U.S. Department of Transportation

Office of the Secretary
of Transportation

The Inspector General

Office of Inspector General
Washington, DC 20590

November 7, 2006

The Honorable Barbara Boxer
United States Senate
Washington, DC 20510

Dear Senator Boxer:

This is in response to your August 17, 2006, request that we examine the circumstances surrounding a number of recent failures with air traffic control equipment that occurred in Southern California. The Federal Aviation Administration (FAA) is responsible for operating and maintaining the equipment used in controlling air traffic in the National Airspace System. We briefed your staff on October 18th on the results of our review thus far and the range of actions that need to be taken. A copy of the materials that summarize the briefing is enclosed in this letter.

You expressed concern over a number of incidents in Southern California that affected all phases of flight. On July 18th, a power outage occurred at Los Angeles Center (responsible for managing high-altitude flights) that caused hundreds of flight delays. Los Angeles International Airport (LAX), which handled over 650,000 operations in 2005, experienced multiple failures of a precision landing system between July 20th and August 20th that slowed the aircraft arrival rate. In addition, on July 26th and August 14th a safety alerting system specifically designed to help controllers prevent collisions was disabled at LAX when incidents occurred on a runway and a taxiway.

Observations on FAA's Response to Equipment Failures and Next Steps

Based on your concerns, we met with FAA's Director of Safety and Operations Support, regional and local maintenance managers, and local maintenance technicians. We reviewed outage statistics, incident reports, and staffing data. Also, we visited LAX and the Los Angeles Air Route Traffic Control Center in Palmdale, California, to get a first-hand understanding of the issues.

Power Outage at Los Angeles Center

On July 18th, a traffic accident caused the loss of commercial electrical power to the Los Angeles Center, the facility responsible for managing high-altitude traffic in Southern California. Approximately 1 hour later, a component of the electrical power distribution system failed, causing the loss of the back-up power, shutting down computers and controller displays used to track aircraft. During the recovery process, a second failure occurred as an FAA technician attempted to manually reconnect the power. These power failures caused over 300 flight delays.

FAA put a special team in place to review this problem and outline corrective actions. For the short term, the team recommended better training for the technicians, forensic evaluation of the failed component (to determine the exact cause of the failure), substitution of the component with a new component, alerting all sites with this distribution system about the problem, optimizing each site's electrical distribution loads, and performing a service-life extension on the equipment at all sites. FAA has started work on these actions.

For the long term, the team recommended that FAA perform an extensive redesign of the distribution system to reduce the single points of failure and an internal review of both the staffing at these sites and the maintenance practices and procedures on this equipment. In discussions with local managers and technicians, concerns were raised about staffing levels and balancing workload between maintaining existing systems and deploying new ones.

Our work shows that a national program is required to solve this problem and prevent its reoccurrence at other locations. However, funds for this effort have not been planned or budgeted. While firm cost or schedule estimates are not available, FAA officials estimate the cost will fall in the $75 million to $100 million range.

Precision Landing System at LAX Failed Five Times

The Instrument Landing System (ILS) is a device that provides precise guidance to pilots approaching a runway. In July and August, multiple failures of the ILS located at LAX slowed the arrival rate of approaching aircraft. LAX was already experiencing restricted arrival rates because one of LAX's four major runways was closed for construction.

After each failure of the ILS, local technicians would identify a probable cause, take corrective action, and bring the system back into service—only to be followed by another failure. Eventually, the technicians were able to identify all of the factors that caused the system to go out of service. The system has not experienced any failures since August.

Multiple factors contributed to the ILS failures. For example, construction vehicles near the system interfered with the propagation pattern of the system, causing interference with the ILS signal and preventing the aircraft from receiving the signal. Another factor was the age of the system. Parts of the system have been in place for 10 years and must be replaced. Finally, the system's components, such as the antenna and the cable connectors, suffer corrosion because of the airport's proximity to the Pacific Ocean.

Given FAA's problems identifying the underlying causes of the ILS failures, the Agency must maintain a proactive monitoring and troubleshooting effort on this system. Also, because of the uncertainty surrounding future satellite-based precision landing systems, FAA must maintain ILS nationwide into the foreseeable future.[1]

Airport Movement Safety System Disabled at LAX

LAX is equipped with a system called Airport Movement Area Safety System (AMASS). It is a radar-based system designed to provide air traffic controllers with an automatic alert when the system predicts that two aircraft will collide on a runway. You expressed concern that this system was not functioning when a collision between two aircraft was narrowly avoided on July 26th.

Prior to July 26th, AMASS was disabled at LAX because radar reflections from the runway construction area caused the system to generate a false alert. While FAA engineers worked to solve the issue, the system was in the "limited" mode, preventing an automatic alert of an impending collision between two aircraft on the runway. On July 26th, an aircraft entered an active runway and nearly collided with another aircraft.

This was not a malfunction of AMASS. False alerts are a longstanding issue with the radar associated with this system. This is especially common in moderate to heavy rain conditions that restrict visibility, when controllers need AMASS the most.

However, it is important to note that even if AMASS had been activated on August 14th and the system had operated as designed, AMASS would not have given an alert when a Qantas Airways aircraft was struck by a ground vehicle. This is because the incident occurred on a taxiway, not a runway. AMASS is not currently designed to alert controllers about potential collisions on a taxiway.

[1] For more information on FAA's progress and challenges with its modernization efforts, see Office of Inspector General Testimony Number CC-2006-065, "Perspectives on the Progress and Actions Needed To Address the Next Generation Air Transportation System," July 25, 2006. OIG reports and testimony can be found on our website: www.oig.dot.gov.

Another close call between two aircraft on the runway was recorded on September 30th at LAX. FAA reports indicate AMASS was on and the alert did activate.

FAA's current plans call for the replacement of AMASS in June 2009 with FAA's latest system, the Airport Surface Detection Equipment-Model X (ASDE-X). Because ASDE-X is also radar-based, it will on occasion suffer from false alerts.

Conclusions

FAA does not see a common thread involving these incidents, but all three areas remain critical watch items that require sustained FAA management attention. These events in Southern California underscore the importance of maintaining existing systems while bringing new ones on line.

A national program is needed to update the power distribution systems at 22 high-altitude control facilities and at three large facilities that manage traffic in the vicinity of airports: Southern California, Chicago, and Dallas. We believe that FAA needs to establish cost and schedule baselines and adjust its Capital Investment Plan accordingly to ensure the expeditious solution to this problem.

Runway safety remains a concern, particularly given LAX's history. Based on your concerns and the recent close call on September 30th, we have included LAX in our in-depth review of efforts to reduce the risk of runway collisions at high-activity airports. Our staff will visit LAX in November in connection with this review.

Taken together, these incidents in Southern California underscore some important lessons. Runway construction can have an unintended but significant impact on critical systems. Careful planning is needed to prevent negative effects of the construction. Aging equipment in harsh environments requires proactive monitoring and troubleshooting, especially after system failures, to eliminate subsequent outages.

We have discussed our concerns with FAA officials, including the Vice President for Technical Operations Services, and they agree with our conclusions and the need for a national program to update the electrical power system that failed and a proactive approach for monitoring FAA's precision landing systems. As noted in discussions with your office, we plan to initiate a review of FAA's overall approach for maintaining the National Airspace System in 2007.

If I can answer any questions or be of further assistance in this or any other matter, please feel free to contact me at 202-366-1959, or my Deputy, Todd J. Zinser, at 202-366-6767.

Sincerely,

Calvin L. Scovel III

Calvin L. Scovel III
Inspector General

Enclosure

Briefing Presentation

FAA Equipment Outages In Southern California

Office of the Inspector General
Congressional Briefing
October 18, 2006

Table of Contents

Senator Boxer's Request

- On August 17, we were requested to review several recent equipment failures at Los Angeles International Airport (LAX) and the Los Angeles Air Route Traffic Control Center in Palmdale. Specifically, we looked at:
  - A power outage at Los Angeles Center on July 18
  - Multiple failures of the Instrument Landing System at LAX between July 20 and August 20
  - The disabling of the Airport Movement Safety System during incidents on July 26 and August 14
- Based on these concerns, we have adjusted ongoing reviews that are examining FAA efforts to reduce runway incursions and the progress to date with Airport Surface Detection Equipment-Model X.

3

Scope and Methodology

To address the Senator's concerns, we conducted a limited review to obtain an understanding of the equipment failures. We:

- Met with FAA's Director of Safety and Operations Support, the field System Management Office, the Power Service Office, and maintenance technicians
- Reviewed FAA's documentation of the incidents, including outage statistics, incident reports, and staffing statistics
- Visited LAX and Palmdale to interview regional and facility managers and maintenance technicians to get a first-hand perspective

4

The Three Incidents Affected All Phases Of Flight

- The July 18th power outage at Los Angeles Center (responsible for managing high-altitude traffic) shut down the facility and caused over 300 delays.
- Multiple failures of the precision Instrument Landing System (ILS) in July and August slowed the arrival rate of aircraft into LAX.
- LAX Surface Movement Safety Alerts were disabled on July 26th, preventing an automatic alert of an impending collision between two aircraft on the runway.

5

Power Outage at Los Angeles Center

- FAA views the power outage at LA Center as the most serious problem because it could occur nationwide.
- Loss of commercial power was followed by multiple failures of the internal power distribution system resulting in the loss of computers and controller displays that track aircraft
- FAA put a team in place to review the problem.
  - Short-Term Recommendations: better training, evaluation of failed card, install new card, alert all sites to problem, optimize the distribution systems at all centers, and perform service-life extension.
  - Long-Term Recommendations: redesign to reduce single points of failure; review staffing, practices, and procedures.
- Our site visit verified concerns about staffing levels and balancing workload between maintaining existing systems and deploying new ones (FAA Telecommunications Infrastructure)
- A national program is likely needed to update power distribution systems—it has not been planned or budgeted. Firm cost or schedule estimates are not available—preliminary estimates are in the $75 million to $100 million range.

6

Precision Landing System Failed Five Times

- The Instrument Landing System provides precise radio signals to the aircraft for approach to landing. Without ILS, fewer aircraft can land, thereby reducing capacity.
- Multiple factors contributed to ILS failures:
  - Construction on the parallel runway
  - Age of System (LAX ILS is 10 years old)
  - Environment (closeness to ocean causes increased corrosion)
- Given the problems it has had identifying the causes, FAA will have to maintain a close watch on this system. Because of uncertainty about future precision landing systems, FAA will have to maintain ILS well into the foreseeable future.

7

Airport Movement Safety System Disabled at LAX

- LAX has Airport Movement Area Safety System (AMASS)
  - AMASS provides controllers an automatic alert when the system predicts two aircraft will collide on the runway.
  - On July 26th, AMASS was in *"limited"* mode due to a previous false alert caused by radar reflections from runway construction equipment, not a malfunction of AMASS.
  - False Alerts are a long standing issue, especially in rain conditions.
- On August 14, AMASS, even working as designed, would not have sounded an alert before the Qantas Airways accident. AMASS only alerts to potential collisions on a runway—not a taxiway.
- FAA plans to replace AMASS at LAX with ASDE-X in June 2009.
- We have larger reviews underway concerning FAA's efforts to reduce runway incursions and new technologies to prevent collisions on runways.

8

Conclusion

- Although FAA does not see a common thread involving all three incidents, events in Southern California underscore the importance of maintaining existing systems while bringing new ones on line.
- All three areas remain critical watch items that require sustained management attention.
- A national program is needed to update the power distribution systems at enroute facilities and 3 large TRACONS which will require cost and schedule baselines.

9

Conclusion (continued)

- Runway safety remains a concern, particularly given LAX's history. Based on the Senator's concerns and another recent close call on September 30th, we have adjusted our ongoing reviews. These incidents underscore some important lessons:
  - Runway construction can have an unintended but significant impact on critical systems. Careful planning is needed to prevent negative effects of the construction.
  - Aging equipment in harsh environments needs proactive monitoring and troubleshooting, especially after system failures, to eliminate subsequent outages.

10

United States Department of Transportation
Office of Inspector General
Compliance with Federal Accessibility Laws

The following pages contain Section 508-compliant versions of data that was presented in the previous document in a non-compliant way. Although this page, and all pages that follow, were not part of the original document, they have been added here to assist screen readers that will be used to read this document electronically.

FAA Equipment Outages In Southern California

Office of the Inspector General

Congressional Briefing

October 18, 2006

Table of Contents

Senator Boxer's Request

- On August 17, we were requested to review several recent equipment failures at Los Angeles International Airport (LAX) and the Los Angeles Air Route Traffic Control Center in Palmdale. Specifically, we looked at:
  - A power outage at Los Angeles Center on July 18
  - Multiple failures of the Instrument Landing System at LAX between July 20 and August 20
  - The disabling of the Airport Movement Safety System during incidents on July 26 and August 14
- Based on these concerns, we have adjusted ongoing reviews that are examining FAA efforts to reduce runway incursions and the progress to date with Airport Surface Detection Equipment-Model X.

Scope and Methodology

To address the Senator's concerns, we conducted a limited review to obtain an understanding of the equipment failures. We:

- Met with FAA's Director of Safety and Operations Support, the field System Management Office, the Power Service Office, and maintenance technicians
- Reviewed FAA's documentation of the incidents, including outage statistics, incident reports, and staffing statistics
- Visited LAX and Palmdale to interview regional and facility managers and maintenance technicians to get a first-hand perspective

The Three Incidents Affected All Phases Of Flight

- The July 18th power outage at Los Angeles Center (responsible for managing high-altitude traffic) shut down the facility and caused over 300 delays.
- Multiple failures of the precision Instrument Landing System (ILS) in July and August slowed the arrival rate of aircraft into LAX.
- LAX Surface Movement Safety Alerts were disabled on July 26th, preventing an automatic alert of an impending collision between two aircraft on the runway.

Power Outage at Los Angeles Center

- FAA views the power outage at LA Center as the most serious problem because it could occur nationwide.
- Loss of commercial power was followed by multiple failures of the internal power distribution system resulting in the loss of computers and controller displays that track aircraft
- FAA put a team in place to review the problem.
  - **Short-Term Recommendations: better training, evaluation of failed card, install new card, alert all sites to problem, optimize the distribution systems at all centers, and perform service-life extension.**
  - **Long-Term Recommendations: redesign to reduce single points of failure; review staffing, practices, and procedures.**
- Our site visit verified concerns about staffing levels and balancing workload between maintaining existing systems and deploying new ones (FAA Telecommunications Infrastructure)
- A national program is likely needed to update power distribution systems—it has not been planned or budgeted. Firm cost or schedule estimates are not available—preliminary estimates are in the $75 million to $100 million range.

Precision Landing System Failed Five Times

- The Instrument Landing System provides precise radio signals to the aircraft for approach to landing. Without ILS, fewer aircraft can land, thereby reducing capacity.
- Multiple factors contributed to ILS failures:
  - Construction on the parallel runway
  - Age of System (LAX ILS is 10 years old)
  - Environment (closeness to ocean causes increased corrosion)
- Given the problems it has had identifying the causes, FAA will have to maintain a close watch on this system. Because of uncertainty about future precision landing systems, FAA will have to maintain ILS well into the foreseeable future.

Airport Movement Safety System Disabled at LAX

- LAX has Airport Movement Area Safety System (AMASS)
  - **AMASS provides controllers an automatic alert when the system predicts two aircraft will collide on the runway.**
  - **On July 26th, AMASS was in *"limited"* mode due to a previous false alert caused by radar reflections from runway construction equipment, not a malfunction of AMASS.**
  - **False Alerts are a long standing issue, especially in rain conditions.**
- On August 14, AMASS, even working as designed, would not have sounded an alert before the Qantas Airways accident. AMASS only alerts to potential collisions on a runway—not a taxiway.
- FAA plans to replace AMASS at LAX with ASDE-X in June 2009.
- We have larger reviews underway concerning FAA's efforts to reduce runway incursions and new technologies to prevent collisions on runways.

Conclusion

- Although FAA does not see a common thread involving all three incidents, events in Southern California underscore the importance of maintaining existing systems while bringing new ones on line.
- All three areas remain critical watch items that require sustained management attention.
- A national program is needed to update the power distribution systems at enroute facilities and 3 large TRACONS which will require cost and schedule baselines.

Conclusion (continued)

- Runway safety remains a concern, particularly given LAX's history. Based on the Senator's concerns and another recent close call on September 30th, we have adjusted our ongoing reviews. These incidents underscore some important lessons:
  - Runway construction can have an unintended but significant impact on critical systems. Careful planning is needed to prevent negative effects of the construction.
  - Aging equipment in harsh environments needs proactive monitoring and troubleshooting, especially after system failures, to eliminate subsequent outages.