specifically, FAA's resource-targeting system is still not fully operational nor has FAA completed and implemented a strategy to improve the quality of the data in the databases used in the targeting system.

GAO's Recommendations Concerning Inspections

FAA develops the federal aviation regulations that airlines must follow and prepares guidance on how FAA's safety inspectors should perform inspections. FAA also inspects commercial and general aviation aircraft, aircraft repair stations, schools for training pilots and maintenance staff, and pilots. These inspections serve as part of an early warning system to identify potential safety problems.

We reported in November 1991 that numerous deficiencies in FAA's inspection program impeded the agency's ability to ensure that airlines were operating safely. Specifically, FAA was unable to effectively evaluate airlines' safety conditions because it did not (1) have adequate guidance for properly classifying the airlines' problems and (2) know whether the airlines were correcting identified problems. Without complete and accurate information, FAA could not determine whether inspection priorities were achieved, inspection follow-up activities were adequate and timely, and inspection resources were being used effectively. We also reported that FAA did not have a system for assessing the relative safety risks among airlines.

Furthermore, we reported in November 1992 that (1) FAA's assessments of foreign countries' oversight of their air carriers to ensure that they were operating in accordance with international standards were not giving priority attention to assessing the oversight of countries whose carriers have serious safety problems, (2) FAA had not defined the nature or frequency of the comprehensive inspections that its field offices should perform when a country did not provide the required oversight or when serious safety problems were identified with a specific foreign air carrier, and (3) FAA was not promptly notifying all relevant field offices of serious safety concerns about foreign carriers. We concluded that these gaps in

[1]Aviation Safety: Problems Persist in FAA's Inspection Program (GAO/RCED-92-14, Nov. 20, 1991) and Aviation Safety: Increased Oversight of Foreign Carriers Needed (GAO/RCED-93-42, Nov. 20, 1992).

the safety coverage of foreign carriers increased the potential for unsafe aircraft to enter or operate in the United States.

To address these concerns, we recommended that FAA

- complete its efforts to provide inspectors with clear and distinctive definitions of the comment codes that they use to classify the airlines' problems into broad categories;
- require inspectors to record the corrective actions taken for identified problems;
- give priority to developing a risk-assessment system, including a plan and milestones for implementation;
- give priority to assessing the oversight capabilities of those countries that FAA determines have one or more carriers with serious safety problems;
- require its field offices to perform comprehensive inspections of foreign air carriers that fly into the United States when FAA finds that these carriers' home government does not comply with international standards and/or becomes aware that the carriers have serious safety problems; and
- promptly notify all relevant field offices of serious safety concerns about foreign carriers.

FAA's Actions to Implement Recommendations

FAA recently revised its guidance to inspectors for recording the results of inspections by providing additional guidance and procedures on selecting the proper comment code and for preparing the narrative relating to the code, and FAA has efforts under way to better define the codes. FAA also recently revised its guidance for recording corrective actions on identified problems. FAA has developed and is deploying a risk assessment system for targeting its resources, and the agency expects to have this system fully operational by 1999. FAA is still in the formative stages for developing a strategy to improve the quality of data used by this system. Finally, FAA has taken several actions to improve its oversight of foreign carriers serving the United States by improving its program for assessing the oversight capabilities of countries with carriers serving the United States, increasing its surveillance and the comprehensiveness of its inspections of foreign carriers, and promptly notifying field offices of problems with foreign carriers.

FAA Has Taken Actions to Improve the Use of Codes for Classifying Inspection Results

In November 1991, we reported that the data in FAA's Program Tracking and Reporting Subsystem (PTRS)[2] were unreliable for providing information on the performance of FAA's inspection program and were inadequate for ensuring the accomplishment of key elements of the inspection program. Among PTRS' features are about 200 comment codes that inspectors use to classify inspection results into 15 broad categories, such as records, flight conduct, maintenance, and management. We reported that FAA did not provide inspectors with adequate definitions of the comment codes. Because of ambiguities in the codes' descriptions, inspectors had difficulty determining how to classify identified problems and could record the same problems differently, thus making it hard to accumulate consistent results and spot trends. Therefore, we recommended that FAA provide inspectors with clear and distinctive definitions of the comment codes.

At the time of our 1991 report, FAA agreed that these codes could be made clearer and stated that PTRS' instructions and job aids for inspectors would be included in the inspectors' handbooks. Subsequently, FAA developed instructions with job aids showing examples of properly used comment codes for some inspections. While FAA had taken some steps to clarify the use of the comment codes used in PTRS, its actions did not fully resolve the problems that we previously reported. During our current review, 35 of the 67 inspectors we interviewed said that a safety problem could be recorded under several codes, and 16 of the 67 said that they had difficulty choosing the correct code.

Subsequent to our field audit work, FAA revised its PTRS Procedures Manual in June 1996. The revised manual contains procedures and guidance to be used by inspectors in recording PTRS activities including the results of inspections. The revision includes an extensive discussion on selecting the proper comment codes as well as guidance on preparing the narrative portion of inspection reports. The manual also points out that national efforts are in progress to redesign PTRS to, among other things, reduce the number of comment codes and better define them. Although FAA's actions address our recommendation, it is too early to determine how effective they will be in addressing the previously identified problems.

[2]FAA developed this computer-based system to provide data for planning and overseeing its inspection program. Inspectors record inspection results in PTRS. FAA's local, regional, and headquarters officials use information from PTRS to track inspection activities and results as well as to plan additional surveillance activities.

FAA Has Revised Its National Guidance for Recording Corrective Actions

In our 1991 report, we stated that although corrective actions are essential to ensure that airlines are operating safely, FAA did not know whether inspectors follow up on identified problems. As a result, FAA had no assurance that airlines were taking corrective actions. Therefore, we recommended that FAA require inspectors to record the corrective actions taken for identified problems.

FAA agreed with the recommendation that a comprehensive data system containing all corrective actions would be ideal. However, FAA stated that given its limited available resources, it believed the greatest safety benefit could be achieved by recording corrective actions only for significant problems. Furthermore, FAA believed that current guidance in the PTRS handbook required inspectors to record corrective actions taken for identified problems. Therefore, FAA did not plan to implement our recommendation.

Although FAA stated during our current field work that the existing guidance requires inspectors to record corrective actions, FAA's headquarters officials and field inspectors were unable to provide us with documentation of a national requirement to record corrective actions. In addition, in reviewing the FAA inspectors' handbooks and PTRS guidance in effect during our field work, we found no requirement that inspectors record corrective actions. However, the FAA field office managers and inspectors whom we spoke with stated that recording corrective actions was encouraged or required by their local office. Thus, all of the field offices we visited were attempting to achieve the intent of our recommendation.

However, at each location, we found some inconsistencies in the degree to which corrective actions were being recorded. Of the 67 inspectors whom we spoke with, 24 stated that they do not always record corrective actions taken. For example, eight inspectors told us that if a problem is identified during an inspection and corrected in their presence, this corrective action is sometimes not recorded. Two inspectors stated that they did not record any problems in PTRS until corrective action is taken, regardless of how long it takes. Ten inspectors said that they do not always have the time to record corrective actions.

Subsequent to our field work, FAA revised the PTRS Procedures Manual in June 1996. An FAA official told us that the June 1996 revision addresses our prior recommendation. Specifically, FAA stated that under the new manual, additional information must be recorded when a potential problem

requiring follow-up action is identified during an inspection. It is too early to determine the effectiveness of this revision and whether it will resolve the inconsistencies we observed.

FAA Is Continuing to Implement a Risk-Assessment System

As early as 1987, we identified the need for FAA to develop criteria for targeting safety inspections to airlines with characteristics that may indicate safety problems. Again, we reported in 1991 that although FAA maintained numerous databases with information concerning safety, the agency did not integrate information on, among other things, accidents, pilot deviations, and inspection results to assess an airline's overall risk and to determine how the agency could best use its limited inspection resources. Rather, FAA assigned its inspection resources on the basis of the size of the airlines' fleet. We recommended that to make more effective use of its limited inspection resources, FAA give priority to developing a risk-assessment system, including a plan and milestones for the system's implementation. FAA agreed with our recommendation and stated that it was developing the Safety Performance and Analysis System (SPAS) for this purpose.

Although FAA has taken steps to better target its inspection resources to areas with the greatest safety risks, these efforts have taken several years and are not expected to be completed until 1999. SPAS, which FAA began developing in 1991, is intended to analyze data from up to 25 existing databases that contain such information as the types and results of airline inspections and the number and nature of aircraft accidents. This system is expected to produce indicators of an airline's safety performance, which FAA will use to identify safety risks and to establish priorities for inspections. FAA completed the development and installation of the initial SPAS prototype in 1993, and as of April 1996, had installed SPAS in 59 locations. FAA expects to have SPAS operational nationwide by 1999.

In February 1995, we reported that although FAA had done a credible job in analyzing and defining the system's user requirements, SPAS could potentially misdirect FAA's resources away from the higher-risk aviation activities if the quality of its source data is not improved.[3] To improve the quality of the data to be used in SPAS analyses, we recommended that FAA develop and implement a comprehensive strategy to improve the quality of all of the data used in its source databases. In its July 10, 1995, response to

[3]See Aviation Safety: Data Problems Threaten FAA Strides on Safety Analysis System (GAO/AIMD-95-27, Feb. 8, 1995). Although this report was issued outside the 1990-94 time frame covered in this review, we mention it here because it provides information directly related to the recommendation in our 1991 report.

this recommendation, FAA concurred with the need for this comprehensive strategy and said that it planned to complete such a strategy by the end of 1995. FAA hired a contractor in November 1995 to develop a plan for this strategy and an additional contractor was hired in 1996 to develop a more comprehensive strategy. FAA's target date for completing the plan and FAA's internal review is October 1996. Until FAA completes its strategy, the extent and the impact of the problems with the quality of the system's data will remain unclear.

FAA Has Improved Its Assessments of Oversight Capabilities of Countries With Carriers Serving the United States

In our November 1992 report, we said that FAA was identifying problems in its inspections of foreign carriers that were flying into the United States, thus raising questions about the oversight capability of the foreign countries' civil aviation authorities. Therefore, we recommended that FAA (1) give priority to assessing the oversight capability of those countries that the agency determined had one or more carriers with serious safety problems and (2) work with these countries to ensure that their oversight capabilities were sound. FAA began assessing foreign civil aviation authorities in August 1991 to determine whether they met their responsibilities to ensure that their carriers comply with international safety standards. As of July 1996, FAA had assessed the civil aviation authorities of 61 of the 104 countries or territories that have air carriers with operating rights or that have requested operating rights to the United States. FAA is scheduled to assess the remaining 43 countries or territories by the end of calendar year 1996. To set the order of assessment, FAA is ranking these remaining inspections according to the rate at which a country's foreign carriers fly into the United States and the results of FAA's inspections of carriers from that country.

FAA Has Increased Its Surveillance and Comprehensive Inspections of Foreign Air Carriers

We reported in 1992 that when FAA found that foreign countries were not providing adequate oversight of their air carriers, the agency attempted to fill the void by performing increased inspections of some carriers. However, we found that (1) FAA's inspections of these foreign aircraft were limited primarily to examining aircraft markings, pilot licenses, and airworthiness certificates and (2) FAA had not defined the nature or frequency of the inspections that its field offices should perform when a country does not provide the required oversight and when a foreign air carrier has serious safety problems. We recommended that FAA require its field offices to perform comprehensive inspections of foreign air carriers that fly into the United States when FAA finds that their home government

does not comply with international standards and/or becomes aware that a carrier has serious safety problems.

In September 1993, FAA developed a quarterly special emphasis list of foreign carriers that merit additional inspection on the basis of its inspection results as well as information from FAA's country assessment program. FAA has also established a minimum standard for the number and type of inspections of foreign carriers. This guidance specifies, for example, that each foreign carrier with scheduled flights to the United States should receive one ramp inspection per year.[4] Beginning in fiscal year 1997, FAA plans to increase the surveillance of these foreign carriers by requiring two ramp inspections for each carrier. However, if a foreign carrier appears on the quarterly special emphasis list, FAA headquarters recommends that inspectors conduct an additional ramp inspection monthly. Additionally, as of January 1996, if a country is ranked as "conditional" because of FAA's assessment, all of that country's carriers will be placed on FAA's quarterly special emphasis list for increased inspection in the United States. Finally, FAA has expanded its inspections to examine logbooks, flight and maintenance manuals, minimum equipment lists, fuel records, emergency medical kits, and the flight crew's licenses.

FAA Is Promptly Notifying Field Offices of Problems With Foreign Carriers

We reported in 1992 that FAA was not acting promptly to notify its field offices to increase surveillance of foreign carriers when it became aware of serious safety concerns and recommended that it do so. FAA concurred with our recommendation and stated that it planned to use its special emphasis quarterly list as a mechanism for notifying its field offices. However, we did not consider this action fully responsive because the list is only published quarterly, and relying on the list would not ensure prompt notification of the field offices. During our current work, we found that FAA has taken steps to promptly notify inspectors of problems identified with foreign carriers. Specifically, we found that FAA was informing its field offices of problems between the issuance of the quarterly lists. Most of the 22 inspectors of foreign carriers we spoke with believed that they were receiving sufficiently prompt notification.

Conclusions

FAA's actions to implement our recommendations should improve its air carrier inspections and oversight of foreign carriers. These actions include

[4]The primary objective of a ramp inspection is to provide inspectors with the opportunity to evaluate an air carrier's operation while the crew members and aircraft are on the ground. It is a method for evaluating an operator's ability to prepare both the aircraft and crew for a flight.

improving guidance on using comment codes to record inspection results, developing and deploying a system to better target its inspection resources to the areas with the greatest safety risks, and increasing its emphasis on foreign carriers flying into the United States. However, problems with the quality of data in the SPAS databases could adversely affect FAA's ability to accumulate reliable data, spot trends, and target FAA's resources. FAA's ongoing effort to develop a strategy to improve the quality of data used in SPAS is a step that if properly implemented should enhance the value of SPAS as a resource-targeting tool.

Runway Safety Problems Not Fully Corrected

The vast majority of serious commercial aviation incidents and accidents occurs during takeoff and landing. NTSB has made numerous recommendations to FAA over the years to improve safety on airport runways. NTSB officials considered runway incursions[1] so serious that they placed 16 recommendations addressing incursions on NTSB's 1990 through 1994 "Most Wanted" lists of critical safety recommendations. These safety recommendations received specialized attention, intensive follow-up, and heightened awareness among industry, the Congress, and the public. In consultation with NTSB officials, we selected seven of these recommendations for detailed follow-up.

FAA agreed with and has taken actions to implement all seven of the NTSB recommendations we reviewed. NTSB has classified five as closed as a result of acceptable action by FAA and two as still open but with acceptable actions being taken by FAA. However, we found that for four of the five closed recommendations, not all of the actions necessary to fully correct the problems that gave rise to the recommendations had been completed. In some cases, the actions had not been completed at only a few airports, but in other cases, they had not been completed at many airports.

NTSB's Recommendations Concerning Runway Safety

The complexity of today's airport operations has the potential to create unsafe conditions, especially when aircraft, vehicles, and even pedestrians may find themselves on active runways in direct conflict with arriving and departing aircraft. Such runway incursions can have tragic results and represent a breakdown in safe operations. For example, in November 1994, a fatal accident occurred at the St. Louis/Lambert International Airport. A jet with 132 passengers was in its takeoff run when its wing clipped a small charter plane that should not have been on the same runway. Both the pilot and passenger aboard the charter plane were killed, and some passengers on the jet were slightly injured. NTSB officials told us that since 1986, when NTSB issued a safety study on runway incursions, FAA has made significant strides in implementing NTSB's recommendations concerning runway safety. NTSB officials told us that FAA has taken specific actions recommended by NTSB, such as issuing standards for airport lights and signs.

Once specific actions are taken, NTSB then closes the recommendations. However, NTSB officials stated they had some concerns about the extent that corrective actions, such as installing signs meeting FAA's new

[1]NTSB defines a runway incursion as "any occurrence involving an aircraft, vehicle, person, object, or procedure that impedes the takeoff, intended takeoff, landing, or intended landing of an aircraft."

standards, were actually being carried out by airport operators at affected airports as well as the pace at which FAA was implementing other recommendations. As a result, we reviewed the status of seven of NTSB's "Most Wanted" recommendations to reduce runway incursions that involved (1) visibility from the control tower, (2) airport signs and markings, (3) airports operating in low-visibility conditions, (4) complex runway intersections, (5) special highly reflective paint for surface markings, (6) runway edge lights, and (7) radars and related systems to alert controllers of pending runway incursions.

FAA's Actions to Implement NTSB's Recommendations

FAA agreed with and has taken actions to implement all seven recommendations. The agency has resolved visibility restrictions at control towers, taken actions to improve signs on runways and taxiways and airport marking and lighting during low-visibility conditions, identified problems at complex intersections at airports, evaluated and approved the use of reflectorized paint in airport surface markings, identified locations where edge lights should be installed, and continues to take actions to install surface detection radar and related equipment at airports. However, not all of the actions necessary to correct the problems that gave rise to the recommendations have been completed at the affected airports.

Restrictions in Visibility From Control Towers Due to Airport Lighting Have Been Resolved

On February 1, 1991, a USAir flight collided with a Skywest flight while the USAir flight was landing on a runway at the Los Angeles International Airport. The Skywest flight was positioned on the same runway, awaiting clearance for takeoff. In the collision, both aircraft were destroyed, and all of the passengers and crew members were killed. During the investigation of this accident, NTSB discovered that both flight crews had received clearance from the air traffic controller to occupy the same runway. Additionally, the investigators agreed that three lighting fixtures produced a glare that impeded the controller's view of the area in which the collision occurred.

As a result of its accident investigation and subsequent findings, NTSB recommended on December 3, 1991, that FAA conduct a one-time examination of the airport lighting at all tower-controlled airports in the United States to eliminate or reduce visibility restrictions from the control tower to the runways and other traffic movement areas. Subsequently, FAA directed all Regional Air Traffic Division managers to examine their facilities to determine if visibility was restricted between the control tower and the runways and other movement areas. The Regional Air Traffic

Division managers identified restrictions at 26 airport air traffic control towers. NTSB classified this recommendation as "closed—acceptable action" on February 10, 1994, because FAA took actions to identify visibility restrictions resulting from problems with lighting and the identified airports resolved most of these problems with additional lighting, realignments, adjustments, glare shielding, and relocations. Two locations still require long-term construction projects—a control tower and a passenger terminal—to eliminate restrictions with visibility. Of the 11 airports we visited, FAA had identified 2 airports with lighting restrictions, and both of these locations have taken corrective actions to resolve the lighting problems.

Most Airports Have Installed New Sign Systems

Two Northwest Airline DC-10s nearly collided at the Minneapolis-St. Paul International Airport in Minnesota on March 31, 1985. One aircraft was taking off from a runway after having been cleared for takeoff by the air traffic controller. A second aircraft was taxiing across the same runway after having been cleared to cross the active runway by the ground controller. The captain of the first aircraft averted a collision by lifting off below the recommended takeoff speeds. Because of this incident and the frequency and potential severity of similar incidents, NTSB initiated a special investigation and study of runway incursions and accidents in July 1985.

One part of this study, issued in May 1986, concluded that the signs on runways and taxiways are effective runway incursion prevention tools and recommended that FAA, in cooperation with terminal air traffic managers, airport managers, airline representatives, and pilot groups, determine the most effective signs, markings, and procedures, from an operational and human performance perspective, to prevent pilot-induced runway incursions and issue an advisory circular to disseminate this information to airport managers and pilot organizations. On January 15, 1992, NTSB classified this recommendation as "closed—acceptable action" on the basis of FAA's issuance of Advisory Circular 150/5340-18C—"Standards for Airport Sign Systems"—on July 31, 1991. This FAA action fully complied with NTSB's recommendation. However, to determine whether the problems that led to NTSB's recommendation had been resolved in the field, we reviewed the status of the installation of these new sign systems.

The circular set forth standards for airports to follow when developing plans for new sign systems, including the development of taxiway designations, installation of holding position signs for the intersections of

taxiways and runways, and the installation of location and directional signs. FAA initially established a January 1, 1994, deadline by regulation for certificated airports[2] to install the new sign systems. However, by January 1, 1994, FAA officials realized that airports were having difficulty meeting this deadline because, among other things, they were trying to obtain signs from the limited number of manufacturers, their funding and budgeting cycles delayed their ability to purchase signs, their electrical systems could not always accommodate the new signs, and they required different signs because of their varied airport configurations. Also, the scope of the work to install the signs was greater than expected. Therefore, FAA extended the deadline to January 1, 1995. As of that date, 52 of the approximately 575 certificated airports were still not in compliance. According to an FAA official, as of August 1996, 46 of these 52 airports had come into compliance, and 3 had decided to cease operating as certificated airports. Of the remaining three airports, one had received an exemption because of ongoing construction work, and two are in the process of installing the signs.

Of the 11 airports we visited, 7 had installed their signs, and several officials at these airports said that the new signs and markings were an improvement because they enhanced visibility and safety. Of the remaining four airports, FAA granted an extension to one airport that finished installing its new signs after the completion of our field work. The other three airports had not met the deadline for installing signs for reasons such as contractors' delays in providing and/or installing the new signs, the changing of standards by FAA, and the inability of the airports' electrical systems to accommodate the new signs.

Implementation of Airports' Plans for Operating in Low-Visibility Conditions Has Been Delayed

Two Northwest Airlines flights, a DC-9 and a B-727, operating under low-visibility conditions, collided near the intersection of two runways at the Detroit Metropolitan/Wayne County Airport on December 3, 1990. The B-727 was in its takeoff roll on the runway at the time of the collision, and the DC-9 had taxied onto the same runway just prior to the accident. The B-727 was substantially damaged, the DC-9 was destroyed, and eight people were killed. In its accident investigation, NTSB determined that some rather obvious shortcomings in the area of maintenance of signs, lights, and pavement markings on the airport were apparent. NTSB's investigation concluded that "FAA was aware of some of these shortcomings and could have taken actions to correct them prior to the

[2]A certificated airport is one that serves any air carrier's scheduled or unscheduled passenger operations with an aircraft that seats more than 30 passengers.

accident." For example, NTSB's investigation revealed problems with the location of several signs observed by the DC-9 crew.

On the basis of its accident investigation, NTSB recommended on July 23, 1991, that FAA improve standards for airport marking and lighting during low-visibility conditions. Specifically, NTSB called for more conspicuous marking and lighting, the evaluation of unidirectional taxi lines for use on acute angle taxiways, and requirements for stop bars or runway guard lights at all taxiways that intersect active runways. On March 15, 1993, NTSB classified the status of this recommendation as "closed—acceptable action" on the basis of FAA's issuance of several advisory circulars addressing the issue of low-visibility conditions, most notably Advisory Circular 120-57—"Surface Movement Guidance and Control System"—issued on September 4, 1992.

The advisory circular provides guidance for the development of plans for airports that choose to conduct landing operations under low-visibility conditions or a runway visual range of less than 1,200 feet. According to an FAA official, 77 airports operate during low-visibility conditions. The circular also calls for visual aids at these airports, such as runway guard lights. FAA's deadline for airports to develop their plans was originally January 1, 1995, but FAA issued an update to the circular on October 5, 1994, extending the deadline to January 1, 1996. The primary reason for the extension was to allow airports sufficient time to plan for capital expenditures. However, not all the airports met this deadline. The following table illustrates the status, as of July 1996, of the 77 airports that FAA identified as being required to develop plans for operating in low-visibility conditions.

Table 5.1: Status of Low-Visibility Operating Plans, as of July 1996

Status of plan	Airports
Plan approved by FAA	19
Plan submitted to FAA's regional office for approval	14
Working group formed and developing plan	21
No working group formed	23
Total airports needing plans	**77**

Source: Based on information from FAA.

Of the 11 airports we visited, 9 were to develop plans for low-visibility operations. Of those nine airports, two had implemented plans, two had

their plans approved and were in the process of implementing them, three had submitted plans to FAA for approval, and two were still drafting their plans. Officials at some of these airports said that FAA's delays in issuing its new lighting specifications have caused problems. For example, an official at one airport stated that the implementation of their plan for low-visibility operations had been delayed because FAA's lighting specifications had not been completed. An FAA official stated that the new specifications for lighting equipment had not been completed as of July 1996.

Thus, 5 years after NTSB made its recommendation, and almost 4 years after NTSB classified the recommendation as "closed-acceptable action" on the basis of FAA's issuance of several advisory circulars addressing this recommendation, the intent of the recommendation is far from being achieved by all affected airports.

Complex Intersections Have Been Identified, but Many Corrective Actions Have Not Been Completed

As a result of the accident in Detroit in December 1990 mentioned earlier, NTSB was also concerned that "the problem of complex intersections, which can confuse pilots, exists at other airports and presents a situation that would require additional lighting and signage." Subsequently, NTSB recommended on July 23, 1991, that FAA identify complex intersections where a potential for pilot confusion exists at the nation's approximately 575 certificated airports. NTSB's recommendation also stated that where needed, FAA should require additional lighting and signs at these complex intersections.

Beginning in October 1991, FAA established Runway Incursion Action Teams (RIATs) in each regional office. These teams comprised airport owners, FAA airports' personnel, air traffic controllers, flight standards personnel, pilots, airline representatives, and other interested parties. The teams' mission was to identify complex intersections as well as other conditions or procedures that could cause runway incursions. In fiscal years 1991 through 1994, the teams completed reviews at 51 airports that FAA identified as having complex intersections and issued recommendations aimed at reducing runway incursions at these airports. According to FAA officials, the recommendations resulted in improvements in the guidance for intersections at certificated airports. However, because of resource constraints in both FAA and the industry, FAA discontinued RIAT meetings after the initial 51 reviews.

On the basis of FAA's completion of the RIAT reviews and the development of new standards for signs, NTSB classified this recommendation as

"closed—acceptable action" on August 31, 1994. However, according to FAA and airport officials, actual implementation of the recommendations resulting from the RIAT reviews had not been completed by airport operators at all the airports. In fact, only 27 of the 51 airports had implemented all of the reviews' recommendations.[3] The remaining airports had not implemented the recommendations because, among other things, they (1) found that implementing the recommendation requires the completion of other future airport projects, (2) lacked funds to take action immediately, (3) had other high priority needs, or (4) they were awaiting new or revised FAA standards. Thus, 2 years after NTSB closed the recommendation on the basis of FAA's actions, many airports have not completed the actions recommended as a result of the RIAT reviews. An FAA official pointed out that FAA cannot require airports to implement the RIAT recommendations because the recommendations were advisory in nature.

FAA had conducted RIAT reviews at 7 of the 11 airports we visited. Of those seven airports, five had implemented all the recommendations resulting from the reviews, and two had not. At one of these two, the installation of the new sign system at the airport had delayed the implementation of one of the RIAT recommendations. Officials at the other airport did not implement all the RIAT recommendations because they believe that the existing controls provide an adequate assurance of safety to satisfy one recommendation and that another recommendation involves future projects that the airport has not yet begun.

Use of Reflectorized Paint for Surface Markings Is at the Discretion of Airport Officials

NTSB's investigation of the Detroit accident also revealed several areas of faded or nearly invisible taxi lines on the airfield, especially near the area where the DC-9 was taxiing. The investigation found that these deficiencies may have been factors in the DC-9 flight crew's incorrect decision to turn left onto the taxiway. In 1991, NTSB recommended that FAA require certificated airports to use reflectorized paint for airport surface markings. Glass beads are dropped onto paint during its application to make the paint reflect more light.

To implement this recommendation, FAA established a research program to evaluate materials and techniques to improve the durability and conspicuity of pavement markings, including testing such materials and techniques at several airports. On the basis of its research results, FAA issued a September 20, 1994, "Signs and Marking Supplement to Advisory

[3]FAA was only able to provide us with information about the RIAT recommendations for 49 of the 51 airports because the officials who maintained such data in one of the FAA regions had retired or were unavailable for other reasons.

Circular 150/5340-1G" stating that glass beads meeting the federal specification requirements may be used in the paint to make runway markings more conspicuous.

The use of reflectorized paint for airport surface markings is not a requirement but, rather, an option that airport officials may choose. However, according to FAA, a new paint specification is in the final approval stage that would require glass beads in paint when federal funds are involved. NTSB classifies this recommendation as "open—acceptable response," pending completion of FAA's research and implementation of the results. FAA officials were unable to provide us with information on which airports were using the reflectorized paint and which ones were not because they do not have a centralized system containing such data. Of the locations we visited, some were using reflectorized paint and others were not. Officials in one region that we visited stated that all the airports in the area are using the reflectorized paint.

Many Airports Have Not Completed Installation of Runway Edge Lights

NTSB's investigation of the Detroit airport accident also revealed that the absence of runway edge lights, particularly in the area where runways and taxiways intersect, probably contributed to the DC-9 flight crew's actions. NTSB investigators determined that if runway edge lights had been embedded in the pavement at intervals of 200 feet as recommended by the existing Advisory Circular 150/5340-24, "Runway and Taxiway Edge Lighting System," the DC-9 pilots would probably have noticed them before the runway incursion and stopped taxiing. Subsequently, NTSB recommended in 1991 that FAA require certificated airports to install semiflush runway edge lights[4] in accordance with Advisory Circular 150/5340-24.

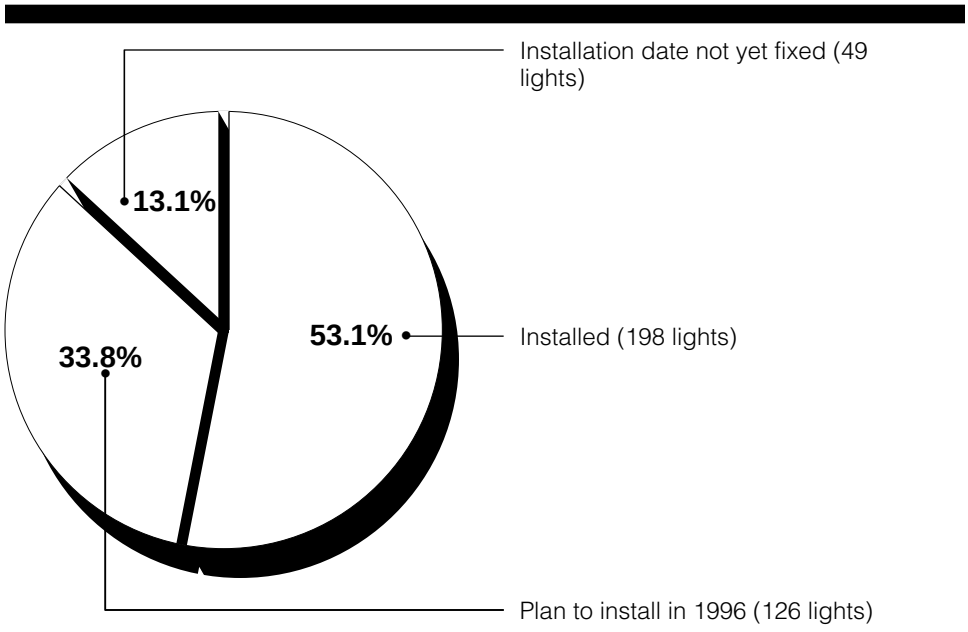
On November 23, 1992, FAA issued a notice to its airport certification inspectors to request that during their inspections, they focus their attention on the absence of lights at runway and taxiway intersections to determine if safety has been compromised. Subsequently, during their fiscal year 1993 inspections of airports, FAA inspectors identified 424 spots where a semiflush light should be installed on a runway surface at 72 airports. However, for the majority of these airports, FAA, after assessing the individual safety situation at each airport, informed airport officials that these lights did not have to be installed immediately but rather when

[4]These lights are referred to as semiflush lights because they are embedded in the edge of the runway and are nearly flush with the ground.

airport officials had other electrical work planned for the runways or during runway reconstruction work.

On February 16, 1995, NTSB classified this recommendation as "closed—acceptable action" on the basis of these actions by FAA. During our current review, FAA could not locate the original list of the 424 needed lights. Consequently, as of October 1995, FAA could account for only 405 of the original 424 needed lights at the 72 airports. Of the 405 lights, FAA determined after additional analysis, that 32 were not needed. Of the remaining 373, 175 lights had not been installed at 26 airports as of October 1995—up to 3 years after FAA identified the need for installing semiflush lights, and over 8 months after NTSB closed this recommendation on the basis of FAA's actions. Figure 5.1 shows the installation status of the 373 lights.

Figure 5.1: Status of Installation of Runway Edge Lights, as of October 1995



Of the 11 airports we visited, none had been identified as having these lighting deficiencies.

Delays Have Occurred in Installing Surface Detection Radar and Related Equipment

On January 18, 1990, at the Atlanta Hartsfield International Airport, an Eastern Airlines B-727 collided with an Epps Air Service Beechcraft King Air A100. The B-727 was landing on the same runway that the King Air A100 was preparing to turn off from after landing ahead of the B-727. As a result of the collision, the King Air A100 was destroyed and the B-727 incurred substantial damage. The pilot of the King Air was killed, and the copilot was seriously injured.

To augment visual observations of aircraft and/or vehicular movements on runways and taxiways or other movement areas and to help identify and preclude runway incursions such as the one described above, FAA has developed a special ground-mapping radar known as the Airport Surface Detection Equipment (ASDE). This radar provides tower controllers with surveillance of an airport's runways and taxiways and of any stationary or moving aircraft or vehicles on these surfaces under all weather conditions. FAA began developing an ASDE-3 system in the late 1970s to replace an earlier system. The new system was to be installed at 29 airports. FAA estimated that the first of these systems would be implemented in the field by March 1988 and the last of these systems would be implemented by April 1990. However, FAA has been slow in deploying and commissioning these systems.[5]

As a result of its investigation of the Atlanta accident in 1991, NTSB recommended on June 12, 1991, that FAA expedite funding the development and implementation of an operational system to alert controllers of impending runway incursions at all terminal facilities that are scheduled to receive the ASDE-3. The system that NTSB referred to in this recommendation is the Airport Movement Area Safety System (AMASS), which is designed to provide controllers using the ASDE-3 radar with audio and visual alerts. AMASS, a software enhancement to ASDE-3, cannot operate as a stand-alone system. AMASS cannot be installed at a location until ASDE-3 is operational. NTSB classifies this recommendation as "open—acceptable response," meaning that although the recommendation has not been fully implemented, FAA is taking action to do so.

FAA's initial estimates of the number of ASDE-3 systems to be installed at airports has increased to 38.[6] As of June 1996, 28 systems had been

[5]Commissioning occurs when the system has demonstrated, for a period of 30 consecutive days, operational availability at least 99.5 percent of the time.

[6]Two additional systems have been installed at FAA's Aeronautical and Technical Centers. These systems will not be commissioned because they will not be used for air traffic control.

installed at airports, and 23 of these had been commissioned. Table 5.2 shows the status of the installation and commissioning of these systems.

Table 5.2: Status of Installation and Commissioning of ASDE-3 Systems, as of June 1996

Status	Number
Systems commissioned	23
Systems installed but not commissioned	5
Systems awaiting delivery to airports	10
Total	**38**

Source: Based on information from FAA.

In a February 1995, letter to FAA, the NTSB Chairman stated that the 1994 accident in St. Louis, discussed in the beginning of this chapter, may have been prevented had AMASS been in use at that airport and suggested that FAA accelerate the commissioning of the ASDE-3 systems. NTSB stated that within 60 days of receipt of the letter, FAA should provide NTSB with a firm schedule for commissioning those systems that had been installed and adhere to that schedule.

In an April 14, 1995, response, FAA stated that it would adhere to its schedule for fiscal year 1995 to commission all 23 systems that had been delivered as of that date. At the time of its response, FAA had commissioned 12 of the 23 systems; dates were set for commissioning the remaining 11. However, FAA did not meet its schedule; by the end of fiscal year 1995, three systems had been commissioned as scheduled, two had been commissioned but later than their scheduled date, and six remained to be commissioned. As of April 1996, FAA had also fallen behind schedule for installing 6 of the 10 systems that remained to be installed. The last site installation is not expected until 1999.

Since AMASS cannot be installed until ASDE-3 is in place, delays with ASDE-3 will also delay AMASS. In addition, AMASS has experienced its own delays. For example, FAA's original estimated installation date for the last site has slipped from October 1999 to August 2000.

Ten of the airports we visited are scheduled to install ASDE-3, and 7 of them had commissioned systems in place. The controllers at these airports generally believed that the ASDE-3 is a vast improvement over the previous version. At two of the airports we visited, a prototype AMASS unit had been

used, but air traffic officials did not yet have enough experience with AMASS to allow us to measure their satisfaction with the system.

Conclusions

While FAA has taken actions to address the seven NTSB recommendations on runway safety that we examined, FAA's actions alone have not necessarily resolved the problems that led to the recommendations. Until the affected airports have fully completed the corrective actions, the problems may remain.

NTSB closes recommendations when FAA takes what NTSB considers as "acceptable action" on its recommendations. Acceptable actions may include, among other things, FAA's issuing of instructions or requirements to airports or its own field offices. If these requirements are not carried out in the field, they will not correct the problems that gave rise to the recommendations in the first place. While we found that for five of the seven NTSB recommendations that were classified as "closed—acceptable action," all actions needed to address the problems that gave rise to the recommendations were not yet completed. This situation is not unique to NTSB's recommendations. As discussed in chapter 1, DOT's Inspector General is currently performing an audit of the implementation of several of its recommendations that were closed as fully implemented because of concerns about actual in-the-field implementation. If corrective actions in the field are not periodically monitored, there is no assurance that actual corrective actions have been completed.

Recommendation

We recommend that the Secretary of Transportation instruct the Administrator of FAA to periodically monitor the implementation of critical safety recommendations and the actions needed to fully resolve the problems that gave rise to the recommendations at the field level and report the status to the Congress and the agency that made the recommendations.

Agency Comments and Our Evaluation

We discussed a draft of this report with DOT officials, including the managers of the National Runway Incursion Program, the Airport Safety and Operations Division, and the Recommendation Branch. DOT raised concerns about following up on all recommendations until in-the-field actions necessary to address the intent of the recommendations are complete. These officials said that they have insufficient resources to perform detailed follow-up on the implementation of all recommendations

at all certificated airports and other field locations. In a draft of this report, our proposed recommendation did not make a distinction about which recommendations warranted intensive follow-up. We recognize that FAA does face resource limitations that can limit its follow-up activities, and we have modified our recommendation, which now calls for FAA to periodically monitor in-the-field follow-up for those recommendations that are particularly critical to safety and to report the results of these efforts to the Congress and the agency that issued the recommendations.

Additionally, DOT disagreed with our discussion of actions on one NTSB recommendation dealing with airport sign systems. Specifically, DOT stated that our draft report went beyond NTSB's recommendation, which called for FAA to determine the most effective markings, signs, and procedures and issue an advisory circular to disseminate the information. DOT said that the inclusion of the status of the installation of the new sign systems in the draft report led the reader to believe that NTSB recommended that the signs be installed. Our draft report clearly pointed out that FAA fully implemented NTSB's recommendation with the issuance of the called-for advisory circular in 1991. We also explained in our draft report that we performed detailed field work to determine whether actions necessary to fully correct the problems that gave rise to NTSB's recommendations had been completed at airports. In this case, we determined whether airports were implementing the advisory circular by installing the new sign systems. Our draft report pointed out that almost all of the new sign systems had been installed as of August 1996, but this was more than 4 years after the recommendation had been closed by NTSB as a "closed—acceptable action." To address DOT's concerns, we have added a specific statement to the section in question clarifying why we included the status of the installation of the new sign systems. We believe our follow-up work on this 1986 NTSB recommendation illustrates the importance of our recommendation calling for FAA's periodic monitoring of critical safety recommendations or the actions needed to fully resolve the problems that gave rise to the recommendations, at the field level, and for reporting the results to the Congress and the agency that made the recommendations.

Objectives, Scope, and Methodology

At the request of Representative Collin C. Peterson, we examined the Federal Aviation Administration's (FAA) responsiveness to recommendations to improve aviation safety from GAO, the Department of Transportation's (DOT) Inspector General, and the National Transportation Safety Board (NTSB). We focused our review on two questions.

- What has been FAA's overall record in responding to, agreeing with, and implementing significant recommendations concerning aviation safety made by GAO and DOT's Inspector General from 1990 through 1994 as well as recommendations made by or added to NTSB's "Most Wanted" list of safety recommendations from 1990 through 1994?
- To what extent have GAO's specific recommendations made on aircraft certification, airline inspections and oversight of foreign carriers, and NTSB's recommendations concerning safety on runways been fully implemented?

To address these questions, we first established a universe of significant GAO, NTSB, and DOT Inspector General reports and recommendations from which we gathered statistical data and then selected a limited number of recommendations on which to perform detailed follow-up audit work on the actual implementation status of these recommendations at FAA locations and airports.

To determine which reports and recommendations to include in our review, we consulted with NTSB, DOT's Inspector General, and our own officials responsible for aviation work and reviewed documents in which significant reports or recommendations were indicated.[1] This enabled us to narrow down our initial listings of aviation safety reports and recommendations over the 5-year period from 1990 through 1994 to a more workable list of significant recommendations, which became our universe. Subsequently, we used the same method to select a limited number of recommendations, which we used to conduct follow-up audit work in the field.

Selection of Universe of Recommendations

To identify GAO's significant reports and recommendations, we relied on (1) our annual "Status of Open Recommendations" reports to the Congress, which list key open recommendations; (2) FAA's annual reports, which cite significant GAO reports; (3) the DOT Inspector General's reports to the Secretary of Transportation in 1993 and 1994, which cited GAO (and

[1]This initial information included 57 GAO reports and testimonies, 30 DOT Inspector General reports, and 714 NTSB recommendations issued to FAA from 1990 through 1994.

Inspector General) reports as the basis for the DOT Inspector General's recommendation that FAA's oversight and inspection activities be included as a high-risk area in the annual Federal Managers' Financial Integrity Act report to the President and the Congress; and (4) our testimony on aviation safety before the Senate Committee on Commerce, Science, and Transportation on January 12, 1995, which discussed significant GAO reports and recommendations. For NTSB's significant recommendations, NTSB officials of the Office of Safety Recommendations and Office of Aviation Safety suggested that we obtain NTSB's "Most Wanted" recommendations lists for 1990 through 1994 and consider any aviation safety recommendations made to FAA on these lists to be significant and thus eligible to be included in our universe.

To identify significant reports and recommendations by DOT's Inspector General, we reviewed (1) the Inspector General's semiannual reports to the Congress, which list reports and recommendations selected as significant; (2) FAA's annual reports, which refer to significant reports and recommendations by the DOT Inspector General; and (3) the DOT Inspector General's reports to the Secretary of Transportation in 1993 and 1994, as noted above.

This review resulted in a universe of 256 significant recommendations on aviation safety. The universe included 34 GAO reports and testimonies with 113 recommendations, 16 DOT Inspector General reports with 114 recommendations, and all 29 of NTSB's "Most Wanted" recommendations to FAA on lists from 1990 through 1994. These lists included 10 recommendations that dated from 1986. We then obtained data from NTSB's, the DOT Inspector General's, and our tracking systems on the status of each recommendation. We did not verify the accuracy of the overall data in the tracking systems. We also discussed and obtained data on the status of these recommendations from the FAA headquarters liaison offices responsible for tracking these recommendations. We reviewed NTSB's, DOT's, FAA's, the Office of Management and Budget's, and our own policies and procedures for responding to and tracking recommendations.

Selection of Recommendations for Detailed Follow-Up Work

From our universe, we initially selected 11 GAO, 7 NTSB, and 5 DOT Inspector General recommendations for detailed follow-up audit work to determine their actual implementation status, including the status of actions necessary to fully correct the problems that gave rise to the recommendations at selected FAA field locations and airports. These recommendations were chosen by consulting with NTSB, DOT's Inspector

General, and our own officials and by using the indicators of significance discussed earlier. The GAO recommendations chosen were in the areas of aircraft certification, safety inspections, and oversight of foreign carriers. The NTSB recommendations relate to actions to reduce runway incursions at airports. The NTSB safety issue arising from runway incursions represents over half of NTSB's "Most Wanted" recommendations to FAA for the 5-year period covered by this report. The five recommendations by DOT's Inspector General involved FAA's inspection activities that were covered in an important 1992 audit by the Inspector General and classified as "closed and fully implemented." However, the Deputy Assistant Inspector General for Audits told us that because his office was also concerned about whether the recommendations on inspections in that report were being effectively implemented by FAA, the office was conducting a follow-up review involving the same recommendations we had identified as significant candidates for our follow-up work. To avoid duplication, we agreed with the DOT Inspector General's office not to conduct any follow-up work on these recommendations.

We chose our field locations to obtain geographical diversity and to allow us to follow up on a number of recommendations at each location. Appendix II shows the locations we visited by safety issue. However, not all the recommendations applied to all of the locations visited. The information developed at these locations cannot be generalized to our larger universe. The locations we visited included FAA headquarters, 3 FAA regional offices, 11 FAA flight standards district offices, 2 FAA international field offices, 2 FAA aircraft certification offices, and 2 FAA certificate management offices. We also visited 11 airports and met with FAA's air traffic control staff and the airports' operating staff. The following sections describe our detailed follow-up work.

Recommendations Concerning Aircraft Certification

Our objectives were to determine if FAA had implemented our recommendations to ensure that its staff are effectively involved in the certifications process and have the necessary technical assistance and training. We discussed the recommendations with officials from FAA headquarters, including the Director and Deputy Director of the Aircraft Certification Service, and two aircraft certification offices to determine the progress made by FAA in implementing the report's recommendations. We also reviewed relevant FAA documents and data.

To determine if FAA ensures that its staff are effectively involved in the certification process, we reviewed and discussed FAA's guidance with

headquarters officials and interviewed 2 managers and 17 other officials in the aircraft certification offices to obtain their views on the agency's involvement in the process since 1993. To determine if FAA provides its engineers with the technical assistance and training needed to evaluate the latest technologies, we interviewed FAA headquarters officials from the Aircraft Engineering Division on their implementation of the National Resource Specialist Program and discussed with the 2 managers and 17 staff of the certification offices the extent to which they involve the national resource specialists in the certification process. To evaluate FAA's training program for certification staff, we interviewed the same certification officials, three headquarters officials from the Program Planning and Analysis Branch, and the Director of the Aircraft Certification Service. We also reviewed pertinent training plans and documents to determine the progress made by FAA in its initiatives to improve staff members' technical competence.

Recommendations on the Airline Inspection Program

Our objectives were to determine if FAA has implemented our recommendations to improve its inspection reporting system by (1) completing its efforts to provide inspectors with clear and distinctive definitions of the comment codes used to classify the airlines' problems into broad categories, (2) requiring inspectors to record corrective actions taken for identified problems, and (3) developing a risk-assessment system to make more effective use of its limited inspection resources.

We reviewed FAA's guidance for inspectors for reporting inspection results, including the use of comment codes and the recording of corrective actions taken by air carriers and discussed this guidance with FAA headquarters officials. In addition, we interviewed 68 FAA inspectors about their use of FAA's system for reporting inspection results and the way they record corrective actions taken in response to identified deficiencies. In addition, we discussed with officials at FAA headquarters the plans and status of FAA's efforts to develop its risk-assessment system. We performed work at FAA headquarters in Washington, D.C., and at three FAA regional offices. We also interviewed inspectors and reviewed documents at 11 FAA Flight Standards District Offices.

Recommendations on Oversight of Foreign Carriers

Our objectives were to determine if FAA had implemented our recommendations to (1) give priority to assessing the oversight capabilities of countries with serious safety problems, (2) require its field offices to perform comprehensive inspections of foreign air carriers that

fly into the United States, and (3) promptly notify field offices of serious safety concerns about foreign carriers.

We discussed FAA's efforts to assess the oversight capabilities of foreign civil aviation authorities with FAA headquarters officials. We reviewed pertinent documents and obtained the results of assessments performed thus far by FAA. We discussed inspections of foreign carriers with officials at FAA headquarters and two international field offices and reviewed related documentation to determine what changes had been made relating to the issues raised in our recommendations. We also interviewed 22 field inspectors who perform inspections of foreign carriers to determine the (1) extent and comprehensiveness of these inspections and (2) actions that FAA headquarters takes to notify the field inspectors when it becomes aware of safety concerns about foreign carriers. Also, to determine if field offices were performing comprehensive inspections, we analyzed FAA's inspection records for 20 of 73 foreign carriers that have appeared on FAA's quarterly "special emphasis" inspection list for an 18-month period (Apr. 1, 1994, through Sept. 30, 1995).

Recommendations on Runway Incursions

Our objectives were to determine if FAA had implemented NTSB's recommendations aimed at reducing runway incursions and to determine the status of the corrective actions taken at the airports where such actions were needed. NTSB's recommendations involved (1) visibility from the control tower, (2) airport signs and marking standards, (3) airports' operations in low-visibility conditions, (4) complex runway intersections, (5) special highly reflective paint for surface markings, (6) runway edge lights, and (7) radars and related systems to alert controllers of pending runway incursions. We performed our work at NTSB and FAA headquarters. At NTSB headquarters, we reviewed the studies and reports leading to the recommendations and data on the status of FAA's actions on these recommendations. At FAA headquarters, we reviewed documents relating to the overall status of the recommendations and the status of the actions relating to the recommendations at affected airports. At the 11 airports we visited, we reviewed documents and actions to implement the applicable recommendations with 24 airport management officials, 18 officials from the FAA airport tower managers' offices, 33 FAA air traffic controllers, 7 FAA supervisory air traffic controllers, 9 representatives of the National Air Traffic Controllers Association, 8 FAA airport safety certification inspectors, and 4 FAA radar technicians. We also accompanied an airport certification inspector on an inspection of one airport's lights and signs.

Locations Visited for Detailed Follow-Up Work

Aircraft Certification	Aircraft Certification Service, FAA, Washington, D.C. Aircraft Certification Office, FAA, Renton, Wash. Aircraft Certification Office, FAA, Lakewood, Calif.
Air Carrier Inspection	Flight Standards Service, FAA, Washington, D.C. Flight Standards District Office, FAA, Atlanta, Ga. Flight Standards District Office, FAA, Baltimore, Md. Flight Standards District Office, FAA, Chantilly, Va. Flight Standards District Office, FAA, Charlotte, N.C. Flight Standards District Office, FAA, Denver, Colo. Flight Standards District Office, FAA, Fort Lauderdale, Fla. Flight Standards District Office, FAA, Los Angeles, Calif. Flight Standards District Office, FAA, Miami, Fla. Flight Standards District Office, FAA, Portland, Oreg. Flight Standards District Office, FAA, Seattle, Wash. Flight Standards District Office, FAA, Van Nuys, Calif. Certificate Management Office, FAA, Atlanta, Ga. Certificate Management Office, FAA, San Francisco, Calif.
Oversight of Foreign Air Carriers	Flight Standards Service, FAA, Washington, D.C. Flight Standards District Office, FAA, Atlanta, Ga. Flight Standards District Office, FAA, Baltimore, Md. Flight Standards District Office, FAA, Chantilly, Va. Flight Standards District Office, FAA, Charlotte, N.C. Flight Standards District Office, FAA, Denver, Colo. Flight Standards District Office, FAA, Fort Lauderdale, Fla. Flight Standards District Office, FAA, Los Angeles, Calif. Flight Standards District Office, FAA, Miami, Fla. Flight Standards District Office, FAA, Seattle, Wash. International Field Office, FAA, Miami, Fla. International Field Office, FAA, San Francisco, Calif.
Runway Incursions	National Transportation Safety Board, Washington, D.C. Various FAA offices, Washington, D.C. FAA Northwest Mountain Region, Airports Division, Renton, Wash. FAA Southern Region, Airports Division, Atlanta, Ga. FAA Western-Pacific Region, Airports Division, Los Angeles, Calif.

Hartsfield-Atlanta International Airport, Atlanta, Ga.
Baltimore-Washington International Airport, Baltimore, Md.
Charlotte-Douglas International Airport, Charlotte, N.C.
Denver International Airport, Denver, Colo.
Dulles International Airport, Chantilly, Va.
Fort Lauderdale-Hollywood International Airport, Fort Lauderdale, Fla.
Los Angeles International Airport, Los Angeles, Calif.
Miami International Airport, Miami, Fla.
Portland International Airport, Portland, Oreg.
San Francisco International Airport, San Francisco, Calif.
Seattle-Tacoma International Airport, Seattle, Wash.

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