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Key Safety and Modernization Challenges Facing the Federal Aviation Administration

Statement of
The Honorable Calvin L. Scovel III
Inspector General
U.S. Department of Transportation

Chairman Murray, Ranking Member Bond, and Members of the Subcommittee:

We appreciate the opportunity to testify today on the Federal Aviation Administration's (FAA) safety and modernization performance. Ensuring that airlines safely meet the demand for air travel is important to the flying public and the national economy; this will remain a top priority for the Department. FAA is facing the formidable challenge of operating and maintaining an increasingly strained system while transitioning to the next generation of air traffic control. In addition, FAA must concurrently address attrition in two of its most critical workforces—air traffic controllers and aviation safety inspectors.

All of these are key facets of FAA's primary mission—aviation safety oversight. As this Subcommittee is aware, safety is a shared responsibility among FAA, aircraft manufacturers, airlines, and airports. Together, all four form a series of overlapping controls to keep the system safe.

The United States has achieved an impressive safety record over the past several years. This is a remarkable accomplishment given the rapidly changing aviation industry. For example, network carriers face considerable uncertainty with a weakening economy, increasing fuel prices, and rising competition from low-cost carriers; these carriers now comprise one-third of the market in terms of available passenger seats.

Network carriers have moved aggressively away from high-cost structures by reducing in-house staff, renegotiating labor agreements, and increasing the use of external repair facilities. Three air carriers recently ceased passenger operations and a fourth just filed for bankruptcy protection. In addition, the recently announced intended merger between Northwest and Delta has generated considerable speculation regarding further consolidation within the industry.

At the same time, demand for air travel has increased, and aircraft load factors are at nearly 80 percent—an all-time high. In 2007, U.S. airlines transported over 700 million passengers, and this number is forecasted to grow to over 1 billion by 2016.

However, several high-profile events, including fundamental breakdowns in FAA oversight at Southwest Airlines (SWA), have raised concerns about whether FAA's overall approach to safety oversight is effective and what changes are needed. These concerns have been amplified by airlines' grounding of nearly 700 aircraft, which caused 4,198 flight cancellations, since FAA began industry-wide assessments of compliance with safety directives. There is an urgent need to identify the root causes of safety problems and proactively examine how to maintain and ultimately enhance the margin of safety.

Madam Chairman, it is against this backdrop that we would like to discuss three key challenges facing FAA and its stakeholders over the next several years:

- Strengthening FAA's oversight of the aviation industry.
- Keeping existing modernization programs on track, reducing risk with NextGen, and setting realistic expectations.
- Addressing attrition within two of FAA's critical workforces.

Strengthening FAA's Oversight of the Aviation Industry

The recent events at SWA drew national attention to serious lapses in FAA's oversight of air carriers. As this Subcommittee is aware, FAA's handling of whistleblower concerns regarding SWA's failure to follow a critical FAA airworthiness directive (AD) has had a cascading effect throughout the industry. While these safety lapses indicated problems with the airline's compliance, they are symptomatic of much deeper problems with FAA's oversight in the following areas.

We found FAA's inspection office for SWA developed an overly collaborative relationship with the air carrier, which allowed repeated self-disclosures of AD violations through FAA's partnership program.[1] These programs are intended to facilitate cooperation between FAA and air carriers to identify and address safety issues. Yet, FAA allowed SWA to repeatedly self-disclose AD violations without ensuring that SWA had developed a comprehensive solution for reported safety problems—which is required for FAA to accept the disclosure and absolve the carrier of any penalty.

We also found that the events at SWA demonstrated weaknesses in FAA's national program for risk-based oversight—the Air Transportation Oversight System (ATOS). This allowed AD compliance issues in SWA's maintenance program to go undetected for several years. As early as 2003, one of the whistleblowers expressed concerns to FAA about SWA's compliance with ADs. In 2006, he began urging FAA to conduct system-wide reviews, but FAA did not begin these reviews until after the details of the March 2007 disclosure became public.

In fact, FAA inspectors had not reviewed SWA's system for compliance with ADs since 1999. At the time of SWA's disclosure, FAA inspectors had not completed 21 key inspections for at least 5 years. While FAA has subsequently completed some of these inspections, as of April 15, 2008, 4 of these 21 inspections were still incomplete; some had not been completed for nearly 8 years.

[1] OIG Testimony Number CC-2008-046, "Actions Needed To Strengthen FAA's Safety Oversight and Use of Partnership Programs," April 3, 2008. OIG reports and testimonies are available on our website: www.oig.dot.gov.

We previously identified system-wide problems with ATOS. In 2005,[2] we found that inspectors did not complete 26 percent of planned ATOS inspections—half of these were in identified risk areas. We recommended, among other things, that FAA strengthen its national oversight and accountability to ensure consistent and timely ATOS inspections. However, FAA has still not fully implemented our recommendations.

Our work at SWA and Northwest Airlines (NWA)[3] has identified similar weaknesses in FAA's processes for conducting internal reviews and ensuring appropriate corrective actions. In the SWA case, FAA's internal reviews found, as early as April 2007, that the principal maintenance inspector (PMI) was complicit in allowing SWA to continue flying aircraft in violation of the AD. Yet, FAA did not attempt to determine the root cause of the safety issue nor initiate enforcement action against the carrier until November 2007. At NWA, FAA's reviews of an inspector's safety concerns were limited and also overlooked key findings identified by other inspectors. Although FAA found that some of the inspector's safety concerns were valid, FAA informed him that all of his concerns lacked merit.

We also have concerns regarding FAA's failure to protect employees who report safety issues from retaliation by other FAA employees. For example, in the SWA case, after one whistleblower voiced his concerns to FAA, an anonymous hotline complaint was lodged against him. According to the inspection office manager, the PMI indicated that a SWA representative submitted the complaint. The complaint was non-specific and never substantiated, but the whistleblower was removed from oversight duties for 5 months while under investigation. Yet, FAA did not suspend other inspectors who were subjects of similar complaints, including the PMI who admitted that he allowed SWA to continue flying in violation of the AD.

Our work at NWA found the same problem with FAA's handling of the inspector who reported safety concerns. As with the inspector in the SWA case, FAA managers reassigned an experienced inspector to office duties, after a complaint from the airline, and restricted him from performing oversight on the carrier's premises. Both the SWA and NWA cases demonstrate that FAA must pursue a more reliable internal review process and protect employees who identify important safety issues.

FAA recently announced several actions to address the SWA safety directive violation. These include initiating a review of AD compliance at SWA and other air carriers. FAA also proposed to fine SWA more than $10 million.

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[2] OIG Report Number AV-2005-062, "FAA Safety Oversight of an Air Carrier Industry in Transition," June 3, 2005.

[3] OIG Report Number AV-2007-080, "FAA's Actions Taken To Address Allegations of Unsafe Maintenance Practices at Northwest Airlines," September 28, 2007.

While FAA's proposed actions are necessary, albeit long overdue, it must make the following changes to its air carrier oversight to prevent recurrence of these safety issues:

- Ensure that its Voluntary Disclosure Reporting Program (VDRP) requires inspectors to (a) verify that air carriers take comprehensive actions to correct the underlying causes of violations identified through self-disclosure programs and (b) evaluate, before accepting a new report of a previously disclosed violation, whether the carrier developed and implemented a comprehensive solution.
- Implement a process for second-level supervisory review of self-disclosures before they are accepted and closed.
- Periodically rotate supervisory inspectors to ensure reliable and objective air carrier oversight.
- Require that its post-employment guidance include a "cooling-off" period when an FAA inspector is hired at an air carrier he or she previously inspected.
- Implement a process to track field office inspections and alert the local, regional, and Headquarters offices to overdue inspections.
- Establish an independent organization to investigate safety issues identified by its employees.
- Develop a national review team that conducts periodic reviews of FAA's oversight of air carriers.

FAA needs to address these recommendations to demonstrate its commitment to effective oversight. We will continue to examine FAA's oversight of the aviation industry from a national perspective. We will keep this Subcommittee apprised of our progress as well as other actions FAA should take to ensure safety.

Our work has also shown that FAA's oversight of repair stations and aircraft manufacturers' suppliers must keep pace with the dynamic changes occurring in those industries. Although outsourcing has increased in recent years, FAA's oversight has focused primarily on carriers' in-house repairs instead of repair stations performing a higher volume of repairs. We have emphasized that the issue is not where maintenance is performed, but that maintenance requires effective oversight.

FAA's system for overseeing manufacturers' suppliers does not fully consider their increased role in the production of aircraft parts. As a result, we found that FAA has not ensured that manufacturers effectively oversee suppliers or that its inspectors perform enough supplier audits to adequately assess manufacturers' quality assurance systems.

Keeping Existing Modernization Projects on Track, Reducing Risk With NextGen, and Setting Realistic Expectations

A major challenge for FAA over the next 10 years and beyond will be transitioning to the Next Generation Air Transportation System (NextGen). FAA's capital account is now being shaped by NextGen—an enormously complex effort that will cost tens of billions of dollars. FAA is requesting $2.7 billion for its capital account in fiscal year (FY) 2009, an increase of over $200 million from the FY 2008 enacted level of $2.5 billion. Over $600 million in the FY 2009 request is dedicated to NextGen efforts, such as the Automatic Dependent Surveillance-Broadcast (ADS-B)—a new satellite-based surveillance system that has the potential to enhance safety and capacity.

It will be important to keep existing modernization efforts on track as 30 projects are expected to serve as platforms for NextGen initiatives. Our recent report[4] on FAA's modernization efforts examined the status of 18 major acquisitions with a combined value of $17.5 billion.

While we are not seeing the massive cost growth or schedule slips that occurred in the past, we are concerned about several projects that continue to experience cost and schedule risks or reduced benefits. For example, FAA has spent about $314 million (57 percent) of planned funding for the Airport Surface Detection Equipment-Model X (ASDE-X) program (a technology to prevent accidents on runways). However, FAA has only deployed 12 of 35 systems for operational use and must now deploy 23 systems at the more complex airports with less than half of the planned funds remaining.

FAA is making progress in developing the NextGen Enterprise Architecture (a technical blueprint), which is planned for implementation by 2025. The Agency is also exploring ways to accelerate NextGen. However, costs for NextGen remain uncertain, and FAA needs to establish reasonable expectations for NextGen investments and realistic timeframes for improvements to enhance capacity and reduce delays. At this juncture, FAA needs to pursue the following actions:

- Conduct a gap analysis of the current National Airspace System (NAS) and future NextGen capabilities. Until FAA completes a gap analysis, it will not be able to determine technical requirements that translate into reliable cost and schedule estimates for major acquisitions.
- Set expectations and establish NextGen funding priorities. FAA needs to better understand costs and benefits and then identify the high priority improvements for inclusion in its budget requests.

[4] OIG Report Number AV-2008-049, "Air Traffic Control Modernization: FAA Faces Challenges in Managing Ongoing Projects, Sustaining Existing Facilities, and Introducing New Capabilities," April 14, 2008.

- Develop an interim architecture for what can be accomplished by 2015. This would help FAA to determine reasonable goals, establish priorities, fully identify adjustments to existing projects, refine requirements for new systems, and understand complex transition issues.
- Develop a strategy for acquiring the necessary skill mix to effectively manage and execute NextGen. FAA must anticipate needed skill sets for NextGen to avoid the problems that have hindered its modernization efforts.

Addressing Attrition Within Two of FAA's Critical Workforces

Another key issue for FAA for at least the next 10 years is addressing attrition in two of its critical safety workforces—air traffic controllers and aviation safety inspectors. Since 2005, 3,300 controllers have left the Agency—23 percent more than projected. FAA has accelerated its hiring efforts and has hired 3,450 new controllers since 2005—25 percent more than projected. Still, FAA faces a major challenge as it must hire and train at least 17,000 new controllers through 2017.

- As a result of the high level of controller attrition, FAA is facing a fundamental transformation in the composition of its controller workforce. The overall percentage of controllers-in-training has grown substantially during the past 3 years. New controllers now represent about 25 percent of the workforce (up from 15 percent in 2004). However, that percentage can vary extensively by location—from as little as 2 percent (e.g., the Boston Terminal Radar Approach Control facility [TRACON]) to as much as 50 percent (e.g., the Las Vegas TRACON).

  A major challenge in addressing the attrition surge will be to train new controllers to the Certified Professional Controller (CPC) level at their assigned locations—a process that can take up to 3 years. Training new controllers to the CPC level is important for two reasons: (1) only CPCs are qualified to control traffic at *all* positions of their assigned area, and (2) only CPCs certified for at least 6 months (at their assigned location) can become on-the-job training (OJT) instructors for other new controllers. FAA must have enough OJT instructors at all locations if it is to achieve its ambitious hiring and training plans for the next 10 years and beyond.

- FAA also is facing challenges to its oversight mission due to attrition in its inspector workforce. FAA has about 4,100 inspectors to oversee a dynamic and rapidly changing industry, which includes 114 commercial air carriers, almost 5,000 foreign and domestic repair stations, more than 700,000 active pilots, and more than 1,600 approved manufacturers. Last year, FAA's hiring efforts kept pace with retirements, and the Agency ended the year with 133 additional inspectors compared to FY 2006 levels. However, FAA must continue to closely oversee this effort, since nearly half of the inspector workforce will be eligible to retire in the next 5 years.

To maximize its limited inspector resources, FAA has been working toward risk-based safety oversight systems for air carriers, repair stations, and manufacturers. These systems target inspector resources to areas of greatest risk. However, unless FAA develops a reliable staffing model, it will not be able to effectively use its inspectors.

I would now like to discuss these areas in further detail.

STRENGTHENING FAA'S OVERSIGHT OF THE AVIATION INDUSTRY

Recent Events at Southwest Airlines Underscore System-Wide Weaknesses in FAA's Air Carrier Oversight

The recent events at SWA exposed significant weaknesses in FAA's oversight of air carriers and problems with its partnership programs. The FAA directive[5] in this case required SWA to inspect the fuselages of its Boeing 737s for potential cracks. FAA issued this directive after an Aloha Airlines 737 lost a major portion of its hull while in flight at 24,000 feet in 1988, resulting in 1 fatality and multiple injuries.

According to FAA, when an air carrier determines that it has not implemented an AD, it is required to immediately ground all non-compliant aircraft. FAA inspectors share this responsibility—if an inspector becomes aware that an air carrier has violated the terms of an AD, the inspector is required to ensure that the aircraft are grounded.

To meet this requirement, air carriers need a system to help them perform repetitive inspections of aircraft fuselages in a timely manner. However, we found that SWA did not have an adequate system to ensure it completed these inspections. As a result, SWA operated 46 aircraft that were not inspected for fuselage cracks. These aircraft flew in violation of the AD on more than 60,000 flights for up to 9 months. We estimate that these aircraft carried 6 million passengers during this period.

According to SWA, it discovered it had violated this directive on March 14, 2007. SWA notified an FAA principal maintenance inspector the following day. However, the inspector did not direct SWA to ground the affected planes, and SWA continued to operate them on 1,451 flights for 8 more days, carrying an estimated 145,000 passengers.

The PMI permitted—and encouraged—SWA to formally self-disclose the AD violation through its Voluntary Disclosure Reporting Program, which would allow the airline to avoid any penalties. FAA accepted the self-disclosure, even though it had

[5] FAA Airworthiness Directive 2004-18-06 requires that Boeing 737s (series 200, 300, 400, and 500) be inspected for fuselage cracks every 4,500 cycles (1 cycle equals 1 take-off and landing) after they reach 35,000 cycles.

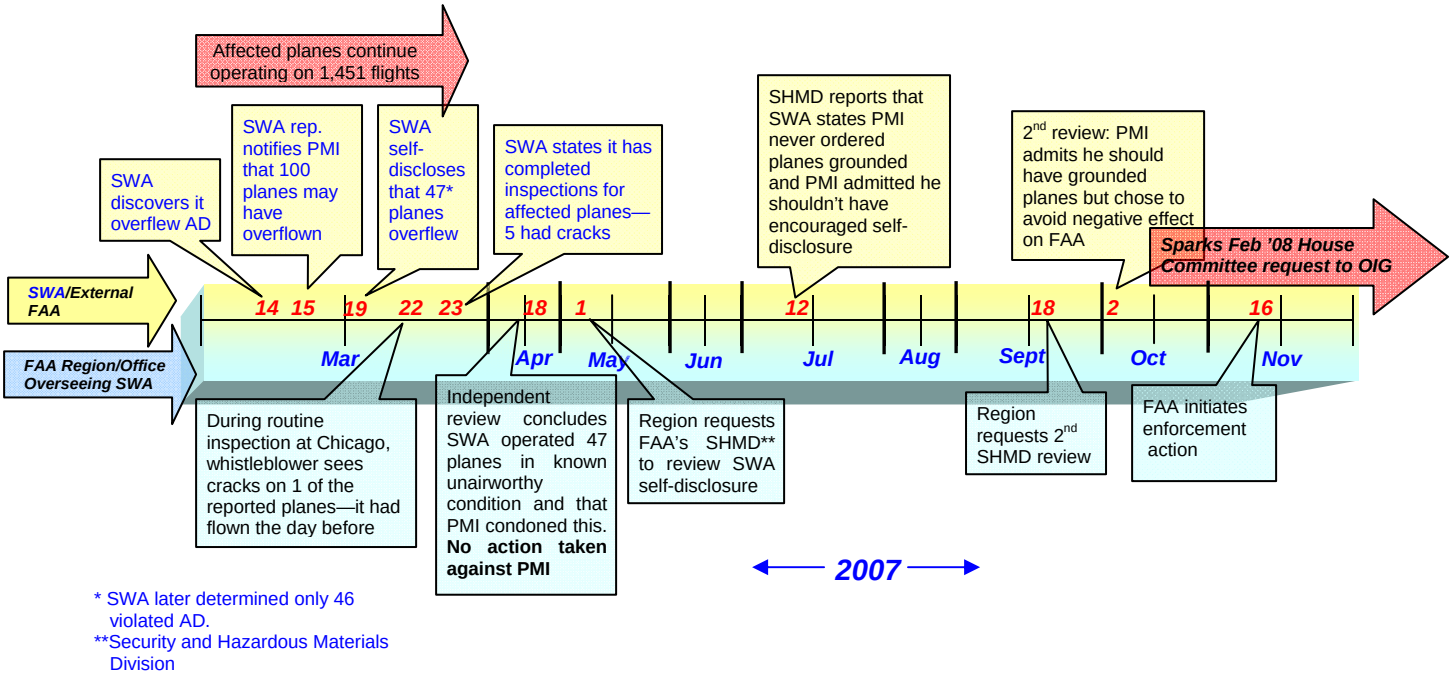
already accepted multiple disclosures on AD violations; this should have prompted FAA to question whether the carrier had corrected underlying problems.

Once it formally self-disclosed the violation on March 19, 2007, SWA stated that it was in compliance with the AD, meaning it had inspected or grounded all affected aircraft. However, two FAA inspectors (the whistleblowers in this case) reported that their supervisor, the PMI, knowingly permitted SWA to continue flying the identified aircraft even after SWA's self-disclosure. SWA officials confirmed this and stated that the PMI gave them verbal permission to continue flying the aircraft.

We found that—after SWA self-disclosed the overflight—several of these aircraft flew into airports multiple times where they could have received the required inspections. When SWA finally inspected the aircraft, it found fuselage cracks in five of them. The AD specifies that these cracks could potentially lead to fuselage separation and rapid aircraft depressurization if left in disrepair.

While these critical safety lapses indicate problems with SWA's ability to comply with safety directives, they are symptomatic of much deeper problems with FAA's oversight (the timeline below shows the events of the SWA disclosure and FAA actions).

Figure 1. Timeline of SWA Disclosure



* SWA later determined only 46 violated AD.
**Security and Hazardous Materials Division

Overly Collaborative Relationship With Air Carrier Contributed to Breakdowns in Partnership Program

We found that FAA's inspection office for SWA developed an overly collaborative relationship with the air carrier that allowed repeated self-disclosures of AD violations through its partnership program. Partnership programs are intended to encourage data-sharing between FAA and air carriers to identify and address safety issues. Yet, FAA allowed SWA to repeatedly self-disclose AD violations without ensuring that SWA had developed a comprehensive solution for reported safety problems—which is required for FAA to accept the disclosure and absolve the carrier of any penalty.

However, SWA's proposed solutions, which FAA has repeatedly accepted, have failed to solve AD compliance issues as the carrier has violated four different ADs eight times since December 2006, including five in 2008. FAA's oversight in this case appears to allow, rather than mitigate, recurring safety violations.

FAA maintains that disclosure programs are valuable, as they can help to identify and correct safety issues that might not otherwise be obtainable. However, we are concerned that FAA relies too heavily on self-disclosures and promotes a pattern of excessive leniency at the expense of effective oversight and appropriate enforcement. Further, a partnership program that does not ensure carriers correct underlying problems is less likely to achieve safety benefits.

Our ongoing work at another carrier has identified concerns with employees using disclosures to avoid penalties for safety violations. FAA must take steps to maintain the safety objective of these programs by actively discouraging improper relationships between inspection offices and carriers so that these programs do not lapse into an amnesty path for perpetual safety violators.

Missed Inspections at SWA Demonstrate Weaknesses in FAA's National Oversight

Our work at SWA and other carriers has found weaknesses in FAA's national program for risk-based oversight—the Air Transportation Oversight System (ATOS). At SWA, multiple, missed ATOS inspections allowed AD compliance issues in SWA's maintenance program to go undetected for several years. As early as 2003, one of the whistleblowers expressed concerns to FAA about SWA's compliance with ADs. In 2006, he began urging FAA to conduct system-wide reviews, but FAA did not begin these reviews until after the details of the March 2007 disclosure became public.

In fact, FAA inspectors had not reviewed SWA's system for compliance with ADs since 1999. At the time of the SWA disclosure, FAA inspectors had not completed 21 key inspections in at least 5 years. While FAA has subsequently completed some

of these inspections, as of April 15, 2008, 4 of these inspections were still incomplete; some had not been completed for nearly 8 years.

We have previously identified system-wide problems with ATOS. For example, in 2002,[6] we found inconsistent inspection methods across FAA field offices for various carriers. As a result, FAA inspectors were confused over how to conduct ATOS inspections and assess risks.

In 2005, we found that inspectors did not complete 26 percent of planned ATOS inspections—half of these were in identified risk areas. We recommended, among other things, that FAA strengthen its national oversight and accountability to ensure consistent and timely ATOS inspections. However, FAA still has not fully addressed our recommendations.

Events at SWA and NWA Demonstrate Weaknesses in FAA's Internal Reviews of Safety Issues and Protection for Employees Who Report Them

Our work at SWA and NWA have identified weaknesses in FAA's processes for conducting internal reviews, ensuring corrective actions, and protecting employees who report safety concerns. In the SWA case, FAA's internal reviews found as early as April 2007 that the PMI was complicit in allowing SWA to continue flying aircraft in violation of the AD. Yet, FAA did not attempt to determine the root cause of the safety issue nor initiate enforcement action against the carrier until November 2007.

At NWA, FAA's reviews of an inspector's safety concerns were limited and overlooked key findings identified by other inspectors. Although some of the inspector's safety concerns were valid, FAA informed him that all of his concerns lacked merit.

We also have concerns regarding FAA's failure to protect employees who report safety issues from retaliation by other FAA employees. For example, in the SWA case, after one whistleblower voiced his concerns to FAA, an anonymous hotline complaint was lodged against him. According to the inspection office manager, the PMI indicated that a SWA representative submitted the complaint.

The complaint was non-specific and never substantiated, but the whistleblower was removed from his oversight duties for 5 months while under investigation. However, FAA did not suspend other inspectors who were subjects of similar complaints, including the PMI who admitted he allowed SWA to continue flying in violation of the AD.

Our work at NWA found the same problem with FAA's handling of the inspector who reported safety concerns. As with the inspector in the SWA case, FAA managers

[6] OIG Report Number AV-2002-088, "Air Transportation Oversight System," April 8, 2002.

reassigned an experienced inspector to office duties, following a complaint from the airline, and restricted him from performing oversight on the carrier's premises.

Both the SWA and NWA cases demonstrate that FAA must pursue a more reliable internal review process and protect employees who identify important safety issues.

FAA Needs To Make Immediate and Comprehensive Changes to Its Air Carrier Oversight Programs

FAA recently announced several actions to address the SWA safety directive violation. These include initiating a review of AD compliance at SWA and other air carriers. FAA also proposed to fine SWA more than $10 million.

While FAA's actions are necessary, albeit long overdue, the issues we have identified will require FAA to make the following changes to its air carrier oversight programs:

- Ensure that its VDRP guidance requires inspectors to (a) verify that air carriers take comprehensive actions to correct the underlying causes of violations identified through self-disclosure programs and (b) evaluate, before accepting a new report of a previously disclosed violation, whether the carrier developed and implemented a comprehensive solution.
- Implement a process for second-level supervisory review of self-disclosures before they are accepted and closed—acceptance should not rest solely with one inspector.
- Periodically rotate supervisory inspectors to ensure reliable and objective air carrier oversight.
- Require that its post-employment guidance include a "cooling-off" period when an FAA inspector is hired at an air carrier he or she previously inspected.
- Implement a process to track field office inspections and alert the local, regional, and Headquarters offices to overdue inspections.
- Establish an independent organization to investigate safety issues identified by its employees.
- Develop a national review team that conducts periodic reviews of FAA's oversight of air carriers.

FAA Must Improve Its Oversight of Repair Stations and Aircraft Manufacturers' Suppliers

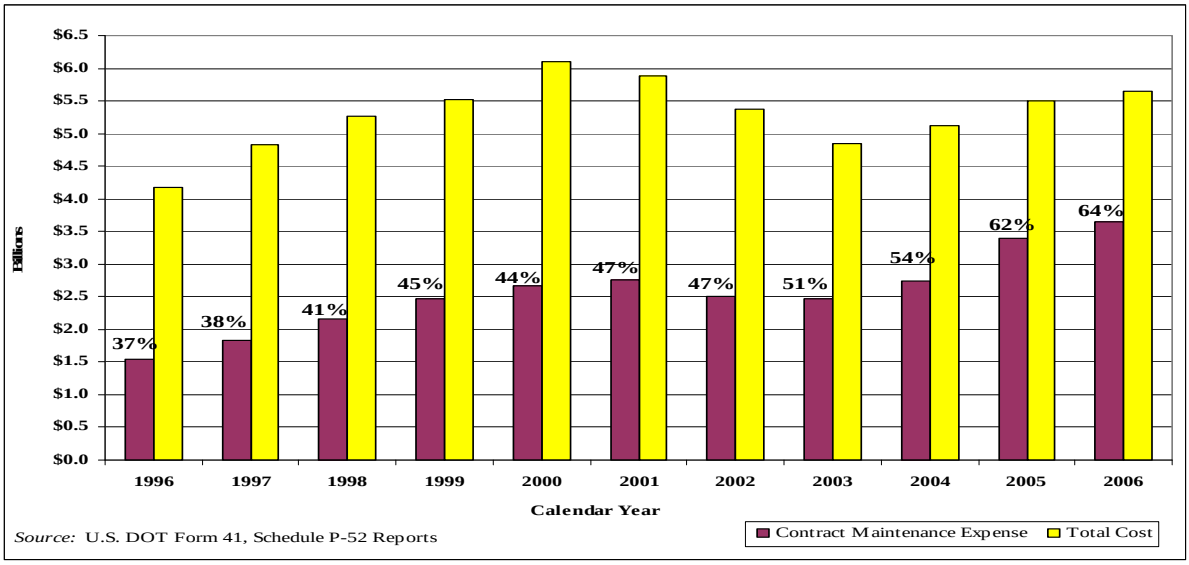
As with its oversight of air carriers, our work has also shown that FAA must make similar improvements to its oversight of repair stations and its risk-based system for overseeing aircraft manufacturers' suppliers. We found that FAA's oversight has not kept pace with the dynamic changes occurring in both of these industries.

FAA Must Closely Monitor Air Carriers' Increased Use of Repair Stations

Air carriers have outsourced maintenance for years to both domestic and foreign repair facilities. These facilities can complete repairs at lower costs and provide services, such as engine repair, that otherwise would require air carriers to have specialized equipment and staff. Many air carriers outsource their engine work to the original equipment manufacturers because they can provide a specific level of expertise as well as warranties for their products. However, in recent years, air carriers' use of external repair facilities has become more prominent.

As we testified in June,[7] from 1996 to 2006, while total maintenance costs fluctuated, air carriers continued to increase the percentage of maintenance dollars spent on outsourced maintenance—from 37 to 64 percent. In 2006, $3.7 billion of the $5.7 billion spent on maintenance was outsourced (see figure 2).

Figure 2. Percentage Increase in Outsourced Maintenance for Major Air Carriers, 1996 to 2006



Neither FAA nor the Department maintains information on how much maintenance air carriers outsource to foreign facilities. However, our work shows that the number of foreign FAA-certificated repair stations repairing U.S. aircraft increased from 344 in 1994 to 698 in 2007. We have emphasized that the issue is not where maintenance is performed, but that maintenance requires effective oversight.

We have identified weaknesses in FAA's ability to effectively monitor the increase in outsourcing. For example, in July 2003, we reported[8] that FAA had not shifted its oversight of aircraft maintenance to the locations where the maintenance was

[7] OIG Testimony Number CC-2007-076, "Aviation Safety: FAA Oversight of Foreign Repair Stations," June 20, 2007.
[8] OIG Report Number AV-2003-047, "Review of Air Carriers' Use of Aircraft Repair Stations," July 8, 2003.

performed. Although air carriers were using external repair stations to perform more of their maintenance work, FAA was still focusing most of its inspections on the maintenance work that air carriers performed within their own facilities.

During the past 8 years, FAA has taken important steps to move its safety oversight for air carriers and repair stations to risk-based systems. FAA's new oversight system applies to both domestic and foreign repair stations. However, FAA cannot effectively implement a risk-based system for oversight of aircraft maintenance if it does not know where the maintenance is performed.

In December 2005,[9] we again reported that FAA did not have good systems for determining which repair facilities air carriers were using to perform their most critical maintenance. FAA subsequently developed new inspector guidance and air carrier processes to address this problem, but these efforts still fall short of providing FAA with the information it needs. We have concerns about the new system primarily because it does not require air carriers to report (1) volume data for repairs performed and (2) all repair stations that provide critical component repairs. Further, FAA does not validate the information that carriers provide. FAA also does not have specific inspector guidance for identifying the types of non-certificated repair facilities that we found were performing critical maintenance.

FAA has agreed to require air carriers to report overall volume data on repairs, but it has not agreed to require them to report volume data for repair stations providing critical component repairs. In addition, FAA still does not require inspectors to validate the information that carriers provide. If air carrier reports are to be an effective means for FAA to track and accurately target repair facilities that air carriers use the most, a more thorough process will be needed.

FAA Must Improve Its Oversight of Aircraft Manufacturers' Suppliers

In February, we reported[10] that FAA has worked toward a risk-based oversight system for aviation manufacturers since 1998. FAA implemented this system in FY 2003, but it does not take into account the degree to which manufacturers now use suppliers to make aviation products. FAA based the new system on historical manufacturing business models, in which manufacturers maintained primary control over the production of their aircraft rather than using suppliers to design and manufacture extensive portions of aircraft.

We found weaknesses throughout FAA's oversight system for manufacturers and their suppliers. First, FAA has not ensured that manufacturers are overseeing their suppliers. Manufacturers are the first line of defense in ensuring the products used on

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[9] OIG Report Number AV-2006-031, "Review of Air Carriers' Use of Non-Certificated Repair Facilities," December 15, 2005.

[10] OIG Report Number AV-2008-026, "Assessment of FAA's Risk-Based System for Overseeing Aircraft Manufacturers' Suppliers," February 26, 2008.

their aircraft meet FAA and manufacturer standards. Yet, during the 24 months preceding our review, manufacturers had not audited 6 of the 21 critical parts suppliers we visited.

Second, FAA does not require inspectors to perform enough audits of suppliers to determine how well manufacturers' quality assurance systems are working. FAA's guidance for overseeing manufacturers' quality assurance systems only requires inspectors to perform, at most, four supplier audits, regardless of how many suppliers the manufacturer uses.

Supplier control audits are a primary tool that FAA uses to assess how well manufacturers' oversight systems are working. Equally important, these audits function as a second layer of control for preventing improperly produced parts from entering the market.

However, as shown in table 1 below, in each of the last 4 years, FAA has inspected an average of *1 percent* of the total suppliers used by the five manufacturers we reviewed. At FAA's current surveillance rate, it would take inspectors at least 98 years to audit every supplier once. This is particularly troubling because manufacturers are not evaluating these suppliers frequently or comprehensively.

Table 1. Number of Supplier Audits Completed by FAA for Five Major Manufacturers

		Supplier Audits Completed by FAA				
Manufacturer	**No. of Supplier Facilities[a/]**	**FY 2003**	**FY 2004**	**FY 2005**	**FY 2006**	**Avg. % Per FY**
A	4,012	2	1	7	4	1%
B[b/]	2,553	31	26	15	27	1%
C	706	5	4	4	6	1%
D	489	5	3	1	2	1%
E	367	0	2	3	2	1%

[a/] Number of supplier facilities based on information obtained for 2004.
[b/] This manufacturer operates seven separate manufacturing divisions. As a result, FAA evaluated the seven divisions separately for risk assessment purposes, which resulted in more supplier control audits.
Source: FAA's National Supplier Control Audit Schedules, FY 2003-2006

Third, the systemic deficiencies we identified at the 21 supplier facilities we visited indicate that manufacturers and FAA need to strengthen their oversight of these facilities. For example, nearly half (43 percent) of the suppliers had deficiencies in their tool calibration and employee training programs. Deficiencies in these areas could impact the quality of the parts these suppliers produce.

KEEPING EXISTING MODERNIZATION PROGRAMS ON TRACK, REDUCING RISKS WITH NEXTGEN, AND SETTING REALISTIC EXPECTATIONS

Progress and Problems With FAA Acquisitions

Overall, we are not seeing the significant cost growth and schedule slips with FAA major acquisitions that occurred in the past. This is because FAA has taken a more incremental approach to managing major acquisitions. When comparing revised baselines, only 2 of the 18 projects we reviewed have experienced additional cost growth ($53 million, combined) and delays (5 years, combined) since our last report in 2005.[11] However, from program inception, six programs have experienced cost growth of close to $4.7 billion and schedule delays of 1 to 12 years.

While FAA's incremental approach may reduce risk in the near term, it has left several programs with no clear end-state and less visibility into how much they will ultimately cost. A case in point involves modernizing facilities that manage traffic in the vicinity of airports, commonly referred to as "terminal modernization."

In 2004, faced with cost growth of over $2 billion for the Standard Terminal Automation Replacement (STARS) program, FAA shifted to a phased process, committing STARS to just 47 sites at an estimated cost of $1.46 billion. FAA's original plan was to deploy the system to 172 sites for $940 million. FAA renamed this modernization effort the Terminal Automation Modernization-Replacement (TAMR) initiative.

In 2005, FAA approved modernizing displays through the TAMR program (referred to as TAMR Phase 2) by replacing legacy equipment at five additional small sites and replacing the aging displays at four large, complex facilities. However, this leaves over 100 sites still in need of modernization. Although FAA has not decided how it will modernize these sites, its FY 2008 budget submission indicates that the total cost for this effort could be over $1 billion. FAA is requesting $31.2 million for terminal modernization efforts for FY 2009.

There is no defined end-state for terminal modernization, and past problems with developing and deploying STARS leave FAA in a difficult position to begin introducing NextGen capabilities. Future terminal modernization costs will be shaped by (1) NextGen requirements, (2) the extent of FAA's terminal facilities consolidation, and (3) the need to replace or sustain existing (legacy) systems that have not been modernized.

[11] OIG Report Number AV-2005-061, "Status of FAA's Major Acquisitions: Cost Growth and Schedule Delays Continue To Stall Air Traffic Modernization," May 26, 2005.

There are several ongoing acquisition programs that warrant attention because of their importance to NextGen and potential cost increases, schedule slips, or diminishing benefits.

En Route Automation Modernization (ERAM): This program replaces the hardware and software at facilities that manage high-altitude traffic and is a key platform for NextGen. With an estimated cost of $2.1 billion, ERAM is one of the largest, most complex acquisitions in FAA's modernization portfolio. FAA is requesting $203 million for ERAM for FY 2009, a reduction from the FY 2008 level of $369 million. ERAM is currently on schedule for its first operational use at the Salt Lake En Route Center in October 2008, but considerable testing and integration work lies ahead. Because ERAM is expected to serve as a foundation for NextGen, any program cost increases or schedule delays will affect the pace of introducing new capabilities and could directly impact the overall transition to NextGen.

ASDE-X: ASDE-X is FAA's latest effort designed to help controllers identify aircraft and vehicle positions on the airport surface, with the ultimate goal of reducing the risks of accidents on runways. It is planned to improve airport safety by operating in all-weather and low-visibility conditions (e.g., fog, rain, and snow) when controllers cannot see surface movement on ramps, runways, and taxiways. In FY 2007, Congress appropriated $70.6 million to FAA for the ASDE-X program. In FY 2008, FAA expects to spend $40.6 million for ASDE-X efforts. For FY 2009, it is requesting $32.7 million.

ASDE-X was initially designed to provide FAA with a low-cost alternative to its ASDE-3 radar systems for small- to medium-sized airports, but it has evolved into a different program. In September 2005, FAA made a major change to the scope of the program, increasing ASDE-X costs from $505.2 million to $549.8 million and extending the completion date from 2007 to 2011. FAA now plans to upgrade ASDE-3 systems with ASDE-X capabilities at 25 large airports and install the system at 10 other airports that have no existing surface surveillance technology. FAA concluded this would yield the greatest return on its investment and maximize safety benefits by deploying ASDE-X capabilities to airports with larger traffic counts or more complex operations.

In October 2007, we reported[12] that the ASDE-X program is at risk of not meeting its goal to commission all 35 ASDE-X systems for $549.8 million by 2011 and may not achieve all planned safety benefits.

[12] OIG Report Number AV-2008-004, "FAA Needs To Improve ASDE-X Management Controls To Address Cost Growth, Schedule Delays, and Safety Risks," October 31, 2007.

- Since the 2005 re-baseline, FAA has increased the cost to acquire and install some ASDE-X activities by $94 million. To stay within the revised baseline, FAA offset this cost by decreasing planned expenditures for seven other program activities, such as construction for later deployment sites.

- We are also concerned that the ASDE-X schedule is not realistic. At the time of our October 2007 report, FAA had commissioned 11 of the 35 ASDE-X sites; however, only 6 of the 11 had all the planned capabilities commissioned for operational use. We note that in April 2008, FAA commissioned the 12th ASDE-X system for operational use. FAA officials told us that all ASDE-X systems have been purchased with spares and test equipment to support each site and that site prep has begun. They also noted that each airport presents unique challenges that must be addressed. We maintain that FAA should not declare ASDE-X as commissioned for operational use until all planned capabilities are fully implemented.

- FAA needs to resolve operational performance issues associated with key ASDE-X safety capabilities. For example, while FAA has commissioned the first ASDE-X system that can alert controllers of potential collisions on intersecting runways or converging taxiways, under certain circumstances the system does not generate timely alerts for controllers to take appropriate action. Additionally, ASDE-X is susceptible to dropping targets during heavy precipitation. FAA has made progress in addressing these problems. FAA will need to fully test ASDE-X safety capabilities to ensure the system can meet the unique needs of each airport scheduled to receive ASDE-X.

Because of these issues, the program is at risk of not meeting its goals to deliver all 35 ASDE-X systems by 2011. In October 2007, we recommended that FAA develop realistic cost estimates for all activities required to complete ASDE-X implementation. We also recommended that FAA resolve operational performance issues identified during system testing before deploying key ASDE-X safety capabilities at remaining airports. FAA concurred with our recommendations and agreed to address our concerns. We will continue to monitor FAA's efforts to deploy ASDE-X and implement safety capabilities.

FAA Telecommunications Infrastructure (FTI) Program: FTI is intended to replace seven FAA-owned and -leased telecommunications networks with a single network to provide FAA with services through 2017 and reduce operating costs. In FY 2007, Congress appropriated $28 million in facilities and equipment (F&E) funds to FAA for this program. In FY 2008, FAA expects to spend $8.5 million in F&E funds for FTI efforts. Unlike most acquisitions, however, the vast majority of FTI is funded out of the operations account as opposed to the F&E account.

For FY 2008, FAA estimates it will need $210 million in operations funds to support FTI operations and another $91 million to extend legacy network operations while continuing the FTI transition. For FY 2009, the Agency is planning to spend $186 million to support FTI operations and an additional $19 million for legacy telecommunications systems. The costliest legacy network FTI will replace is the Leased Interfacility National Airspace System Communications System (LINCS), with over $600 million spent for operations from 2002 to 2007. In April 2007, FAA completed negotiations to extend LINCS until April 2008 for a $92 million ceiling price, with three 6-month options. FTI program officials told us they do not intend to extend the contract for LINCS legacy network beyond April 2008. This will help to control telecommunication costs.

In April 2006, we reported[13] that FTI was unlikely to meet its December 2007 transition completion date and recommended that FAA improve FTI management controls and develop a realistic master schedule. FAA agreed and tasked the MITRE Corporation with conducting an independent assessment of the FTI master schedule. The assessment identified several risks associated with FAA meeting its transition deadline. Consequently, in August 2006, FAA's Joint Resource Council approved a second re-baseline of FTI's cost and schedule goals, which extended the completion date to December 2008 and increased the overall cost from $3.3 billion to $3.4 billion. FAA also reduced the total number of NAS services to be transitioned to FTI from 25,294 to 20,033.

Since we last reported, FAA has made significant progress with the FTI transition. As of January 31, 2008, FAA has delivered 18,294 services. However, it is important to note that shifting requirements, eroding cost benefits, and risks to air traffic operations during the transition have impacted the FTI program.

We note that FAA will not replace all networks as originally planned. FAA has decided not to replace digital equipment that supports long-range radars or switching equipment that supports flight data for high-altitude communications, as originally envisioned by the FTI program office. As a result, FAA will have to maintain this existing equipment much longer than expected. The cost of doing so and the impact on potential FTI benefits remain uncertain. Additionally, even though the last baseline significantly reduced the number of services planned for transition, this number has since climbed to 22,545. FAA attributes the increase to "emerging requirements" (requirements for new services). Further, the master schedule does not yet include requirements for moving forward with NextGen efforts. We recognize that these requirements will have to be addressed through adjustments to the FTI program or another effort.

[13] OIG Report Number AV-2006-0147 "FAA's Telecommunications Infrastructure Program: FAA Needs To Take Steps To Improve Management Controls and Reduce Schedule Risks," April 27, 2006.

FAA's main goal for FTI was to reduce Agency operating costs. Yet, we found that costs for FTI remain uncertain since FAA still has not validated cost and benefit estimates as agreed after our 2006 report. Although FAA reduced the number of services planned, the overall program cost estimate grew by over $100 million through 2017. As costs have escalated, cost savings have eroded. In 2006, when FAA re-baselined FTI, we estimated that cost savings decreased from $672 million to $434 million (when including previous investments in FTI). Further, FAA did not achieve any FTI cost savings for FY 2007. Until FAA independently validates FTI cost and benefit information, the cost effectiveness of the investment in FTI will remain questionable.

Finally, because of recurring outages and customer service problems, many FTI services are not meeting availability requirements—9 percent of accepted FTI services in December 2007, as reported by the FTI program office. The contractor also reported that many of these were not being restored to service within contractual timeframes after outages.

Unscheduled outages of both primary and back-up services have led to flight delays and affected air traffic operations. For example, on September 25, 2007, the Memphis En Route Center lost its radar, flight, and voice communications data on its primary and alternate paths, which triggered 566 flight delays. FAA attributed the outage to its third-party telecommunications provider, which was inappropriately routing FAA telecommunications through a single point of failure. According to FAA, this same design is in place at other critical FAA facilities, including the Atlanta and Jacksonville En Route Centers.

Additionally, on November 9, 2007, the Jacksonville En Route Center experienced an FTI equipment failure that caused the loss of radar and communication services, forcing air traffic controllers to implement a ground stop and triggering 85 flight delays. The most recent outage occurred on April 12, 2008, at the Southern California TRACON, where an FTI equipment failure caused the loss of flight data to controllers. We will be reporting on the FTI program again later this year.

Air Traffic Management (ATM): This program provides FAA with hardware and software tools to manage air traffic, expand system capacity, and reduce the impact of bad weather system-wide. FAA is requesting $90.2 million for ATM for FY 2009. FAA baselined ATM for $454 million in August 2005 and scheduled its deployment for FY 2011. ATM is baselined for two initial segments with plans for additional segments.

Although the ATM effort has not experienced cost increases or schedule delays, we are concerned about risks and the final outcome since FAA and the contractor significantly underestimated the size and complexity of software development. Since then, FAA has modified the contract and adjusted the scope of the work. Although

FAA is attempting to adjust the contract, we note that underestimating software development has led to significant problems with other modernization projects.

The challenges FAA faces with ATM include: (1) developing complex software and integrating ATM with other NAS systems and (2) determining cost and schedule decisions on the additional segments, which are unknown at this time.

Challenges With NextGen Programs

FAA has established initial cost and schedule baselines for the first segments of two key NextGen initiatives: ADS-B and the System-Wide Information Management program (SWIM). Both programs will require enhanced oversight as FAA begins integrating them with existing systems.

ADS-B: This program provides satellite-based technology that allows aircraft to broadcast their position to other aircraft and ground systems. For FY 2009, FAA is requesting $300 million for ADS-B. In August 2007, FAA awarded a service-based contract for the ADS-B ground infrastructure worth $1.8 billion if all options are exercised. FAA estimates that ADS-B will cost about $1.6 billion in capital costs for initial segments of its implementation through 2014, which include the completion of a nationwide ground system for receiving and broadcasting ADS-B signals.

FAA must address several challenges to realize the benefits of ADS-B. These include: (1) gaining stakeholder acceptance and aircraft equipage, (2) addressing broadcast frequency congestion concerns, (3) integrating with existing systems, (4) implementing procedures for separating aircraft, and (5) assessing potential security vulnerabilities in managing air traffic. As we noted in October 2007,[14] the implementation of ADS-B is a long-term effort that will require significant investment from Government and industry. Given FAA's history with developing new technologies and its approach to ADS-B, in which the Government will not own the ground infrastructure, we believe this program will require a significant level of oversight. We will report on ADS-B later this year.

SWIM: This program provides FAA with a web-based architecture that allows information sharing among airspace users. For FY 2009, FAA is requesting $41 million for SWIM. In June 2007, FAA baselined the first 2 years of segment 1 (planned to occur between FY 2009 and FY 2010) for $96.6 million. FAA's latest Capital Investment Plan cost estimate for SWIM is $285 million. Current challenges include the work to determine requirements and interfaces with other FAA systems, including ERAM and ATM. Moreover, SWIM will require integration with other Federal agencies' operations to realize NextGen benefits and develop a robust cyber security strategy and design. While FAA has begun initial efforts, it still needs to

[14] OIG Testimony Number CC-2007-100, "Challenges Facing the Implementation of FAA's Automatic Dependent Surveillance-Broadcast Program," October 17, 2007.

establish the architecture, strategy, and design. FAA still has not determined additional SWIM segments or the cost to fully implement SWIM.

FAA Must Enhance Its Cost and Schedule Metrics To Monitor NextGen Programs

In its FY 2007 Flight Plan and most recent Performance and Accountability Report, FAA reported that, for FY 2006, 100 percent of its critical acquisitions were within 10 percent of budget estimates and 97 percent were on schedule. In FY 2006, FAA tracked about 29 projects, including acquisition of new radars. While FAA cost and schedule performance metrics are worthwhile tools, they have limitations that decision makers must understand to properly assess the status of FAA's major acquisitions.

- First, FAA's cost and schedule metrics are "snapshots" in time. They are not designed to address changes in requirements, reductions in procured units, or shortfalls in performance that occur over time.

- Second, FAA's budget metrics compare cost estimates taken during the fiscal year using updated, "re-baselined" cost figures—not estimates from the original baseline. This is why the Wide Area Augmentation System (a satellite-based navigation system) is considered "on budget" even though costs have grown from $892 million to over $3 billion since 1998.

- Finally, FAA's schedule metrics used for assessing progress with several programs in 2006 and 2007 were generally reasonable but focused on interim steps or the completion of tasks instead of whether systems met operational performance goals. For example, ASDE-X metrics focused on the delivery of two systems instead of whether the systems entered service or operated as planned. We also found that there are no written criteria for selecting or reporting the milestones, and FAA needs to develop written criteria for offices to improve milestone reporting.

Although re-baselining a project is important to obtain reliable cost and schedule parameters and is consistent with Office of Management and Budget guidelines, comparisons of revised baselines—absent additional information—do not accurately depict a program's true cost parameters. To sufficiently measure progress with NextGen initiatives, FAA will need to explore a wider range of metrics that focuses on promised capabilities and benefits from bundled procedures and multiple systems. Our report issued earlier this week recommended that FAA develop new metrics to assess progress with NextGen with respect to enhancing capacity, boosting productivity, and reducing Agency operating costs.

Much Work Remains To Determine How To Transition Existing Projects to NextGen

In February 2007, we recommended that FAA examine existing projects to determine if they were still needed and, if so, what adjustments would be required. FAA concurred with our recommendation and stated that it has begun this assessment. To date, however, FAA has not made major adjustments to modernization projects

According to FAA, approximately 30 existing capital programs will serve as "platforms" for NextGen. Over the next 2 years, FAA must make over 20 critical decisions about ongoing programs. These decisions have significant budget implications and affect all major lines of the modernization effort with respect to automation, communications, navigation, and surveillance.

- **Automation:** FAA will approve a limited number of "candidate capabilities" and enhancements for the second major ERAM software release. In FY 2008, FAA will identify the requirements and cost parameters for new capabilities based on ERAM targeted for the 2012 to 2018 timeframe. FAA will also have to address what changes are needed to modernize its terminal facilities and whether or not it will pursue a "common automation platform" for terminal and en route environments in the future.

- **Communications:** Between FY 2008 and FY 2009, FAA plans to decide how to move forward with data communications and when to restart a data-link communications program for controllers and pilots. Costs remain uncertain, and FAA faces a myriad of complex questions about its overall technical approach, implementation plans, and rulemaking initiative timeline.

- **Navigation:** FAA intends to decide how much of the existing ground-based navigation system will be retained. Specifically, in FY 2008, FAA will consider how best to move forward with the next generation precision and approach landing system and whether to pursue the Local Area Augmentation System—which has been in research and development status since FY 2004.

- **Surveillance:** As part of the effort to move forward with ADS-B, FAA must decide how to best incorporate "fusion" into existing air traffic control automation systems. Fusion in this context is defined as taking all surveillance data available for an aircraft and using the best data or combination of data to determine aircraft position and intent. Industry groups have asked FAA to accelerate its work on fusion.

FAA Needs To Refine Its Plans To Move Forward With NextGen, Reduce Risks, and Focus Investment Decisions

FAA is making progress toward developing the NextGen Enterprise Architecture (a technical blueprint), which is planned for implementation by 2025. FAA is exploring ways to accelerate NextGen. However, costs for NextGen remain uncertain, and FAA has yet to establish reasonable expectations for mid- and long-term NextGen investments and realistic timeframes for improvements to enhance capacity and reduce delays. At this juncture, FAA needs to pursue the following actions:

- **Conduct a gap analysis of the current NAS and future NextGen capabilities.** FAA's architecture for NextGen does not detail how FAA will transition from the present NAS and the future NextGen architectures, which will have considerably different capabilities and performance parameters. Until FAA completes a gap analysis, it will not be able to determine technical requirements that translate into reliable cost and schedule estimates for major acquisitions.

- **Set expectations and establish NextGen funding priorities.** At this point, it is difficult for decision makers and FAA to determine what projects to invest in first or what elements can be accelerated. FAA needs to better understand costs and benefits and then identify the high priority improvements and reflect those priorities in budget requests.

- **Develop an interim architecture for what can be accomplished by 2015.** Because of the significant differences between the present system and the NextGen architecture and concept of operations, FAA should develop an interim architecture for the 2012 to 2015 timeframe. This would help FAA to determine reasonable goals, establish priorities, fully identify adjustments to existing projects, refine requirements for new systems, and understand complex transition issues.

- **Develop a strategy for acquiring the necessary skill mix to effectively manage and execute NextGen.** In response to our February 2007 report,[15] FAA contracted with the National Academy of Public Administration to assess the skill sets needed for NextGen. A preliminary report[16] highlighted the need for proficiency in systems integration and systems engineering, particularly with an understanding of the human factors discipline. FAA must anticipate needed skill sets for NextGen to avoid the problems that have hindered its modernization efforts.

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[15] OIG Report Number AV-2007-031, "Joint Planning and Development Office: Actions Needed To Reduce Risks With the Next Generation Air Transportation System," February 12, 2007.

[16] Report by a panel of the National Academy of Public Administration, "Workforce Needs Analysis for the Next Generation Air Transportation System (NextGen), Preliminary Findings and Observations," December 2007.

ADDRESSING ATTRITION WITHIN FAA'S CRITICAL WORKFORCES

A key challenge for FAA for at least the next 10 years is addressing attrition in two of its critical safety workforces—air traffic controllers and aviation safety inspectors. FAA is currently training more new controllers than it has in the past 15 years. The percentage of new (developmental) controllers within the controller workforce has increased from about 15 percent in 2004 to about 25 percent in 2007.

As a result, FAA is facing a fundamental transformation in the composition of its controller workforce that will require improvements in its facility training program—a critical component in addressing controller attrition. However, we found that FAA's facility training program continues to be extremely decentralized and the efficiency and quality of the training varies extensively from one location to another. We found similar problems in 2004.[17]

FAA also is facing substantial safety oversight challenges due to potential attrition in its inspector workforce. FAA has about 4,100 inspectors to oversee a dynamic and rapidly changing industry, which includes 114 commercial air carriers, almost 5,000 foreign and domestic repair stations, more than 700,000 active pilots, and more than 1,600 approved manufacturers.

Addressing Controller Attrition by Improving Facility Training

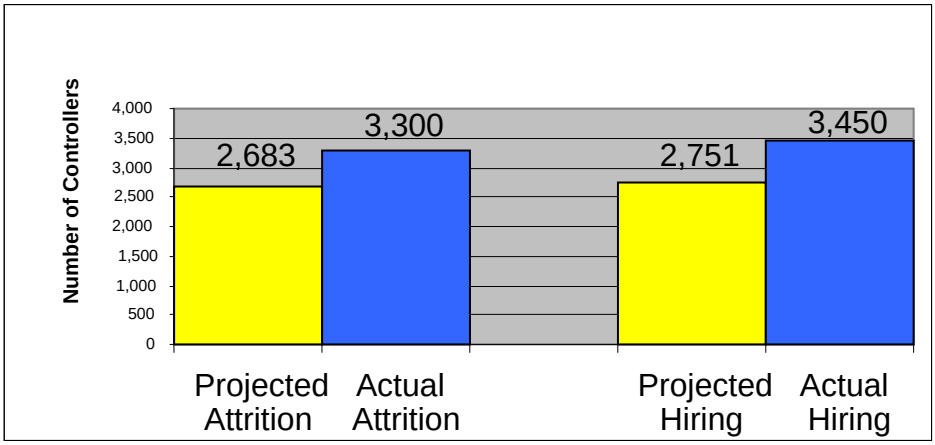
The long expected surge in controller attrition has begun. Since 2005, 3,300 controllers have left the workforce[18]—only 37 of these left because they had reached the mandatory retirement age of 56. The total rate of attrition was 23 percent higher than FAA had projected. However, FAA has accelerated its hiring efforts to fill vacancies. Since 2005, FAA has hired 3,450 new controllers—25 percent more than projected. Still, FAA faces a major challenge as it must hire and train 17,000 new controllers through 2017.

Figure 3 shows FAA's estimates and actual numbers for controller attrition and new controller hiring from FY 2005 through FY 2007.

[17] OIG Report Number AV-2004-060, "Opportunities To Improve FAA's Process for Placing and Training Air Traffic Controllers in Light of Pending Retirements," June 2, 2004.

[18] Attrition includes retirements, resignations, promotions to supervisory or non-controller positions, training failures, and deaths.

Figure 3. Controller Attrition and Hiring Projected Versus Actual
(FY 2005 to FY 2007)



Source: FAA

The overall percentage of controllers-in-training has grown substantially over the past 3 years. From April 2004 to December 2007, the overall size of the controller workforce remained constant. However, during the same period, the number of controllers-in-training increased by 1,375, or 62 percent, while the total number of CPCs decreased by 1,302, or 11 percent (see table 2). As a result, FAA is now training more new controllers than it has in the past 15 years.

Table 2. Total Controller Workforce Composition

Date	CPCs	Controllers In Training*	Total
April 2004	12,328	2,209	14,537
December 2007	11,026	3,584	14,610**
Difference	(-1,302)	+1,375	+73

* Includes newly hired or developmental controllers and transferred CPCs in training at new locations.
** This number does not include new hires in training at the FAA Academy.
Source: FAA

While the number of controllers in training has increased significantly since 2004, FAA's reports to its stakeholders do not reflect this change. This is because FAA does not differentiate between CPCs and controllers-in-training in its Controller Workforce Plan. FAA only reports the total number of controllers at each location. In our opinion, FAA should report the number of CPCs *and* the number of controllers-in-training separately for each location. Differentiating those figures by location could provide Congress and the Secretary with a "snapshot" of the controller workforce and provide a benchmark for year-to-year comparisons.

A major challenge in addressing the surge in controller attrition will be to train transferring and developmental controllers to the CPC level at their assigned locations. Facility training can take up to 3 years and is the most expensive part of new controller training. Developmental controllers and transferring veteran controllers face a demanding training process at their assigned locations. The training is conducted in stages and consists of a combination of classroom, simulation, and OJT.

After controllers complete classroom and simulation training they begin OJT, which is conducted by a CPC who observes and instructs trainee controllers individually as they work the control position. Controllers in training achieve certification on each position as they move through the various stages. After they have certified on all positions within their assigned area, they are commissioned as a CPC at that facility.

Training new controllers to the CPC level is important for two reasons: (1) only CPCs are qualified to control traffic at *all* positions of their assigned area and (2) only CPCs certified for at least 6 months (at their assigned location) can become OJT instructors for other new controllers. FAA must have enough OJT instructors at all locations if it is to achieve its ambitious hiring and training plans for the next 10 years and beyond.

It is important to note that new controllers who have completed portions of training and have been certified on a position can independently staff that position. However, controllers are not qualified CPCs until they have certified on all positions within their assigned area. In addition, using position-qualified controllers extensively to staff positions can lengthen the time required for them to become CPCs since they are not training on other new positions.

We recently completed an audit of FAA's controller facility training program—our second review of this program since 2004. Overall, we found that the program continues to be extremely decentralized and the efficiency and quality of the training varies from one location to another. We found similar problems in 2004. FAA is taking actions at the national level to get this important program on track. For example, FAA increased the use of contractor training support from 53 facilities in 2004 to 190 facilities in November 2007.

However, many of FAA's other efforts are still in the early stages of implementation. To achieve its goals for the controller workforce, FAA will need to take the following actions.

Clarify responsibilities for oversight and direction of the facility training program at the national level. Since the creation of the Air Traffic Organization, FAA has assigned national oversight responsibility for facility training to the Air Traffic Organization's Vice President for Terminal Services and the Vice President

for En Route Services. However, the Vice President for Acquisition and Business Services oversees new controller hiring and the FAA Academy training program, and the Senior Vice President for Finance oversees the development of the Controller Workforce Plan. Both play key roles in the controller training process.

As a result of these overlapping responsibilities, we found that there is significant confusion at the facility level. During our review, facility managers, training managers, and even Headquarters officials were unable to tell us who or what office was responsible for facility training. In our opinion, FAA needs to clarify responsibility for oversight and direction of the facility training program at the national level and communicate those roles to facility managers.

Establish realistic standards for the level of developmental controllers that facilities can accommodate. FAA plans to increase the number of developmental controllers to over 30 percent of the total controller workforce. This would be the highest percentage of developmental controllers in the past 15 years. In its Controller Workforce Plan, FAA estimates that the controller workforce at each facility can comprise up to 35 percent in developmental controllers and still maintain operations and training.

FAA also estimates that if facilities exceed that amount, training times would significantly increase because the number of developmental controllers would surpass available training capacity. However, we found that many facilities already meet or exceed the 35-percent level. As of December 2007, 70 facilities nationwide (over 22 percent of all FAA air traffic control facilities) exceeded that level, compared to just 22 in April 2004. This represents a 218-percent increase in just 3 years. For example, as of December 2007:

- Teterboro Tower had 12 CPCs and 13 developmental controllers (52 percent developmental).
- Oakland Center had 163 CPCs and 101 developmental controllers (38 percent developmental).
- Las Vegas TRACON had 22 CPCs and 22 developmental controllers (50 percent developmental).

Many facility managers, training officers, and union officials we spoke with disagreed with FAA's estimate of an acceptable level of developmental controllers. They stated that, in order to achieve effective controller training while maintaining daily operations, the *maximum* percentage of developmental controllers should be limited to between 20 percent and 25 percent of a facility's total controller workforce.

The difference between these estimates and FAA's maximum percentage is disconcerting, particularly since 70 facilities already exceed the FAA limit. A

significant issue is that FAA's 35-percent estimate was originally intended to determine how many developmental controllers could be processed through the FAA Academy—not how many new controllers that could be trained at individual facilities. However, it appears FAA is now using that percentage as a benchmark for all facilities.

FAA Headquarters officials we spoke with agreed that "no one size fits all" when determining how many trainees a facility can accommodate. We agree, given the various sizes and complexities of FAA's more than 300 facilities. In our opinion, FAA needs to re-examine its estimate and identify (by facility) how many developmental controllers facilities can realistically accommodate.

In determining this amount, FAA needs to consider several factors at each location, such as the number of available OJT instructors, available classroom space, the number of available simulators, and the number of recently placed new personnel already in training.

Implement key initiatives proposed in its 2004 Controller Workforce Plan. FAA has not implemented several key initiatives relating to facility training that it first proposed in its December 2004 Controller Workforce Plan. Those included "developing, implementing and enforcing a policy that assigns facility training as a priority second only to operations." This was to be accomplished by (1) placing developmental controllers only at facilities that had available training capacity, (2) requiring facility managers to suspend training *only* for critical operational necessities, and (3) establishing nominal "time-to-certify" metrics and holding managers accountable for achieving those targets. However, FAA never issued this policy.

In addition, FAA has not comprehensively evaluated its facility training program. In its 2004 Controller Workforce Plan, FAA stated it would, "conduct a thorough review of facility training to ensure it begins where the Academy ends. This review will take into consideration other efficiency gains identified in this plan and will result in facility training programs tailored to meet the needs of developmental controllers of the future." FAA intended for this effort to help reduce the time it takes new controllers to become CPCs. However, FAA never conducted the evaluation.

To its credit, FAA has successfully implemented an important initiative—increasing the use of training simulators at towers. Tower simulators were recently installed at four towers: Chicago O'Hare, Miami, Ontario, and Phoenix. The simulators are programmed with scenarios and occurrences exclusive to those airports, using actual aircraft with their respective call signs. By using simulators, controllers gain inherent knowledge of a particular airport, its airspace, and application of air traffic procedures for that specific location. The simulators also have a function that writes software for

additional airports; this allows controllers from surrounding facilities to utilize the simulators as well.

Results thus far indicate that simulators at towers are a valuable training tool, and managers of the facilities with simulators are pleased with the results. The National Aeronautics and Space Administration (NASA) Ames Research Center conducted an evaluation and found that it took 60 percent fewer days for developmental controllers to complete ground control training at the Miami tower. Further, at Chicago O'Hare, NASA reported that it took developmental controllers 42 percent fewer days to complete ground control training.

FAA plans to install 12 additional simulators this year (6 at large airports and 6 at the FAA Academy) and 12 next year (at other airports). FAA must ensure that this effort remains on track to capitalize on the significant success that this training has demonstrated.

We plan to issue our final report on controller facility training later this spring. We are also conducting other congressionally requested reviews of related controller issues. At the request of the Chairman of the House Subcommittee on Aviation, we are reviewing controller training failures (developmental controllers who fail training either at the FAA Academy or at their assigned facility). At the request of Senator Durbin of Illinois, we are reviewing factors that could affect controller fatigue. This issue was identified by the National Transportation Safety Board after the crash of Comair 5191 in 2006. We are focusing our current efforts at Chicago O'Hare Tower, Chicago TRACON, and Chicago Center but may review other locations and FAA's national efforts based on the results of our work at Chicago.

Addressing Inspector Attrition and Implementing Staffing Models

FAA and the U.S. aviation industry have experienced one of the safest periods in aviation history. While much of the credit for this impressive safety record is due to safety systems that air carriers have built into their operations, FAA regulations and inspectors play an important role in providing an added layer of safety oversight. This oversight covers a vast network of operators and functions, which make up the largest, most complex aviation system in the world (see table 3 below).

Table 3. FAA Inspectors' Workload

Commercial Air Carriers	114		Flight Instructors	89,396
Repair Stations	4,978		FAA Designee Representatives	11,292
Active Pilots	749,834		Aircraft	319,549
Approved Manufacturers	1,647		FAA-Licensed Mechanics and Repairmen	361,273

Source: FAA

FAA's approximately 4,100 inspectors must oversee both domestic and foreign aspects of these operations. This task is made more difficult by the rapidly changing aviation environment. We see two issues that warrant attention: FAA must (1) maximize risk-based oversight programs and (2) develop and implement a reliable staffing model to ensure it has a sufficient number of inspectors where they are most needed.

To maximize its limited inspector resources, FAA has been working toward risk-based safety oversight systems for air carriers, repair stations, and manufacturers. These systems target inspector resources to areas of greatest risk.

FAA has worked to move its safety oversight for aircraft repair stations to a risk-based system over the past 2 years. However, FAA's new system does not include a process for overseeing critical repairs performed by non-certificated repair facilities. In December 2005, we reported that FAA must understand the full extent and type of work that non-certificated repair facilities perform. These facilities are not licensed or routinely visited by FAA inspectors but perform critical maintenance, such as engine replacements. FAA's efforts to identify which non-certificated repair facilities perform this type of maintenance for air carriers are still underway.

FAA will also need to modify its risk-based system for manufacturers so that inspectors can more effectively oversee manufacturing operations in today's complex aviation environment. FAA's current oversight system does not consider the increasingly prominent role that aircraft parts and component suppliers now play in aviation manufacturing. In the past, manufacturers built the majority of their aircraft within their own manufacturing facilities using their own staff. Now, manufacturers use domestic and foreign part suppliers to build large sections of their aircraft. Given these changes, FAA needs to strengthen its system for overseeing aircraft and aircraft part suppliers so that its oversight is effective and relevant.

In addition to targeting inspector resources through risk-based oversight, FAA must have a reliable staffing model on which to base its inspector assignments. FAA has made at least two attempts to develop a staffing model to determine the number of

inspectors needed and the best locations for placement. Neither model, however, provided FAA with an effective approach for allocating inspector resources.

Last year, FAA's hiring efforts kept pace with retirements, and the Agency ended the year with 133 additional inspectors over FY 2006 levels. Because of staffing gains in FY 2007 to 2008, FAA's budget request for FY 2009 does not include funding for any additional inspectors over the FY 2008 levels. However, FAA must continue to closely oversee this hiring effort since nearly half of the workforce will be eligible to retire within the next 5 years. FAA will never have an inspection workforce that is large enough to oversee every aspect of aviation operations, but it must develop a reliable staffing model to effectively use its inspector resources.

At the direction of Congress, the National Research Council evaluated FAA's current methods for allocating inspector resources in September 2006. This study reported similar concerns that we identified in past reports—that FAA's current method of allocating inspectors is antiquated and must be redesigned to effectively target inspectors to those areas of higher risk.

The Council also reported that the changing U.S. and global aviation environments will be key drivers of future inspector staffing needs. For example, airlines' outsourcing of aircraft maintenance, FAA's shift to a system safety oversight approach, and safety inspectors' attrition and retirement are all important factors that must be considered in determining staffing needs.

FAA is still in the early stages of developing a new staffing method and has established an interim target date to assess current staffing methods and begin identifying the elements of the next generation staffing tool by September 2008. FAA recently finalized milestones to develop and implement the new model and plans to begin using it by October 2009. FAA's measurable progress toward a new staffing model is a key watch item, and we will continue to monitor this important initiative.

That concludes my statement, Madam Chairman. I would be happy to address any questions you or other Members of the Subcommittee may have.