
Office of Inspector General

Audit Report

*Follow-up Review of FAA's
Runway Safety Program*

*Federal Aviation Administration
Department of Transportation*

*Report Number: AV-1999-114
Date Issued: July 21, 1999*






Memorandum

U.S. Department of
Transportation
Office of the Secretary
Of Transportation
Office of Inspector General

Subject: **ACTION:** Report on Follow-up Review of FAA's
Runway Safety Program
Report No. AV-1999-114

Date: July 21, 1999

From: Alcxis M. Stefani 
Deputy Assistant Inspector General for Aviation

Reply to
Attn of: JA-10: x60500

To: Federal Aviation Administrator

This report summarizes our follow-up audit of FAA's Runway Safety Program (formerly known as the Runway Incursion Program). We are providing this report for your information and use. In preparing this report, we considered FAA's July 16, 1999 comments to our draft report. A synopsis of the report follows this memorandum.

We consider your actions taken and planned to be responsive to five of our six recommendations. These recommendations are considered resolved subject to the follow-up provisions of Department of Transportation Order 8000.1C. However, we request further clarification on your response to our recommendation to complete an investment analysis to determine actual funding requirements for 1998 Action Plan initiatives for fiscal year (FY) 2001 and beyond and request the amounts in future budgets. While FAA initially planned to address both technological and operational needs for the Runway Safety Program in its investment analysis, FAA now plans to limit its investment analysis to technological needs which will be funded with Facilities and Equipment funds. Therefore, it is unclear as to how FAA will identify and set aside funds to address Runway Safety Program initiatives for FY 2001 and beyond which require Operations funds. Accordingly, we request that you provide further clarification by August 6, 1999 to resolve this recommendation.

We appreciate the cooperation and assistance provided by your staff during the audit. If I can answer any questions or be of further assistance, please feel free to call me at (202) 366-0500, or Richard Kaplan, Program Director for Automation and Infrastructure, at (202) 366-1402.

#

Follow-up Review of FAA's Runway Safety Program

Federal Aviation Administration

AV-1999-114

July 21, 1999

Objectives

The objectives of the audit were to monitor FAA's progress in implementing its 1998 Airport Surface Operations Safety Action Plan (1998 Action Plan), which included actions to satisfy our prior audit recommendations. Additionally, we reviewed FAA's progress in developing and deploying the Airport Movement Area Safety System (AMASS). AMASS is a system designed to monitor airport surface traffic and alert air traffic controllers to potential collisions.

Background

On February 9, 1998, we issued Report on Audit of the Runway Incursion Program (Report Number AV-1998-075), on the adequacy of FAA's efforts in meeting its goal of reducing runway incursions. We reported runway incursions had increased 54 percent during 1993 through 1996, and that FAA's Runway Incursion Program (now called the Runway Safety Program) needed to be strengthened. We found that the 1995 Runway Incursion Action Plan, designed to coordinate systemwide runway incursion prevention initiatives, was not working as intended. Additionally, we found that regional offices did not focus their efforts on local solutions to identify and correct airport specific problems. We made eight recommendations to assist in reversing the upward trend in runway incursions.

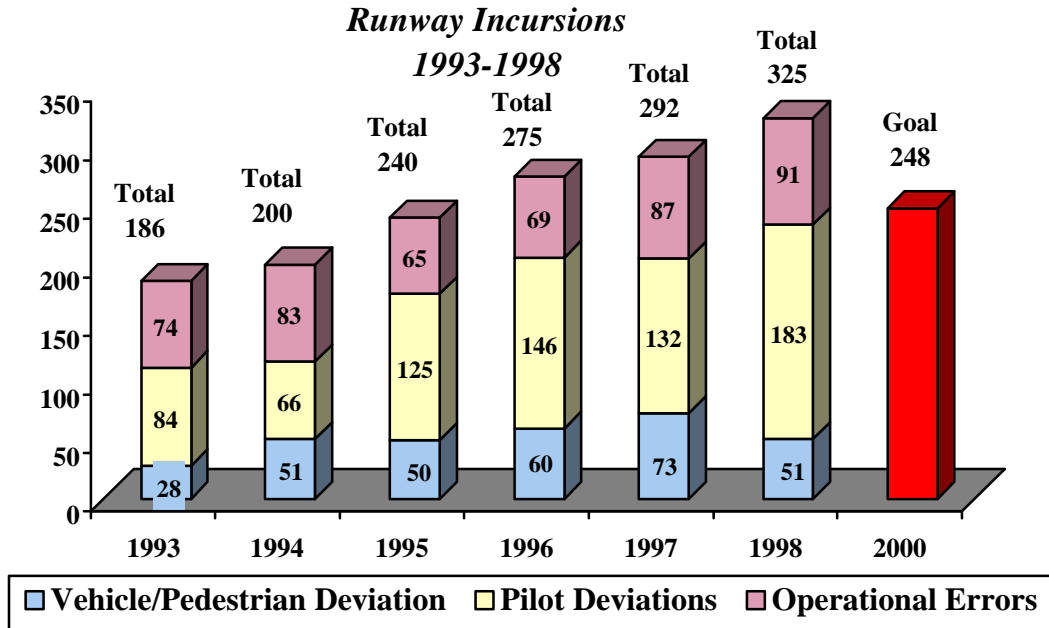
In a December 11, 1997 memorandum, FAA agreed to implement all eight recommendations by the end of 1998. FAA planned to develop a new Runway Incursion Action Plan, with industry input, which would include measurable goals and accountability both at the Headquarters and Regional level. FAA also agreed to establish regional focus on local runway incursion prevention activities and coordinate regional and headquarters efforts to reduce runway incursions. Further, FAA agreed to focus on projects to reduce pilot deviations and improve runway incursion data.

FAA defines a runway incursion as "any occurrence at an airport involving an aircraft, vehicle, person or object on the ground that creates a collision hazard or results in a loss of separation with an aircraft taking off, intending to take

off, landing, or intending to land.” FAA’s definition applies only to airports with operating air traffic control towers. Runway incursions can have serious consequences. Eleven runway accidents dating back to 1972 have claimed a total of 719 lives and destroyed 20 aircraft. Since 1990, 4 major runway accidents have claimed 45 lives. Reducing runway incursions has been on the National Transportation Safety Board annual “Most Wanted” list of transportation safety improvements since the inception of the list in 1990.

Results-in-Brief

FAA’s Runway Safety Program continues to be ineffective in reducing runway incursions. Following up on prior action plans in 1991 and 1995, FAA established a 1998 Action Plan to strengthen FAA’s runway incursion prevention efforts. The plan included goals, objectives, and actions to reduce the number of runway incursions by 15 percent of the 1997 baseline level of 318 by the year 2000, which is 270 occurrences. Since issuing the Action Plan, FAA changed the 1997 baseline level to 292 runway incursions, and its goal for reducing runway incursions by the year 2000 is now 248 (15 percent of 292) occurrences. However, as shown on the following chart, the upward trend in runway incursions continued with 325 incursions in 1998, an 11 percent increase from 1997, primarily attributed to increases in pilot deviations.



The chart shows runway incursions from 1993 through 1998 by the three types of runway incursions: vehicle or pedestrian deviations, pilot deviations, and

operational errors. Vehicle or pedestrian deviations involve the presence of vehicles, non-pilot operated aircraft, or pedestrians on runways or taxiways without authorization from a controller. Pilot deviations are errors that violate Federal Aviation Regulations. For example, a pilot fails to follow air traffic controller instructions to stop short of an active runway, causing another aircraft to abort its departure or arrival. Operational errors are occurrences attributable to air traffic control which result in less than the required separation between aircraft.

The primary cause for the increase in runway incursions during 1998 continues to be attributed to pilot deviations, which accounted for 56 percent of the 325 runway incursions. Further analysis of the 183 pilot deviations in 1998 shows that 119, or 65 percent, of the pilot deviations were attributed to general aviation aircraft. FAA does not maintain data to identify whether commercial aircraft or general aviation aircraft were involved in operational errors.

Runway incursions continue to be a serious problem in 1999. FAA's data show that runway incursions from January through June 1999 remain at a high level. There were 149 runway incursions during the first 6 months of 1999 as compared to 150 incursions during the first 6 months of 1998. The following examples of two recent near collisions on the runway show the severity of runway incursions and the potential for a serious accident.

- *On April 1, 1999, a Korean Air passenger jet taking off from O'Hare International Airport in Chicago narrowly averted a collision when its pilot veered sharply away from a cargo plane that had taxied onto the runway and into its path.*
- *On June 28, 1999, an Air France 747 freighter crossed an active runway at New York Kennedy Airport while an Icelandair 757 was lifting off, which nearly resulted in an accident.*

In our opinion, FAA's progress in reducing runway incursions has been too slow. Stronger oversight is needed to ensure follow-through on planned initiatives to reduce runway incursions, including projects to reduce pilot deviations. Without immediate progress in implementing its plan, it is unlikely that FAA will achieve its goal of reducing runway incursions by 15 percent by the year 2000 and mitigate the risk of a tragic runway accident.

Further, FAA has not identified all actions and funding necessary to reduce runway incursions. Also, developmental and operational problems continue with the Airport Movement Area Safety System (AMASS), a major technology

based initiative to help air traffic controllers respond to human errors. AMASS will not meet its August 2000 deployment date for the last system because of unresolved human factors issues and the revised delivery date has yet to be determined.

Limited Progress Made in Implementing 1998 Action Plan Initiatives

In October 1998 FAA issued its 1998 Action Plan to strengthen runway incursion prevention efforts, and establish an overall goal for reducing runway incursions by the year 2000. There were 51 required actions in the plan with near-term and long-term actions with milestone dates covering a 4-year period. It identifies goals, objectives, and actions to be implemented encompassing management and procedural changes; pilot/controller education and training initiatives, technology-based initiatives, airport improvements, and increased incursion awareness efforts.

To evaluate FAA's progress in implementing its 1998 Action Plan, we determined whether FAA had implemented a series of near-term actions that were most likely to reduce runway incursions as called for in the plan. We reviewed the status of 23 of 51 actions with scheduled completion dates through January 1999 and found that FAA completed 8 of the 23 actions. For example, FAA issued its 1998 Action Plan to increase emphasis on results and accountability for the Runway Safety Program. FAA also, through MITRE Corporation, completed a controller survey to identify causal factors of runway incursions from the controller perspective.

However, FAA had not implemented 15 of the 23 near-term actions, (65 percent), within established milestone dates as shown on the following chart.

Analysis of 23 Near Term Actions by Goal

Major Goal	# of Actions Required	# of Actions Not Implemented	Percent of Actions Not Implemented
Management and Procedural Changes	16	10	63
Pilot Education, Training, & Incursion Awareness Efforts	2	2	100
Technology-Based Initiatives	2	1	50
Airport Improvements	3	2	67
Total	23	15	65

We analyzed the 15 actions that had not been implemented and found slippages from 5 to 13 months. For example, a project to improve aircraft lighting and aircraft visibility was 13 months behind its December 1998 milestone date. Also, the last installation of the Airport Surface Detection Equipment-3 (ASDE-3), technology to identify potential conflicts on the runway, is 11 months behind its January 1999 completion date shown in the Action Plan.

We noted that 4 of the 10 actions to address management and procedural changes which were not completed related to recommendations made in our prior report. FAA partially completed actions by establishing regional focal points from Air Traffic, Flight Standards, and Airports Divisions in each region, and drafting procedures on surface incident prevention plans. The plans are to be completed by Surface Incident Prevention Teams after conducting annual evaluations at airports. These two actions were not complete because Runway Safety Program standard operating procedures for regional focal points and Surface Incident Prevention Teams were not finalized.

Further, FAA had not implemented controls to ensure the accuracy of runway incursion data. We found that final investigative reports of runway incursions were not being prepared and forwarded by field offices within the required timeframe to enable FAA Headquarters to validate the incident as a runway incursion. During our audit, FAA discontinued using preliminary and final investigative reports and now uses daily alert bulletins to identify and count runway incursions. Using the daily alert bulletins may be an effective approach, but we did not have an opportunity to evaluate this process for counting runway incursions. Moreover, written procedures to ensure the accuracy of runway incursion data using the daily alert bulletins have not been

finalized. Also, FAA developed an improved vehicle/pedestrian deviation reporting form, but had not yet issued the form.

In April 1999, FAA issued a program implementation plan to provide a central management structure and system-wide approach to accomplish FAA's goals and objectives called for in the 1998 Action Plan. Additionally, the program implementation plan establishes a system to track milestones. We discussed the slippages in planned initiatives in the 1998 Action Plan with the Program Director for Air Traffic Operations. He agreed that while the program implementation plan establishes a system to track milestones, there is a lack of central oversight authority to ensure that established milestones for planned initiatives are met.

All Actions and Funding Have Not Been Identified

Further, FAA has not identified all actions and funding necessary to reduce runway incursions. Even though the 1998 Action Plan identified 51 actions to reduce runway incursions, FAA is now conducting an investment analysis to identify further actions to prevent runway incursions which involve technology initiatives. FAA has only identified limited funds to support initiatives in its 1998 Action Plan for fiscal year (FY) 1999, and has yet to establish a budget for FY 2000. The investment analysis when completed will only address funding requirements for technology initiatives for FY 2001 and forward. However, the investment analysis will not be completed until January 2000, 15 months after issuance of the 1998 Action Plan.

AMASS Continues to Experience Problems

In 1991, the National Transportation Safety Board (NTSB) recommended that FAA expedite efforts to develop and implement a system to alert controllers of pending runway incursions. The recommendation was made after a runway incursion caused an accident on the runway at Atlanta Hartsfield International Airport in January 1990. NTSB then listed runway incursions on its "Most Wanted" list of transportation safety improvements in 1990 and it has been on the list for the past 10 years. In August 1991, FAA advised NTSB that AMASS would address the intent of the Board's safety recommendation. AMASS is a system that continually monitors airport surface traffic and automatically alerts air traffic controllers to potential conflicts. AMASS is currently installed and undergoing testing at Detroit, St. Louis, and Atlanta airports.

AMASS has experienced cost increases and schedule delays due to software development and human factors issues. The contract was awarded in September 1990. In 1993, AMASS was estimated to cost \$59.8 million and be installed in 1996. By December 1998, the cost estimate increased to \$89.8 million.¹ FAA plans to install 40 AMASS at 34 airports nationwide. In August 1996, FAA advised NTSB that the last AMASS delivery is scheduled for August 2000, 4 years later than anticipated. FAA continues to experience developmental problems with AMASS which will prevent delivery of the last AMASS by August 2000.

Software development problems have been the primary cause for cost increases and schedule delays. As an example, software development problems delayed installation and testing of the system in Atlanta by 6 weeks and cost an additional \$300,000. Between December 1996 to October 1998, software development problems delayed the system by 13 months and increased cost by \$4.8 million.

Unresolved human factors issues are now causing additional delays. In October 1998, an FAA/National Air Traffic Controllers Association workgroup was formed to resolve various issues with AMASS. At the request of the workgroup, FAA's Human Factors Branch evaluated 5 human factor concerns of the workgroups and issued a quick look report in April 1999 detailing 14 issues. For example, the AMASS alert message on the ASDE-3 display is not readable beyond 10 feet, which is a concern since controllers are often further than 10 feet from the display during their normal operations. The workgroup has determined that 9 of the 14 issues need to be resolved now. FAA needs to revise the AMASS schedule to incorporate the most urgent human factors changes and identify and request additional funds needed.

In addition to developmental problems, AMASS is experiencing operational problems. For example, even when the 40 systems are deployed, FAA will initially limit AMASS capabilities to detecting conflicts that **occur on all active runways** for arrivals and departures. Controllers will not be alerted to potential conflicts that involve traffic on runways or taxiways that intersect the active runways. As AMASS is adapted to each site, additional areas of coverage may be added.

Observations on Runway Safety Program Compliance with Government Performance and Results Act Requirements

¹ Total funds obligated for AMASS, as of May 31, 1999, are \$74.2 million.

The Government Performance and Results Act requires agencies to prepare annual performance plans covering each program activity set forth in their budgets. Among other things, the plans are to contain clear, outcome-oriented annual goals. The Department of Transportation's 1999 Performance Plan established a goal to reduce runway incursions by 15 percent of the calendar year 1997 level of 318 runway incursions by the year 2000, which is 270 occurrences. During our audit, FAA data indicated the number of runway incursions that occurred in calendar year 1997 was 292 and not 318. This occurred because the 318 number included runway incursions that were counted twice and other incidents that were incorrectly classified as runway incursions.

While the number of runway incursions in 1997 changed, FAA had not notified the Department's Office of Budget and Programming that the baseline used in the 1999 Performance Plan was no longer correct. The Department's 2000 Performance Plan also uses the 318 figure as the 1997 baseline. Adopting 292 as the new 1997 baseline lowers the year 2000 goal to 248 (a 15 percent reduction from 292). We brought this to the attention of FAA's Program Director for Air Traffic Operations who agreed to change the baseline to 292 and the year 2000 goal to 248. The Department's Office of Budget and Programming was verbally informed by FAA Air Traffic officials of the revised goal on June 2, 1999. FAA should formally submit the 1997 baseline change in writing.

Recommendations

We recommend that FAA:

- Establish central oversight authority to ensure follow-through on initiatives in the 1998 Action Plan to reduce runway incursions.
- Develop operating procedures for regional focal points, surface incident prevention plans, and controls for ensuring the accuracy of runway incursion data, by finalizing its Runway Safety Program standard operating procedures.
- Issue its new vehicle/pedestrian form and procedures.
- Identify funding requirements for initiatives in the 1998 Action Plan with milestone dates in FY 1999 and FY 2000, and set aside funds to support those initiatives.

- Complete the investment analysis to determine actual funding requirements for 1998 Action Plan initiatives for FY 2001 and beyond and request the needed amounts in future budgets.
- Revise the AMASS schedule to incorporate the most urgent human factors changes and identify and request additional funds needed.

Management Position

FAA concurred with all six of our recommendations and agreed to take the following action.

- FAA stated that direction is needed from higher levels to ensure controls in all lines of business to follow through on initiatives in the 1998 Action Plan. On June 4, 1999, FAA initiated monthly meetings with the Administrator and Associate Administrators to provide such direction.
- FAA issued standard operating procedures on June 30, 1999 for the Runway Safety Program.
- FAA stated that the revised vehicle/pedestrian form was developed and submitted to the Office of Accident Investigation on June 1, 1999, to be incorporated into the next change to FAA Order 8020.11, Aircraft Accident and Incident Notification, Investigation, and Reporting. FAA plans to have the revised form available electronically in September 1999 through the National Airspace Information Monitoring System.
- FAA stated that funding strategies (including Facilities and Equipment; Research Equipment, and Development; and Operations funds) for 1998 Action Plan initiatives targeted for completion during FY 1999 and FY 2000 will be completed no later than August 1999. FAA also stated that recent Senate language includes \$2.5 million in operational dollars to be used specifically for completion of Action Plan tasks and associated Runway Safety Program initiatives. Also, funding requests have been placed in FY 2000 and FY 2001 budget cycles for most technology initiatives.
- FAA stated that the Investment Analysis Plan was approved in June 1999. The first set of recommendations will be forwarded to the Joint Resources Council in January 2000 and the second set in October 2000. The Investment Analysis currently addresses future technology issues. Future operational and non-technological funding requirements for the Runway

Safety Program have been identified and will be addressed through FAA's budget process.

- FAA stated that proposed human factors changes have been prioritized and incorporated into AMASS program plans. Associated funding requirements have been identified. FAA plans to complete the proposed human factors modification in three phases based on need, priority, and development complexity. Ten human factors modifications for the first two phases will be completed by May 2000. Two remaining human factors changes will be completed in phase 3, to be considered under ASDE-3 Service Life Extension Program and AMASS Preplanned Product Improvements.

Office of Inspector General Comments

With the exception of FAA's response to our fifth recommendation, we consider actions taken and planned to be responsive to our recommendations. However, FAA did not clearly respond to our recommendation to complete an investment analysis to determine actual funding requirements for 1998 Action Plan initiatives for fiscal year (FY) 2001 and beyond and request the amounts in future budgets. While FAA initially planned to address both technological and operational needs for the Runway Safety Program in its investment analysis, FAA now plans to limit its investment analysis to technological needs which will be funded with Facilities and Equipment funds. Therefore, it is unclear as to how FAA will identify and set aside funds to address Runway Safety Program initiatives for FY 2001 and beyond which require Operations funds. We have requested FAA to provide additional clarification on the actions they proposed in response to this recommendation.

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I. INTRODUCTION

Background

In November 1997 the Inspector General testified on FAA's Runway Incursion Program before the House Subcommittee on Aviation, Committee on Transportation and Infrastructure. Subsequently, on February 9, 1998, we issued Report Number AV-1998-075, Report on Audit of the Runway Incursion Program, on FAA's efforts in meeting its goal of reducing runway incursions. We reported runway incursions had increased 54 percent from 1993 to 1996, and that FAA's Runway Incursion Program (now called the Runway Safety Program) needed to be strengthened. We found that the 1995 Runway Incursion Action Plan, designed to coordinate systemwide runway incursion prevention initiatives, was not working as intended. Also, regional offices did not focus their efforts on local solutions to identify and correct airport specific problems. We made eight recommendations to assist in reversing the upward trend in runway incursions.

In a December 11, 1997 memorandum, FAA agreed to implement all eight recommendations by the end of 1998. FAA planned to develop a new Runway Incursion Action Plan, with industry input, which would include measurable goals and accountability both at the Headquarters and Regional level. FAA also agreed to establish regional focus on local runway incursion prevention activities and coordinate regional and headquarters efforts to reduce runway incursions. Further, FAA agreed to focus on projects to reduce pilot deviations and improve runway incursion data.

In response to our prior recommendations, FAA issued its 1998 Airport Surface Operations Safety Action Plan (1998 Action Plan) in October 1998. The Action Plan assigned specific responsibilities to oversee and coordinate various tasks with targeted completion dates, and set a goal to reduce incursions by 15 percent of the 1997 baseline of 318¹ by the year 2000. It identifies goals, objectives, and actions that address management and procedural changes, airport improvements, technology-based efforts, and incursion awareness efforts through education and training. The 1998 Action Plan represents a systemwide, multifaceted strategy to improve airport surface operations and reduce incidents and accidents directly attributable to runway incursions.

FAA defines a runway incursion as "any occurrence at an airport involving an aircraft, vehicle, person or object on the ground, that creates a collision hazard

¹ The 1997 baseline of 318 runway incursions was based on preliminary data. Data provided by FAA indicate that the 1997 baseline level of runway incursions is actually 292.

or results in the loss of separation with an aircraft taking off, intending to take off, landing, or intending to land.” FAA’s runway incursion definition only applies to airports with operating air traffic control towers. Runway incursions can have serious consequences. Eleven runway accidents dating back to 1972 have claimed a total of 719 lives and destroyed 20 aircraft. Since 1990, 4 major runway accidents have claimed 45 lives. Reducing runway incursions has been on the National Transportation Safety Board’s (NTSB) annual “Most Wanted” list of transportation safety improvements since the inception of the list in 1990.

Runway incursions are classified into three categories: pilot deviations, operational errors/deviations, and vehicle/pedestrian deviations. Pilot deviations are errors by a pilot that violate Federal Aviation Regulations. For example, a pilot fails to follow air traffic controller instructions to stop short of an active runway, causing another aircraft to abort its departure or arrival. Operational errors/deviations are occurrences attributable to air traffic control that result in less than the required separation between aircraft. Vehicle/pedestrian deviations involve the presence of vehicles, non-pilot operated aircraft, or pedestrians in runways or taxiways without authorization from a controller.

FAA’s runway incursion mitigation efforts consist of a wide range of initiatives that cross four lines of business within FAA². The Runway Safety Program Office located within Air Traffic Operations, serves as the focal point for both FAA headquarters and regional offices. The Runway Safety Program Office works with Flight Standards, Airports, and the Air Traffic Resource Management Program to collect and analyze incursion data. In addition, the Office of Research and Acquisitions is responsible for developing and deploying technologies to assist air traffic controllers in preventing runway accidents. Such efforts include the deployment of Airport Surface Detection Equipment-3 (ASDE-3) (an airport surface radar) and development of the Airport Movement Area Safety System (AMASS). AMASS is a system designed to monitor airport surface traffic and alert air traffic controllers to potential collisions. AMASS uses data from the ASDE-3 to identify aircraft, vehicles and pedestrians on the airport surface.

² The four lines of business are FAA’s Air Traffic, Flight Standards, Airports, and Research and Acquisitions.

Objectives, Scope, and Methodology

The objectives of the audit were to monitor FAA's progress in implementing its 1998 Airport Surface Operations Safety Action Plan (1998 Action Plan), which included actions to satisfy our prior audit recommendations. Additionally, we reviewed FAA's progress in developing and deploying AMASS.

We performed the audit during the period October 1998 through April 1999, and covered the period February 1998 to April 1999. We also used runway incursion data from 1993 through June 1999. The audit was performed at FAA Headquarters, and the Eastern, New England and Western-Pacific Regions. We conducted meetings with officials at Northrop Grumman Norden Systems, Inc., Volpe National Transportation Systems Center, and the NTSB.

We evaluated FAA's progress to reduce the upward trend in runway incursions. We reviewed the current status of 1998 Action Plan initiatives, including actions taken in response to recommendations in our prior audit report, through discussions with FAA program officials and reviewing FAA's draft Program Implementation Plan. We evaluated FAA's progress in developing and deploying the AMASS by discussing AMASS cost, schedule, and technical issues with FAA and contractor officials. We also reviewed and analyzed AMASS contract and program related information. Finally, we determined whether FAA's Runway Safety Program was in compliance with the 1993 Government Performance and Results Act requirements.

The audit was performed in accordance with the Government Auditing Standards prescribed by the Comptroller General of the United States. The audit included such tests of procedures and records as were considered necessary in the circumstances.

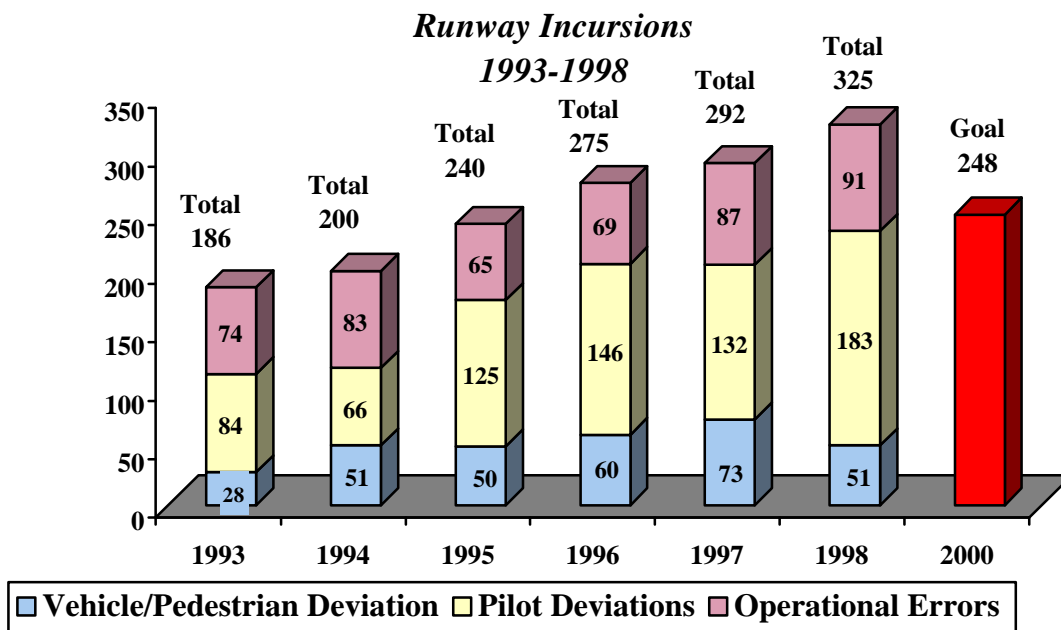
II. FINDING AND RECOMMENDATIONS

FAA's Runway Safety Program continues to be ineffective in reducing runway incursions. Following up on prior Action Plans in 1991 and 1995, FAA established a 1998 Action Plan to strengthen FAA's runway incursion prevention efforts. The plan included goals, objectives, and actions to reduce the number of runway incursions by 15 percent of the 1997 baseline level of 318 by the year 2000, which is 270 occurrences. Since issuing the Action Plan, FAA changed the 1997 baseline level to 292 runway incursions, and its goal for reducing runway incursions by the year 2000 is now 248 (15 percent of 292) occurrences. However, as shown on the chart below, the upward trend in runway incursions continued with 325 incursions in 1998, an 11 percent increase from 1997, primarily attributed to increases in pilot deviations.

While FAA's 1998 Action Plan provided a sound foundation to reduce the number of runway incursions, limited progress has been made in implementing actions in the plan. Further, FAA has not identified all actions and funding necessary to completely implement the plan and is preparing an investment analysis to identify further initiatives to reduce runway incursions. Also, the Airport Movement Area Safety System (AMASS) will not meet its August 2000 delivery date for the last system because of unresolved human factors issues.

Finding: Progress to Reduce Runway Incursions Has Not Been Made

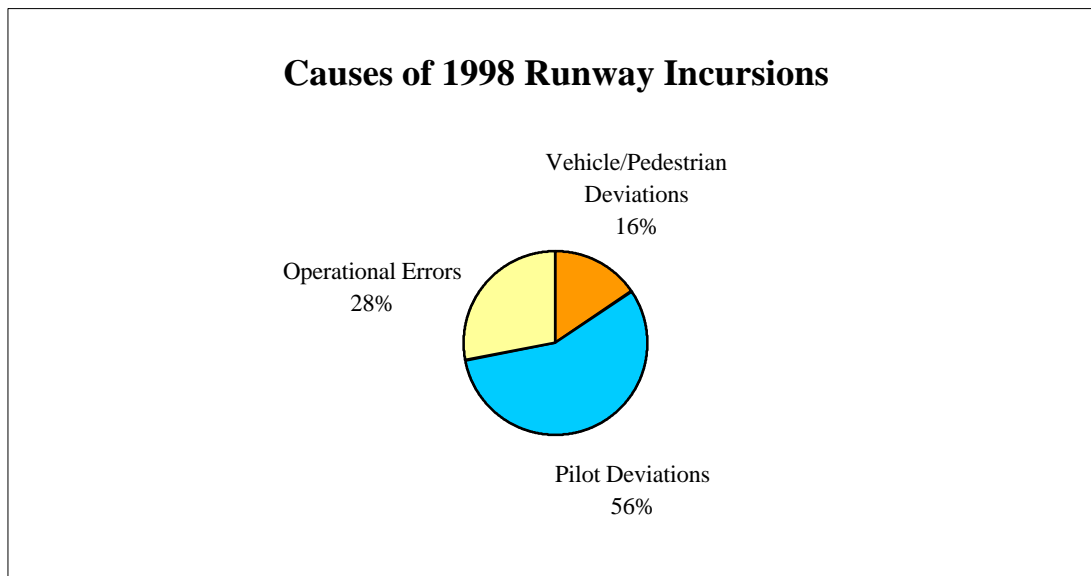
As shown on the chart below, runway incursions continue to increase:



The chart on the previous page shows runway incursions from 1993 through 1998 by the three types of runway incursions: vehicle or pedestrian deviations, pilot deviations, and operational errors. Vehicle or pedestrian deviations involve the presence of vehicles, non-pilot operated aircraft, or pedestrians on runways or taxiways without authorization from a controller. Pilot deviations are errors that violate Federal Aviation Regulations. For example, a pilot fails to follow air traffic controller instructions to stop short of an active runway, causing another aircraft to abort its departure or arrival. Operational errors are occurrences attributable to air traffic control which result in less than the required separation between aircraft.

While the number of runway incursions has been increasing, the rate has also risen in relation to the number of airport operations. FAA data indicate that runway incursion rates increased from 0.47 per 100,000 airport operations in 1997 to 0.52 in 1998.

The primary causes for the increase in runway incursions during 1998 continues to be attributed to pilot deviations, which accounted for 56 percent of the 325 runway incursions, as shown on the following chart.



Further analysis of the 183 pilot deviations in 1998 shows that 119, or 65 percent, of the pilot deviations were attributed to general aviation aircraft.

FAA does not maintain data to identify whether commercial aircraft or general aviation aircraft were involved in operational errors. The following chart shows that from 1993 through 1998, between 61 and 76 percent of the pilot deviations causing runway incursions were attributed to general aviation aircraft.

Pilot Deviations by Type of Operation

Pilot Deviation by Type of Operation	1993	1994	1995	1996	1997	1998
General Aviation (G/A)	64	40	86	104	88	119
Commercial Aviation	20	26	39	42	44	64
Total Pilot Deviations	84	66	125	146	132	183
Percent of G/A Pilot Deviations to Total Pilot Deviations	76	61	69	71	67	65

Runway incursions continue to be a serious problem in 1999. FAA's data show that runway incursions from January through June 1999 remain at a high level. There were 149 runway incursions during the first 6 months of 1999 as compared to 150 incursions during the first 6 months of 1998. The following examples of two recent near collisions on the runway show the severity of runway incursions and the potential for a serious accident.

- *On April 1, 1999, a Korean Air passenger jet taking off from O'Hare International Airport in Chicago narrowly averted a collision when its pilot veered sharply away from a cargo plane that had taxied onto the runway and into its path.*
- *On June 28, 1999, an Air France 747 freighter crossed an active runway at New York Kennedy Airport while an Icelandair 757 was lifting off, which nearly resulted in an accident.*

Additionally, the number of runway incursions at the top ten airports for 1993 through 1998 shows an increase from 1997 to 1998 for all but two of the airports, as shown on the following table:

**Top Ten Airports (1998 Ranking)
1993 through 1998**

Airport	1993	1994	1995	1996	1997	1998
Los Angeles Intl, CA	4	5	2	4	3	13
Lambert-St. Louis Intl, MO	1	1	3	7	7	8
Newark Intl, NJ	2	4	2	7	2	8
Phoenix Sky Harbor Intl, AZ	1	0	2	5	4	7
Cleveland-Hopkins Intl, OH	2	1	1	6	6	6
Detroit-Wayne County, MI	2	3	0	1	2	6
Anchorage Intl, AK	0	0	1	1	2	5
Dallas-Ft. Worth Intl, TX	2	6	6	3	8	5
Indianapolis Intl, IN	1	0	1	1	1	5
McCarran Intl, NV	3	3	6	6	2	5

In our opinion, FAA’s progress in reducing runway incursions has been too slow. Stronger oversight is needed to ensure follow-through on planned initiatives to reduce runway incursions, including projects to reduce pilot deviations. Without immediate progress in implementing its plan, it is unlikely that FAA will achieve its goal of reducing runway incursions by 15 percent by the year 2000 and mitigate the risk of a tragic runway accident.

Limited Progress Made in Implementing 1998 Action Plan Initiatives

In October 1998 FAA issued its 1998 Action Plan to strengthen runway incursion prevention efforts, and establish an overall goal for reducing runway incursions by the year 2000. There were 51 required actions in the plan with near-term and long-term actions with milestone dates covering a 4-year period. FAA’s Action Plan represents a system-wide, multifaceted strategy to reduce incidents and accidents directly attributed to runway incursions and improve airport surface operations. It identifies goals, objectives, and actions to be implemented encompassing management and procedural changes; pilot education and training initiatives, technology-based initiatives, airport improvements, and increased incursion awareness efforts.

To evaluate FAA’s progress in implementing its 1998 Action Plan, we determined whether FAA had implemented a series of near-term actions that were most likely to reduce runway incursions as called for in the plan. We reviewed the status of 23 of 51 actions with scheduled completion dates through January 1999 and found that FAA completed 8 of the 23 actions. (*See Exhibit A for Analysis of 23 Near-Term Actions*) For example, FAA issued its

1998 Action Plan to increase emphasis on results and accountability for the Runway Safety Program. FAA also, through MITRE Corporation, completed a controller survey to identify causal factors of runway incursions from the controller perspective. However, FAA had not implemented 15 of the 23 near-term actions (65 percent) within established milestone dates as shown on the following chart.

Analysis of 23 Near-Term Actions by Goal

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Technology-Based Initiatives	2	1	50
Airport Improvements	3	2	67
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We analyzed the 15 actions that had not been implemented and found slippages from 5 to 13 months. For example, a project to improve aircraft lighting and aircraft visibility was 13 months behind its December 1998 milestone date. Also, the last installation of the Airport Surface Detection Equipment-3 (ASDE-3), technology to identify potential conflicts on the runway, is 11 months behind its January 1999 completion date shown in the Action Plan.

We noted that 4 of the 10 actions to address management and procedural changes which were not completed related to recommendations made in our prior report. FAA partially completed two actions by establishing regional focal points from Air Traffic, Flight Standards, and Airports Divisions in each region, and drafting procedures on surface incident prevention plans. The plans are to be completed by Surface Incident Prevention Teams after conducting annual evaluations at airports. These two actions were not complete because Runway Safety Program standard operating procedures for regional focal points and Surface Incident Prevention Teams were not finalized.

Further, FAA had not implemented controls to ensure the accuracy of runway incursion data. We found that final investigative reports of runway incursions were not being prepared and forwarded by field offices within the required timeframe to enable FAA Headquarters to validate the incident as a runway incursion. As of February 1999, FAA reported 24 pilot deviations and 16 operational errors occurring between 1995 and 1998 that had not been

validated. For example, on July 26, 1995, FAA reported a pilot deviation on the runway at the airport in Reno, Nevada. While a preliminary determination was made that it was a runway incursion, a final investigative report was never submitted to validate that it was in fact a runway incursion.

During our audit, FAA discontinued using preliminary and final investigative reports and now uses daily alert bulletins to identify and count runway incursions. Using the daily alert bulletins may be an effective approach, but we did not have an opportunity to evaluate this process for counting runway incursions. Moreover, written procedures to ensure the accuracy of runway incursion data using the daily alert bulletins have not been finalized. Also, FAA had not completed an improved vehicle/pedestrian deviation reporting form. The new form is required because FAA did not have sufficient information to make a final determination on whether a reported vehicle/pedestrian deviation was a runway incursion. FAA plans to issue new forms and procedures that will assist investigators in making a final determination on vehicle/pedestrian deviations. FAA rescheduled the issuance date for its new vehicle/pedestrian deviation forms and procedures to June 1999.

In April 1999, FAA issued a program implementation plan to provide a central management structure and system-wide approach to accomplish FAA's goals and objectives called for in the 1998 Action Plan. Additionally, the program implementation plan establishes a system to track milestones. We discussed the slippages in planned initiatives in the 1998 Action Plan with the Program Director for Air Traffic Operations. He agreed that while the program implementation plan establishes a system to track milestones, there is a lack of central oversight authority to ensure that established milestones for planned initiatives are met.

All Actions and Funding Have Not Been Identified

FAA has yet to identify all actions and funding necessary to reduce runway incursions. Even though the 1998 Action Plan identified 51 actions to reduce runway incursions, FAA is now conducting an investment analysis for the Runway Safety Program to identify additional actions for surface movement enhancement and runway incursion prevention that will be effective, comprehensive and affordable. Originally the investment analysis was to (1) include detailed cost estimates and solutions for procedural changes and guidelines, educational and training, integration of technology based initiatives, and airport improvement; (2) determine whether the capital investment for the actions are cost beneficial; and (3) identify the funding requirements by type including Facilities and Equipment; Research, Engineering and Development; and Operations and Maintenance. The investment analysis is not expected to

be completed until January 2000, 15 months after issuance of the 1998 Action Plan. Recently FAA decided to limit the investment analysis to technological needs which will be funded with facilities and equipment funds.

FAA has only identified limited funds to support initiatives in its 1998 Action Plan for FY 1999, and has yet to establish a budget for FY 2000 to complete initiatives in the plan. Certain initiatives in FAA's 1998 Action Plan are funded from various sources by different FAA lines of business. Those lines of business include FAA's Air Traffic, Flight Standards, Airports, and Research and Acquisition organizations. We found that only limited funds have been provided for FY 1999. For example, \$200,000 in FY 1999 facilities and equipment funds were set aside by the Office of Research and Acquisitions-Runway Incursion Reduction Program³ to support the Runway Safety Program office efforts in accomplishing initiatives in the plan. Also, \$55,000 in FY 1999 operations funds was provided by the Air Traffic Operations to the Runway Safety Program office for travel to airports with high numbers of runway incursions.

While limited funds have been provided to support the 1998 Action Plan, it is important to note that when the plan was initiated, funding requirements were not included in either the FY 1999 or FY 2000 budgets. This occurred because FAA begins formulating its budget for a specific fiscal year approximately 2 years in advance. Therefore, the FY 1999 budget, formulated in March 1997, did not include funds for the 1998 Action Plan, which was not issued until October 1998. Runway Safety Program officials stated that a separate line item in support of the 1998 Action Plan can not be established until the FY 2001 budget is formulated.

FAA's Runway Safety Program officials estimated that at least \$7.9 million is needed to complete initiatives in the 1998 Action Plan. However, FAA officials stated that until the investment analysis in support of the Runway Safety Program is complete, they will not know the actual funding requirements. FAA has not budgeted funds for FY 2000 to support the 1998 Action Plan, but has included \$3 million in operating funds in its reauthorization bill to support the planned initiatives scheduled for completion in FY 2000.

AMASS Continues to Experience Problems

In 1991, the National Transportation Safety Board (NTSB) recommended that FAA expedite efforts to develop and implement a system to alert controllers of

³ The Runway Incursion Reduction Program is intended to develop technologies that improve the situational awareness of controllers and pilots to help prevent runway accidents and incidents.

pending runway incursions. The recommendation was made after a runway incursion caused an accident on the runway at Atlanta Hartsfield International Airport in January 1990. NTSB then listed runway incursions on its annual "Most Wanted" list of transportation safety improvements in 1990 and it has remained on the list since that time. In August 1991, FAA advised NTSB that AMASS would address the intent of the Board's safety recommendation. AMASS is a system that continually monitors airport surface traffic and automatically alerts air traffic controllers to potential conflicts. AMASS uses data from the Airport Surface Detection Equipment-3 (ASDE-3) to identify aircraft on the airport surface. AMASS is currently installed and undergoing testing at Detroit, St. Louis, and Atlanta airports.

AMASS has experienced cost increases and schedule delays due to software development and human factors issues. The contract was awarded in September 1990. In 1993, AMASS was estimated to cost \$59.8 million and be installed in 1996. By December 1998, the cost estimate increased to \$89.8 million. FAA plans to install 40 AMASS at 34 airports nationwide. In August 1996 FAA advised NTSB that the last AMASS delivery is scheduled for August 2000, 4 years later than anticipated. FAA continues to experience developmental problems with AMASS which will prevent delivery of the last AMASS by August 2000.

Software development problems have been the primary cause for cost increases and schedule delays. For example, software development problems delayed installation and testing of the system in Atlanta by 6 weeks and cost an additional \$300,000. Between December 1996 and October 1998, software development problems delayed the system by 13 months and increased cost by \$4.8 million.

Unresolved human factors issues are now causing additional schedule delays. In October 1998, an FAA/National Air Traffic Controllers Association workgroup, formed to resolve various issues with AMASS, identified five human factors concerns. At the request of the workgroup, FAA's Human Factors Branch evaluated the workgroup's concerns and issued a quick look report in April 1999 detailing 14 issues. The workgroup has determined that 9 of the 14 issues need to be resolved immediately. For example, the AMASS alert message on the ASDE-3 display is not readable beyond 10 feet, which is a concern since controllers are often further than 10 feet from the display during their normal operations. As a result of the 9 human factors issues, FAA needs to revise the AMASS schedule to incorporate the most urgent human factors changes and identify and request additional funds needed. FAA officials have not yet revised the last delivery date.

In addition to developmental problems, AMASS is experiencing operational problems. For example, even when the 40 systems are deployed, FAA will initially limit AMASS capabilities to detecting conflicts that **occur on all active runways** for arrivals and departures. Controllers will not be alerted to potential conflicts that involve traffic on runways or taxiways that intersect the active runways. FAA is limiting AMASS capabilities because of its longstanding concern that false alarms will adversely impact controllers in air traffic control towers. A false alarm or false alert occurs when the system detects a false radar target⁴ and projects a collision hazard, thereby alerting the controllers to a situation that does not exist. If false alarms continue, controller confidence in the system could erode and lead to controllers completely disregarding the system. However, current testing in Atlanta has shown a reduction of false alerts using new software to detect and mitigate false targets. As AMASS is adapted to each site, additional capabilities may be added. The layout and configuration of each airport will determine what additional areas of the airport movement area can be covered by the system without generating additional false alerts.

In addition, the MITRE Corporation has raised issues regarding the performance capability of AMASS. In January 1999, MITRE reported that it is doubtful AMASS would have alerted air traffic controllers to four of nine runway incursions that occurred between November 1998 and January 1999. MITRE determined that it is doubtful AMASS would have provided effective and timely alerts in the four runway incursions, but noted that further adjustments to AMASS may have helped detect two of the four missed incursions. The primary problem is that AMASS has difficulty in differentiating between actual collision hazards and normal operations at runway intersections, which results in excessive false alerts for the controllers.

Another problem which effects AMASS is that the Airport Surface Detection Equipment, Model 3 (ASDE-3) radar, designed to provide tower controllers with surveillance information on aircraft and vehicles on the runways and taxiways in all weather conditions, will require increased availability and performance to support AMASS. The ASDE-3 radar system has not met the 24 hours a day, 7 days a week availability requirement for AMASS. A service life extension program is to be established to address ASDE-3 availability, but will require an additional \$16.5 million for FYs 2001-2003 to implement. Additionally, ASDE-3 performs poorly in heavy rain, a prime period of low visibility when the system is needed most.

⁴ This occurs when radio-frequency energy radiates off buildings or other aircraft, which creates a false target on the ASDE-3 radar display.

Recent Actions

During our audit, FAA initiated several actions to expedite efforts to reduce runway incursions. In March 1999, FAA identified short term initiatives called “Now Strategies” designed to provide immediate results in reducing runway incursions. These strategies include national initiatives such as alerting airport operators with the runway incursion problems with emphasis on actions they can take to prevent runway incursions, and regional initiatives such as mandatory monthly air traffic/airport operator/user meetings at the “top 20” priority airports. In addition, the Commercial Aviation Safety Team, which includes representatives from FAA, Air Line Pilots Association, Aircraft Owners and Pilots Association, and the airline industry has formed a Runway Incursion Joint Safety Analytical Team to study possible causal factors for runway incursions. The team is reviewing the past four major runway incursions using operational error and pilot deviation databases to assist in their analysis. The team expects to issue their findings in September 1999 and plans to work on proposed solutions. We support FAA’s efforts to expedite efforts to reduce runway incursions, which are needed to reverse the upward trend, and mitigate the risk of a tragic accident.

Recommendations

We recommend that FAA:

- Establish central oversight authority to ensure follow-through on initiatives in the Action Plan to reduce runway incursions.
- Develop operating procedures for regional focal points, surface incident prevention plans, and controls for ensuring the accuracy of runway incursion data, by finalizing its Runway Safety Program standard operating procedures.
- Issue its new vehicle/pedestrian form and procedures.
- Identify funding requirements for initiatives in the 1998 Action Plan with milestone dates in FY 1999 and FY 2000, and set aside funds to support those initiatives.
- Complete the investment analysis to determine actual funding requirements for 1998 Action Plan initiatives for FY 2001 and beyond and request the needed amounts in future budgets.

- Revise the AMASS schedule to incorporate the most urgent human factors changes and identify and request additional funds needed.

Management Position

FAA concurred with all six of our recommendations and agreed to take the following action:

- For Recommendation 1, FAA stated that direction is needed from higher levels to ensure controls in all lines of business to follow through on initiatives in the 1998 Action Plan. On June 4, 1999, FAA initiated monthly meetings with the Administrator and Associate Administrators to provide such direction.
- For Recommendation 2, FAA issued standard operating procedures on June 30, 1999 for the Runway Safety Program.
- For Recommendation 3, FAA stated that the revised vehicle/pedestrian form was developed and submitted to the Office of Accident Investigation on June 1, 1999, to be incorporated into the next change to FAA Order 8020.11, Aircraft Accident and Incident Notification, Investigation, and Reporting. FAA plans to have the revised form available electronically in September 1999 through the National Airspace Information Monitoring System.
- For Recommendation 4, FAA stated that funding strategies for 1998 Action Plan initiatives targeted for completion during FY 1999 and FY 2000 will be completed no later than August 1999. FAA also stated that recent Senate language includes \$2.5 million in operational dollars to be used specifically for completion of Action Plan tasks and associated Runway Safety Program initiatives. Also, funding requests have been placed in FY 2000 and FY 2001 budget cycles for most technology initiatives.
- For Recommendation 5, FAA stated that the Investment Analysis Plan was approved in June 1999. The first set of recommendations will be forwarded to the Joint Resources Council in January 2000 and the second set in October 2000. The Investment Analysis currently addresses future technology issues. Future operational and non-technological funding requirements for the Runway Safety Program have been identified and will be addressed through FAA's budget process.
- For Recommendation 6, FAA stated that proposed human factors changes have been prioritized and incorporated into AMASS program plans.

Associated funding requirements have been identified. FAA plans to complete the proposed human factors modifications in three phases based on need, priority, and development complexity. Ten human factors modifications for the first two phases will be completed by May 2000. Two remaining human factors changes will be completed in phase 3, to be considered under ASDE-3 Service Life Extension Program and AMASS Preplanned Product Improvements.

Office of Inspector General Comments

With the exception of FAA's response to our fifth recommendation, we consider actions taken and planned to be responsive to our recommendations. However, FAA did not clearly respond to our recommendation to complete an investment analysis to determine actual funding requirements for 1998 Action Plan initiatives for fiscal year (FY) 2001 and beyond and request the amounts in future budgets. While FAA initially planned to address both technological and operational needs for the Runway Safety Program in its investment analysis, FAA now plans to limit its investment analysis to technological needs which will be funded with Facilities and Equipment funds. Therefore, it is unclear as to how FAA will identify and set aside funds to address Runway Safety Program initiatives for FY 2001 and beyond which require Operations funds. We have requested FAA to provide additional clarification on its proposed action.

**Status of Near-Term Action Plan Items
(Target Completion Dates Through January 1999)**

Actions Related to FAA Runway Safety Program Management and Procedural Changes	Target Date	Revised Date	Status/Remarks
1. *Increase emphasis on results and accountability within FAA headquarters and field organizations by improving communications and implementing effective performance measurement reporting systems.	12/98	10/98	Completed
2. *Establish regional and headquarters framework and identify responsibilities for each operational element to place special emphasis on prevention of accidents and incidents attributable to runway incursions.	8/98-11/98	6/99	7 to 10 months behind schedule
3. *Develop individual airport surface incident prevention plans.	12/98	6/99	6 months behind schedule
4. *Implement controls to ensure the accuracy and completeness of surface incident data.	12/98	6/99	6 months behind schedule
5. *Develop more effective means to use incursion data and related human factors data.	12/98		Completed
6. *Develop an improved reporting form for vehicle/pedestrian deviations.	12/98	6/99	6 months behind schedule
7. *Develop special programs and publications to improve the dissemination of surface safety-related "lessons learned."	12/98		Completed
8. Develop and implement standardized taxi routes where appropriate.	12/98	6/99	6 months behind schedule
9. Develop and implement an improved position relief checklist for air traffic facilities.	12/98	6/99	6 months behind schedule
10. Develop a remedial training program for FAA employees, such as technicians and vehicle operators, involved in surface incidents.	12/98	9/99	9 months behind schedule
11. Improve the utility of Operational Error, Operational Deviation, Pilot Deviation, and Vehicle/Pedestrian Deviation reports.	12/98	9/99	9 months behind schedule
12. Examine using pilot and controller immunity as a means of gathering and analyzing causal information relating to surface incidents.	12/98	5/99	5 months behind schedule
13. Work with regional management to assure effective response by FAA Headquarters to surface incident prevention issues raised by field facilities.	12/98	10/99	10 months behind schedule
14. Develop specific remedial training for pilots/crews involved in surface incidents.	12/98		Closed-out Already exist
15. Develop specific remedial training for controllers involved in surface incidents.	12/98		Closed-out Already exist
16. Encourage airport operators to develop remedial training programs for employees involved in surface incidents.	12/98	9/99	Completed Ongoing-Funded

Exhibit A
(2 of 2)

Actions Related to Pilot Education, Training, and Incursion Awareness	Target Date	Revised Date	Status/Remarks
1. Improve surface movement safety by reducing radio frequency congestion through the use of standard taxi routes and digital communications.	12/98	12/99	1 year behind schedule
2. Work with aircraft operators and aircraft manufacturers to investigate technologies and procedures to improve aircraft lighting and other schemes to improve aircraft conspicuity.	12/98	1/00	13 months behind schedule
Actions to Aid Controllers Including Technology Based Initiatives	Target Date	Revised Date	Status/Remarks
1. Undertake a controller survey to help identify surface incident causal factors.	12/98		Complete
2. Complete the installation of Airport Surface Detection Equipment-3 (ASDE-3).	1/99	12/99	11 months behind schedule
**Continue AMASS testing and deployment.	8/00		According to FAA, 8/00 date for deployment is not attainable. Revised date is undetermined.
Actions to Improve Airport Surface Facilities, Design, and Operations	Target Date	Revised Date	Status/Remarks
1. Task FAA control tower management to work with Regional Airports Divisions, airport operators, and aircraft operators to develop surface incident prevention plans, and identify needed surface aids.	12/98	6/99	6 months behind schedule
2. Take steps to identify and analyze surface incident problem areas to enhance awareness and develop solutions.	12/98	6/99	6 months behind schedule
3. Expand the use of Runway Incursion Action Teams.	12/98	9/99	Completed Ongoing-Funded

*DOT/OIG Recommendations

**Although included here, AMASS is not considered a short-term action item.

AUDIT TEAM MEMBERS

These individuals participated in the Follow-up Review of FAA's Runway Safety Program.

Richard Kaplan	Program Director
Kevin Dorsey	Project Manager
Robert Drake	Engineer
Melissa Pyron	Auditor
Steven Schamberger	Evaluator



U.S. Department
of Transportation
**Federal Aviation
Administration**

Memorandum

Subject: **INFORMATION:** Response to Report on
Follow-up Review of FAA's Runway Safety
Program

Date: JUL 16 1999

From: Assistant Administrator for Financial
Services/CFO

Reply to
Attn. of:

To: Assistant Inspector General for Auditing

As requested in your June 11 memorandum, we have reviewed the subject report and offer the attached comments.

Should you have any questions, please contact Mr. Anthony Williams, Management Programs Division, APF-200. Mr. Williams can be reached on 267-9000.

A handwritten signature in black ink, appearing to read 'Carl B. Schellenberg', written over a horizontal line.

Carl B. Schellenberg

Attachment

Federal Aviation Administration's (FAA) Response to the Office of Inspector General's (OIG) Draft Report on the Follow-up Review of the FAA's Runway Safety Program

OIG Recommendation 1: Establish central oversight authority to ensure follow through on initiatives in the 1998 Action Plan to reduce runway incursions.

FAA Response: Concur with comments. The central oversight, as provided by the Program Director for Air Traffic Operations, ATO-1, and the Runway Safety Program, ATO-102, is operationally in the right organization. Direction is needed from higher levels to ensure controls in all lines of business and this is accomplished through monthly meetings with the Administrator and associate administrators. The first meeting was accomplished on June 4.

OIG Recommendation 2: Develop operating procedures for regional focal points, surface incident prevention plans, and controls for ensuring the accuracy of runway incursion data by finalizing its Runway Safety Program standard operating procedures.

FAA Response: Concur with comments. Architecture was initiated by a memorandum signed by the Director of Air Traffic, AAT-1, to the regional Air Traffic Division managers in early 1998. Regional points of contact within Airports, Flight Standards, and Air Traffic were established in June 1998 and weekly telecons began in November 1998. The original commitment in the action plan did not include an order; however, official direction is provided in the Runway Safety Program order. The order was signed on June 30.

OIG Recommendation 3: Issue its new vehicle/pedestrian form and procedures.

FAA Response: Concur with comments. The revised form was developed and submitted to the Office of Accident Investigation on June 1, to be incorporated into the next change to FAA Order 8020.11, Aircraft Accident and Incident Notification, Investigation, and Reporting. Forms will be available electronically in September through the National Airspace Information Monitoring System reporting process.

OIG Recommendation 4: Identify funding requirements for initiatives in the 1998 Action Plan with milestone dates in fiscal year (FY) 1999 and FY 2000, and set aside funds to support those initiatives.

FAA Response: Concur with comments. FAA funding for 1998 Action Plan initiatives targeted for completion during FY 1999 and 2000 will be generated from many sources. Sources include facilities and equipment, research equipment and development, and operations. FAA funding strategies will be

completed no later than August. Additionally, recent Senate language indicates FY 2000 approval for 2.5 million in operational dollars to be used specifically for completion of action plan tasks and associated Runway Safety Program initiatives. Funding requests have been placed in FY 2000 and 2001 budget cycles for most technology initiatives. Looping sensors remain under further consideration based on Long Beach results.

OIG Recommendation 5: Complete the investment analysis to determine actual funding requirements for 1998 Action Plan initiatives for FY 2001 and beyond and request the needed amounts in future budgets.

FAA Response: Concur with comments. The Investment Analysis (IA) Plan was approved in June 1999. The first set of recommendations will be forwarded to the Joint Resources Council (JRC) in January 2000 and the second set in October 2000. The IA currently addresses future technology issues and follows Acquisition Management System (AMS) guidelines. Runway Safety Program future operational and non-technological funding requirements have been identified and will be addressed through the processes identified in the FAA comment to FY 1999 and 2000 funding issues (see above).

OIG Recommendation 6: Revise the Airport Movement Area Safety System schedule to incorporate the most urgent human factors changes and identify and request additional funds needed.

FAA Response: Concur with comments. Proposed Human Factors (HF) changes have been prioritized and incorporated into the AMASS program plans. All associated funding requirements have been identified. Proposed HF modifications are divided into three phases based on need, priority, and development complexity. Estimated completion dates are phase I (five HF changes) November; phase II (five additional HF changes) May 2000; and phase III (two remaining changes) to be considered under ASDE-3 Service Life Extension Program and AMASS Preplanned Product Improvements.