

GAO

Report to the Chairman and Ranking
Democratic Member of the
Subcommittee on Aviation, House
Committee on Transportation and
Infrastructure

June 2002

AIR TRAFFIC CONTROL

FAA Needs to Better Prepare for Impending Wave of Controller Attrition



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Abbreviations

ATCS	Air Traffic Control Specialists
CPMIS	Consolidated Personnel Management Information System
CSRS	Civil Service Retirement System
DOD	Department of Defense
DOT	Department of Transportation
FAA	Federal Aviation Administration
FERS	Federal Employee Retirement System
GAO	General Accounting Office
NATCA	National Air Traffic Controllers Association
TRACON	Terminal Radar Approach Control
OPM	Office of Personnel Management



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United States General Accounting Office
Washington, D.C. 20548

June 14, 2002

The Honorable John L. Mica
Chairman, Subcommittee on Aviation
Committee on Transportation and Infrastructure
House of Representatives

The Honorable William O. Lipinski
Ranking Democratic Member, Subcommittee on Aviation
Committee on Transportation and Infrastructure
House of Representatives

In response to your request, this report identifies potential scenarios for future air traffic controller attrition and FAA's plans for dealing with such attrition. This report contains recommendations to the Secretary of Transportation.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to interested congressional committees; the Secretary of Transportation; the Administrator, Federal Aviation Administration; the Secretary of the Air Force; the Secretary of the Army; the Secretary of the Navy; the Director, Office of Management and Budget; and the Director, Office of Personnel Management. We will also make copies available to others upon request.

Please call me at (202) 512-3650 if you or your staff have any questions concerning this report. Major contributors to this report are listed in appendix VII.

Gerald L. Dillingham, Ph.D.
Director, Physical Infrastructure Issues

Executive Summary

Purpose

The Federal Aviation Administration (FAA) is responsible for managing the nation's air transportation system so that the 200,000 aircraft taking off and landing each day can safely and efficiently carry more than 700 million passengers per year. Because of the significant hiring in the early 1980s to replace strikers who had been fired, many thousands of FAA's controllers will soon become eligible to retire, potentially leaving FAA with too few fully trained controllers.

Because of these concerns, the chairman and ranking democratic member of the Subcommittee on Aviation, House Committee on Transportation and Infrastructure, asked GAO to (1) identify likely future attrition scenarios for FAA's controller workforce and (2) examine FAA's strategy for responding to its short- and long-term staffing needs, including how it plans to address the challenges it may face.

To identify likely future attrition scenarios, we (1) reviewed FAA's 10-year hiring plan and associated attrition forecasts for approximately 15,000 controller specialists who actively control and separate traffic in the air and on the ground; (2) analyzed FAA's workforce database to determine when the current controllers (those at FAA as of June 30, 2001) would become eligible to retire; (3) developed a computer model to predict future attrition based on historic levels; and (4) developed and administered a survey to a statistically representative sample of controllers so as to obtain information on when they might leave FAA.¹ GAO's analysis covers over 20,000 controllers—the 15,000 controller specialists whom FAA analyzed, plus about 5,000 controllers who supervise and manage the air traffic control system. GAO included the additional personnel because attrition from these positions is generally filled from the controller specialist ranks and, thus, omitting them would understate potential attrition among all controllers. In addition, among other things, we contacted all FAA regional offices, the 14 colleges or universities that have controller training programs, and the branches of the military so as to identify and discuss various aspects of workforce planning for air traffic controllers.

Background

In 1981, thousands of air traffic controllers who participated in a nationwide strike were fired and barred by a presidential directive from

¹For this report, "attrition" refers to controllers who leave FAA for a variety of reasons, including retirement, removal for cause, death, or disability.

reemployment with FAA as air traffic controllers. As a result of the strike, FAA was forced to hire, over a 3 to 4 year period, thousands of new air traffic controllers and to rebuild its controller workforce.

FAA currently employs over 20,000 employees who manage the air traffic control system. Most of these (about 15,000) are air traffic control specialists who are responsible for controlling the take-off, landing, and ground movement of planes. In addition, there are traffic management coordinators (about 670), who control the flow of air traffic; front-line supervisors (about 1,900), who work in various facilities around the country; and managers or staff (about 2,370), who oversee and administer the air traffic control program. Under a 1998 collective bargaining agreement with the National Air Traffic Controllers Association (NATCA), the union that represents the air traffic control specialists, controller specialist staffing levels were set at 15,000 for fiscal years 1999 through 2001 and are authorized to grow to 15,606 controllers by the end of fiscal year 2003.

FAA hires new air traffic controller candidates from several different sources. Most candidates with no prior experience come from one of 14 post-secondary educational institutions that train new controllers for FAA. Once hired by FAA, most of these candidates attend a 12-week training program at FAA's academy in Oklahoma City and receive an average of 2 to 4 years of on-the-job training at field facilities to become certified professional controllers. Most candidates with prior experience come from either the Department of Defense or the pool of fired controllers who were allowed to return to FAA beginning in 1993.

Air traffic controllers are covered under either the Civil Service Retirement System (CSRS) or the Federal Employee Retirement System (FERS), depending upon when they were hired by FAA. Under either retirement program, controllers are subject to special requirements that allow them to retire at an earlier age and with fewer years of service than most federal employees. In addition, Congress directed that air traffic controllers are subject to mandatory separation from controlling live air traffic at age 56 because of safety concerns, but there are exemptions to this requirement.²

²Although most controllers are required to stop controlling live traffic at age 56, they can continue working at FAA in other positions.

Results in Brief

Although the exact number and timing of the controllers' departures is impossible to determine, attrition scenarios developed by both FAA and GAO indicate that the total attrition will grow substantially in the short and long terms. As a result, FAA will likely need to hire thousands of air traffic controllers in the next decade to meet increasing traffic demands and to address the anticipated attrition of experienced controllers, predominately because of retirement. For example, the results of GAO's survey of controllers indicate that approximately 5,000 controllers may leave in the next 5 years, a figure that is more than two times higher than that for the past 5 years. GAO also found that the potential for retirement among frontline supervisors and controllers at some of FAA's busiest facilities is high.

FAA has not developed a comprehensive human capital workforce strategy to address its impending controller needs. Rather, FAA's strategy for replacing controllers is generally to hire new controllers only when current, experienced controllers leave. GAO's review identified challenges that FAA will face in trying to ensure that well-qualified new controllers are available when needed. For example, FAA's hiring process does not adequately take into account the potential increases in future hiring and the time necessary to fully train replacements. In addition, there is uncertainty about the ability of FAA's new aptitude test to identify the best controller candidates. Further, FAA has not addressed the resources that may be needed at its training academy and for providing on-the-job training at its control facilities in order to handle the large influx of new controllers and to ensure that FAA's controller workforce will continue to have the knowledge, skills, and abilities necessary to perform its critical mission. Finally, exemptions to the age-56 separation rules raise safety and equity issues that FAA has not assessed.

GAO recently published a model of human capital management that highlights the critical success factors FAA can use to manage its human capital more strategically to accomplish its mission.³ Along these lines, GAO makes recommendations intended to help FAA meet its impending need to hire and train thousands of air traffic controllers. In commenting on a draft of this report, senior FAA officials indicated that the report was generally accurate. The officials also commented that they would look at

³A *Model of Strategic Human Capital Management*, GAO-02-373SP (Washington, D.C.: Mar. 15, 2002).

GAO's human capital management model to determine its applicability to air traffic controller specialist staffing, and that FAA would consider GAO's recommendations in its planning.

Principal Findings

FAA Will Likely Be Faced with Hiring Increasing Numbers of Controllers

FAA will likely need to hire increasing numbers of controllers over the next decade to meet increasing traffic demands and to address the anticipated attrition of experienced controllers. FAA estimates that by 2010, it will need about 2,000 more controllers than are presently employed to handle future increases in air traffic. In addition, many air traffic controllers currently employed by FAA will likely leave their positions within the next decade. FAA estimates that by 2010, about 7,000 controller specialists, nearly 50 percent of those currently employed, will leave. The largest part of this exodus will come from retirements, with FAA estimating that it will experience retirements of controller specialists at a level three times higher than that experienced over the 5-year period from 1996 through 2000. GAO analyzed aspects of FAA's controller workforce in addition to controller specialists and found that even more controllers might soon leave their current positions than FAA estimates. For example, GAO's analysis of personnel data for over 20,000 of FAA's controllers shows a scenario where about 2,500 of FAA's current controllers were eligible to retire as of September 30, 2001, and nearly 14,000 controllers (or 70 percent of the current controllers) will become eligible to retire by the end of fiscal year 2011. In addition, GAO's model for potential controller attrition indicates that, on average, about 600 to 800 controllers will leave FAA employment, primarily through retirement, in each of the next 10 years. Further, results from GAO's survey of air traffic controllers indicated that many controllers are currently planning on leaving (predominately because of retirement) in the near future. Of the approximately 20,000 controllers now working at FAA, GAO estimates on the basis of its survey that approximately 5,000 controllers plan to leave by the end of fiscal year 2006.⁴ This includes an estimated 51 percent of the controllers who plan to retire when they first

⁴All estimates based on GAO's survey of air traffic controllers are subject to sampling error. Unless otherwise noted, 95 percent confidence intervals for percentage estimates are +/- 5 percentage points or less, and numerical estimates other than percentages have confidence intervals of +/- 10 percent or less the value of the estimate.

become eligible to do so. Many potential retirees currently hold key positions as supervisors, work in some of FAA's busiest facilities, or both. GAO found that about 93 percent of current supervisors will reach retirement eligibility by the end of fiscal year 2011. In addition, by the end of that year, FAA's busiest centers will potentially face a significant turnover in their current controller workforce, as about 65 percent of current controllers in en route centers become eligible to retire by the end of fiscal year 2011.

A Comprehensive Workforce Strategy Could Better Prepare FAA for Upcoming Controller Attrition

An effective human capital process anticipates expected attrition and includes the development of a comprehensive workforce plan that (1) establishes an effective approach for hiring individuals with the requisite skills and abilities in time to accomplish agency missions; (2) provides new employees with the best training opportunities possible to maximize their potential; and (3) uses opportunities to retain qualified staff. FAA has not developed such a comprehensive workforce strategy to address all of the challenges it faces in responding to its impending need for thousands of new air traffic controllers, thus increasing the risk that FAA will not have enough qualified controllers when necessary to meet air traffic demands. GAO identified several challenges in FAA's approach to hiring, recruiting, and training new candidates and to retaining existing ones, and these are not fully addressed in FAA's plans. For example, FAA's process of generally hiring replacements only after a current controller leaves does not adequately take into consideration the time it takes to train a replacement to become a fully certified controller—up to 5 years, which might result in gaps of coverage or increased overtime. In addition, FAA's proposal to rely more heavily on candidates who have no previous experience (so-called off-the-street hires) may result in additional challenges. Because it takes a certain type of person to become an effective controller and FAA has experienced failure rates at its training academy of as high as 50 percent, FAA developed a screening test to help select better potential candidates. However, recent changes have been made to the screening test to allow additional candidates to pass it. As a result, the effectiveness of the screening test in identifying successful candidates has yet to be determined. FAA plans to implement the revised exam in June 2002 and, if funding is available, plans to evaluate the success of the exam in identifying successful candidates. A further challenge exists at FAA's training academy, where staff have identified equipment and personnel requirements that will need to be addressed to effectively handle the expected influx of new candidates. Finally, with the rehiring of controllers who went on strike in 1981, FAA is faced with having increasing numbers of employees

controlling air traffic who are past age 56—most of the 733 rehired controllers are exempt from this mandatory separation age. FAA has not assessed the potential safety and equity issues associated with exempting these or other controllers from the mandatory separation age.

Recommendations for Executive Action

To better respond to the challenges presented by the need to hire thousands of new controller candidates, GAO recommends that the secretary of transportation direct the administrator of the Federal Aviation Administration to develop a comprehensive workforce plan that includes strategies for (1) identifying the timing of hiring necessary to ensure that facilities have appropriate numbers of certified controllers available to provide adequate coverage; (2) evaluating the newly developed screening test to determine whether it is identifying the most successful candidates; (3) addressing the capacity challenges associated with the training academy and on-the-job training programs; and (4) assessing the potential safety and equity issues associated with exempting potentially large numbers of controllers from the mandatory separation age requirement.

Agency Comments and GAO's Evaluation

We provided FAA with a draft of this report for its review and comment. Senior FAA officials found that the report was generally accurate and indicated that they would consider GAO's recommendations in its workforce planning.

Overall, FAA's comments stressed that FAA has a working human capital workforce strategy model that has enabled the agency to meet its staffing goals over the past few years. FAA officials agreed that the potential for sizable future attrition, in the range of 600–800 controllers per year, is likely over the next decade. The officials said, however, that although they have plans that extend to 2010, the uncertainty surrounding the future, as well as labor contracts and budget constraints, limit their specific workforce planning for air traffic controllers to fiscal years 2002 through 2004. With general agreement between FAA and GAO that attrition will grow substantially over the next decade, GAO believes that the workforce challenges FAA faces exist well beyond fiscal year 2004. As such, GAO believes that sound workforce planning demands that FAA develop a strategic vision that includes a workable, long-term plan to meet staffing needs.

Regarding GAO's concern about FAA's preparedness for the future, the officials remarked that FAA's ability to meet its past goals is an indication of its ability to meet future needs, and that there is nothing to indicate that its successful performance will not continue in the future. GAO recognizes that FAA has been able to meet its recent staffing goals. However, the recent workforce climate for FAA could be significantly different from that which it will face over the next decade. The report highlights the workforce challenges, particularly the sizable anticipated increases in controller attrition, that are likely over the next decade, and identifies challenges in FAA's planning that will make it difficult for FAA to maintain its past performance. In particular, the report points out the potential skills gap that FAA could face in the future because its current hiring process does not ensure that fully qualified controllers are available to replace experienced controllers when they leave.

The officials also commented that FAA has long planned for an operational evaluation of the new screening exam. The officials indicated that they are currently considering two options for evaluating the effectiveness of the exam, and that they need to decide on the appropriate option and develop an implementation and funding plan. However, the officials noted that continued funding for the ongoing research could not be assured. In response to this comment, GAO revised the text of the report to recognize FAA's efforts and plans regarding evaluation of the new screening exam, and modified its recommendation to clarify that the evaluation is needed as part of a comprehensive workforce plan.

In addition, the FAA officials provided technical comments that GAO incorporated, as appropriate.

Introduction

The Federal Aviation Administration is responsible for managing the national airspace system and ensuring the safe and efficient movement of air traffic. In doing so, FAA controls the take-off and landing of nearly 200,000 planes per day, which carry over 700 million passengers per year. To accomplish this mission, FAA must have a sufficient number of adequately trained air traffic controllers working at its air traffic control facilities.

In 1981 over 11,000 air traffic controllers went on strike and were subsequently fired by President Ronald Reagan. Between 1982 and 1990, FAA hired thousands of individuals to permanently replace the fired controllers. Most of this hiring took place between 1982 and 1986. Many of these controllers, as well as those controllers who did not participate in the strike, are now eligible or will soon be eligible to retire from FAA.

Air Traffic Controllers' Responsibilities Vary by Facility and Position

Air traffic controllers play a critical role in the nation's air transportation system by helping ensure the safe, orderly, and expeditious flow of air traffic in the air and on the ground. Controllers help ensure that aircraft maintain a safe distance between one another and that each aircraft is on proper course to its destination.

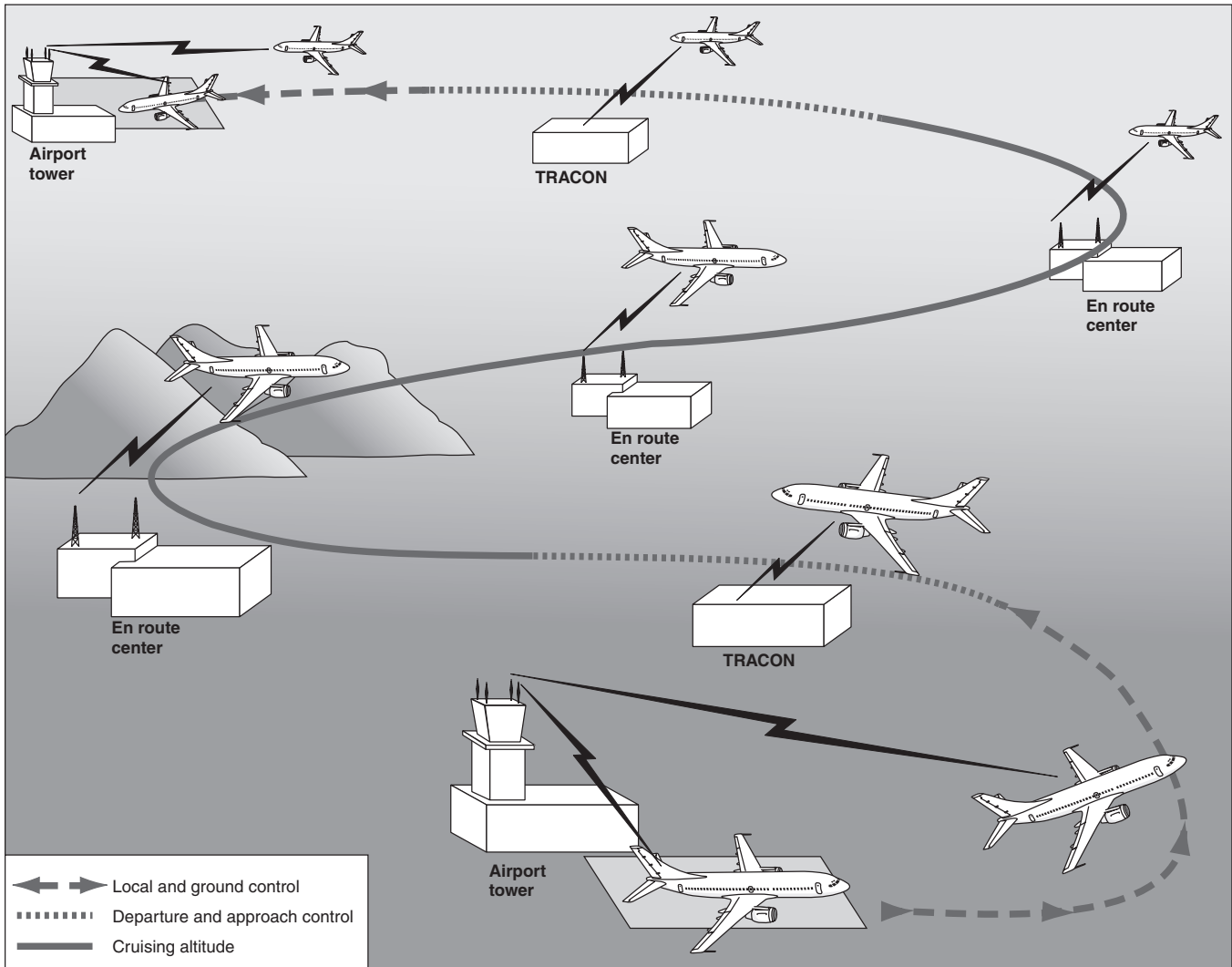
Specific controller responsibilities for managing air traffic vary according to the type of air traffic control facility. For instance, controllers who work at airport control towers are responsible for ensuring the safe separation of aircraft on the ground and in flight in the vicinity of airports, generally within a 5-mile radius. These controllers manage the flow of aircraft during take-off and landing and coordinate the transfer of aircraft with adjacent control facilities as aircraft enter or leave an airport's airspace. Controllers working at terminal radar approach control (TRACON) facilities use radar screens to track planes and manage the arrival and departure of aircraft within a 5- to 50-nautical mile radius of airports. At these TRACON facilities, a key function of an approach controller is to line up and sequence airplanes as they descend into an airport's 5-mile radius. Controllers working at air route traffic control centers (commonly called en route centers) manage aircraft beyond a 50-nautical mile radius. These controllers assign aircraft to specific routes and altitudes while they fly along federal airways. These controllers also coordinate the transfer of

aircraft control with adjacent en route or terminal facilities.⁵ The typical en route center is responsible for more than 100,000 square miles of airspace, which generally extends over several states.

Figure 1 shows how controllers working at the different air traffic control facilities track aircraft during ground movements, take-off, in-flight, and landing operations. Currently, FAA operates 339 air traffic control facilities, consisting of 24 en route centers and 315 terminal facilities.

⁵There are 24 en route centers, which include 3 center en route radar approach facilities—facilities that combine center and TRACON operations. Terminal facilities can include both a TRACON and a tower, which FAA categorizes as one facility.

Figure 1: Air Traffic Control System



Source: GAO presentation of FAA information.

In total, about 20,000 employees categorized as air traffic controllers directly control and manage the air traffic system, comprising several positions with differing responsibilities.⁶ (See table 1.) This total includes positions that actively control, or supervise the control of, traffic (air traffic control specialists, traffic management coordinators, and operational supervisors); and “off-line” positions that do not control traffic (former air traffic control specialists in management, training, or staff positions).

Table 1: Numbers and Types of Air Traffic Controllers

Air traffic control position	Duties and responsibilities	Number of employees
Air traffic controller specialists (ATCS)	Controls and manages the separation of air traffic in designated airspace or on the ground at airports.	15,120
Traffic management coordinators	Controls the flow of air traffic by determining how many planes should be in designated airspace at once. Can order that planes be held on the ground and special routings.	670
Operations supervisors (first-line)	Provides general supervision of the controllers on duty, including monitoring and managing the flow of traffic and distributing work among controllers.	1,862
Other (management, staff specialists, and so forth)	Provides support services such as training, management, and administration in an air traffic control facility.	2,369
Total		20,021

Source: GAO’s analysis of FAA’s personnel database, as of June 30, 2001.

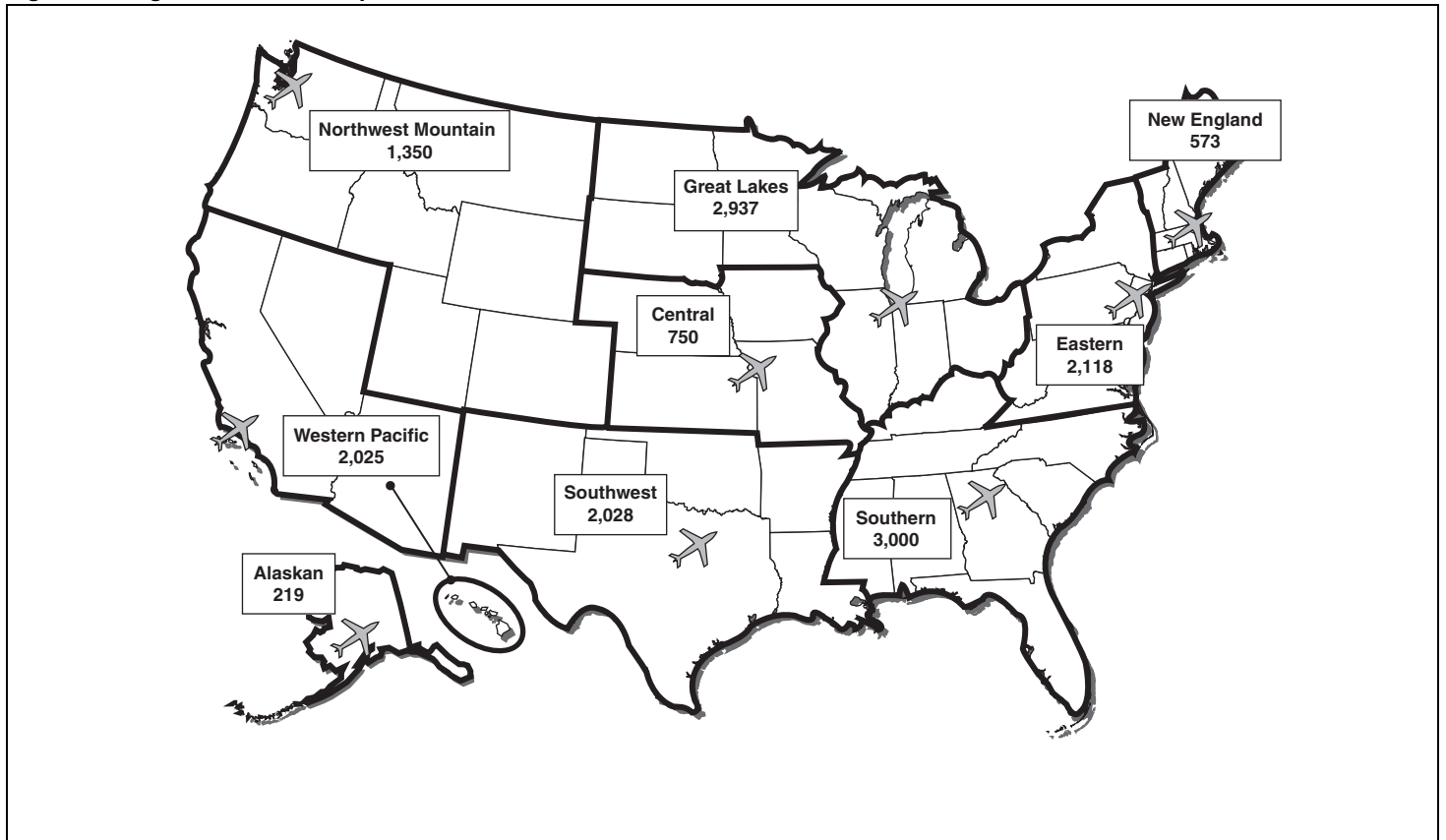
Staffing Levels Negotiated between FAA and Controllers’ Union

As the table above indicates, the majority of air traffic controllers are classified as specialists. These controllers are represented by the National Air Traffic Controllers Association, which negotiated staffing levels with FAA in 1998. Under the terms of the agreement, nationwide staffing (in full-time equivalents) for these specialists was set at 15,000 for fiscal years 1999 through 2001. The agreement also called for 2 percent staff increases for fiscal years 2002 and 2003, arriving at a controller specialist staffing level of

⁶The Office of Personnel Management classifies civilian air traffic controllers in the FAA as occupational series 2152—civilian air traffic controllers. In addition to these 20,021 employees, there are about 2,800 flight service station controllers who do not directly control or manage air traffic but provide pilot briefing, weather reports, and emergency services to pilots before and during flights.

15,606 by the end of fiscal year 2003. FAA has requested funding to meet the staffing levels called for in the agreement. Under the 1998 agreement, FAA headquarters officials and NATCA national representatives negotiate allocation of staffing levels for the air traffic control specialists among FAA's nine regions. Figure 2 below shows the location of each FAA region and the number of controller specialists allocated to each region for fiscal year 2001.

Figure 2: Regional Controller Specialist Allocations, Fiscal Year 2001



Source: GAO presentation of FAA data.

Once the regions receive their staff allocations, FAA regional managers and NATCA regional representatives negotiate staff allocations among the various field facilities in each region. The additional 606 controllers called for under the 1998 agreement are to be distributed to regions and field

facilities in the same way, with FAA and NATCA officials negotiating allocations to each region and specific facility.

Special Requirements Affect the Hiring and Retirement of Air Traffic Controllers

In 1972, Congress passed Public Law 92-297, which authorized the secretary of transportation to set a maximum entry age for initial appointments to air traffic controller positions at the FAA. Pursuant to this authority, FAA requires that a potential controller candidate be hired before reaching his or her 31st birthday. This provision was established in recognition of the fact that younger trainees are more successful in completing the controller training programs, and that younger individuals may be better able to deal with the stress of controlling air traffic. One exception to this rule is the Employment of Retired Military Air Traffic Controllers Program, commonly known as the Phoenix Controller-20 program, under which FAA commits to hiring retired military controllers who are past the age of 30. This exception allows military controllers to stay with the military longer before moving to FAA to continue their controller activities.

Controller retirement is also affected by special requirements. Controllers working at FAA's air traffic control facilities and staff offices are eligible to retire under two sets of retirement provisions: the general retirement requirements for federal employees and special requirements for controllers. Depending on when a controller was hired, he or she is covered by either the Civil Service Retirement System or the Federal Employee Retirement System. As federal employees, controllers under these systems can retire if they meet certain age and years-of-service requirements. For example, under general CSRS, a controller who is 55 years old can retire after 30 years of federal service, or at 60 years old with 20 years of service, or at 62 with 5 years of service.

Under the special controller retirement requirements, a controller may retire earlier than under the general CSRS and FERS requirements if he or she has enough service time as an active controller specialist, traffic management coordinator, or immediate supervisor. Time in these "covered" positions is generally known as "good time" because it counts toward the special retirement requirements. Controllers can retire at age 50 if they have spent at least 20 years in a covered position, or at any age if they have at least 25 years in a covered position. Under these provisions, controllers covered by CSRS are guaranteed a retirement annuity

amounting to the greater of two figures: either 50 percent of their high average 3-year salary or the basic federal retirement annuity.⁷ Controllers covered by FERS receive an annuity amounting to 1.7 percent of their high average 3-year salary for the first 20 years of service plus 1 percent of their high average 3-year salary for each additional year of service.

Table 2 summarizes the CSRS, FERS, and special retirement provisions.

Table 2: Retirement Eligibility Requirements for Controllers

Type of retirement	Age	Years of service
CSRS (applicable for most federal employees hired before 1984)	62	5
	60	20
	55	30
FERS (applicable for most federal employees hired in or after 1984)	62	5
	60	20
	55 to 57 ^a	30
Special controller retirement under either CSRS or FERS (service time must be in a “good time” position)	50	20
	Any age	25

^aBasic retirement eligibility under FERS is subject to a minimum retirement age that varies depending on the birth date of the employee.

Source: GAO presentation of Office of Personnel Management information.

In addition to these basic retirement eligibility requirements, air traffic controllers covered by CSRS are also subject, pursuant to Public Law 92-297, to a rule requiring mandatory separation at age 56. Controllers

⁷There is currently a Senate bill, S. 871, that proposes to increase CSRS annuity levels. See appendix I for a discussion of the impacts of this proposal.

covered by FERS are subject to a similar rule, pursuant to Public Law 99-335. Under this requirement, with some exceptions, controllers actively working in covered positions must separate by the last day of the month in which they turn 56.⁸

FAA Relies on a Variety of Sources for Air Traffic Controller Candidates

FAA relies on a number of sources to fill its controller positions. These sources are (1) individuals with no prior controller training or work experience in the air traffic control environment, (2) individuals with some controller training but generally no actual controller work experience, and (3) individuals with prior controller work experience.

The first group includes individuals who respond to an Office of Personnel Management vacancy announcement. Referred to as off-the-street hires, these candidates must pass an OPM exam to qualify for employment with FAA and must pass a 15-week initial training program at FAA's Academy in Oklahoma City, Oklahoma, before being assigned to a facility.⁹ There have been no OPM job announcements for entry-level air traffic control specialist positions since 1992, because FAA has chosen to rely on other sources for new candidates. FAA estimates that approximately 150 people who responded to the last announcement and passed the OPM exam are still eligible for employment as controllers.¹⁰

The second group includes graduates of FAA-accredited collegiate programs who receive initial air traffic control training prior to being hired by FAA. This type of training introduces students to the terminology, airspace configurations, and technical skills necessary to manage air traffic and operate equipment. Students can receive general air traffic control training at one of 13 schools under FAA's collegiate training initiative program, or specialized en route training at the Minneapolis Community

⁸Most controllers in FAA are subject to this rule. However, controllers appointed by the Department of Transportation prior to May 16, 1972, and controllers appointed to the Department of Defense prior to September 12, 1980, are exempted. In addition, controllers covered under FERS can work until they accrue 20 years of good time regardless of age, and CSRS controllers can work past the age of 56 if they have not qualified for a retirement annuity.

⁹The FAA Academy in Oklahoma City provides management and technical training to controllers, inspectors, and other FAA personnel.

¹⁰Over the past 5 years, FAA has hired on average fewer than 10 candidates from the 1992 OPM list each year.

and Technical College, formerly known as the Mid-American Aviation Resource Consortium school (see app. II for more detailed information on the schools). Collegiate training initiative schools offer either two- or four-year aviation related degrees. Unlike these schools, the Minneapolis Community and Technical College program is not part of a broader academic program, and the federal government subsidizes the cost of training its students. Collegiate training initiative graduates must pass an initial 12-week controller training program at the FAA academy to begin work at their assigned facility, while Minneapolis Community and Technical College graduates can immediately begin working at their assigned facilities. During fiscal years 1997 through 2001, FAA has hired 465 from the collegiate training programs and 291 from the Minneapolis Community and Technical College.¹¹

The third group of candidates consists of controllers with previous air traffic control experience, including both former Department of Defense (DOD) controllers and controllers fired in the 1981 strike. DOD employs both active-duty military controllers and civilian controllers. In general, military controllers can leave DOD for FAA at the end of their enlistments, as long as they do so before turning 31 years of age.¹² To help DOD minimize military controller losses, FAA and DOD designed a program in 1999 called the Phoenix Controller-20 program to give controllers an incentive to stay in the military past age 30. Under this program, military controllers can join FAA after they retire from military service. FAA may also hire controllers who previously held air traffic controller positions with the agency; most of them are among those fired in the 1981 controller strike. President Reagan banned the federal government from hiring any of these controllers, but President Bill Clinton lifted this ban in 1993, at which time FAA issued a job announcement for fired controllers interested in returning to work. Candidates in this group are not required to attend initial controller training at the academy but may be required to take refresher training there. During fiscal years 1997 through 2001, FAA hired 793 former DOD controllers and rehired 562 controllers who had been fired in 1981.

¹¹FAA regional officials supplied us with hiring information for each fiscal year since 1997. Fiscal year 2001 reflects partial year data.

¹²FAA policy pursuant to Public Law 92-297 prohibits hiring controllers after they have turned 31 years of age. Exceptions to this rule include retired military controllers, civilian controllers whom DOD had hired prior to their 31st birthdays, and re-hired former controllers, such as those fired in the 1981 strike.

Once assigned to an air traffic control facility, candidates are classified as “developmental controllers” until they complete all requirements to be certified for all of the air traffic control positions within a defined area of a given facility. It generally takes new controllers who have had only initial controller training between 2 and 4 years—depending on the facility and the availability of facility staff or contractors to provide on-the-job training—to complete all the certification requirements to become certified professional controllers.¹³ It normally takes individuals who have prior controller experience less time to become fully certified.

Objectives, Scope, and Methodology

In October 2000, the chairman and ranking democratic member of the Subcommittee on Aviation, House Committee on Transportation and Infrastructure, asked us to examine FAA’s efforts to address existing and future controller staffing needs. We were asked to (1) identify likely future attrition scenarios for FAA’s controller workforce and (2) examine FAA’s strategy for responding to its short- and long-term staffing needs, including how it plans to address the challenges it may face.

To identify future attrition scenarios for FAA’s controller workforce, we (1) obtained and analyzed FAA estimates of future retirement and attrition; (2) analyzed FAA’s employee database to determine when controllers would reach retirement eligibility; (3) developed a computer model to simulate future attrition based on historic FAA air traffic controller rates; and (4) developed and mailed a survey to a sample of current air traffic controllers to determine their retirement plans.

FAA’s estimates: To obtain FAA’s estimates of future retirements and attrition, we interviewed officials in FAA’s Office of Air Traffic Resource Management who are responsible for managing the controller workforce. These officials provided information on the data used to support FAA’s estimates of future controller attrition. They provided estimates only for the 15,000 controller specialists; similar estimates were not available for other categories of air traffic controllers.

Analysis of FAA’s workforce: We used personnel data supplied by FAA to calculate the age and service characteristics of 20,021 air traffic controllers who were employed as of June 30, 2001, the most recent data available at

¹³In some of FAA’s busiest and most complex air traffic control facilities it can take up to 5 years to become a certified professional controller.

that time. These included 15,120 controller specialists, 670 traffic management coordinators, 1,862 operational supervisors, and 2,369 managers and staff specialists. We used this information to determine the number of controllers reaching retirement eligibility over the next decade. Additional information on how we made these projections is contained in appendix III.

Simulation model of attrition: We developed a computer simulation that projected the level of potential controller attrition through 2011. This model used age and years of service information for the controller workforce, in addition to past attrition rates and some assumptions about future attrition rates, to estimate the number of future losses FAA will face in its controller workforce. Additional information on the methodology of the computer simulation, including the assumptions we used, is given in appendix IV.

Survey of controllers: We mailed a survey to controllers to obtain independent estimates of future controller attrition. After developing and pre-testing the survey, we sent it to a statistically representative sample of 2,100 current controllers. The survey asked the controllers about when they planned to retire or leave the agency and about factors that could affect their decision. We received responses from over 75 percent of our sample. Additional information on the survey methodology can be found in appendix V.

To address the second objective of examining FAA's strategy for responding to its short- and long-term staffing needs, including how it plans to address the challenges it may face, we obtained information on the availability of potential controller candidates, FAA's process for hiring new controller candidates, and FAA's training activities associated with new candidates.

To obtain information on the availability of candidates, we interviewed officials at FAA headquarters, the 9 FAA regional offices, the 14 college or university air traffic control programs, and the Department of Defense to determine the number of controllers who are potentially available to FAA. We visited schools in California, Minnesota, New Hampshire, and Florida to better understand their activities. We did not verify the information provided by these sources.

To understand FAA's process for hiring new controller candidates, we interviewed officials at FAA's headquarters and regional offices. At FAA's headquarters we focused on the activities of the Air Traffic Resource

Management office, which is responsible for monitoring air traffic controller hiring levels. In addition, we met with officials at FAA's Civil Aeronautical Medical Institute to discuss their activities to develop a new screening test for potential controller candidates—referred to as Air Traffic Selection and Training exam (AT-SAT). In addition, we obtained information on how FAA uses staffing standards to determine staffing levels at its various facilities and interviewed officials with the National Academy of Sciences about their review of FAA's staffing standards.

To obtain information on FAA's training activities, we visited FAA's training academy in Oklahoma City, Oklahoma, and discussed on-the-job training with each of FAA's nine regional offices.

We also interviewed officials with the Air Transport Association, NATCA, and representatives of all nine FAA regional offices to ensure that we obtained a nationwide perspective on controller staffing issues. Finally, we obtained and reviewed information from the Office of Personnel Management and our previous reports on good human capital practices in government agencies to evaluate FAA's workforce plan regarding air traffic controller staffing.

We conducted our review from January 2001 through April 2002, in accordance with generally accepted government auditing standards. We obtained oral comments on a draft of this report from senior FAA officials, which are discussed at the end of chapter 3.

FAA Is Facing Increased Controller Hiring because of Higher Staffing Levels and Growing Attrition

Although the exact number and timing of the controllers' departure is impossible to determine, attrition scenarios developed by both FAA and GAO indicate that the total attrition will grow substantially in the short and long terms. As a result, FAA will likely need to hire thousands of air traffic controllers in the next decade to meet increasing traffic demands and to address the anticipated attrition of experienced controllers, predominately created by retirements. Depending on the scenario, total attrition could range from 7,200 to nearly 11,000 controllers over the next decade. GAO also found that the potential for retirement among frontline supervisors and controllers at some of FAA's busiest facilities may be high.

To identify likely future attrition scenarios, we (1) reviewed FAA's 10-year hiring plan and associated attrition forecasts for approximately 15,000 controller specialists who actively control and separate traffic in the air and on the ground; (2) analyzed FAA's workforce database to determine when the current controllers (those at FAA as of June 30, 2001) would become eligible to retire; (3) developed a computer model to predict future attrition based on historic levels; and (4) developed and administered a survey to a statistically representative sample of controllers so as to obtain information on when they might leave FAA.¹⁴ GAO's analysis covers more than 20,000 controllers—the 15,000 controller specialists whom FAA analyzed and about 5,000 controllers who supervise and manage the air traffic control system. GAO included the additional personnel because attrition from these positions is generally filled from the controller specialist ranks and, thus, omitting them would understate potential attrition among all controllers.

FAA Estimates It Will Need to Increase Controller Staffing Levels and Will Increasingly Lose Many Controller Specialists

In May 2001 FAA prepared a 10-year estimate of its hiring needs that included a projection of the number of controller specialists who may be needed in the future and estimates of expected controller losses. The estimate shows that the number of controller specialists needed to help manage the air traffic system could grow from about 15,000 in fiscal year 2001 to over 17,000 by the end of fiscal year 2010, and that losses of controllers could increase from 428 in fiscal year 2001 to over 1,000 in 2010.

¹⁴In this report, "attrition" refers to controllers who leave FAA for a variety of reasons, including retirement, removal for cause, death, or disability.

FAA Estimates It Will Need about 2,000 More Controller Specialists

FAA estimates that future air traffic increases will require it to hire more than 2,000 additional air traffic controllers over the next decade. FAA bases its future projections on a mathematical model, referred to as the staffing standard, which factors expected traffic levels and the amount of tasks a typical controller can perform in a given time frame in order to estimate the future number of controllers that FAA will need. As shown in table 3, FAA anticipates a growing requirement for controller specialists.

Table 3: FAA’s Controller Specialist Staffing Needs through 2010, by Fiscal Year

	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total controllers required	15,300 ^a	15,606 ^a	15,906	16,139	16,363	16,599	16,836	17,072	17,309

^aStaffing levels for fiscal years 2002 and 2003 were negotiated between FAA and NATCA.

Source: GAO’s presentation of FAA data.

FAA’s controller staffing levels in fiscal years 2002 and 2003 were established under the terms of FAA’s 1998 contract with NATCA, which represents the controller specialists. To estimate staffing needs for fiscal year 2004 and beyond, FAA used its air traffic control staffing standards. The standards estimate that FAA will need, on average, about 245 additional controllers each year from the end of fiscal year 2003 through fiscal year 2010, mainly because of increases in air traffic.¹⁵ The standards further estimate that FAA will need 17,309 controllers by fiscal year 2010—over 2,000 more controllers than are currently employed.

The National Academy of Sciences examined FAA’s staffing standards in 1997.¹⁶ It found that the standards did a reasonable job of estimating future needs on a national or regional level, but that the standards were not as useful in determining facility level needs. It recommended that FAA modify its staffing process to produce more reliable facility staffing estimates. To date, however, FAA has not fully implemented this recommendation

¹⁵FAA estimates that the events of September 11, 2001, will cause decreases in air traffic through 2003. However, FAA predicts that air traffic will then rebound and steadily increase, creating a need for additional air traffic controllers. Future controller staffing levels will be negotiated between FAA and the union.

¹⁶*Air Traffic Control Facilities: Improving Methods to Determine Staffing Requirements*, National Academy of Sciences, 1997.

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because of funding limitations, according to the branch manager, Resource Management.

**FAA Estimates that Future
Controller Losses Will Grow**

FAA's projections show growing losses of controller specialists. FAA included estimates of three types of losses: retirements, nonretirements (for example, resignations, firings, and deaths), and non-attrition (controllers who leave to take other positions within FAA, such as supervisory and staff positions). According to the branch manager, Resource Management, the forecast is based on historic attrition levels. Table 4 displays FAA's 10-year projections.

Table 4: FAA's 10-year Estimate of Controller Specialist Losses, by Fiscal Year

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
ATCS retirement	153	202	246	294	335	423	569	620	666	719	4,227
Non-retirement	104	106	108	110	111	113	115	116	118	119	1,120
Non-attrition	171	174	178	181	184	187	189	192	195	197	1,848
Total estimated losses	428	482	532	585	630	722	873	928	978	1,036	7,195

Source: GAO's presentation of FAA data.

As the table shows, FAA is estimating sizable increases in controller specialist retirements over the next decade, with retirements increasing each year and exceeding 700 by the end of fiscal year 2010. The average annual retirement level over the length of the forecast period is 423, which is three times higher than the average annual retirement level of 141 that FAA experienced over the 5-year period of 1996 through 2000. Combined with other losses, this estimate anticipates a nearly 50-percent turnover in the next decade from its current controller specialist contingent of approximately 15,000.

**GAO's Analysis
Indicates that Sizable
Controller Attrition Is
Likely**

The scenarios shown by our analysis of retirement eligibility trends, the results of our simulation model, and estimates from our controller survey all indicate that FAA may face a sizable increase in future attrition, primarily because of retirements. In addition, we examined attrition patterns for supervisors and for controllers at the busiest facilities because of their importance to the national air traffic control operations, and we

found that attrition levels for these groups could be sizable over the next decade.

Number of Employees
Eligible to Retire Increases
Rapidly

Because many controllers were hired in the early 1980s, FAA is facing an aging controller workforce. As of June 30, 2001, the average age of an FAA controller was 43, and approximately 7,400 controllers were 45 or older. In addition, because of the special controller retirement provisions, many controllers may soon accrue enough years of service to meet the retirement eligibility requirements. Because FAA's employee database does not identify the amount of time controllers have worked controlling traffic (good time), we examined the eligibility of FAA's entire controller workforce (about 20,000 employees), using both the special controller retirement provisions and the CSRS/FERS retirement provisions.¹⁷ Although most of the employees would be expected to first reach eligibility under the special provisions (20 years of good time and age 50, or 25 years of experience at any age), some of those employees who were older when hired or were working at positions other than actually controlling traffic (like training) might first become eligible under CSRS or FERS provisions (age 55 with 30 years federal employment, age 60 with 20 years federal experience, or age 62 with 5 years experience).

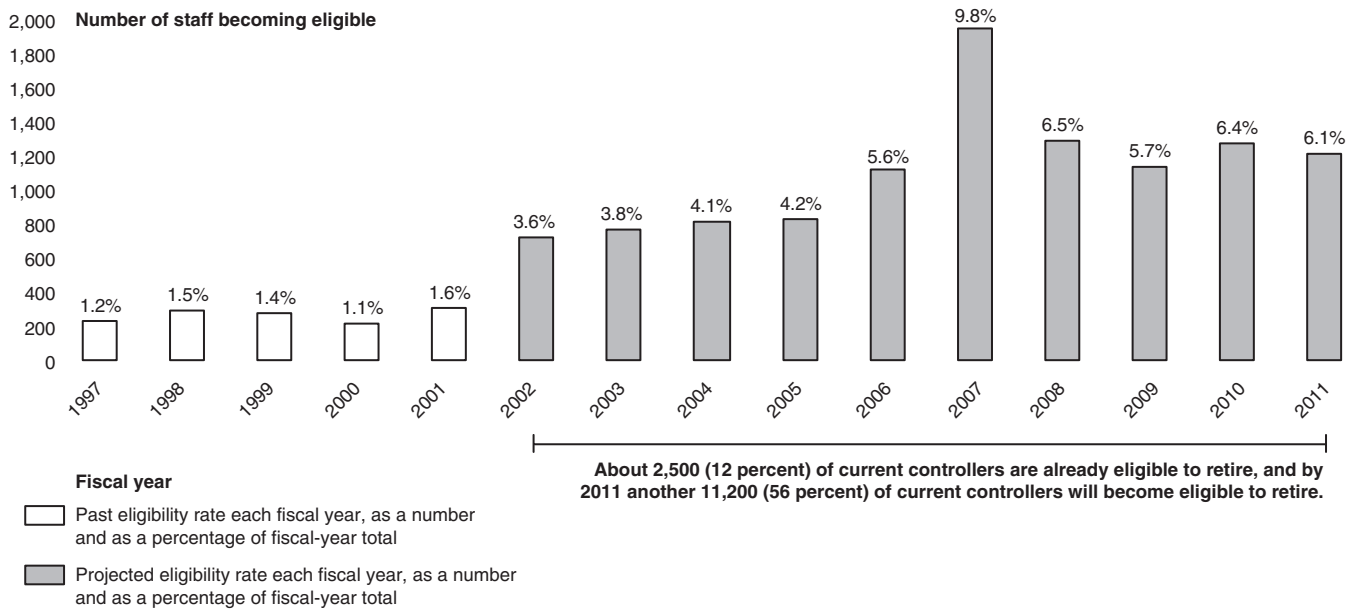
Our review of the eligibility data shows that about 2,500, or 12 percent of the current controller workforce, was eligible to retire at the end of fiscal year 2001. As figure 3 shows, an increasing percentage of current controllers will become eligible to retire between fiscal year 2002 and 2011, with nearly 11,200 of the current controllers becoming eligible for retirement over the next 10 years. In addition, those already eligible, coupled with the nearly 11,200 additional controllers becoming eligible over the next 10 years, will increase the number of current controllers eligible to retire to more than 13,600, or 68 percent of FAA's total current controller workforce, by the end of fiscal year 2011.¹⁸

¹⁷Because FAA's database does not contain information on the amount of an employee's good time service, to calculate retirement eligibility under the special provisions we assumed that all of the controllers' FAA experience was good time. The results indicate the maximum number of current controllers who become eligible each year.

¹⁸Although about 68 percent of current controllers may become eligible to retire by 2011, FAA's workforce at that time will not have this level of eligibility because some current controllers will retire before then and FAA will hire new employees.

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Figure 3: Air Traffic Controllers Becoming Eligible for Retirement in Each Fiscal Year



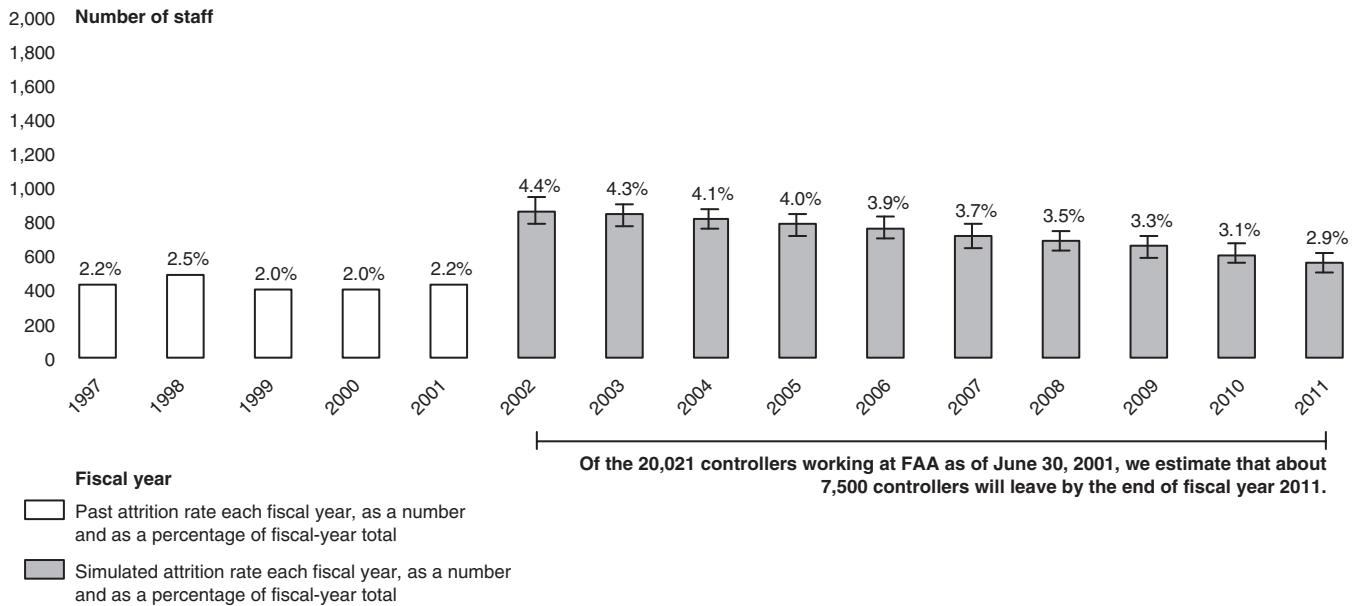
Source: GAO's analysis of FAA's data.

GAO Model Predicts High Attrition Levels over the Next Decade

Our controller attrition simulation model projects that high numbers of controllers will leave the workforce between fiscal years 2002 and 2011. Probabilities for separation were based on controller attrition patterns between 1997 and 2000 and were applied to the 20,021 controllers at FAA as of June 30, 2001. Projections are therefore based on the June 2001 population, and there is no adjustment for new appointments. As shown in figure 4, the simulation model predicts that about 600 to 800 controllers will leave each year between fiscal years 2002 and 2011, which is one and one-half to two times higher than average attrition was over the past 5 years. It also indicates that nearly 7,500 controllers (about 37 percent of the current controller workforce) are projected to leave FAA by the end of fiscal year 2011.

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Figure 4: Past and Simulated Air Traffic Controller Attrition, by Fiscal Year



Note: ┘--Denotes the minimum and maximum values from the simulation model.

Source: GAO simulation using FAA database.

Many Controllers Responding to GAO Survey Plan to Leave FAA Soon

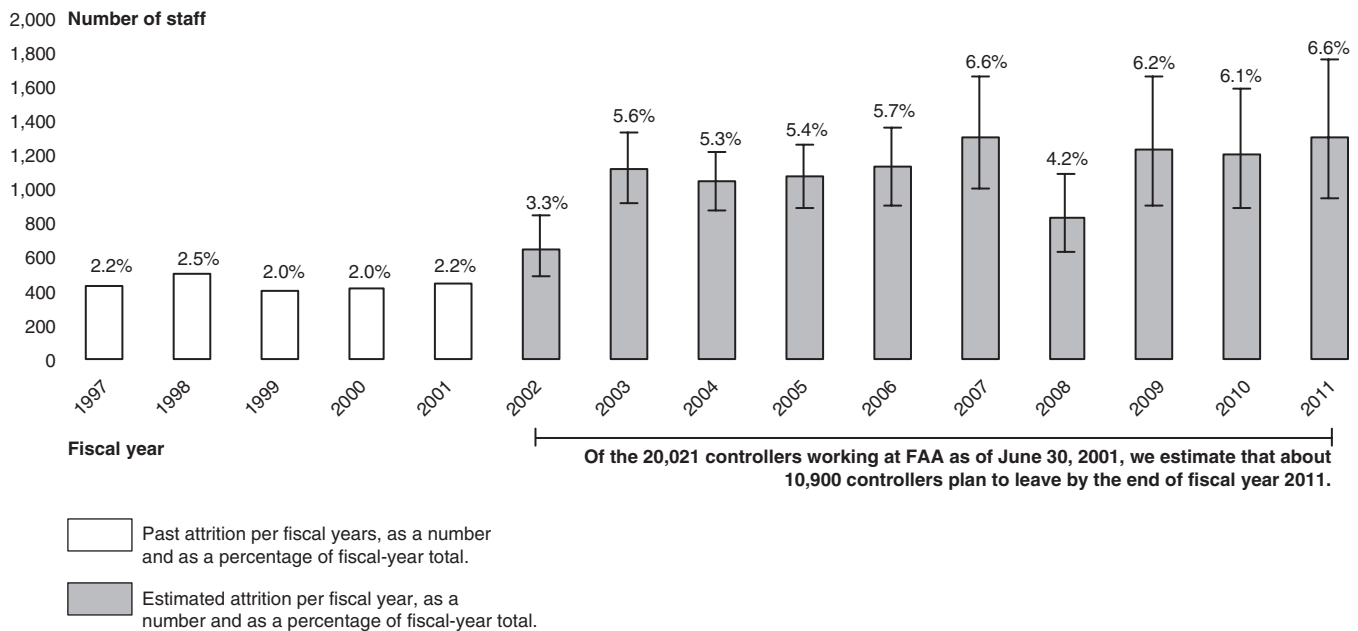
Based on the results of our survey of air traffic controllers, we estimate that many controllers plan to leave FAA soon. Of the 20,021 controllers working at FAA as of June 30, 2001, we estimate that approximately 5,000 controllers plan to leave (predominately because of retirement) between fiscal years 2002 and 2006, and about 10,900 by the end of fiscal year 2011.¹⁹ As shown in figure 5, we estimate that between fiscal years 2002 and 2011, approximately 1,100 controllers on average plan to leave each year, and about 1,300²⁰ controllers plan to leave in fiscal year 2007 alone—also the peak year for controllers reaching retirement eligibility. These estimates are more than double the recent attrition levels that FAA has

¹⁹These estimates also include some minimal amount of nonretirement attrition—those few controllers who indicated that they would leave FAA before they retired.

²⁰The 95 percent confidence interval for this estimate extends from 1,007 to 1,656 controllers.

experienced—on average, about 436 controllers separated each year for the past 5 years.

Figure 5: Survey Estimates: Past and Estimated Air Traffic Controller Attrition



Note: ┘--Confidence interval: displays the upper and lower bounds of the 95% confidence interval for each estimate.

Source: FAA's historical data and GAO's estimates based on survey responses.

We also estimate, based on the survey responses, that there are two time frames for when controllers said they might leave or retire. An estimated 40 percent of the controllers said they planned to leave or retire at age 50 or earlier, and another 26 percent said they planned to leave or retire around the maximum 56-separation age. In addition, we also found that approximately 51 percent of controllers said they planned to retire when they first become eligible.

Supervisor Attrition Is Likely to Increase Rapidly

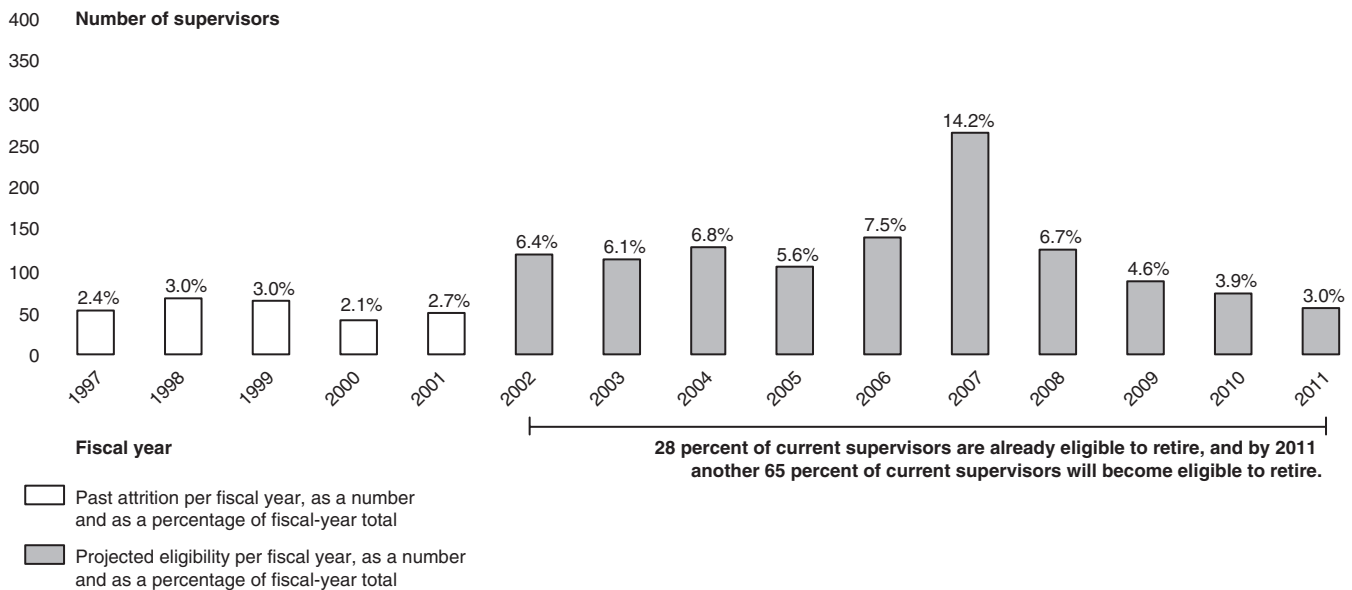
Because supervisors are important to air traffic control operations and because they tend to be older than others controlling traffic, we examined retirement eligibility and survey results of supervisors at FAA as of June

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2001. We found that supervisors will become eligible and said they planned to leave FAA in very high numbers over the next decade.

We found that 1,205, or 65 percent, of current supervisors will become eligible to retire between 2002 and 2011. (See fig. 6.) Given that 28 percent of current supervisors are already eligible to retire and that by 2011 another 65 percent will have reached eligibility, about 93 percent of current supervisors will be eligible to retire by the end of fiscal year 2011. As a result, FAA may face substantial turnover in its supervisory ranks over the next decade.

Figure 6: Past and Projected Retirement Eligibility for Supervisory Air Traffic Controllers



Source: GAO's analysis of FAA database.

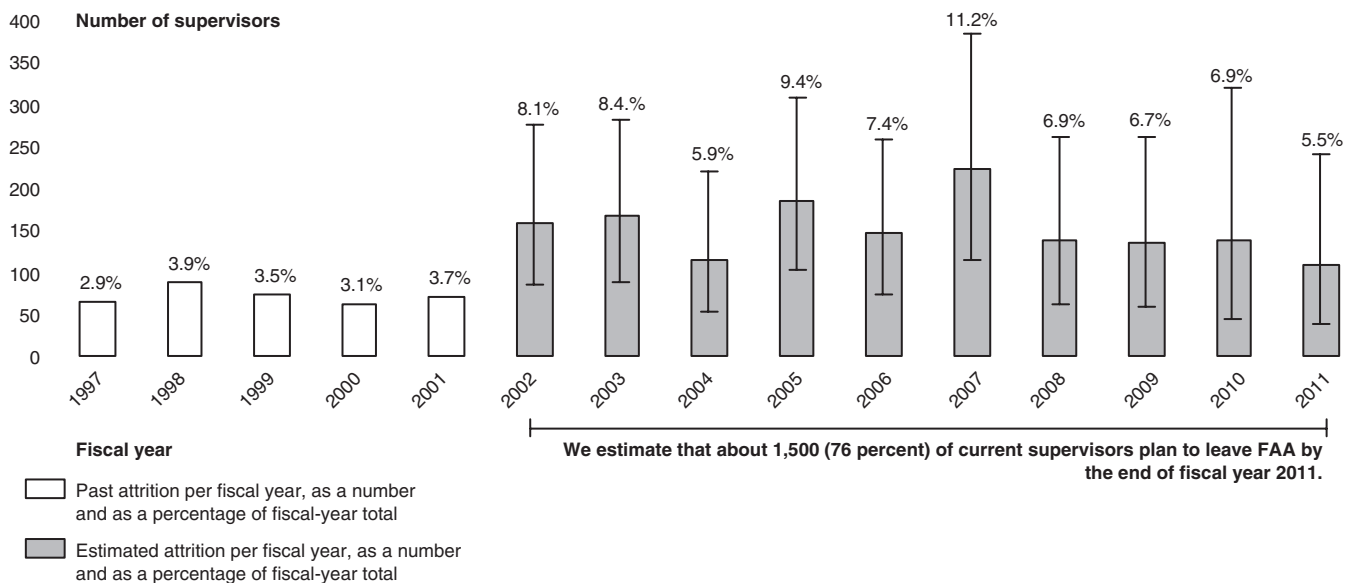
In addition, estimates from our survey show sizable attrition through fiscal year 2011. As shown in figure 7, we estimate that 770²¹ supervisors (about 39 percent of current supervisors) said they plan to leave between fiscal

²¹The 95 percent confidence interval for this estimate extends from 592 to 984 supervisors.

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years 2002 and 2006, and 1,503²² supervisors (about 76 percent of current supervisors) plan to leave FAA, primarily through retirement, through fiscal year 2011, an average of about 150 per year. The peak year in planned attrition is fiscal 2007, when we estimate that 221²³ supervisors plan to leave. This level of potential attrition for supervisors is higher than in the past 5 years, during which an average of 71 supervisors left each year.

Figure 7: Survey Estimates: Past and Estimated Air Traffic Controller Attrition for Supervisory Air Traffic Controllers



Note: I--Confidence interval: displays the upper and lower bounds of the 95% confidence interval for each estimate.

Source: FAA's historical data and GAO's estimates based on survey responses.

High levels of supervisor attrition could also affect the controller specialist workforce. To the extent that FAA replaces supervisors who leave, increases in supervisory retirements could further reduce the number of experienced controller specialists available to control traffic and increase controller specialist hiring needs in order to replace the controllers moving

²²The 95 percent confidence interval for this estimate extends from 1,279 to 1,728 supervisors.

²³The 95 percent confidence interval for this estimate extends from 115 to 382 supervisors.

to supervisory positions. The overall impact of supervisor attrition is unclear at this time. Until recently, FAA was in the process of reducing the controller-to-supervisor ratio from 7-to-1 to 10-to-1, through attrition, as agreed to in the 1998 NATCA collective bargaining agreement. This strategy would help mitigate the flow of NATCA bargaining unit controllers into the supervisory ranks. The outcome of this strategy is uncertain because the Conference Report for the fiscal year 2002 Department of Transportation Appropriations (H. Rpt. 107-308) stated that the conferees were concerned about the impact of the reduction and directed FAA not to reduce supervisory staffing further.²⁴ FAA intends to abide by this language for this fiscal year, and its future decisions on supervisory reductions are subject to congressional direction.

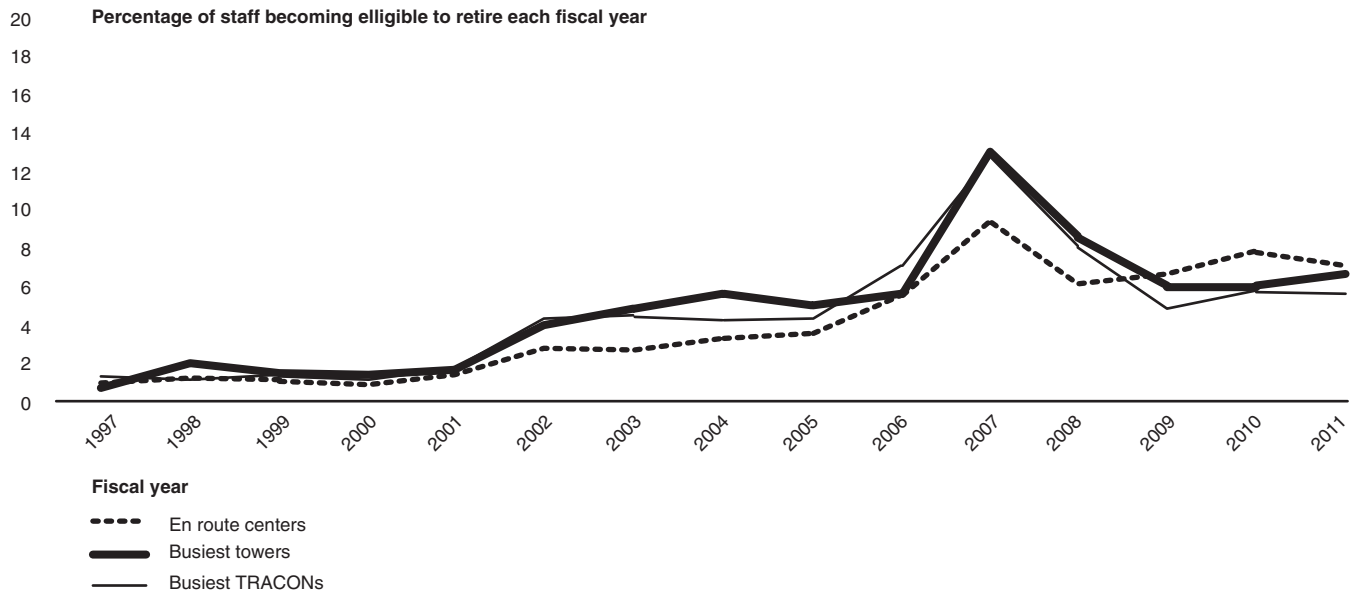
FAA's Busiest Facilities May Face High Attrition Levels

Because of the crucial role played by en route centers and the busiest terminal facilities in the national air space system, we analyzed the impact of retirement eligibility on the 21 major en route centers, the 10 busiest airport towers, and the 10 busiest TRACON facilities. Based on our analysis of FAA's employee database, we found that the en route centers and the busiest terminal facilities will experience a sizable increase in the number of controllers reaching retirement eligibility. As figure 8 shows, retirement eligibility in these facilities grows over the next decade.

²⁴For additional discussion of controller supervisors see *Air Traffic Control: FAA Enhanced the Controller-In-Charge Program, but More Comprehensive Evaluation Is Needed*, GAO-02-55 (Washington, D.C.: Oct. 2001).

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Figure 8: Controllers Becoming Eligible for Retirement by Fiscal Year for En Route Centers, Ten Busiest Towers, and Ten Busiest TRACONs



Source: GAO's analysis of FAA's data.

In analyzing retirement eligibility data for the en route centers, we found that 903, or about 11 percent, of the controllers currently at FAA's 24 en route centers are already eligible to retire. Additionally, the cumulative percentage of current controllers becoming eligible to retire increases to about 28 percent by the end of fiscal year 2006 and reaches about 65 percent by the end of fiscal year 2011. In terms of the 21 major en route centers, the Jacksonville center had the highest proportion of retirement-eligible controllers at the end of fiscal year 2001, with 79 of its 376 controllers being eligible for retirement (21 percent). By the end of fiscal year 2006, at least 29 percent of current controllers will be eligible for retirement at 10 centers—Albuquerque, Atlanta, Boston, Fort Worth, Houston, Jacksonville, Los Angeles, Memphis, Seattle, and Washington, D.C.

At the 10 busiest airport towers, 76, or about 10 percent, of current controllers are eligible to retire. The cumulative percentage rises to about 34 percent by the end of fiscal year 2006 and reaches 74 percent by the end of fiscal year 2011. Based on our analysis for these towers, we found that

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the Denver tower had the highest proportion of retirement-eligible controllers as of September 30, 2001, with 14 of its 51 (27 percent) controllers being eligible to retire. By the end of fiscal year 2006, 45 percent of Denver's current controllers will be eligible to retire, and by the end of fiscal year 2011 it reaches 90 percent, as 46 of its 51 current controllers will reach retirement eligibility.

At the 10 busiest TRACON facilities, about 199, or about 12 percent, of current controllers are eligible to retire. The cumulative percentage increases to about 36 percent by the end of fiscal year 2006 and reaches about 73 percent by the end of fiscal year 2011. Based on our analysis for these facilities, the Dallas/Fort Worth TRACON had the highest level of current controllers eligible to retire at the end of fiscal year 2001, with 36 of its 147 (24 percent) controllers being eligible. By the end of fiscal year 2006, the cumulative percentage grows to 46 percent, and by the end of fiscal year 2011 it reaches 87 percent, as 128 of the 147 controllers currently at the facility will have reached retirement eligibility.

FAA Needs a More Comprehensive Workforce Plan for Air Traffic Controllers

Attrition of air traffic controllers will increase substantially over the next decade, primarily because many controllers will retire. This condition is widespread across the various air traffic control facilities at the FAA, and the potential for massive turnover exists even at FAA's most complex and busiest facilities. To effectively deal with expected attrition, government agencies must identify human capital needs, assess how current staff and expected future staff will meet those needs, and create strategies to address any shortfalls or imbalances. As we have reported, a high-performing organization typically addresses its current and future workforce needs by estimating the following: the number of employees it will need; the knowledge, skills, and abilities those employees will have in order for the organization to accomplish its goals; and the areas where employees should be deployed across the organization.²⁵ We have developed a model that identifies strategic workforce planning as a critical success factor in effectively managing a human capital program, because such planning can help agencies ensure that they have adequate staff to accomplish their missions.²⁶

Although FAA will be faced with unprecedented numbers of retirements of its air traffic controllers, it has not yet developed a comprehensive workforce plan to address this issue and therefore risks having a shortage of qualified controllers. Good workforce planning includes developing strategies for integrating hiring, recruiting, training, and other human capital activities in a manner that meets the agency's long-term objectives. FAA generally hires new controllers only when current, experienced controllers leave, and it does not adequately take into account the time necessary to fully train these replacements. Furthermore, although FAA intends to increasingly hire individuals with no prior controller experience, its new aptitude test for potential candidates may not be as effective in screening them as initially planned. In addition, FAA has not provided its training academy with the resources necessary to handle the expected large increase in controller candidates. Finally, exemptions to the mandatory age 56-separation provision raise equity and safety issues. FAA therefore might face a shortage of experienced controllers, leading to an increase in overtime logged by its remaining controllers. Increased flight delays might also result from this situation, as fewer controllers might not

²⁵*Human Capital: Key Principles from Nine Private Sector Organizations*, GAO/GGD-00-28 (Washington, D.C.: Jan. 31, 2000).

²⁶*A Model of Strategic Human Capital Management*, GAO-02-373SP (Washington, D.C.: Mar. 15, 2002).

be able to safely guide the same number of flights that would be possible with a fully staffed controller workforce.

FAA's Hiring Process Does Not Adequately Ensure that Qualified Controllers Will Be Available When Necessary

A key component of workforce planning is ensuring that appropriately skilled employees are available when and where they are needed to meet an agency's mission. This means, in part, that an agency continually needs trained employees becoming available to fill newly opened positions. FAA's current hiring process does not adequately ensure that qualified replacements are available to expeditiously assume the responsibilities of those who retire. The main objective of FAA's branch manager for resource management is to ensure that controller-staffing levels meet the levels called for in FAA's contract with the controller's union (NATCA). To do this, he estimates how many controller specialists will leave during the year and allocates this number among regions as a target-hiring figure. On at least a quarterly basis, he informs the officials in the regions how many controller candidates they are allowed to hire for that period. If attrition is lower than expected during that period, he may tell them to delay hiring until a later quarter. For example, in fiscal year 2001, the plan called for hiring 425 controller candidates but, because of lower-than-expected attrition levels, FAA hired only 358 new controllers. According to this official, FAA does not have budgetary resources to maintain and develop an employee pipeline to ensure that fully certified replacements are available, so it has no plans to change these hiring practices.

FAA's approach of hiring new employees only when current employees leave does not adequately account for the time needed to train controllers to fully perform their functions, or for the increased retirements that are projected in the short and long terms. The amount of time it takes new controllers to gain certification depends on the facilities at which they will work, but it generally takes from 2 to 4 years and can take up to 5 years at some of the busiest and most complex facilities.

The branch manager's May 2001 hiring plan identifies a "hiring lead time adjustment" starting in fiscal year 2004 that provides for additional hiring in recognition of the time necessary to train employees. The numbers included, however, do not appear adequate to account for the large potential increases in controller attrition. For example, in fiscal year 2004, the adjustment is for hiring 70 extra candidates, which would respond to a potential attrition of about 700 to 1,100 controllers in 2006, when these new hires might be ready for certification at some facilities. In addition, the branch manager told us that budget constraints play a key role in

determining the timing of hiring new candidates. For example, he said that budget requests are tied to the NATCA contract amounts and that FAA had no plans to request the additional funding necessary to go above those levels. FAA officials also stressed that staffing management is now a partnership between FAA and NATCA, and that this also creates constraints on FAA's ability to hire and place new controllers at specific facilities.

FAA regional officials, who are responsible for ensuring that FAA's air traffic facilities are adequately staffed, are particularly concerned about FAA's replacement-hiring policy. Eight of nine regional officials with whom we spoke stated that they would like for FAA to allow them to hire new controller staff above their authorized levels so that experienced, fully qualified controllers will be ready when current controllers retire. The officials were particularly concerned that significant increases in retirement rates among veteran controllers would leave the facilities short of qualified controllers while new trainees are hired and trained. Several regions stated that they had made formal and informal requests to FAA headquarters to obtain additional controllers who could be hired and trained in advance of future retirements. In May 2001, for example, officials from FAA's Southwest Region formally requested 48 additional staff members to mitigate the impact of future retirements. The region asked for new hires at one of its en route centers to "ensure that quality customer service is maintained, budgetary concerns are addressed, and controller attrition is dealt with." In April 2002, FAA headquarters informed the region that their request was denied because of operational constraints imposed by the 1998 agreement with the controllers' union and because of the current fiscal year's budgetary constraints. Furthermore, numerous FAA regional officials told us that they were frustrated by their agency's insistence on staffing as close to the numbers called for in the NATCA contract as possible.

A lack of experienced controllers could have many adverse consequences, according to several FAA regional officials. Several regional officials stated that if a facility becomes seriously short of experienced controllers, the remaining controllers might have to slow down the flow of air traffic through their airspace. If the situation became dire, FAA could require airlines to reduce their schedules, but this would be an unlikely, worst-case scenario, according to some FAA regional officials. Also, because there would be fewer experienced controllers available to work, some FAA facility officials stated that those controllers could see increased workloads and additional, potentially mandatory, overtime. Some facility

managers told us that they expected this increased burden to result in additional work-related stress for the remaining controllers, which would increase sick leave usage. It could also cause experienced controllers to retire sooner than they otherwise might. For example, based on our survey results, we estimate that 33 percent of controllers would accelerate their decision to retire if forced to work additional mandatory overtime.

FAA Developed Screening Test to Help Identify Potential Candidates Most Likely to Succeed

Identifying sources of future potential employees with the requisite skills and aptitude is another key piece of a comprehensive workforce plan. As discussed in chapter 1, FAA historically has hired its new controllers from a variety of sources, including graduates of institutions in FAA's collegiate training initiative program, the Minneapolis Community and Technical College, candidates already on a list maintained by OPM, controllers formerly employed by FAA who were fired by President Reagan in 1981, and former DOD controllers. Table 5 shows the sources and number of new controllers that FAA hired between fiscal years 1997 and 2001.

Table 5: Sources of New Controllers, Fiscal Years 1997–2001

Source	1997	1998	1999	2000	2001 ^a	Total
Collegiate Training Initiative	161	50	60	119	75	465
Minneapolis Community and Technical College	32	48	52	77	82	291
Office of Personnel Management	4	14	14	9	7	48
Reinstated employees	26	12	4	7	16	65
Former controllers fired in 1981	188	289	30	41	14	562
Department of Defense	89	355	96	136	117	793
Total	500	768	256	389	311	2,224

^aPartial year data.

Source: GAO's analysis of FAA regional data.

DOD officials were concerned that increasing retirements of FAA's controllers over the next 5 years will cause greater operational problems, and possibly affect defense readiness, if potentially thousands of DOD controllers were to fill openings at FAA. DOD has lost many controllers to FAA—about 35 percent of FAA's hires in the past 5 years. FAA's regional

officials told us that they like to hire former military controllers because of their experience, maturity, and work ethic. DOD officials with whom we spoke explained that these losses had resulted in cutbacks for fighter training missions by at least one of the armed services and in the implementation of significant retention bonuses to military controllers. Although DOD employs both civilian and uniformed military controllers, there remains a pay disparity between DOD and FAA. These officials believe that the higher pay offered by FAA explains why DOD military and civilian controllers apply for FAA controller jobs. For example, in fiscal year 2001, the maximum base salary levels for DOD controllers were \$48,730 for a DOD military controller and \$74,553 for a DOD civilian controller, while FAA controllers could earn up to \$128,386.²⁷ DOD officials stated that both agencies (FAA and DOD) must meet their recruiting and retention goals to support national security and defense requirements. To that end, DOD officials said that the focus needs to be on the requirement for air traffic controllers as a whole and not on two competing systems.

Along these lines, FAA headquarters officials said that because FAA hopes to achieve a more diverse workforce, it expects to concentrate increasingly on hiring off-the-street candidates. The success of the off-the-street hiring depends in large part on identifying potential candidates who have an appropriate aptitude for controllers' work. Traditionally, FAA used the academy's initial entry-training program to screen out candidates who could not become successful controllers. According to FAA officials, as many as 50 percent of off-the-street applicants have dropped out before finishing the required training program. These officials estimated that about \$10 million per year was spent on training candidates who later failed the program. FAA therefore developed a new screening exam, known as AT-SAT, to better ensure that the new hires have the skills and abilities to succeed on the job. FAA plans to require that candidates without prior experience pass the 8-hour AT-SAT exam before they begin training at its academy. According to academy officials, the academy is planning to rely on AT-SAT as a way to screen out candidates unlikely to pass the academy's training, and it has therefore revised its training program to emphasize teaching skill-sets rather than serving as a screening program.

Uncertainty exists regarding the exam's ability to screen out unsuccessful candidates and help ensure that new candidates have the aptitude to

²⁷Base salary figures do not include other military compensation, such as subsistence and housing allowances; these allowances fluctuate, depending on numerous factors.

become successful controllers. For example, FAA has recently changed the exam to allow more candidates to pass, which creates some uncertainty about its ability to identify successful candidates. During initial validation of AT-SAT, FAA found that the test should predict, with a high level of validity, that those who passed it would become successful controllers. However, FAA found that only about 28 percent of non-FAA test subjects and about 62 percent of active controllers could pass the test. In addition, they found that passing rates for some applicant groups, including particularly African-Americans and females, might be significantly lower than the overall passing rates. Therefore, FAA concluded that the passing score on the test was set higher than the typical controller's job expectations. As a result, the developers of the exam changed the weight given to different portions of the exam and adjusted the passing score to tie the test more accurately to the actual job performance of controllers. According to FAA, this will result in more applicants passing the exam (68 percent are now expected to pass).

FAA plans to begin using the test in June 2002. Although FAA has not revalidated the effectiveness of the revised exam, FAA officials stated that they have long planned to perform an operational evaluation of the exam to assess how well the exam works in practice, and that they are currently considering two options for performing this evaluation. First, FAA could correlate candidates' scores on the exam with how well they perform on a computer simulation of actual air traffic. In order to implement this option, FAA would have to develop a new computer-based performance measure for the terminal environment. Officials indicated that this would cost several hundred thousand dollars. The second option would be to validate the exam against initial training at the academy, field training, and job performance. This would require FAA to develop criteria for measuring success in each of these three areas. In any case, to evaluate the exam, the officials need to decide on an option, develop a detailed implementation plan, and identify funding for this purpose. Officials could not provide an estimate as to when they will decide on a specific option. Until the results are evaluated, the operational effectiveness of the exam will be unknown.

Challenges Exist in Addressing Academy and On-the-Job Training Resources and Equipment Needs

Workforce planning should consider the approach and resources necessary for providing new employees with the means to acquire the knowledge, skills, and abilities to accomplish the agency's mission. However, FAA has not adequately addressed the challenges associated with providing the training resources—specifically training staff, equipment, and opportunities for on-the-job training—needed for large increases in new hires. Most controller candidates undergo both 15 weeks of classroom exercises at FAA's academy in Oklahoma City and on-the-job training at the facility where employees are assigned. As of March 2002, the academy was staffed with 91 FAA employees and 60 contractors. This number of employees and contractors has been used to train, on average, about 200 new hires for each of the past 5 years. The academy's training plan anticipates that between 547 and 980 controller candidates might need training each year through fiscal year 2005. To meet the projected levels, these officials believe they will need up to 50 additional staff to provide training.

The training academy may have difficulty recruiting current controllers to conduct portions of their training program. Academy officials told us that their recent attempts to persuade experienced controllers to volunteer to train new recruits have not been very successful. Academy officials explained that the 1998 pay raise, which in some cases increased salaries for controllers by more than 30 percent but applied only to periods when the controllers were actually guiding air traffic, has affected the controllers' willingness to participate. Whereas a controller was once paid the same amount for providing training as for controlling traffic, under the new system a controller would lose pay by becoming a trainer at the academy. Academy officials said they recently put an announcement out asking for volunteers to conduct training and received 31 applications. They noted that before the pay raise they were receiving hundreds of applications for these positions, which provided them a greater opportunity to select from a broader pool.

Equipment deficiencies also hamper the academy. For example, the academy is training en-route controllers on equipment that is not used at actual en-route centers, so controllers must retrain on different equipment once they reach their facilities. To efficiently train en-route and terminal controllers, academy officials told us that they need a specialized en-route simulator lab known as a Display System Replacement lab, which costs between \$7 million to \$45 million, depending on the sophistication of the model purchased. Academy officials have been trying to obtain this

equipment for several years, and the academy has recently made another proposal regarding this equipment. FAA headquarters is expected to decide whether to purchase this lab in the near future. In addition, the academy uses tower simulators to give trainees experience with controlling traffic in a computer-simulated environment. However, academy officials said their current simulators are often broken, outdated, and lacking in the necessary capacity to train large numbers of new hires. The cost of the new equipment is estimated at \$2 million. If FAA does not make these investments, academy officials said, controller candidates will need more training time when they reach their facilities.

New controllers might also have difficulty obtaining on-the-job training, FAA regional officials stated. New controllers are to receive their facility training from fully certified controllers already working in that facility. Under FAA's current hiring system and estimated attrition rates, however, there will be fewer experienced controllers to provide training and more new hires in need of training. More time will thus likely be needed to train new controllers. This situation could be particularly acute at FAA's en-route centers and busy terminal facilities, because it takes longer to train replacement controllers at these facilities. Retirements at these facilities are expected to increase the burden on the remaining experienced controller staff.

Exemptions to the Age 56 Separation Provision Raise Safety and Equity Concerns

Ensuring that a workforce retains employees with the requisite skills and abilities is another important piece of workforce planning. As described in chapter 1, legislation passed in 1972 stipulates that air traffic controllers must separate at age 56.²⁸ Some controllers are exempt from the retirement rule, however, and continue to work beyond age 56. This practice raises two concerns: (1) whether the skills and abilities of the older controllers have diminished, thus potentially compromising safety; and (2) whether the exemptions result in unequal treatment for some controllers.

²⁸This legislation covers those controllers under the CSRS retirement system. Another mandatory separation provision was passed in 1986 to cover those controllers who are under the FERS retirement system Public Law 99-335 (codified at 5 U.S.C. 8425a).

In 1972, Congress directed that “an air traffic controller shall be separated from the service on the last day of the month in which he becomes 56 years of age.”²⁹ The House Report associated with this law justifies the provision by stating that “air traffic control is a young man’s business...and that because of the natural forces of aging, magnified by the stresses of control functions, the productive and proficient life of the controller is substantially less than that which prevails in most other occupations.”³⁰ In addition, the report states, “the controllers themselves are convinced that the demands of their job are so great that only young, healthy adults can consistently do a safe, competent job of controlling the steadily growing volume of air traffic.” The House Report further states that “as the controller approaches age 50 his mental faculties of alertness, rapid decision making, and instantaneous reaction...begin a definite decline.” In addition, the associated Senate Report³¹ states, “like skilled athletes, most controllers lose proficiency to some degree after age 40, and in the interest of the public’s safety, should not be retained as controllers in busy facilities beyond the time they can perform satisfactorily.”

The law’s provision requires mandatory separation at age 56 for controllers who separate and control air traffic; provide preflight, in-flight, or airport advisory service to aircraft operators; or serve as the immediate supervisors of any employee who performs these duties. These positions include controller specialists and their first-line supervisors as well as traffic management coordinators and their first-line supervisors.

Some controllers who separate and control traffic are exempted from this provision, however, including controllers appointed by the Department of Transportation (DOT) before May 16, 1972, and controllers appointed by DOD before September 12, 1980. In addition, those controllers covered by the FERS retirement system can continue working past age 56 until they have reached 20 years of service in a covered position (so called good time under the special air traffic controller retirement provisions). Similarly, on November 12, 2001, the president signed a law allowing controllers covered by the CSRS retirement system to work in covered positions past age 56 until they first become eligible for retirement annuities under any

²⁹Public Law 92-297 (codified at 5 U.S.C. 8335).

³⁰House Report 92-516.

³¹Senate Report 92-774.

retirement scenario.³² Our analyses of FAA's employee database shows that approximately 700 of those controllers currently engaged in separation and control of traffic are exempt from the requirement and have already turned age 56, and another 1,200 will reach 56 by December 31, 2006, if they do not leave FAA before then. According to FAA, 287 controllers were appointed by DOT before May 16, 1972, and are exempt from the requirement. Most of the remaining exempted controllers were either appointed by DOD before September 12, 1980, or are covered by FERS provisions.

FAA also has the statutory authority to waive the age provision on a case-by-case basis. The applicable law states that "the Secretary of Transportation, under such regulations as he may prescribe, may exempt a controller having exceptional skill and experience as a controller from the automatic separation provisions of this subsection until that controller becomes 61 years of age."³³ However, according to an FAA Headquarters official, FAA has never granted an age waiver to the mandatory separation provision. Further, since 1995, it has been FAA's policy not to grant any age waivers. This official also stated that most controllers are aware of the difficulty in obtaining an age waiver and do not even apply for one—only seven controllers have applied for a waiver since 1995. Despite this view, many controllers said they would like the opportunity to work past the age of 56. Our survey indicates that many controllers would continue to work if they were permitted to do so; approximately 31 percent of respondents cited the opportunity to work past age 56 as a factor that could lead them to delay their retirement plans. In addition, regional FAA officials said they would like to have the flexibility to retain some of these experienced controllers.

As mentioned above, safety concerns formed the basis of the age-56 separation provision. Only limited actions have been taken, however, to assess whether those controllers who are exempted from the provision have adequately retained the skills and abilities necessary to perform their duties. FAA requires all controllers to pass annual physical examinations that test sight, hearing, and overall health conditions. No additional tests—such as for mental acuity or changes in reaction time—are given to controllers who surpass age 56.

³²Treasury, Postal Service, and General Government Appropriations Act, 2002, Public Law 107-67, Sec. 640 (a).

³³Public Law 92-297 for CSRS, Public Law 99-335 for FERS.

The equity issues associated with the exemptions to the age-56 separation rule could become more prominent in the future if FAA continues to rehire controllers fired during the 1981 strike. In 1993 President Clinton, through presidential directive, lifted the ban on hiring former striking employees. In the past 5 years, FAA has rehired about 850 controllers who were fired in 1981. The average age of the 733 still working as of June 30, 2001, was 54, and about 35 percent were aged 56 or older. The oldest was 69 as of June 30, 2001. In addition, FAA officials said that most of the rehires are exempt from the mandatory separation provisions because they were originally hired before May 16, 1972. Further, recently a group of controllers fired during the 1981 strike filed a class action lawsuit alleging that FAA discriminates against such controllers because of their age. Depending on the outcome of this lawsuit, about 2,000 former controllers—many aged 50 and above—could be given hiring priority.

Conclusions

Although the attrition scenarios projected by FAA and us reflect estimates of the future, and any particular estimate in any given year is subject to varying degrees of uncertainty, the overall results suggest that FAA will face significant personnel challenges. If controllers leave at a quicker pace than estimated, the situation may become even more difficult for FAA, as it would have to swiftly replace its seasoned controllers with new controllers possessing lesser experience. To the extent that controllers leave at a slower pace than estimated, FAA will have a larger window of opportunity to replenish its workforce. Ultimately, FAA's ability to successfully plan for and manage this situation will dictate its overall impact on the nation's air traffic control system and the safety and efficiency of air travel in the United States.

The employees whom FAA will need to replace possess unique skills and are critical to the safety and efficiency of the nation's air transportation system. FAA, as the agency responsible for managing this workforce, does not have a comprehensive workforce plan to help manage the expected turnover. An effective human capital process anticipates expected attrition and includes the development of a comprehensive workforce plan that (1) establishes an effective approach for hiring individuals with the requisite skills and abilities in time to accomplish agency missions, (2) provides new employees with the best training opportunities possible to maximize their potential, and (3) uses opportunities to retain qualified staff.

FAA's approach to workforce planning does not adequately address these strategies, raising the risk that the safety and efficiency of the nation's air

transportation system will be adversely affected. In addition, if FAA does not take steps to develop and implement a more comprehensive workforce strategy, increased traffic delays and overtime costs could result. FAA's practice of hiring replacements for controllers only after a position is vacated leaves the agency vulnerable to skills imbalances, with inexperienced and uncertified controllers replacing seasoned veterans. This situation may be exacerbated at individual air traffic control facilities because the age and experience of controllers varies across the system, which could cause some locations to experience additional staffing challenges. Also of concern are the effects of the recent scoring changes that were made to the test used to screen potential candidates. Until the screening test results are examined, the ability of the exam to identify candidates who will make successful controllers will not be known. Further, the quality of the training that controllers receive could be compromised because FAA has not addressed the human resources and equipment needs of its training academy, despite the growing projected student population. Finally, safety and equity issues associated with the age-56 separation exemptions could affect the morale of the controller workforce and the safety of air traffic.

Recommendations for Executive Action

To help meet the challenges presented by hiring thousands of new controller candidates, we recommend that the secretary of transportation direct the administrator of the Federal Aviation Administration to develop a comprehensive workforce plan that includes strategies for:

- Identifying the number and timing of hiring necessary to ensure that facilities have an adequate number of certified controllers available to perform needed duties. As part of this effort, FAA should determine and plan for the expected attrition levels and timing at each facility;
- Evaluating the newly developed screening test to determine whether it is identifying the most successful candidates;
- Addressing the resource and equipment needs at the training academy to help ensure that FAA is in a position to successfully train a growing number of controller candidates; and
- Assessing the safety and equity issues associated with exempting potentially large numbers of controllers from the mandatory age-56 separation requirement.

Agency Comments and GAO's Evaluation

In commenting on a draft of this report, senior FAA officials found that the report was generally accurate and indicated that they would consider our recommendations in FAA's workforce planning.

Overall, FAA stressed that it has a working human capital workforce strategy model that has enabled the agency to meet its staffing goals over the past few years. FAA officials agreed that the potential for sizable future attrition, in the range of 600–800 controllers per year, is likely over the next decade. The officials said, however, that although they have plans that extend to 2010, the uncertainty surrounding the future, along with labor contracts and budget constraints, limit their specific workforce planning for air traffic controllers to fiscal years 2002 through 2004. With general agreement between FAA and GAO that attrition will grow substantially over the next decade, we believe that the workforce challenges FAA faces extend well beyond fiscal year 2004. As such, we believe that sound workforce planning demands that FAA develop a strategic vision that includes a workable, long-term plan to meet staffing needs.

Regarding our concern about FAA's preparedness for the future, the FAA officials remarked that FAA's ability to meet its past goals is an indication of its ability to meet future needs, and that there is nothing to indicate that its successful performance will not continue in the future. We recognize that FAA has been able to meet its recent staffing goals. However, the recent workforce climate for FAA could be significantly different from that which it will face over the next decade. Chapter two of the report highlights the workforce challenges, particularly the sizable anticipated increases in controller attrition, that are likely over the next decade, and this chapter identifies challenges in FAA's planning that will make it difficult for FAA to maintain its past performance. In particular, the report points out the potential skills gap that FAA could face in the future because its current hiring process does not ensure that fully qualified controllers are available to replace experienced controllers when they leave.

The officials also commented that FAA has long planned for an operational evaluation of the new screening exam, and that research associated with this evaluation has been underway for some time. The officials indicated that they are considering two options for evaluating the effectiveness of the exam. The officials commented, however, that limited work has been done on the evaluation process since 1998, and that they must determine which option to pursue, develop a detailed implementation plan, and identify funding for the evaluation. The officials further noted that continued

funding for the ongoing research could not be assured. In response to this comment, we revised the text of the report to recognize FAA's efforts and plans regarding evaluation of the new screening exam. As such, we are encouraged that FAA plans to conduct an operational evaluation of the exam, once it has been implemented. However, we remain concerned that FAA has not decided how it will conduct the evaluation or how it will fund it and has already highlighted potential funding issues that could serve as a constraint to performing the planned evaluation. Further, we believe that an evaluation of the revised exam is an integral part of a comprehensive workforce plan and have modified the recommendation to emphasize this belief.

Finally, the FAA officials provided technical comments that we incorporated, as appropriate. For example, we added information in this chapter to highlight the constraints that FAA's labor contract and budget impose on the timing of hiring controllers.

Potential Impacts of Proposed Changes to Increase Air Traffic Control Annuity Calculations

In May 2001, a bill was introduced in the U.S. Senate that would amend annuity computations for air traffic controllers retiring under the CSRS system.³⁴ It would provide controllers with an additional 2 percent to their annuity computation for each year of service past 20 years. Under CSRS, air traffic controllers are guaranteed the greater of either (a) 50 percent of their average highest 3 years salary (high-3) or (b) the basic CSRS annuity, which is 1.5 percent of the high-3 for the first 5 years, 1.75 percent of the high-3 for the next 5 years, and 2 percent of the high-3 for the remaining years. In general, annuity calculations under the special provisions are greater than under the basic CSRS formula until a controller has attained 27 years of service. The controllers' union supports this proposed legislation and believes it serves as an incentive to keep controllers on the job beyond their date of retirement eligibility. The bill, however, would create substantial financial impacts to the federal treasury.

Proposed Bill Would Increase Annuities

The controllers' union notes that while CSRS controllers may receive an annuity of 50 percent of their high-3 salaries after 20 years of service at age 50 or after 25 years and any age, there is little incentive to continue working longer because the amount of the annuity does not grow until a controller accrues 27 years of service. For example, as shown in table 6, a controller with the same high-3 salary has the same level of annuity whether he or she has worked 20 or 25 years.

Table 6: Current and Proposed Annuity Calculations

Current years of service	High-3 salary	Higher of current special rule annuity (50 percent of high-3 or basic CSRS)	Proposed annuity (2 percent for each year over 20)
20	\$100,000	\$50,000	\$50,000
25	100,000	50,000	60,000
27	100,000	50,250	64,000

Source: GAO analysis.

Under the proposed bill, controllers would receive an extra 2 percent to their annuities for every year of service past 20 years. As the above table shows, this would increase the annuity calculation. In addition, the union

³⁴S. 871, the Federal Air Traffic Controllers Annuity Computation Act of 2001.

**Appendix I
Potential Impacts of Proposed Changes to
Increase Air Traffic Control Annuity
Calculations**

notes that federal firefighters and law enforcement officials receive increased annuities after 20 years of service. The union also points out that such an incentive could be useful in keeping controllers working longer, which would help address the expected upcoming increase in retirements.

**Proposed Bill Would
Create Financial
Impacts**

This proposal does not take into account the existing incentives that encourage controllers to work past the point when they first become eligible for retirement. First, a controller receives a full salary for each year he or she continues working as a controller. This level of income is significantly higher than what controllers would receive from their retirement annuities. For example, many controllers who are eligible for retirement are making in excess of \$100,000 per year. Assuming they would retire under the controllers' current special rules, the differential would be at least \$50,000 in the first year. Second, controllers receive annual pay increases like other federal employees, which increase the amount of salary they receive and also increase the annuity levels. Table 7 shows examples of retirement annuity calculations for an individual controller, including projected salary increases, with 20 years of service at 50 years of age, 25 years of service at 55 years of age, and 26 years of service at 56 years of age. Also shown is the effect of current federal retirement rules for other federal employees, which contain annuity penalties for federal employees who retire before age 55.

Table 7: Retirement Annuity Calculations under Current CSRS and S. 871

Age	Years of service	High-3 ^a	Current special rule annuity (50%)	Proposed annuity (with 2% increase)	Current federal CSRS basic annuity
50	20	\$100,000	\$50,000	\$50,000	\$32,676 ^d
55	25	112,551	56,275	67,530 ^b	52,055
56	26	115,928	57,964	71,875 ^c	55,935

^aAssumes 3% annual growth.

^b\$56,275 plus 2 percent of the high-3 for 5 years—each year of service after 20.

^c\$57,964 plus 2 percent of the high-3 for 6 years.

^dThe CSRS calculation includes an age penalty of 2 percent per year for each year prior to age 55 that a federal employee retires. It also assumes that employees with these ages and years of service would be allowed to retire with immediate annuity. Otherwise, these individuals would need to wait until turning 60 to begin receiving these amounts.

Source: GAO analysis.

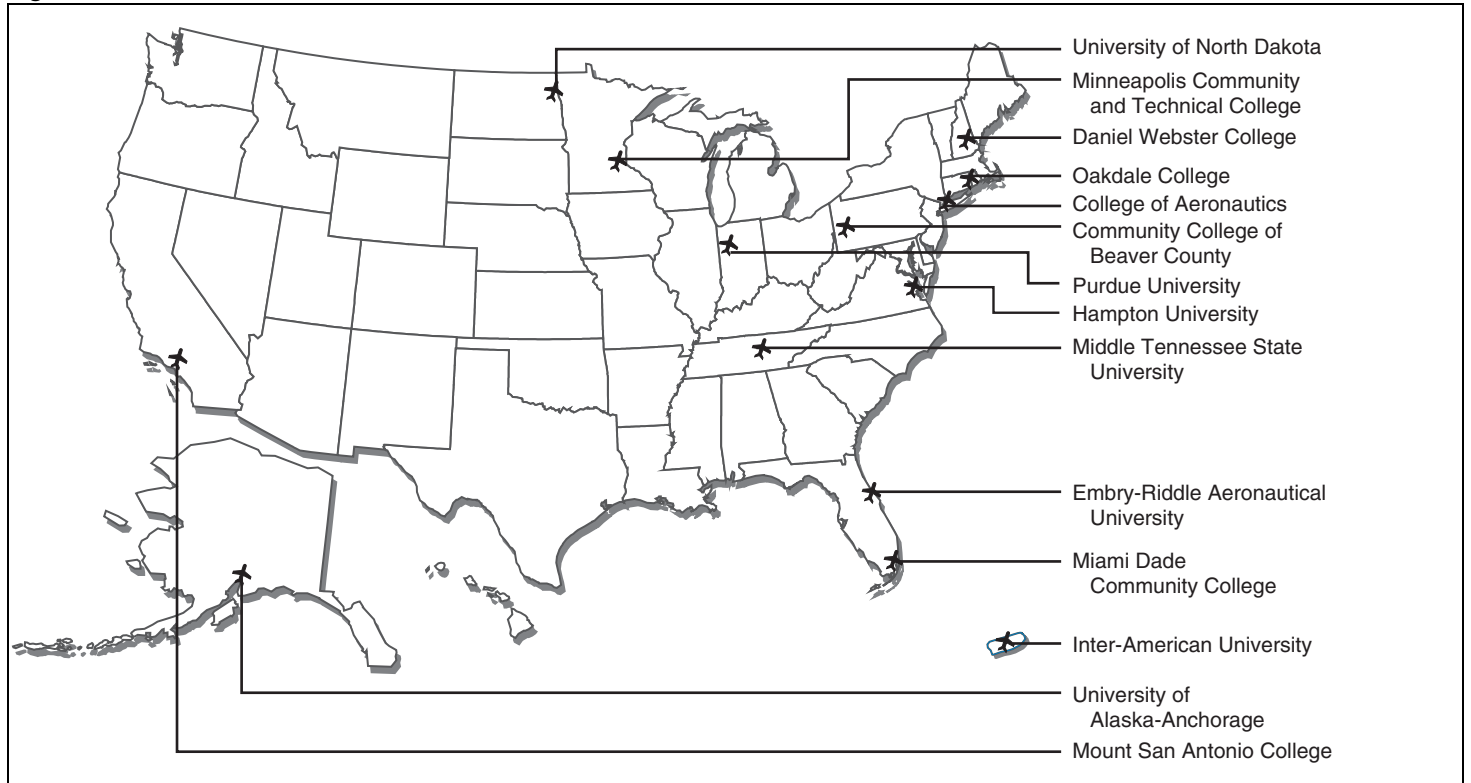
**Appendix I
Potential Impacts of Proposed Changes to
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Calculations**

The table above also shows the potential financial impacts that the bill would create for individual controllers. For example, a controller with 26 years of service and a high-3 of approximately \$116,000 would receive an annual increase of roughly \$14,000 during each year of his or her annuity.

To determine the overall financial impact of the proposed bill, OPM prepared an analysis of the bill's long-term costs. OPM estimated that the cost of the bill to the treasury had a present value of \$1.7 billion. In addition, OPM found that the higher benefit levels under the proposal could potentially encourage somewhat earlier retirements, because employees with 24 years of service would receive the same benefit they now get with 31 years of service (that is, 58 percent of the high-3).

Air Traffic Controller Schools

Figure 9: Locations of Air Traffic Controller Schools



Source: GAO presentation of FAA data.

Appendix II
Air Traffic Controller Schools

Table 8: Current Capacities of Air Traffic Controller Schools, as of November 2001

School	Type of degree program	Current number of students	Current program capacity
Daniel Webster College	4-year	9	20
University of North Dakota	4-year	68	119
Embry-Riddle Aeronautical University	4-year	24	45
Miami-Dade Community College	2-year	30	80–100
Purdue University	4-year	52	800
Community College of Beaver County	2-year	139	139
Dowling College	4-year	9	Unknown
Inter American University of Puerto Rico	5-year	12	15
Middle Tennessee State University	4-year	18	18
College of Aeronautics	2- or 4-year	17	100
Mt. San Antonio College	2-year	40	Near capacity
Hampton University	4-year	1	20
University of Alaska-Anchorage	2- or 4-year	62	90

Source: GAO interviews with school representatives.

Retirement Eligibility Methodology and Analysis

A key piece of information needed to assess FAA's controller staffing is knowing when controllers will become eligible to retire. To determine when FAA's series 2152 controllers will become eligible to retire, we obtained selected demographic information from FAA's personnel database for all 22,865 controllers (categorized as series 2152) working at FAA as of June 30, 2001. Because we wanted to focus on those controllers who are or could be involved in managing air traffic, we eliminated the 2,844 flight service station controllers from our analyses, leaving a total of 20,021 controllers.

For the 20,021 controllers on board as of June 30, 2001, we determined the earliest date when they would become eligible to retire based on age at hire at FAA, retirement plan, years of service at FAA, and years of pre-FAA, retirement-creditable service. All FAA service was assumed to be in good time and creditable toward air traffic controller special retirement provisions (25 years of service at any age, and 20 years of service at age 50). For example, to compute the eligibility dates of controllers hired by FAA at an age younger than 26, we added 25 years to their FAA service entry dates. The eligibility date for controllers entering FAA from the ages of 26 up to 30 was calculated to be the date they turned 50 years of age. Eligibility for those from ages 30 through 35 was calculated by adding 20 years to their FAA service entry date. For controllers entering FAA after the age of 35, eligibility dates were based on the provisions of their retirement plans (CSRS or FERS) and the amount of retirement-creditable service they had before entering FAA. Whether the individual first became eligible under air traffic controller special rules or regular CSRS/FERS rules was dependent on the number of years of creditable prior service he or she had upon entry at FAA.

To provide a context for projected eligibility trends, we calculated the number of controllers becoming eligible to retire each year between 1997 and 2001, using the same method described above, with FAA personnel data from fiscal years 1997 through 2001. We also stratified our analyses of controllers by facility type, supervisory status, selected location, and position. The positions we examined included supervisors, certified professional controllers, traffic management coordinators, controllers not controlling traffic, developmental controllers, and trainees.

Methodology for Computer Simulation

To assess the impact of estimated separations for the career controllers between fiscal years 2002 and 2011, we analyzed past separation trends and used these factors in estimating future controller separations.

Analysis of Separation Trends

We analyzed FAA's fiscal year–1997 through fiscal year–2000 data for separations for the career air traffic controllers. In doing so, we categorized past separations into voluntary retirements, other retirements, and all other separations. For separations, we calculated years of service by finding the difference between the service computation date and the date of actual separation. Similarly, we calculated age at separation by finding the difference between the date of birth and the date of separation. We calculated the age and years of service for the air traffic controllers on board at the end of the fiscal year similarly, but used September 30th as the end date.

For each 2-year interval of years of service and age of those who separated from FAA during the period 1997 through 2000, we calculated the probability of leaving by dividing the number who separated by the number of controllers with a similar combination of years of service and age who were on board at the end of the fiscal year preceding the fiscal year of separations. We also bound all controllers into those 64 years and above, as well as all controllers with 32 or more years of service. We then modeled the rate of separation as a function of years of service, age, and CSRS/FERS retirement status. We developed an equation that estimates the rate of separation for any age, years of service, and CSRS/FERS retirement status.

Estimation Methodology of Future FAA Controller Separations

We applied a simulation technique to each of the 20,021 controllers on board in 2001. Each controller's age and years of service was used as input into the model described above. Based on the model, an individual controller was considered to have separated if his or her predicted rate of separation was less than a generated random number. If the predicted value was greater than a generated random number, then the individual controller was deemed not to have separated. This process was repeated for each of the 20,021 controllers. The process was then continued for those controllers who were not estimated as having separated in 2001, but with each controller now being 1 year older and having 1 more year of service. As before, the controller's new age and new years of service were used as input into the model, and a predicted rate of separation was contrasted with a newly generated random number to determine whether

the controller was considered as separated in 2002. A separation decision was made for each of the remaining controllers, and either each controller was counted as having separated in 2002 or else 1 year was again added to both age and years of service. This process was repeated 11 times to represent an 11-year horizon.

Because we are dealing with a process that is of a probabilistic nature (that is, a controller may or may not have separated in any one year), we repeated the process 100 times. The results of the 100 iterations were then averaged to estimate the number of controllers separating in 2001 through 2011.

Limitations

We developed a mathematical model in order to calculate any individual controller's rate of separation, which was based on three criteria: (1) FERS/CSRS retirement status, (2) age at any point during the 11-year horizon, and (3) years of service at any point during the 11-year horizon. This mathematical model was based on the retirement rates for the same three conditions: FERS/CSRS retirement status, age, and years of service for the 4 previous years. The optimization in developing the mathematical model, known as regression analysis, is to minimize the squared differences between the actual rates of separation and the predicted rates of separation. An index, which is known as the squared correlation coefficient and is bounded between zero and one, is one useful numerical quantity to assess the strength or predictive power of the mathematical model. A perfect fit in a model would yield a squared correlation coefficient of 1.00. In our mathematical model, we achieved a squared correlation coefficient of .79. Thus, we were able to capture and predict about four-fifths of the variability in the rates of separation for the 4 years' worth of separation data. One limitation, therefore, is that our model does not predict with 100 percent accuracy the actual rates of separation, although it is uncommon in real world applications to find such a high squared correlation when dealing with behavioral data such as separating from controller service. It is also worth noting that associated factors such as an individual's health, race, sex, or even children's ages and college status may affect his or her decision to separate. These other factors were either not available or not included in the mathematical model.

Another limitation in simulating the separation from service, which is based on a mathematical model, includes the concept of using the previous patterns of separating from service to generate the mathematical model. If the rate of separation for those individual controllers starting in 2001 is

different from the previous 4-year patterns, then we introduce a source of error into the simulation. As mentioned earlier, many factors are possible in deciding to separate from service, which may include something unique or something that for many controllers does not manifest itself until 2001 or beyond. It is possible that the controllers who came aboard in 1982 and beyond will separate at either higher or lower rates of separation than those of their counterparts who began their service at an earlier time. This variability cannot be assessed until actual rates of separation occur and should be very closely monitored by the FAA.

Methodology for GAO's Survey of Air Traffic Controllers' Retirement and Attrition Plans

A primary objective in this study was to determine the number or proportion of current air traffic controllers who plan to retire each year, over the upcoming 10-year period. To meet this objective, among other things, we surveyed a statistically representative sample of air traffic controller personnel. We developed and administered a survey designed to obtain the views of selected air traffic controller personnel regarding issues associated with attrition, with emphasis on retirement. The survey was mailed in August 2001 to a stratified sample of 2,100 controllers. As of February 12, 2002, we had received 1,591 completed, usable surveys. Our work was conducted in accordance with generally accepted government auditing standards.

Study Population

FAA provided data from the Consolidated Personnel Management Information System (CPMIS) as of June 30, 2001, for all FAA controllers (Series 2152). Since our primary interest was to estimate for the controller population most likely to be directly involved in monitoring the movement of planes, we removed from our study population 2,844 flight service station controllers who give out weather information and pilot briefings. This left us with a study population consisting of 20,021 air traffic controllers.

Sample Design

The sample design for this study is a single-stage stratified sample of FAA employees in the study population. The first four strata consisted of employees who were likely to be eligible to retire before the end of 2006.³⁵ The fifth stratum consisted only of rehired former employees, and a final, "residual" stratum was defined to ensure complete coverage of our study population. A total sample of 2,100 employees was selected from the 20,021 employees in our study population, and we received a total of 1,591 valid responses, for an overall response rate of 76 percent.³⁶ The following table summarizes the population size, sample size, number of respondents, and response rate for each of the sampling strata.

³⁵We assigned employees to one of the four "eligible to retire by 2006" strata based on age and years of service, as reflected in the CPMIS data files provided by FAA.

³⁶Several surveys were received but not valid and are not included among the 1,591 respondents. This includes surveys that were returned blank, surveys that were duplicates from the same individual, and surveys that were returned by respondents who had left FAA before the fielding period ended.

Table 9: Survey Sample Size and Disposition

Stratum	Population size	Sample size	Respondents	Response rate
(1) Non-supervisors at en route centers—Eligible to retire by 2006	2,079	331	247	0.75
(2) Supervisors at en route centers—Eligible to retire by 2006	547	177	152	0.86
(3) Non-supervisors at other facilities—Eligible to retire by 2006	3,937	614	473	0.77
(4) Supervisors at other facilities—Eligible to retire by 2006	754	242	187	0.77
(5) All rehired former employees	733	336	254	0.76
(6) Controllers not eligible to retire by 2006	11,971	400	278	0.70
Total	20,021	2,100	1,591	0.76

Source: GAO analysis.

Survey Development

In designing the questionnaire, we interviewed FAA officials in Human Resources at headquarters in Washington, D.C., and at the Oklahoma City center to identify issues of interest and past work on retirement. We met with NATCA officials and reviewed their 1999 survey about the retirement eligibility and intentions of NATCA members in the terminal and en-route air traffic controller bargaining unit. To further guide the development of appropriate questions, we reviewed current literature on retirement issues and studies. We also asked officials at FAA, NATCA, and the Federal Managers Association to review a draft version of the survey.

To verify the clarity, length of time of administration, and suitability of the questions, we also pre-tested the questionnaire with selected controllers at two towers, one en-route center, and the Systems Command Center in Herndon, Va. A copy of the Survey of Air Traffic Controllers Retirement and Attrition Plans can be found in Appendix VI.

Survey Administration

We conducted a survey between August 2001 and February 2002, using a self-administered mail-out survey. We sent a second questionnaire on October 2, 2001, to all initial nonrespondents in order to encourage a higher response rate. Following this mailing, we experienced an extended delay in returns until January 9, 2002, because mail delivery was halted on account of the anthrax contaminations in Washington, D.C. Hence, we extended the expected cut-off date until February 12, 2002, after a stream of returns had tapered off.

By February 12, 2002, we had 1,591 completed, usable surveys for an overall response rate of 76 percent. Some surveys were eliminated because they (1) had been returned blank, (2) were duplicates from the same individual, or (3) came from respondents who had left FAA before the fielding period ended. We used a contractor to create a database of survey responses. All data were double keyed during the data entry process, and GAO staff verified a sample of the resulting data to ensure accuracy.

Estimates

Estimates produced in this report are for a target population defined as air traffic controllers in our study population. A very small proportion (fewer than 1 percent) of the survey respondents indicated that they were not classified as Series 2152 air traffic controllers at the time of the survey. Those respondents are not included in any estimates derived from survey data in this report; therefore, the final target population for estimation is 19,880 controllers.

Estimates were formed by weighting the survey responses to account for effective sampling rates in each stratum. These weights reflect both the initial sampling rate and the response rate for each stratum. As with most surveys, our estimation method assumes that nonrespondents would have answered like the survey respondents.

Sampling Error

Because we surveyed a sample of air traffic controllers, our results are estimates of air traffic controller characteristics and thus are subject to sampling errors that are associated with samples of this size and type. Our confidence in the precision of the results from this sample is expressed in 95-percent confidence intervals. The 95-percent confidence intervals are expected to include the actual results for 95 percent of the samples of this type. We calculated confidence intervals for our study results using methods that are appropriate for a stratified probability sample. For the

percentages presented in this report, we are 95-percent confident that the results we would have obtained had we studied the entire study population are within +/- 5 or fewer percentage points of our results, unless otherwise noted. For example, our survey estimates that 33 percent of the controllers would retire earlier if there were increased mandatory overtime. The 95 percent confidence interval for this estimate would be no wider than +/- 5 percent, or from 28 percent to 38 percent. For estimates other than percentages, 95-percent confidence intervals are +/- 10 percent or less of the value of the estimate, unless otherwise noted.

Nonsampling Error

In addition to these sampling errors, the practical difficulties in conducting surveys of this type may introduce other types of errors, commonly referred to as nonsampling errors. For example, questions may be misinterpreted, the respondents' answers may differ from those of people who did not respond, or errors could be made in keying completed questionnaires or in the preparation of data files for analysis. We took several steps in an attempt to reduce such errors.

In addition to the steps taken during the development of the survey and its administration, we performed computer analyses to identify inconsistencies and other indicators of errors, and a second independent analyst reviewed all computer programs.

GAO Survey of Air Traffic Controllers



United States General Accounting Office Survey of Air Traffic Controllers Retirement and Attrition Plans

NOTE: Numbers to the left of each response are the estimated percentage of all controllers that would have provided that response based on a sample of 1,591.

INTRODUCTION

The U.S. General Accounting Office (GAO), an independent agency of Congress, has been asked by the Chairman, Subcommittee on Aviation, Committee on Transportation and Infrastructure, U.S. House of Representatives, to study the retirement and attrition of air traffic controllers (ATC) historically, currently, and planned. A major aspect of this study is to assess the Federal Aviation Administration's (FAA) air traffic controller staffing needs.

As part of our study, we are sending this questionnaire to a randomly selected sample of current air traffic controllers. Your name was part of this sample. In this survey you are asked about your plans concerning continued employment with, or retirement from, the FAA. Your responses will help to determine what steps need to be taken in order to ensure a smooth continuation of air traffic control service.

We will present the results of this survey in summary form, taking steps to safeguard the privacy of your responses. Individual responses will not be reported in any way that would allow an individual respondent to be identified. The number on your survey is to help us track responses and analyze results. This survey can be answered by checking boxes or filling in blanks; it should take about 10 minutes to complete.

Please return your completed survey, within the next 10 days, in the enclosed pre-addressed, postage-paid envelope. In the event that the envelope is misplaced, the return address is

Mr. William R. Chatlos
U.S. General Accounting Office
441 G Street, NW, Room 2440F
Washington, DC 20548

If you have any questions, please call either David Lichtenfeld at (312) 220-7663 or William Chatlos at (202) 512-7607. Thank you very much for your time.

(Survey Number)

PROFESSIONAL HISTORY

1. In your current position, are you classified as a Series 2152? (Check one.)

100.0% 1. Yes (Please go to Question 2.)
0.0% 2. No (STOP! DO NOT PROCEED FURTHER. Please return your uncompleted questionnaire in the enclosed envelope.)

2. In what type of facility do you currently work? (Check one.)

43.6% 1. En Route Center
11.6% 2. TRACON
12.1% 3. Tower
27.4% 4. TRACON/Tower combination
0.0% 5. Flight Service Station
0.7% 6. ATC System Command Center
1.6% 7. Regional Office
1.5% 8. Headquarters
1.6% 9. Other: _____

3. Which Series 2152 position do you currently hold? (Check one.)

3.8% 1. (Developmental Controller)
72.0% 2. (Certified Professional Controller)
3.1% 3. (Traffic Management Controller)
3.1% 4. (Support Specialist)
9.4% 5. (Operations Supervisor)
0.6% 6. (Traffic Management Supervisor)
2.5% 7. (Support or Operations Manager)
2.1% 8. (Air Traffic Manager or Assistant
3.4% 9. Other _____

4. In what month and year were you born?

_____/_____
(Month) (Year)

**Appendix VI
GAO Survey of Air Traffic Controllers**

RETIREMENT: When responding to the retirement questions in this section, it is important to keep the eligibility rules, in the box below, in mind.

Retirement Eligibility Rules		
Controllers working at FAA's facilities are eligible to retire under two sets of retirement rules - the general rules for federal employees and special provisions for air traffic controllers.		
	----- Eligibility -----	
Type of retirement	Age	Years of service
Special Provisions for air traffic controllers Under CSRS or FERS	50 Any	20* 25* <small>*Years actively controlling planes as a Controller or Operations Supervisor, i.e., "good time" (FAA & DOD civilian controller time, but not military).</small>
General Provisions for all federal employees Under CSRS	55 60 62	30 20 5
Under FERS	55-57** 60 62	3 20 5 <small>**For those with 30 years of service or more, retirement eligibility under FERS is subject to a minimum age that differs depending on the employee's birth date.</small>

5. When did you *first* begin working at FAA as a Series 2152 ATC (include time spent as a developmental controller)?

Initial ATC employment date: _____ / _____
(Month) (Year)

6. How many years and months of federal service towards retirement (including military service) had you accrued by June 30, 2001?

Federal service
Towards retirement _____ Yrs & _____ Mos

7. How many years and months of air traffic controller service towards FAA retirement had you accrued in "good time" and not "good time" by June 30, 2001?

Total "good time") _____ Yrs & _____ Mos
(Add in DOD civilian ATC time, but not military controller time)

Not "good time" _____ Yrs & _____ Mos

8. Are you currently working in a "good time" position? (Check one.)

87.9% 1. Yes
12.1% 2. No

9. In what month and year will you, or did you, *first* become eligible to retire from FAA under any federal retirement system? (Provide your best estimate.)

First eligibility date: _____ / _____
(Month) (Year)

10. Do you plan to permanently leave employment with the FAA before you retire?

99.1% 1. No → **If no** (Continue to Quest 11.)
0.9% 2. Yes
If yes, when? _____ / _____
(Month) (Year)
If yes (Skip to Question 18.)

11. In what month and year do you plan to retire from FAA? (Provide your best estimate.)

Date planning to retire: _____ / _____
(Month) (Year)

12. How certain are you that you will retire within 3 months of the date you specified in your response to Question 11? (Check one.)

36.7% 1. Very certain
31.7% 2. Certain
24.6% 3. About as certain as uncertain
5.1% 4. Uncertain
2.0% 5. Very uncertain

**Appendix VI
GAO Survey of Air Traffic Controllers**

13. On the *planned retirement date* you listed in Question 11, how many years and months of retirement applicable federal service will you have of the following service types?
- Military service _____ Yrs & _____ Mos
- 2152 "good time" _____ Yrs & _____ Mos
(only FAA and DOD civilian ATC)
- 2152 Not "good time" _____ Yrs & _____ Mos
- Other Federal Service _____ Yrs & _____ Mos
- TOTAL Retirement Applicable Service** _____ Yrs & _____ Mos

14. Under which of the following retirement systems will you retire? (*Check one.*)

- 28.1% 1. CSRS Special ATC Provisions
 18.2% 2. CSRS
 2.7% 3. CSRS Offset
 39.2% 4. FERS Special ATC Provisions
 11.7% 5. FERS

15. In what way, if at all, will or did the pay increase that began in 1998 affect your retirement plans? (*Check one.*)

- 3.4% 1. Not eligible for the pay increase
 5.7% 2. Delayed retirement _____ years
 2.3% 3. Accelerated retirement _____ years
 88.6% 4. Had no effect on planned retirement date

(Please go to Question 14.)

16. How might each of the following actions affect the retirement date you specified in your response to Question 11? (*Check one column for each action.*)

Action	1 Retire Earlier	2 No Effect	3 Retire Later	4 Does Not Apply
a. Increased pay	3.4 %	50.1%	43.8%	2.6%
b. Increased mandatory overtime	32.8%	57.0%	2.8%	7.3%
c. More opportunities to work staff positions (not good time)	2.4%	67.3%	21.6%	8.7%
d. Flexibility in shift scheduling (trading shifts)	0.4%	71.0%	22.2%	6.4%
e. Ability to work part time at FAA	3.7%	44.8%	47.4%	4.1%
f. Increased work responsibilities	23.5%	71.6%	1.7%	3.1%
g. Increased training responsibilities for new staff	18.0%	75.7%	1.8%	4.5%
h. Increased air traffic operations	18.4%	74.5%	3.2%	3.8%
i. Improved labor-management relations	1.0%	68.8%	27.0%	3.2%
j. Technological changes in the workplace	1.6%	76.1%	19.6%	2.7%
k. Approval of waivers to work as ATC past the age of 56	0.4%	60.4%	31.1%	8.1%

(Please continue on the back on page 4.)

**Appendix VI
GAO Survey of Air Traffic Controllers**

17. To what extent, if at all, did each of the following factors contribute to your choice of the planned retirement date you specified in response to Question 11? (Check one in each row.)

Factors	1 Little or No Extent	2 Some Extent	3 Moderate Extent	4 Great Extent	5 Very Great Extent	6 Does Not Apply
a. Difficulty getting time off or weekends off	45.4%	14.1%	11.7%	8.9%	12.5%	7.4%
b. Will reach the age of 56 and must leave scope	36.2%	5.1%	2.3%	4.1%	17.4%	35.0%
c. Near first date eligible to retire	30.6%	10.6%	10.4%	13.9%	24.0%	10.5%
d. Dissatisfaction with work	53.7%	15.4%	11.2%	6.2%	6.3%	7.2%
e. Time to move on; date was my choice	41.5%	14.7%	11.4%	11.0%	13.7%	7.7%
f. Completed major responsibilities for children	39.2%	13.3%	11.4%	11.7%	10.6%	13.8%
g. Chosen to coincide with spouse's plans/needs	53.5%	13.4%	7.0%	6.4%	3.3%	16.3%
h. Will have enough retirement savings by then	30.7%	18.6%	20.0%	13.3%	11.3%	6.0%
i. Other (Specify.)	21.3%	0.2%	1.0%	8.8%	41.1%	27.5%

DEMOGRAPHICS

18. What is your specific facility ID code, for example, ZAU, ORD, or C90?

Facility ID Code: _____

19. What is your sex?

87.7% 1. Male
12.3% 2. Female

COMMENTS

20. In the space provided, please write any comments you would like to make about retirement and attrition.

Thank you for responding to this survey.
Please place your completed survey in the enclosed envelope and mail.

GAO Contacts and Staff Acknowledgments

GAO Contacts

Gerald L. Dillingham, Ph.D. (202) 512-3650
Glen Trochelman (312) 220-7729

Staff Acknowledgments

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