

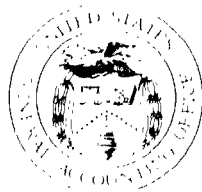
GAO

Report to the Chairman, Subcommittee
on Aviation, Committee on Public
Works and Transportation, House of
Representatives

November 1991

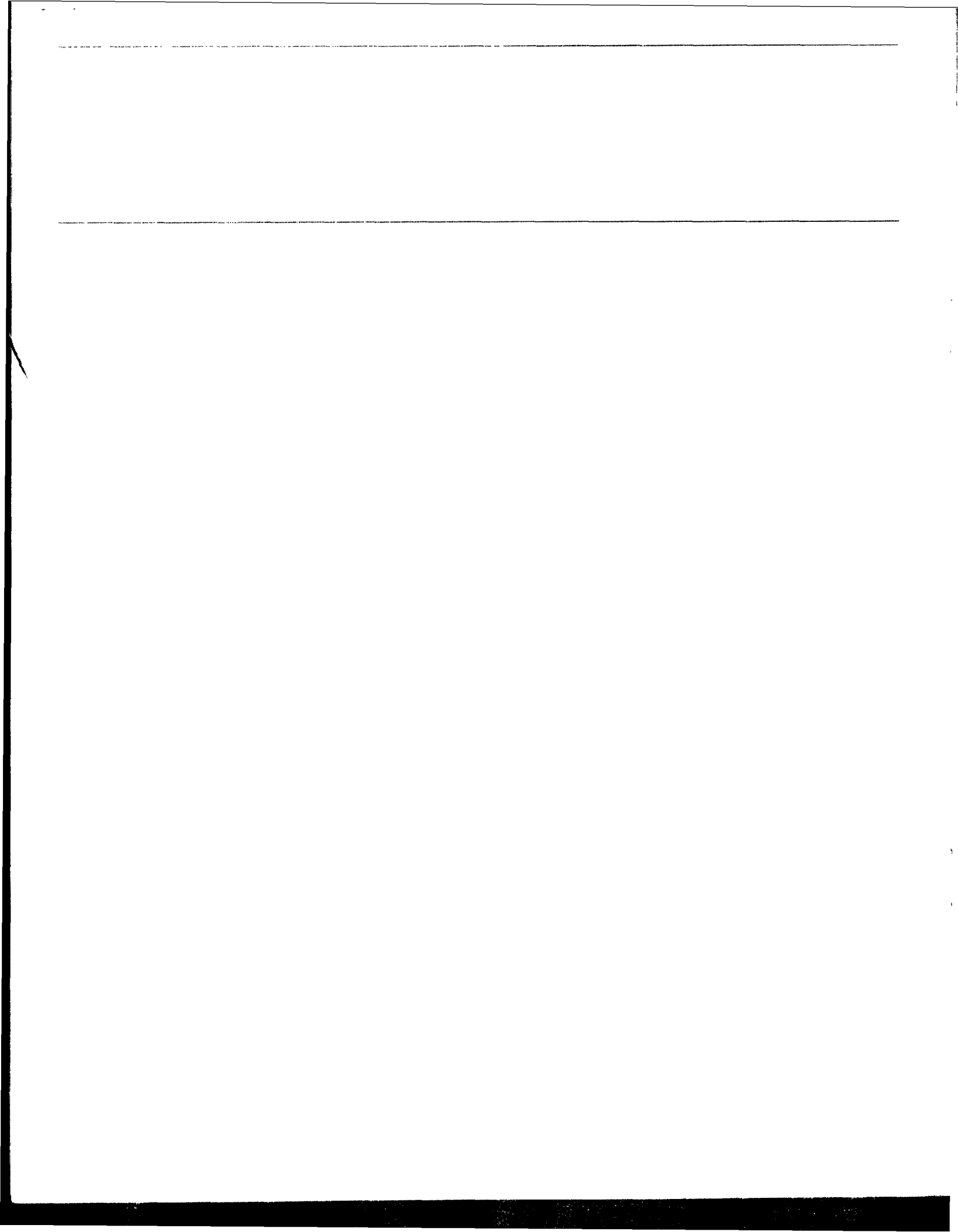
AVIATION SAFETY

Problems Persist in FAA's Inspection Program



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552921



**Resources, Community, and
Economic Development Division**

B-245206

November 20, 1991

The Honorable James L. Oberstar
Chairman, Subcommittee on Aviation
Committee on Public Works
and Transportation
House of Representatives

Dear Mr. Chairman:

To ensure the safety of the flying public, the Federal Aviation Administration (FAA) inspects airlines and related activities for compliance with aviation regulations. FAA has about 2,500 inspectors to provide oversight of more than 6,500 scheduled commercial aircraft, 4,439 repair stations, 547 pilot training schools, 177 maintenance schools, 641,477 active pilots, and 274,834 general aviation aircraft. Last year FAA inspectors identified about 300 regulatory violations and 1,900 unsafe practices on scheduled commercial airlines.

You asked us to determine whether (1) FAA has sufficient information to provide effective oversight of its inspection program, (2) FAA targets its inspection resources to airlines posing the greatest safety risks, and (3) FAA has a system, similar to the one developed by the Department of Defense (DOD), to assess the performance of those commercial airlines with which it contracts. DOD developed its system in response to the National Defense Authorization Act for fiscal year 1987, which required DOD to inspect airlines transporting military personnel.

Results in Brief

FAA lacks complete and accurate information on its inspection program, a problem on which we reported in 1987 and again in 1989. Without complete and accurate information, FAA cannot determine whether inspection priorities are achieved, inspection follow-up activities are adequate and timely, and inspection resources are being used effectively. Although inspections are FAA's number one priority, inspectors spent only 23 percent of their time performing inspections, instead of FAA's required 35-percent time allocation in fiscal year 1990. Furthermore, although FAA requires at least one operations, maintenance, and avionics inspection annually of each airline, 1,305 of about 3,600 airlines (36 percent) did not receive the required inspections in fiscal year 1990. All but 31 of the 1,305 airlines were air taxis—small aircraft operators that fly unscheduled routes—which in 1990 had an accident rate 15 times greater than major airlines per 100,000 hours flown.

FAA does not have a system for assessing airline risk. FAA assigns inspection resources on the basis of airlines' fleet size. However, DOD's performance evaluation system for scheduled commercial airlines and air taxis shows that airlines can and do pose significantly different risks to the flying public. In this regard, on the basis of DOD's performance ratings for 97 airlines that both FAA and DOD inspected during fiscal year 1990, we found that FAA sometimes spent more inspection time on airlines DOD rates as better performers than on poorer performing airlines. For example, FAA spent more hours inspecting six better-rated national airlines than any of the five poorer-rated airlines in this category. Although FAA does not have a system similar to the one developed by DOD, FAA recognizes that such a system can help it better manage its inspection program. In September 1991, the initial requirements for such a system were drafted, and FAA expects to develop and evaluate a prototype system for air carriers by fiscal year 1993.

Background

The Federal Aviation Act of 1958 established the safety of U.S. air passengers as a joint responsibility of the airlines and FAA. The airlines are responsible for operating their aircraft safely. FAA is responsible for, among other things, examining an airline's operations when the airline seeks a certificate to operate and conducting periodic inspections to ensure continued compliance with safety regulations.

FAA's 2,500 inspectors are located in 90 district offices located throughout the United States. These inspectors perform four principal functions: (1) routine surveillance (a process of continuous periodic inspections of airlines and aviation-related activities), (2) certification of an airline's operations, (3) accident and incident investigations, and (4) safety promotion. FAA divides inspections into three categories—operations, maintenance, and avionics. Operations inspections focus on such items as pilot certification and performance, flight crew training, and in-flight recordkeeping. Maintenance inspections examine an airline's overall maintenance program, including personnel training, policies, and procedures. Avionics inspections focus on electronic components of the aircraft.

FAA's inspection program is intended to ensure compliance with federal aviation regulations and safe aviation operating practices. The National Transportation Safety Board (NTSB) sees a link between inadequate FAA inspections and accidents. In October 1985, NTSB testified before the Subcommittee on Aviation, Senate Committee on Commerce, Science, and Transportation, about the apparent lack of quality in FAA inspections.

NTSB was concerned because three separate accident investigations it had conducted found ineffective FAA inspections to be a contributing factor. In 1988 and 1989, NTSB again cited FAA's ineffective surveillance as contributing to three accidents involving Delta Air Lines, Aloha Airlines, and AVAir, Incorporated.

FAA Lacks Reliable Information on Its Inspection Program

To provide effective management oversight of the inspection program, FAA's managers need current and reliable information on key program elements. This includes knowing whether work priorities—such as surveillance over certification—are met, inspection follow-up activities are adequate and timely, and inspection resources are being used effectively. To facilitate oversight, FAA implemented a Program Tracking and Reporting Subsystem (PTRS) in fiscal year 1990.¹ This computer-based system is designed to provide data for planning and overseeing FAA's inspection program. However, FAA has encountered numerous problems, such as outdated computer equipment and inadequate guidance on system use, since PTRS' inception. As a result, FAA lacks important information on program performance and is not in a position to adequately ensure accomplishment of key program elements, such as district office adherence to inspection priorities and inspector follow-up when unsatisfactory conditions are identified.

FAA uses PTRS to inform management of scheduled and actual inspections and the manner in which resources are being used. Inspectors are required to enter information on inspections as they are actually performed. We previously reported that FAA did not have accurate and complete information because inspectors were not always entering inspection results, field offices did not have adequate computer support, and inspectors were not adequately trained in how to enter their results.² Despite efforts to correct these shortcomings, FAA recognizes that PTRS is still inaccurate and incomplete and is evaluating the data to determine the extent of the inaccuracies.

FAA officials told us that FAA experienced widespread problems with outdated computer hardware and software in its district offices, which hindered input and retrieval of data from PTRS. Houston, for example, did

¹ PTRS replaced the Work Program Management Subsystem. The basic difference between the two systems is that inspectors can now provide comments on inspection results in PTRS.

² Aviation Safety: Needed Improvements in FAA's Airline Inspection Program Are Underway (GAO/RCED-87-62, May 19, 1987) and Aviation Safety: FAA's Safety Inspection Management System Lacks Adequate Oversight (GAO/RCED-90-36, Nov. 13, 1989).

not input 6 months of inspection results for fiscal year 1990. According to FAA headquarters officials, Houston plans to concentrate on current data operations rather than continually trying to input past data results. FAA said that current limitations, namely outdated computers and an insufficient number of computers and work stations, result in incorrect data entry and contribute significantly to poor data quality and absence of data. FAA is now replacing the outdated computer hardware and software and plans to complete this effort by the end of fiscal year 1994.

PTRS has 188 codes to classify problems in 15 broad categories, such as records, flight conduct, maintenance, and management. Each numeric code has a one- or two-word description. FAA officials said that inspectors have difficulty determining how to classify identified problems and may record the same problems differently because of ambiguities in the code descriptions, making it difficult to accumulate consistent results and to spot trends. For example, we found that one inspector classified engine oil leaks as an engine problem and another inspector recorded it as an engine oil problem. As a result, FAA cannot rely on PTRS to provide accurate data on the frequency of problems and corrective actions needed. FAA headquarters officials told us that inspectors need guidance on using the codes. FAA officials said that they plan to provide inspectors with job aids providing specific comment codes that should be used for completing inspection reports. However, FAA officials could not estimate when this would occur.

FAA Does Not Know If Work Priorities Are Being Met

According to FAA's policy, surveillance is the most important function performed by field office personnel to ensure safe operations and regulatory compliance. FAA requires (1) inspectors to spend 35 percent of their time on surveillance, (2) district offices to perform certain headquarters-required inspections annually, and (3) district offices to perform at least one operations, maintenance, and avionics inspection on each airline annually. We found that FAA has not analyzed PTRS inspection data to assess performance against stated requirements or determined whether the level of effort set by the requirements is valid. On the basis of our analysis of PTRS data and discussions with FAA officials, we found that FAA had not met its requirements.

FAA requires its inspectors to spend 630 hours a year performing surveillance, or 35 percent of 1,800 hours—time available after vacations, sick leave, and training. Although PTRS has reliability problems, its data are

the only available information to assess whether FAA is achieving program priorities. On the basis of our analysis of PTRS data, we estimated that inspectors spent an average of 414 hours, about 23 percent of their time, conducting surveillance. According to the Department of Transportation (DOT), the 35-percent goal was based on the full number of inspectors that FAA is authorized. In fiscal year 1992, FAA plans to adjust the goal to one that is based on the actual number of inspectors on-board.

In 1987, we reported that inspectors did not spend sufficient time on surveillance and that FAA did not know it.³ According to inspectors in some district offices, airline certification and other tasks sometimes took precedence because of industry pressure on FAA to certify new airlines and operating changes for existing ones. We recommended that FAA establish a system to measure performance so headquarters could evaluate regional and district office compliance with inspection work priorities. Despite agreeing with our findings, FAA did not solve the problem. FAA still does not know how much time inspectors spend on surveillance or other functions.

Our analysis of inspection data for fiscal year 1990 showed that FAA district offices did not meet their goals for conducting headquarters-required inspections. Of 83 district offices, 53 met their goal and 30 did not.⁴ These 30 district offices did not conduct 5,241, or about 28 percent, of the 19,032 required inspections. We also found that 1,305 of 3,605 airlines (36 percent) did not receive at least one operations, maintenance, and avionics inspection in fiscal year 1990. All but 31 of the 1,305 airlines were air taxis—small aircraft operators that fly unscheduled routes—that in 1990 had an accident rate 15 times greater than major airlines per 100,000 hours flown.

FAA headquarters officials said that they had not analyzed their inspection data to determine whether goals were achieved. They explained that, although FAA has an evaluation office that is responsible for overseeing the inspection program, it is not the mission of this office to analyze the data. FAA plans to establish a separate staff to perform the analysis but would not estimate when this would occur.

³Aviation Safety: Needed Improvements in FAA's Airline Inspection Program Are Underway (GAO/RCED-87-62, May 19, 1987).

⁴Although FAA has 90 district offices, 7 are satellites to the 83, and FAA includes their results with the 83 district offices.

FAA Does Not Know If Safety Problems Were Corrected or the Severity of Conditions Found

Effective corrective actions are essential to ensure that airlines are operating safely. However, FAA does not know whether inspectors follow up on identified problems or the severity of conditions that inspectors find. As a result, FAA has no assurance that airlines are taking corrective action, particularly for those problems that are the most severe. In fiscal year 1990, FAA inspectors identified 9,115 problems that were, or had the potential to be, in noncompliance with either regulations or other safe operating practices.

FAA headquarters did not know how many of the 9,115 problems were corrected because inspectors are not required to account for the disposition of identified problems. For example, PTRS data showed that an inspector found evidence of a slight leak on the landing gear of an aircraft and stated that the gear was dirty and hard to inspect. The inspector informed the flight engineer, who then wiped off the dirty area and told the inspector that he would check it at the next landing. PTRS did not indicate whether the inspector or airline took any follow-up action.

According to principal inspectors⁵ at one of FAA's largest district offices, they rely on individual field inspectors to discuss infrequent occurrences of unsafe practices with local airline officials, and they are responsible for discussing unsafe practice trends with an airline's top management. They said that the only airlines that can accumulate enough occurrences to constitute a trend for follow-up actions are the major airlines because they have the largest fleets and are most frequently inspected. For example, at one major airline inspectors identified over 850 problems that were, or had the potential to be, in noncompliance with either regulations or other safe operating practices. The principal inspectors told us that they convinced the carrier to take corrective action on the 20 most frequently coded problems—accounting for 437 of the 850 problems. Principal inspectors and FAA managers did not track the remaining problems and are not sure whether inspectors who made the observations told the airlines about them.

NTSB has criticized FAA for not ensuring that airlines take corrective action. A September 1989 NTSB report of its investigation of a Delta Air Lines accident resulting in 14 fatalities and 26 serious injuries revealed

⁵Each airline is assigned three principal inspectors—one for each of the three functional inspection categories—who are usually located in an FAA district office at or near the airline's main operations or maintenance facilities.

that poor flight crew discipline and coordination contributed to the accident. FAA inspectors had consistently observed these deficiencies but did not require corrective action. NTSB said that

“ . . . contributing to the accident was the lack of sufficiently aggressive action by the FAA to have known deficiencies corrected by Delta and the lack of sufficient accountability within the FAA’s air carrier inspection process.”

Furthermore, inspectors describe the problem found but generally provide no evaluation of its severity, making it difficult to direct FAA’s limited resources to those areas that warrant immediate attention. FAA headquarters officials do not know which of the 9,115 problems posed the greatest safety risk. FAA generally classifies its findings as unacceptable or potential safety problems. The following illustrates how severity can vary for problems FAA classified as unacceptable. One inspector found it unacceptable that an airline had returned an aircraft to service even though the maintenance performed was inadequate. Another inspector deemed a partially empty first-aid kit as unacceptable. A third inspector who observed an aircraft before and after de-icing found the airline’s de-icing procedures to be unacceptable.

FAA Does Not Inspect Airlines on the Basis of Safety Risk

FAA does not determine which airlines pose the greatest safety risks. Although FAA maintains numerous data bases with safety-related information, it does not integrate such data as accidents, incidents, pilot deviations, and inspection results to assess overall airline risk and to determine how it could best use its limited inspection resources. In 1987, we reported that FAA could develop criteria for targeting inspections at high-risk conditions and noted that targeting is important because FAA will never have sufficient resources to inspect all carriers all of the time.⁶ As of February 1991, FAA had 2,500 inspectors, about 300 fewer than called for by its staffing standards.

FAA assigns airline inspection resources largely on the basis of the size of an airline’s fleet. FAA also considers the location of airlines and such other aviation activities as repair stations and pilot training schools in assigning resources. Airlines with similarly sized fleets receive similar levels of inspection coverage, even though some pose significantly greater risks to the flying public.

⁶Department of Transportation: Enhancing Policy and Program Effectiveness Through Improved Management (GAO/RCED-87-3, Apr. 13, 1987).

DOD System Provides Conceptual Framework for Targeting Resources

FAA's ability to target its inspection resources and provide adequate inspection coverage of airlines became an issue of concern to the Congress following a December 1985 Arrow Air crash in Newfoundland, Canada. As a result, the Congress included a provision in the National Defense Authorization Act for fiscal year 1987 that required DOD to conduct on-site surveys of air carriers that have contracts with DOD at least once every 2 years and evaluate their performance at least once every 6 months. To accomplish this mandate, DOD increased its inspection capabilities and focused on developing the Air Carrier Analysis Support (ACAS) system to effectively use its limited resources for assessing the performance of about 130 airlines that have contracts with DOD. (App. II describes DOD's system.)

Although DOD's system may not be totally applicable for FAA's needs, it offers a different conceptual framework that FAA could use to make resource allocation decisions and target airline inspections. We used DOD's performance ratings for 97 airlines that it inspected in fiscal year 1990 and compared each airline's rating to the hours that FAA spent inspecting each airline. FAA inspection hours consist of required and discretionary hours. Required hours are mandated by headquarters, ensure minimum airline coverage, and help inspectors gain knowledge of current airline operations. Discretionary hours are determined by local FAA management. We used discretionary hours for our analysis because FAA has the flexibility to shift this time among airlines or other aviation-related inspections.

Our analysis of 97 commercial airlines that both FAA and DOD inspected showed that FAA sometimes spent more inspection resources on airlines DOD rates as better performers rather than on poorer performing airlines. For example, FAA spent about 26,100 discretionary hours inspecting eight better-rated national carriers with fleets ranging from 11 to 123 aircraft. In contrast, FAA spent about 6,900 discretionary hours inspecting five poorer-rated national carriers with fleets ranging from 5 to 32 aircraft. FAA spent more discretionary hours inspecting six of the eight better-rated national airlines than any of the five poorer-rated airlines in this category. In total, FAA spent 151,700 discretionary hours on 62 better-rated airlines. Appendix I provides examples of FAA's resource allocations relative to DOD's performance scores. In addition, we performed an analysis of each of the 97 airlines using the average number of inspection hours per aircraft and DOD's performance ratings. As a result, we determined that FAA spent more inspection hours on 17

better-rated airlines and fewer inspection hours on 17 poorer-rated airlines. To its credit, FAA spent more inspection hours on 16 poorer-rated airlines and less inspection time on 44 better-rated airlines.⁷

FAA headquarters and Eastern Region have had access to ACAS from its inception to monitor the results of DOD's inspection surveys and performance evaluations as part of the inspection coordination process between DOD and FAA. However, according to FAA officials, neither FAA headquarters nor regional offices had explored ways to enhance FAA's inspection program by using ACAS as a conceptual framework because of other priorities. Recently, FAA headquarters has begun developing a Safety Performance Analysis Subsystem (SPAS) similar to ACAS that would assess airline risk and other facets of FAA's inspection responsibilities, including pilot schools, repair stations, and maintenance technician schools. FAA has tasked DOT's National Transportation Systems Center, which developed DOD's system, to define the requirements for such a system. For fiscal year 1991, FAA provided about \$150,000, primarily to fund the study, and expects to perform a cost analysis once the requirements are defined. The Center provided FAA with its analysis in September 1991; FAA plans to develop and evaluate a prototype system for air carriers by fiscal year 1993.

Conclusions

FAA's inspection program contains numerous deficiencies that impede FAA's ability to ensure that airlines are operating safely. FAA does not have adequate information to help oversee its inspection activities. PTRS has little value today as a management tool for determining whether program requirements are met and for monitoring inspection results. In addition, FAA is unable to effectively evaluate airlines' safety conditions because it does not (1) have adequate guidance for properly classifying airline problems, (2) assess the conditions inspectors found or evaluate their severity, and (3) know whether airlines are correcting problems.

Since FAA will never have enough resources to inspect all carriers all the time, it needs a mechanism to make more effective use of its limited resources. PTRS does little to help FAA decide which carriers need more inspection emphasis and which need less. A system to systematically and uniformly determine risk could provide FAA with information vital to enhancing its inspection program. Although FAA has monitored DOD's

⁷Two airlines were neither poorer- or better-rated. Also, because of insufficient data for one airline, we could not determine the average number of inspection hours per aircraft.

system for years, it has done little, until recently, to apply the concept of risk assessment to the management of its inspection resources.

Recommendations

To enhance inspection program oversight, we recommend that the Secretary of Transportation direct the Administrator, FAA, to improve the inspection reporting system by (1) completing its efforts to provide inspectors clear and distinctive definitions of comment codes, (2) requiring inspectors to record corrective actions taken for identified problems, and (3) developing and using criteria for determining the severity of problems identified and for rendering overall assessments of airlines' operations, maintenance, and avionics activities.

Also, to make more effective use of limited inspection resources, we recommend that the Secretary of Transportation direct the Administrator, FAA, to give priority to developing a risk-assessment system, including a plan and milestones for implementation.

Agency Comments and Our Evaluation

The Department of Transportation generally concurred with our recommendations, stating that FAA is making improvements in its inspection data base and developing a system that will enhance the assessment of airline risk. Specifically, DOT said that improvements are possible in PTRS and that actions are underway to improve system performance, including installing state-of-the-art hardware and providing enhanced guidance and training for inspectors. We agree with DOT that FAA is installing new equipment, but this effort will not be completed until fiscal year 1994.

DOT also said that SPAS will allow FAA to evaluate airline risk and assist management in better utilizing inspector resources. DOT suggested that we discuss the development of SPAS in the report. We agree that SPAS will enhance FAA's ability to assess airline risk. Our draft report discussed FAA's efforts in this area but did not name the system being developed. We have clarified this in the report.

With regard to our recommendation on the need to record corrective actions, DOT said that the greatest safety benefit is achieved by recording corrective actions only for significant actions and that FAA addresses severity through emergency revocation orders. However, between January 1987 and May 1991, FAA had issued only 52 emergency revocation orders and none were against major airlines. Our concern is that inspectors identified over 9,100 safety problems with various airlines that FAA

management should analyze to determine whether they are isolated or widespread occurrences and significant enough to warrant increased attention.

Finally, DOT said that we were technically inaccurate in assessing the accomplishment of inspection goals using full staffing needs as opposed to using the actual number of inspectors on board. However, we used actual staff on-board at the beginning of fiscal year 1990 in our calculation of inspection time spent on surveillance. This calculation provided a conservative estimate. If an annual average, end-of-year figure, or authorized positions had been used, a lower percentage of time spent on surveillance would have resulted. Further, FAA officials, in consonance with us, agreed with our methodology to measure inspection performance against stated goals. DOT's detailed comments and our response are contained in appendix III.

DOD provided oral comments that referred to more technical points in the draft. DOD's comments have been incorporated where appropriate.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 15 days after the date of this letter. At that time, we will send copies to the Secretaries of Transportation and Defense; the Administrator of FAA; and the Director, Office of Management and Budget. We will make copies available to others upon request.

Details on our objectives, scope, and methodology are contained in appendix I. This work was performed under the direction of Kenneth M. Mead, Director, Transportation Issues, who can be reached at (202) 275-1000. Other major contributors to this report are listed in appendix IV.

Sincerely yours,



J. Dexter Peach
Assistant Comptroller General

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Abbreviations

ACAS	Air Carrier Analysis Support
DOD	Department of Defense
DOT	Department of Transportation
FAA	Federal Aviation Administration
GAO	General Accounting Office
NTSB	National Transportation Safety Board
PTRS	Program Tracking and Reporting Subsystem
SPAS	Safety Performance Analysis Subsystem
WPMS	Work Program Management Subsystem

Objectives, Scope, and Methodology

The Chairman, Subcommittee on Aviation, House Committee on Public Works and Transportation, asked us to determine whether (1) the Federal Aviation Administration (FAA) has sufficient information to provide effective oversight of its inspection program, (2) FAA targets its inspection resources to airlines posing the greatest safety risks, and (3) FAA has a system, similar to the one developed by the Department of Defense (DOD), to assess the performance of those commercial airlines with which it contracts. These objectives also allowed us to follow-up on a central finding in our management review, Department of Transportation: Enhancing Policy and Program Effectiveness Through Improved Management (GAO/RCED-87-3, Apr. 13, 1987), concerning the manner in which FAA allocates inspection resources.

To meet these objectives, we performed work at FAA headquarters in Washington, D.C.; its Eastern Region in New York; and three district offices located in Pennsylvania, Virginia, and New York. We also performed work at the DOD Military Airlift Command headquarters in Illinois. We conducted our work between May 1990 and May 1991 in accordance with generally accepted government auditing standards. We reviewed agency regulations, policies, and procedures governing FAA's inspection program as well as specific guidance stipulating inspection program goals for fiscal year 1990. We also analyzed inspection reports to determine whether program requirements were achieved and discussed with FAA officials how they ensure that the requirements are met.

We also discussed with FAA officials the measures they use to ensure airline compliance with aviation regulations. We analyzed information in FAA's inspection data base showing the problems inspectors report and enforcement actions initiated to determine the program's effect on reducing noncompliance with regulations. We also analyzed these data to determine whether FAA inspectors document corrective action on identified problems and to ascertain the analyses that FAA uses to oversee inspection activities.

We also reviewed documents on FAA's efforts to develop a risk-assessment system and discussed the status of that effort with FAA. We collected and analyzed information on DOD's Air Carrier Analysis Support (ACAS) system and compared the results with FAA's inspection coverage for airlines that both DOD and FAA inspect. We focused on DOD's system as a conceptual framework for targeting inspection resources. We did not, however, independently validate ACAS since FAA is now in the process of

examining its processes and use. Finally, we discussed with the Department of Transportation's (DOT) National Transportation Systems Center officials their development of DOD's performance evaluation system and their current efforts to define the requirements for an expanded FAA system.

We used DOD's rating for 97 airlines that both DOD and FAA inspected in fiscal year 1990 since FAA does not have a system for assessing airline risk. We developed a score for each airline, using DOD's five point rating scale and scoring weights for each of the five areas at the start of each of the four quarters of fiscal year 1990. Our overall rating for the fiscal year represented the average of the quarterly scores. On the basis of the overall rating, we grouped each of the 97 airlines into one of three performance categories and determined FAA inspection hours for each airline and category, concentrating on better-rated and poorer-rated airlines. A better-rated airline had a score lower than 3, whereas a poorer-rated airline had a score higher than 3.

We placed the 97 airlines into four groups—majors, nationals, regionals, and air taxis using DOT's criteria. Under this criteria, major airlines have more than \$1 billion of annual operating revenue, nationals have between \$100 million to \$1 billion, and regionals have less than \$100 million. DOT does not collect financial data on air taxis. The 97 airlines included 12 majors, 14 nationals, 28 regionals, and 43 air taxis.

To determine the inspection effort FAA invested in better-rated and poorer-rated airlines, we compared our calculated performance rating for the 97 airlines to the total number of discretionary hours FAA spent on these airlines in fiscal year 1990. We used discretionary hours because FAA has the flexibility to shift this time among airlines or other aviation-related inspections. Required inspection hours, on the other hand, are directed at meeting program goals and must be performed. The figures that follow show the result of the application of our methodology for each of the four airline groups. We also analyzed FAA's inspections hours and airline fleets for each of the 97 airlines to determine the average number of inspection hours per aircraft. We then compared the results to DOD's performance ratings for each airline to determine which airlines were the better and the poorer performers.

Figure I.1: Relationship of GAO-Developed Airline Performance Rating to FAA Inspection Hours for 12 Major Airlines

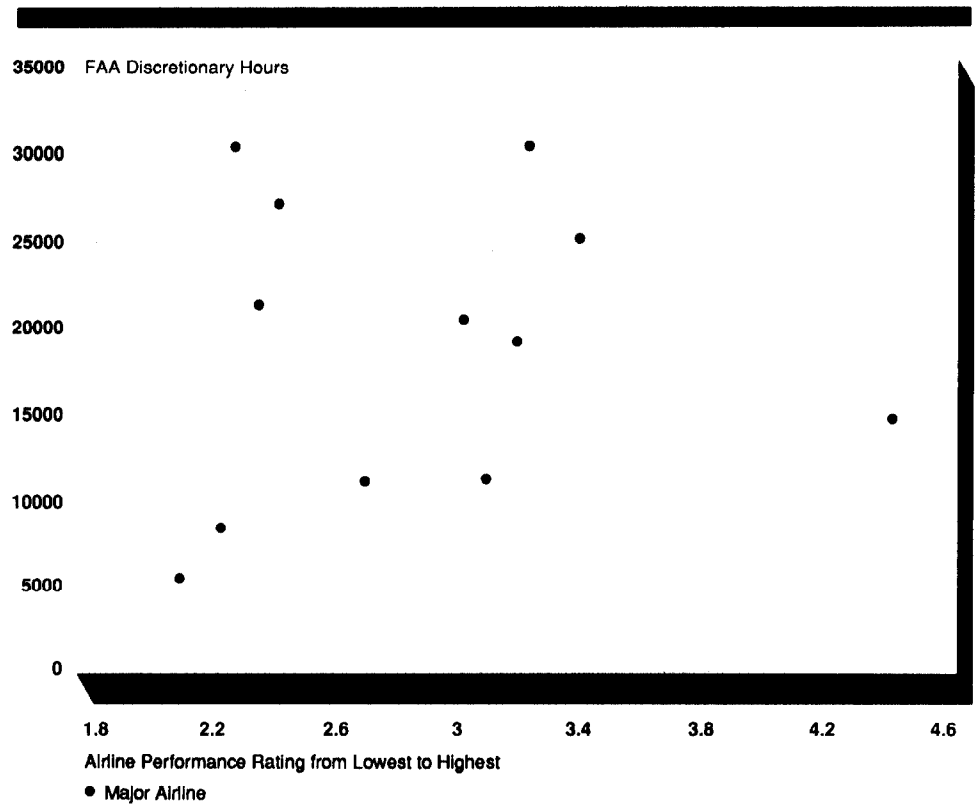


Figure I.2: Relationship of GAO-Developed Airline Performance Rating to FAA Inspection Hours for 14 National Airlines

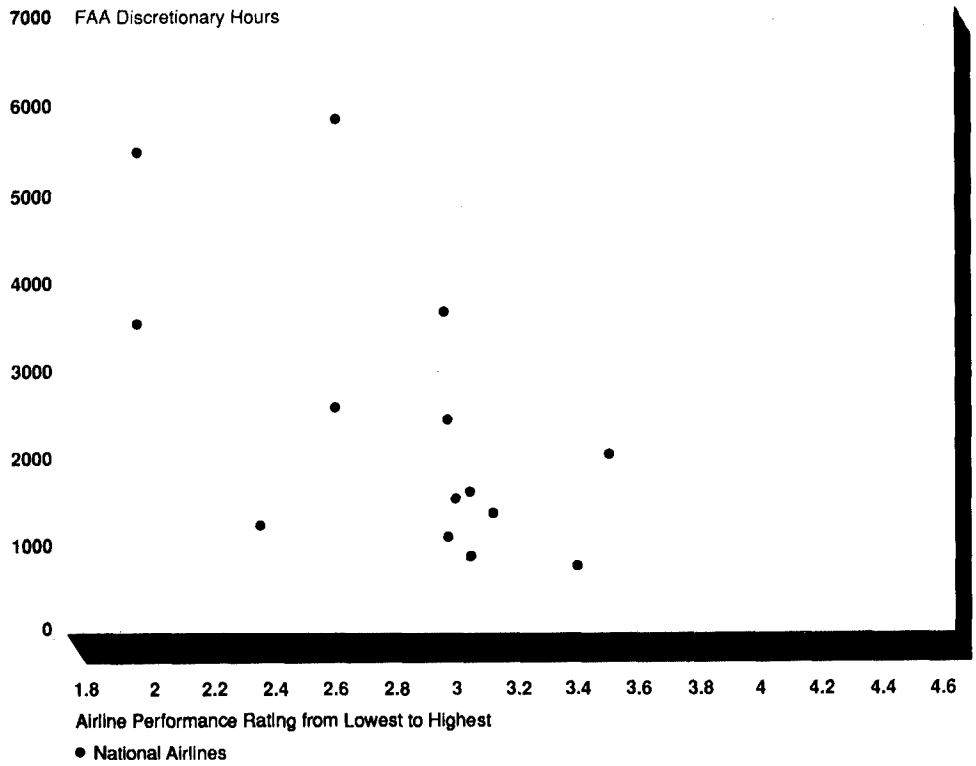


Figure I.3: Relationship of GAO-Developed Airline Performance Rating to FAA Inspection Hours for 28 Regional Airlines

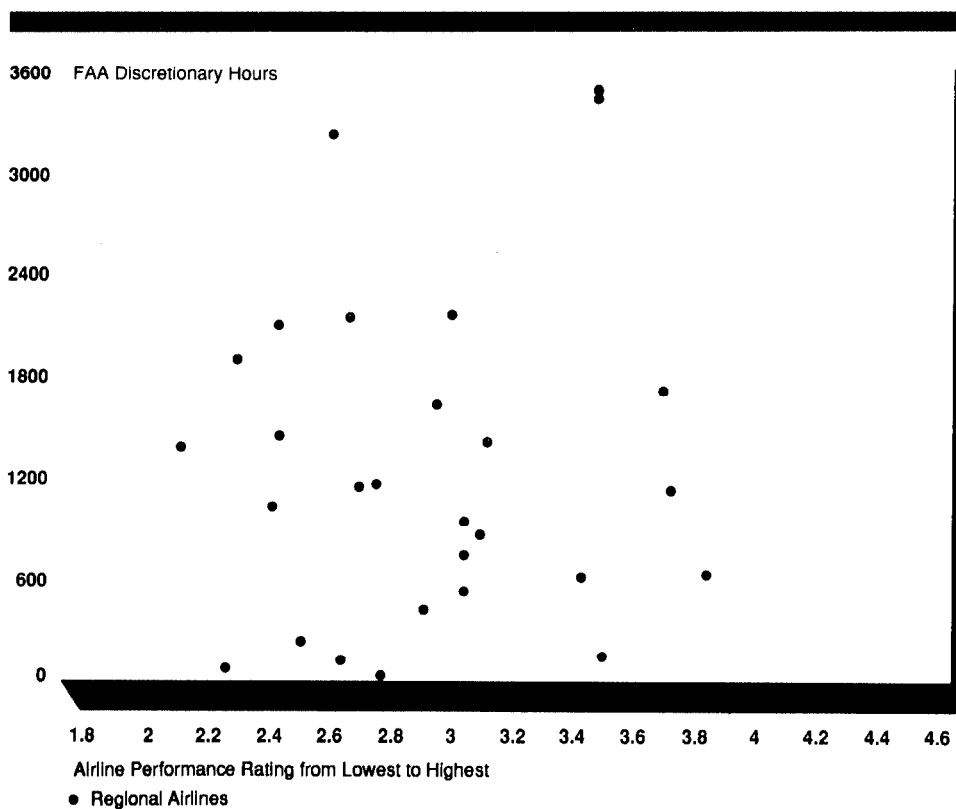
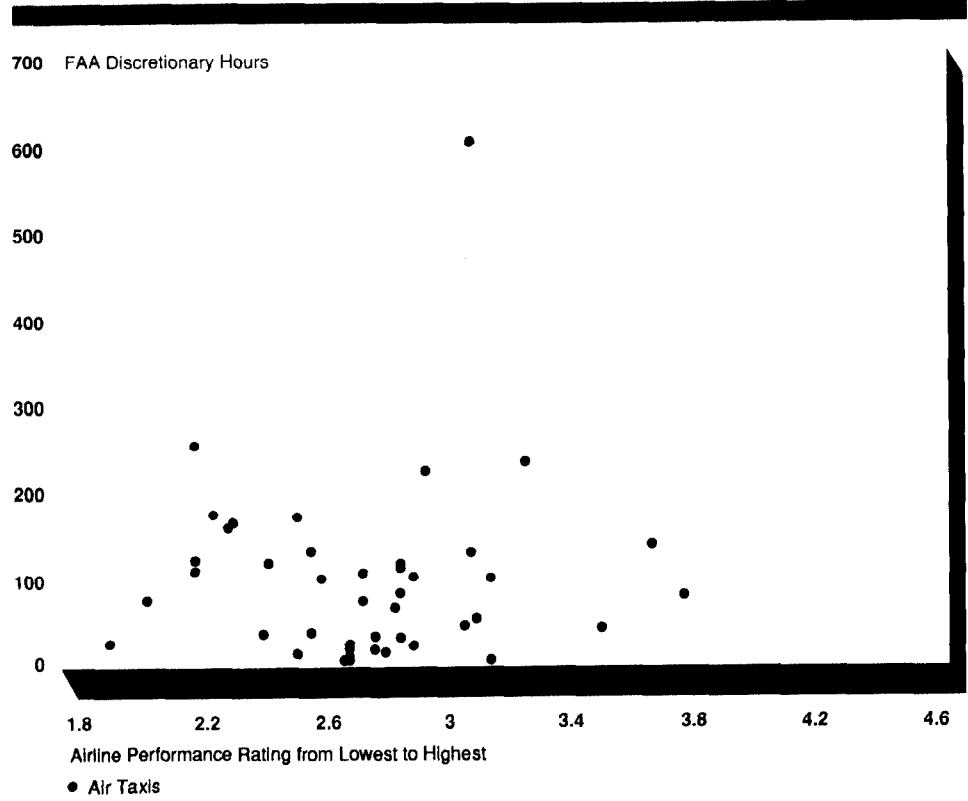


Figure I.4: Relationship of GAO-Developed Airline Performance Rating to FAA Inspection Hours for 43 Air Taxis



Information on DOD's Airline Risk-Assessment System

DOD evaluates airlines that want to contract for the transport of military personnel and cargo. As required by the National Defense Authorization Act for fiscal year 1987, DOD must inspect contract airlines at least once every 2 years and conduct a performance evaluation once every 6 months. DOD uses the Air Carrier Analysis Support system to rate airline performance using predefined criteria to determine whether an airline needs increased inspection. The system draws upon government and commercial information and uses the data to evaluate each carrier's performance regardless of fleet size in five areas: accident/incidents, operations, maintenance, service quality, and finance. Each area receives a performance rating from 1 (best) to 5 (worst).

ACAS first assigns a rating using a combination of DOD inspections and data obtained from other sources. DOD analysts may change the numerical rating based on additional or more current information, such as that obtained from discussions with FAA inspectors. DOD does not, however, incorporate the results of FAA's Program Tracking and Reporting Subsystem (PTRS) data base into ACAS because of concerns about its reliability. The rating is then used to target selected airlines and areas for further scrutiny, including discussions with airline management and follow-up inspections. At the end of this process, DOD considers the information at its disposal and determines whether an airline can safely meet its needs.

Comments From the Department of Transportation

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



U.S. Department of
Transportation

Assistant Secretary
for Administration

400 Seventh St., S.W.
Washington, D.C. 20590

September 30, 1991

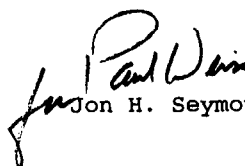
Mr. Kenneth M. Mead
Director, Transportation Issues
Resources, Community, and Economic
Development Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Mead:

Enclosed are two copies of the Department of Transportation's comments concerning the U.S. General Accounting Office draft report entitled "Aviation Safety: Problems Persist in FAA's Inspection Program."

Thank you for the opportunity to review this report. If you have any questions concerning our reply, please call Martin Gertel on 366-5145.

Sincerely,


Jon H. Seymour

Enclosures

DEPARTMENT OF TRANSPORTATION (DOT) REPLY

TO

GENERAL ACCOUNTING OFFICE (GAO) DRAFT REPORT

ON

AVIATION SAFETY: PROBLEMS PERSIST IN FAA'S

INSPECTION PROGRAM

GAO/RCED-91-211

SUMMARY OF GAO FINDINGS AND RECOMMENDATIONS

The GAO draft report found that the Federal Aviation Administration (FAA) lacks complete and accurate information on its inspection program, and as a result, FAA cannot determine whether inspection priorities are achieved, inspection follow-up activities are adequate and timely, and inspection resources are used effectively. GAO also found that inspectors are not meeting FAA's goal of spending 35 percent of their time performing inspections. GAO asserts that FAA does not have a system for assessing airline risk and therefore assigns their inspection staff based on the size of the airline's operations rather than in consideration of the different risks airlines pose to the flying public.

GAO recommends that the Secretary of Transportation direct the Administrator, FAA, to improve the inspection reporting system by: (1) completing efforts to provide inspectors clear and distinctive definitions of comment codes; (2) requiring inspectors to record corrective actions taken for identified problems; (3) developing and using criteria for determining the severity of problems identified and for rendering overall assessments of airlines operations, maintenance and avionics activities; and (4) giving priority to developing a risk assessment system, including a plan and milestones for implementation.

SUMMARY OF THE DEPARTMENT OF TRANSPORTATION POSITION

The Department agrees that improvements are possible in the Program Tracking and Reporting Subsystem (PTRS) and has been moving aggressively to optimize system performance by installing state-of-the-art hardware, providing enhanced guidance regarding coding to the inspectors, standardizing reports, implementing system edit checks, and providing training. We believe that these actions are moving the system towards achieving optimal performance.

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See comment 1.

FAA guidance to inspectors clearly establishes safety surveillance as a priority activity. GAO's assessment that FAA inspectors are not meeting the goal of spending 35 percent of their time on surveillance is technically inaccurate due to assumptions regarding full staffing. These goals will be adjusted starting in FY 1992 to reflect the actual number of inspectors on-board.

See comment 2.

FAA is also developing the Safety Performance Analysis System (SPAS) to evaluate airline risk and assist management in better utilizing inspector resources. SPAS further refines the methodology initiated by the Air Carrier Analysis System (ACAS), and we believe that it would be desirable for it to be discussed in GAO's report. While this system will add further quantitative basis for allocating inspection resources, FAA has always allocated its inspection resources in consideration of risk exposure to make the best use of limited inspection resources and ensure aviation safety. Finally, the Department has noted several specific technical concerns in the report. These are discussed in Attachment 1.

See comment 3.

See comment 4.

DETAILS OF THE DEPARTMENT OF TRANSPORTATION POSITION

Efforts Underway to Optimize PTRS

See comment 5.

While the GAO draft report enumerates several concerns with FAA's PTRS, the draft report does not indicate that these problems have been recognized, or that numerous efforts are underway to optimize system performance. Outdated computer hardware is being replaced by the state-of-the-art OATS system at the maximum rate that resources, efficient installation, and training will permit. Along with the new hardware, edit checks and other improvements have been incorporated into the system. Increased standardization with PTRS reports has also been achieved.

See comment 6.

Improved system use is being achieved by adding coding guidance and completing initial inspector training. Enhanced guidance for PTRS use is included in the new inspector handbooks which cover PTRS work function codes for each job function, along with job aids to supplement the instructions. All of FAA's inspectors have completed initial PTRS training. Additional computer-assisted training as well as trained PTRS instructors for each office are now available to inspectors.

See comment 7.

GAO's conclusions about the system were based on occurrences related to the first year of system implementation. Any system of this magnitude will experience a number of start-up problems. While no system can expect error free operation, we are confident that with time, as these improvements are implemented, mistakes should be minimized, and the system should perform according to expectations.

Risk Exposure Considered in Allocating Inspector Resources

See comment 8.

FAA has always considered risk exposure as one factor in allocating inspection resources. While we agree that the process needs to be more efficient, it is an exaggeration to state that FAA does not have a system for assessing airline risk. At the regional and local level FAA relies on the skills and expertise of field offices and individual managers to assess emerging trends as daily occurrences are analyzed. Further, FAA is developing a more effective central safety analysis point to make better use of national data in directing resources to the most appropriate locations. This is being developed along with SPAS.

The SPAS system was developed as a refinement of the methodology used in the ACAS system. As described in Appendix 2 of the GAO draft report, ACAS is essentially a subjectively based numerical ranking. SPAS is a computer based system that will provide current and historical analysis. It will track the performance of air carriers, air agencies, and airmen against regulatory safety norms. This system will provide additional managerial direction in developing annual work programs to better utilize inspector resources. Other ongoing efforts are underway to enhance resource use. The Continuing Development Program is underway to refine the current range of systems for which FAA's Flight Standards Service has oversight responsibility. The Flight Standards Information Systems Strategy integrates the administrative processes with current information systems to enhance resource use.

Now on p. 6.

On page 8 of the draft report, GAO indicates that 36 percent of the airlines did not receive at least one inspection in FY 1990 in each of the areas of operations, maintenance, and avionics. GAO then identifies 99.8 percent of these airlines as on-demand air taxis. Air taxis, many with fleets as small as one plane, carry less than one percent of the flying public and receive the requisite level of inspection resources relative to the risk they present to the flying public.

See comment 9.

Now on p. 9.

On page 13 of the draft report, GAO concludes that FAA is spending more hours inspecting airlines it labels low risk than those it characterizes as high risk. Further analysis of the numbers presented in the GAO report shows that more total hours are spent inspecting "low risk" airlines due to the larger size of their fleets. In addition, the number of inspection hours per aircraft for the "high risk" airlines is almost twice that of the low risk airlines. Attachment 2 shows our calculations using GAO's figures.

See comment 10.

See comment 11.

FAA Inspection Goals and Monitoring

FAA guidance to inspectors clearly establishes safety surveillance as a priority activity. GAO's assessment that FAA inspectors are not meeting the goal of spending 35 percent of their time on surveillance is technically inaccurate. This goal is based on the full number of inspectors that FAA is authorized, assuming 100 percent staffing. It would be unusual for 100 percent of the inspector positions to be filled throughout the year; therefore the 35 percent goal would not be met. Because of the confusion generated by this methodology, FAA will be establishing goals starting in FY 1992 based on the actual number of inspectors on-board.

See comment 12.

FAA monitors achievement of program priorities through several means in addition to PTRS. The National Aviation Safety Inspection Program (NASIP), the Office of Flight Standards Evaluation and Analysis Branch, and regional evaluation programs all track performance. The Director of Flight Standards oversees performance through monthly program reviews, and executive oversight committees also monitor and report on performance.

See comment 13.

Inspection Follow-up Appropriate

As previously mentioned, while centralized analysis of inspection problems and severity is being improved, it is an overstatement to conclude that FAA does not know whether safety problems were corrected or the severity of conditions found. FAA field office personnel are well aware of the problems being identified and their severity and have been handling them appropriately. FAA has the authority to issue an emergency revocation with mandatory follow-up on individual airworthiness certificates, airline operating certificates, or airman certificates when an immediate safety need exists. FAA uses this authority only for the most severe problems. Inspectors cannot follow-up and record information in PTRS regarding corrective actions taken on every deficiency cited if the Department is to make the best use of available resources. Only serious or systemic problems can be followed up if there is to be sufficient time for surveillance.

Now on p. 10.

FAA Uses ACAS

See comment 14.

On page 13 of the draft report, GAO states that FAA does not make use of the ACAS system, even though access has been available. However, FAA has been involved with ACAS development, and has made use of the system since FAA began joint development and funding with the U.S. Air Force many years ago. FAA does not make use of all of the ACAS features, because of the different regulatory nature of FAA's mission.

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Also, ACAS was used as a prototype for the development of SPAS.

RESPONSE TO GAO RECOMMENDATIONS

The GAO draft report recommends that the Secretary of Transportation direct the Administrator, FAA, to improve the inspection reporting system by undertaking the following steps:

RECOMMENDATION: Complete efforts to provide inspectors clear and distinctive definitions of comment codes.

RESPONSE: The Department agrees that the coding can be made more clear. PTRS is a large and complex system that will continue to improve and evolve. FAA is attacking the system's problems aggressively. Currently, FAA is including PTRS instruction in the inspector's handbook along with job aids. As part of an overall approach to optimizing PTRS operation, FAA recently completed a survey to identify problems with the PTRS form and coding scheme. Further, PTRS system revisions may result from analysis of the data obtained.

See comment 15.

RECOMMENDATION: Require inspectors to record corrective actions taken for identified problems.

RESPONSE: A comprehensive data system containing all corrective actions would be ideal; however, given the limited available resources, the greatest safety benefit is achieved by recording corrective actions only for significant actions. FAA deals with the most severe problems through emergency revocation authority and mandatory follow-up. Other less severe avenues are pursued to ensure that significant but less critical problems are dealt with by airlines.

See comment 16.

RECOMMENDATION: Develop and use criteria for determining severity of problems identified and for rendering overall assessments of airlines operations, maintenance and avionics activities.

RESPONSE: We share GAO's concern that safety analysis is of utmost importance and agree that developing a risk assessment system is a priority. The SPAS effort, underway at FAA for some time, is intended to provide such a system. We believe that SPAS is an appropriate answer to comprehensive safety analysis. Further, it would be desirable for GAO's report to provide information on this system.

See comment 17.

RECOMMENDATION: Make more effective use of limited inspection resources by giving priority to developing a risk assessment system, including a plan and milestones for implementation.

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See comment 18.

RESPONSE: We agree and are developing the SPAS system to serve this purpose.

Attachment 2

CALCULATIONS USING GAO FIGURES

Now on p. 9.

On page 13 of the report GAO states:

"FAA sometimes spent more inspection resources on airlines DOD rates as better performers rather than poorer performing airlines. For example our analysis shows that FAA spent 26,100 discretionary hours inspecting 8 better rated national carriers with a fleet size ranging from 11 to 123 aircraft. In contrast, FAA spent about 6,900 discretionary hours inspecting 5 poorer-rated carriers with a fleet size ranging from 5 to 32 aircraft. FAA spent more total discretionary hours inspecting 6 of the 8 low risk national airlines than any of the 5 high risk airlines in this category."

A closer examination of the numbers in GAO's analysis shows that FAA spends more inspection hours per aircraft on fleets identified as poorer-rated than on the aircraft in fleets identified as better-rated. Apparently, GAO's analysis does not consider the fleet size difference and its affect on inspection time requirements. The fleets that GAO identifies as better-rated are larger fleets with more planes, and will require more time to inspect the fleet.

For example, using GAO's numbers and some simple averages,

"Better-rated Fleets"

8 fleets with 11 to 123 aircraft each -- simple average:

$$\begin{aligned} 11+123 &= 134 \\ 134/2 &= 67 \text{ aircraft/fleet} \\ \text{Total aircraft} &= 8 \times 67, \text{ or } \underline{536} \end{aligned}$$

Therefore, $\frac{26,100 \text{ hours}}{536 \text{ aircraft}} = 48 \text{ hours per aircraft}$

"Poorer-rated Fleets"

5 fleets with 5 to 32 aircraft each -- simple average:

$$\begin{aligned} 5+32 &= 37 \\ 37/2 &= 19 \text{ aircraft per fleet} \\ \text{Total aircraft} &= 5 \times 19, \text{ or } \underline{95} \end{aligned}$$

Therefore, $\frac{6900 \text{ hours}}{95 \text{ aircraft}} = 73 \text{ hours per aircraft}$

Attachment 2

This calculation shows that, using GAO's own numbers, FAA is devoting 73 hours per aircraft for the poorer-rated fleets and 48 hours per aircraft for the better-rated fleets. Thus, according to GAO's numbers, FAA is spending almost 50 percent more time per aircraft for those in the poorer-rated group than for those in the better-rated group. While this analysis could be more accurate using the exact numbers of aircraft in the fleets, it is not possible to identify the specific fleets GAO is including in each category based on the information in the draft report. However, it is likely that the airlines in the better-rated group are comprised of fleets larger than the 67 aircraft per fleet average used in the simple analysis above. Therefore, while specific fleet sizes might change the number of inspection hours per aircraft, we believe that the basic conclusion would be the same.

GAO Comments

1. We did not assume full inspector staffing when calculating the amount of time inspectors spent on surveillance. We met with FAA officials to determine the methodology for calculating surveillance time because FAA does not record the actual time that inspectors spend on surveillance. FAA suggested, and we agreed, to the following method for calculating surveillance time. We first determined the total number of inspection hours available by multiplying 1,800 hours—individual inspector's time available for work after vacation, sick leave, and training—by the number of inspectors actually on-board at the beginning of fiscal year 1990. We then divided the total number of inspection hours by the total number of inspection hours available. The total number of inspection hours is based on FAA estimates for the amount of time it typically takes to perform various tasks. This method conservatively estimates time spent on surveillance because the inspector work force increased by 266 during the fiscal year which means that more inspector hours were available at the end of the year than the beginning. If we had used an average for the year, the year-end number, or the authorized number of inspectors in our calculation, a lesser percentage of time would have been shown to have been spent on surveillance.
2. The draft did discuss FAA's efforts to develop a Safety Performance Analysis Subsystem (SPAS). However, we did not identify the name of the system. We revised the report to do so.
3. The draft clearly pointed out that FAA does not integrate such data as accidents, incidents, pilot deviations, and inspection results to assess overall airline risk to determine the best use of its limited inspection resources. In addition, FAA relies on each inspector's discretion to determine risk. With such a subjective system, FAA cannot distinguish the relative risks posed by different airlines. One key reason that FAA is pursuing SPAS is to provide a risk-assessment capability, which we recognized in the draft. Such a system would provide FAA with uniform criteria on which to make more informed resource allocation decisions. Furthermore, as early as 1987, we reported that FAA could develop criteria for assessing risk and better target its inspection resources to airlines that pose the greatest risk.
4. Attachment 1 contained comments of a technical nature that have been addressed, where appropriate, in the report. Therefore, attachment 1 has not been reprinted with DOT's comments.
5. The draft stated that FAA was aware of the problems with PTRS and discussed its efforts to address them. It should also be noted that the

“maximum rate” to which DOT refers for replacing computer hardware means that FAA currently expects to have all the new equipment in place by the end of fiscal year 1994.

6. FAA states that inspectors are completing training and have better guidance. Our analysis of PTRS data disclosed that trained inspectors did not know how to code their findings on about 32,000 inspections during fiscal year 1990. On page 5 of its comments, DOT says that FAA recently completed a survey to identify problems with the PTRS form and coding scheme and that system revisions may result from analysis of the data obtained. During our work, we visited FAA’s Eastern Region and asked officials if they were aware of job aids to help inspectors accurately code their findings. These officials said that they were not aware of the coding aids. Further, when asked, FAA officials could not provide us with data on the number of inspectors that had been trained on PTRS. Of those that were, less than 4 hours of training had been provided. Upon further review, FAA officials said they had found the training to be insufficient because inspectors are having difficulty determining which codes to apply when problems are found.

7. We recognize that systems in their first year of implementation may experience start up problems. However, we pointed out in the draft that PTRS replaced the Work Program Management Subsystem (WPMS). PTRS is basically the same system with some refinements. The problems with WPMS were addressed in a November 1989 GAO report, many of which parallel those that we identified with PTRS.

8. FAA’s system for assessing airline risk is not as effective as a system that would allow it to (1) distinguish the relative importance of individual inspection findings, (2) identify those airlines that pose the greatest risk, and (3) rank the safety of airlines against established criteria. Relying on the skills and expertise of its field offices and managers may not be sufficient. As described in the report, one inspector identified improper deicing procedures. In that instance, the inspector did not take action to prevent the airplane from taking off. One could question whether the inspector used good judgment in this case. FAA recognizes that the development of SPAS will provide a risk-assessment capability. SPAS, however, is in the very early stages of development, and FAA does not expect to have a prototype system for air carriers developed and evaluated until fiscal year 1993.

9. FAA's National Program Guidelines for fiscal year 1990 established the requirement that all airlines, including air taxis, should receive an operations, maintenance, and avionics inspection. FAA did not meet its own criteria for inspections even though it developed its criteria after a previous GAO report, Compilation and Analysis of the Federal Aviation Administration's Inspection of a Sample of Commercial Air Carriers (GAO/RCED-85-157, Aug. 2, 1985), found that some airlines' operations and avionics activities were not inspected.

10. As DOT points out in attachment 2, the report did not disclose the specific fleet size of the airlines included in our analysis. DOT used information in the report that included a high and low range of fleet size and estimated the average to determine that poorer-rated airlines received more inspection coverage than better-rated airlines. Using the high and low fleet size to determine the average does not represent the actual conditions. Although not included in the draft, we performed an analysis using the actual fleet size for each airline. Of the 97 airlines examined, we determined that FAA spent more inspection hours on 17 better-rated airlines and less inspection hours on 17 poorer-rated airlines. This information has now been included in the report.

11. See comment 1.

12. We agree that these processes are in place; however, during our work, FAA headquarters officials could not explain why specific district offices and regions did not meet their goals. As stated in the draft, FAA's evaluation office did not analyze inspection data to determine whether goals were met, and a separate staff was being formed to do this.

13. Although FAA field office staff are aware of the problems they identify, FAA headquarters does not know whether field staff have acted on identified problems since their disposition is not identified in PTRS or elsewhere. We agree that to effectively use its resources FAA should follow-up on the most serious problems. However, FAA lacks criteria for determining severity.

14. The draft stated that FAA has been involved with ACAS but also stated that its use has been limited. For example, during our work officials from FAA's Eastern Region—the region responsible for evaluating ACAS—told us that they had not received guidance from FAA headquarters on how and what to monitor in ACAS and did not use ACAS to help plan and perform inspections. In October 1990, FAA provided the Eastern

Region with direction on how to proceed with ACAS. Also, the draft recognized that FAA has expressed interest in developing a system like ACAS. (See comment 2.)

15. DOT agrees with this recommendation. See comment 6 for a discussion of the actions underway.

16. DOT believes that, given limited resources, the greatest safety benefit is to record corrective action only for significant actions that are dealt with through emergency revocation orders. However, between January 1987 and May 1991, FAA has issued only 52 emergency revocation orders. Furthermore, as the report points out, FAA inspectors identified over 9,100 safety problems that need to be analyzed to determine whether additional actions are needed. Comment 13 provides additional information on the need to record corrective action.

17. Although DOT and we agree that to effectively use its resources FAA should follow-up on the most serious problems, our point is that criteria does not exist for determining severity. Furthermore, if FAA does not distinguish the severity of inspection findings in SPAS, FAA could erroneously classify an airline that had, say five, minor problems as performing poorer than an airline that had one major or serious problem.

18. DOT agrees with the need for a risk-assessment system. Comment 3 provides additional information on FAA's efforts to develop such a system.

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