



**U.S. Department of  
Transportation**

Office of the Secretary  
of Transportation

The Inspector General

Office of Inspector General  
Washington, DC 20590

March 22, 2007

The Honorable Barbara Boxer  
United States Senate  
Washington, DC 20510

Dear Senator Boxer:

Thank you for your letter of October 11, 2006, concerning the causes of “near misses” (i.e., runway incursions or potential collisions on the runway) at Los Angeles International Airport (LAX). Your request was prompted by an incident that occurred on September 30, 2006, where two aircraft narrowly missed each other by 100 feet, marking the eighth near-miss incident in fiscal year (FY) 2006.

Specifically, you asked us to determine: (1) why the September 30, 2006, incident and other near misses were occurring; (2) if these incidents were the result of the poor configuration of the runways at the airport; and (3) whether there is too much traffic at the airport. To address your concerns, we analyzed runway incursion incidents at LAX from FY 2003 through FY 2006; conducted a site visit; and interviewed local Federal Aviation Administration (FAA), airport, and pilot representatives.

Based on your request, we also added LAX to our ongoing audit of actions taken by FAA to address runway incursions at three large commercial airports. The objectives of the audit are to assess the actions taken by FAA to (1) identify and correct the causes of recent runway incursions at Boston Logan, Chicago O’Hare, and Philadelphia International Airports and (2) address those issues that could affect safety system-wide.

The enclosed briefing, which we provided to your staff on January 24, 2007, details the results of our review at LAX.

In summary, we found the following pertaining to the incidents at LAX:

- The September 30, 2006, runway incursion occurred when the pilot of a Gulfstream corporate jet deviated from controllers' instructions and taxied across an active runway as a Skywest regional jet was departing. The Skywest pilot saw the Gulfstream aircraft entering the runway and immediately aborted the take-off, stopping 100 feet from the other aircraft. The pilot of the Gulfstream indicated that he crossed the active runway because he was confused as to which side of runway 25R he was to hold short of.<sup>1</sup> According to the Gulfstream pilot, this was partly due to the closure of parallel runway 25L for construction purposes.
- From FY 2003 through FY 2006, 32 runway incursions occurred at LAX. Twenty-six (81 percent) of these runway incursions were caused by pilot deviations. Most of the pilot deviations occurred because pilots failed to hold short of a runway as instructed by controllers. Pilots we interviewed indicated that due to the short distances between the parallel runways (750 feet from the runway centerlines), pilots landing and exiting the outboard runway are sometimes unable to stop prior to crossing the threshold of the inboard parallel runway.<sup>2</sup>
- Runway configuration appears to be a primary factor contributing to runway incursions at LAX. The airport is in the process of modifying the runway configuration to mitigate this factor by moving runway 25L 55 feet farther away from its parallel runway 25R to accommodate the construction of a centerfield taxiway between the two runways. The centerfield taxiway will be designed so that when aircraft exit runway 25L, they will have to slow down enough to make a turn before reaching the parallel runway 25R. The centerfield taxiway is scheduled to be complete by mid-2008.
- Traffic does not appear to be a contributing factor to runway incursions at LAX. From FY 2001 to FY 2006, air traffic operations have decreased by 17 percent at LAX while the number of runway incursions each year has remained relatively constant. We also found that it was rare for actual hourly air traffic operations to exceed the airport arrival and departure rates.<sup>3</sup>
- FAA and the airport operator have taken numerous actions over the last several years to reduce the risk of runway incursions. For example, after the September 30, 2006, runway incursion, FAA air traffic management changed the phraseology used by controllers and eliminated any reference to runway 25L since

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<sup>1</sup> "Hold short" is terminology used by controllers when instructing pilots to stop and not enter onto or cross a runway.

<sup>2</sup> The outboard runway is the runway farthest from the terminal area. The inboard runway is the runway closest to the terminal area.

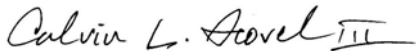
<sup>3</sup> The "airport arrival and departure rate" represents the maximum number of aircraft that can land and depart within a given hour at an airport based on weather conditions, runway configuration, and traffic mix.

it is temporarily closed. Other actions taken included issuing alert bulletins to controllers after each incident; revising local air traffic control procedures; meeting with pilots; developing a pilot education program; and improving airfield lighting, signage, and markings.

The results of our review at LAX and the three other large commercial airports reviewed as part of our audit of runway incursions will be included in a separate audit report, which we plan to issue later this year. The audit report will address systemic issues and include recommendations to help improve FAA's efforts to reduce runway incursions.

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

Sincerely,

A handwritten signature in cursive script that reads "Calvin L. Scovel III". The signature is written in black ink and is positioned above the typed name.

Calvin L. Scovel III  
Inspector General

Enclosure

# **Runway Incursions at Los Angeles International Airport**



**DOT Office of Inspector General  
Congressional Briefing to Senator Boxer  
January 24, 2007**

## Background

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- FAA defines a runway incursion as any incident at an airport involving an aircraft, a vehicle, person, or an object on the ground that creates a potential collision hazard or results in a loss of separation with an aircraft taking off, intending to take off, landing, or intending to land. Runway incursions are classified into three types of operational categories:
  - Operational Errors (when the actions of a controller cause an incident),
  - Pilot Deviations (when the actions of a pilot cause an incident), and
  - Vehicle/Pedestrian Deviations (when the actions of a vehicle operator or pedestrian cause an incident).
- Runway incursions are also graded by severity of the incident (A through D). A Category A runway incursion represents an incident in which a collision was barely avoided, whereas a Category D runway incursion represents an incident where there was little or no chance of a collision. Categories A and B are considered the most serious.

## Senator Boxer's Request

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- On October 11, 2006, you wrote us regarding concerns about a recent incident at Los Angeles Airport (LAX) that occurred on September 30, 2006, where 2 aircraft narrowly missed each other by 100 feet, marking the eighth near-miss incident in fiscal year (FY) 2006.
  
- Specifically, you asked:
  1. Why the September 30, 2006, incident and other near misses were occurring;
  2. If these incidents were the result of the poor configuration of the runways at the airport; and
  3. Whether there is too much traffic at the airport.

We also reviewed actions taken by the Federal Aviation Administration (FAA), the airlines, and the airport operator to mitigate runway incursions.

## Scope and Methodology of Review

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To address your concerns we:

- Analyzed runway incursion incidents that have occurred at LAX from FY 2003 through FY 2006.
- Conducted a site visit at LAX November 13 to 17, 2006, which included a tour of the airfield and the air traffic control tower.
- Interviewed representatives from FAA's Air Traffic Control Tower, Regional Airports Division, and local Flight Standards District Office.
- Interviewed LAX Airport officials and local pilot representatives from United, American, Skywest, and Southwest Airlines.

## Summary

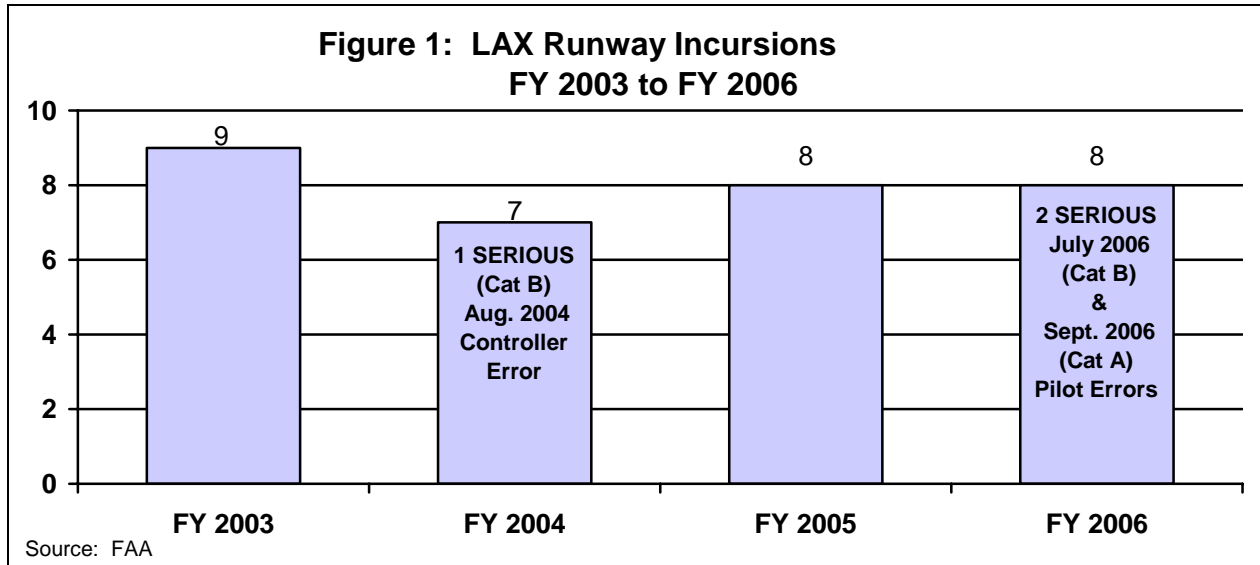
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We found that:

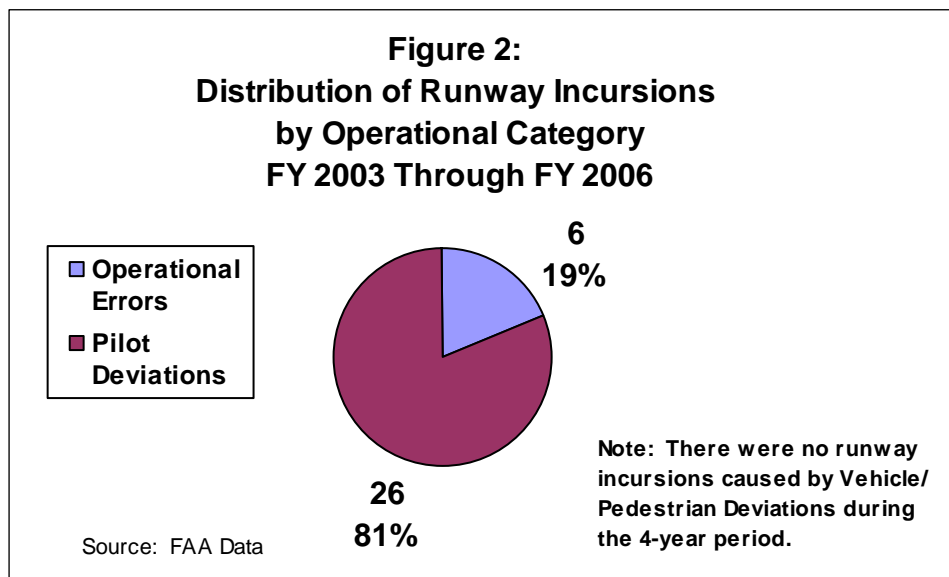
- Historically, over 80 percent of the runway incursions at LAX were caused by pilot deviations.
- Runway configuration (i.e., closely spaced parallel runways) appears to be the biggest factor contributing to runway incursions. The airport is in the process of modifying the runway configuration to mitigate this factor.
- Traffic does not appear to be a contributing factor. Over the last 5 years, air traffic operations have decreased by 17 percent at LAX while runway incursions have remained at about the same level.
- FAA and the airport operator have taken numerous actions over the last several years to reduce the risk of runway incursions, including the following: issuing alert bulletins to controllers after each incident; revising local air traffic control procedures; meeting with pilots; developing a pilot education program; and improving airfield lighting, signage, and markings.



## Finding 1. Over 80 Percent of Runway Incursions at LAX Are Caused by Pilot Deviations



The chart above (figure 1) depicts the total number of runway incursions at LAX by fiscal year. The number of runway incursions has remained relatively constant over the last 4 fiscal years. In total, there have been 32 runway incursions since FY 2003, including 3 serious (Category A/B) runway incursions. As shown in the pie chart below (figure 2), 26 of the 32 runway incursions at LAX (81 percent) were pilot deviations (errors). Of the 26, 18 were commercial pilots, 7 were general aviation, and 1 was military.



## **Finding 2. Runway Configuration Appears To Be the Biggest Factor Contributing to Runway Incursions**

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- For the 26 pilot deviations, 24 occurred because pilots failed to hold short<sup>1</sup> of a runway. Fifteen of these involved pilots who, after landing on the outer runway, failed to hold short of the inboard parallel runway.<sup>2</sup> This has occurred on both sides of the airport but is most prevalent on the south side.

Pilots we interviewed indicated that due to the short distance between the parallel runways (750 feet from runway centerline), pilots (especially if they are not familiar with the airport) find themselves approaching the inboard runway very rapidly after landing and exiting the outboard runways. As a result, they are unable to stop before their aircraft cross the hold-short lines of the parallel runway, which can result in a runway incursion.

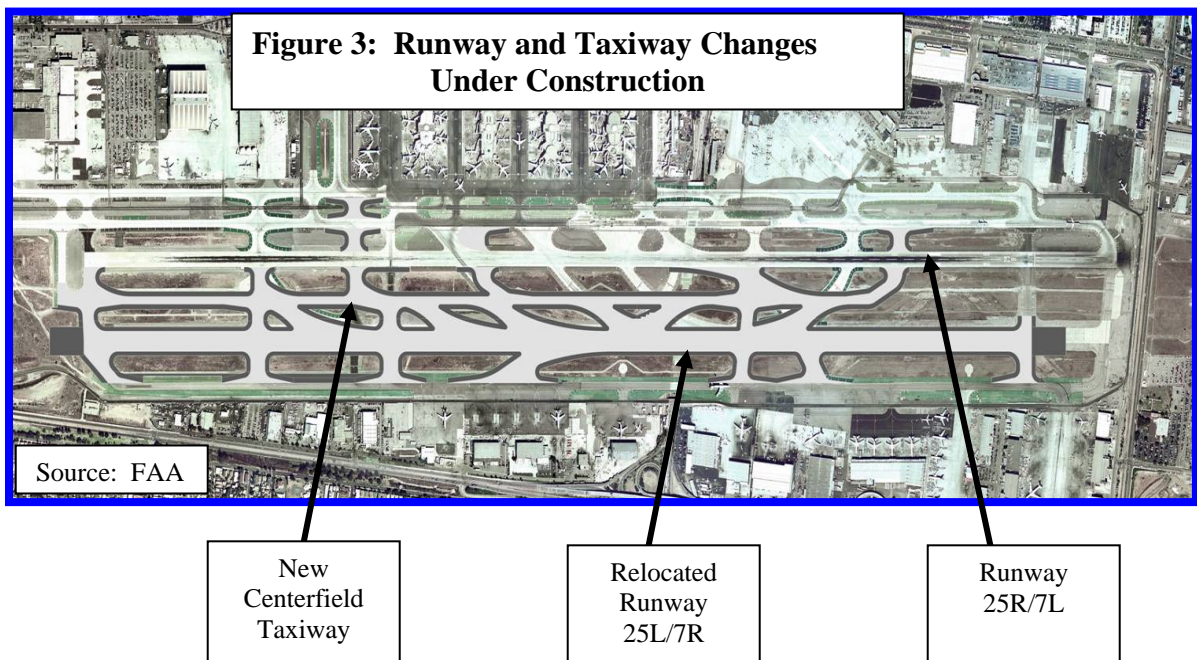
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<sup>1</sup> “Hold short” is terminology used by controllers when instructing pilots who are taxiing aircraft to stop and not enter onto or cross a runway. Pilots must stop before a defined spot referred to as the hold-short line.

<sup>2</sup> The outboard runway is the runway farthest from the terminal area. The inboard runway is the runway closest to the terminal area.

## Finding 2. Runway Configuration Appears To Be the Biggest Factor Contributing to Runway Incursions (Continued)

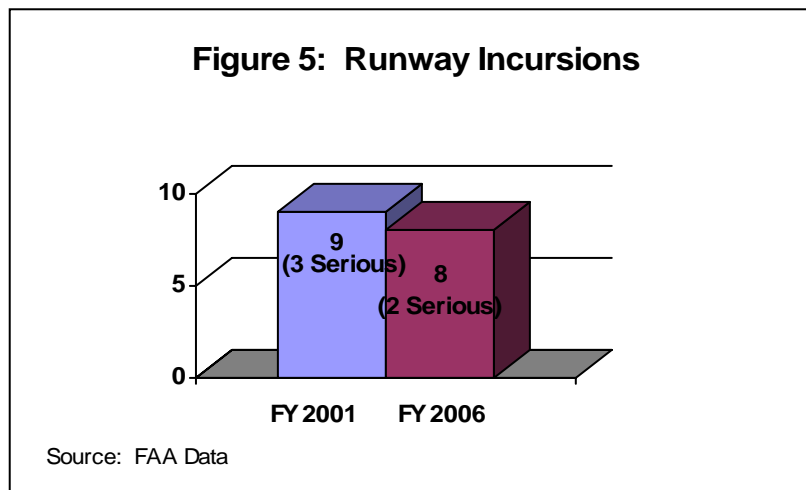
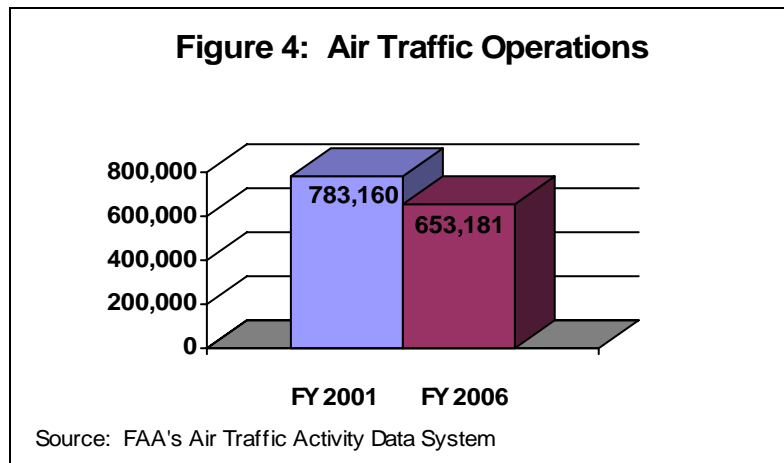
- To mitigate this problem, the airport is re-locating the outboard runway (runway 25L/7R) approximately 55 feet farther away from its parallel runway (25R/7L) to accommodate the construction of a centerfield taxiway between the runways. The centerfield taxiway will be designed so that when aircraft exit runway 25L/7R, they will have to slow down enough to make a turn before reaching the parallel runway hold-short line, thus reducing the risk of pilots crossing the hold-short line (see figure 3). The centerfield taxiway is scheduled for completion in mid-2008.



### Finding 3. Traffic Does Not Appear To Be a Factor in Runway Incursions

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- As shown in figure 4 below, from FY 2001 to FY 2006, air traffic operations at LAX have decreased from a total of 783,160 to 653,181, respectively. This represents a decrease of 129,979 operations or approximately 17 percent over the last 5 years. Figure 5 shows that during the same time period, runway incursions have remained at about the same level.



### **Finding 3. Traffic Does Not Appear To Be a Factor in Runway Incursions (Continued)**

- We also reviewed hourly traffic counts to determine if LAX has periods when the actual traffic count was higher than the maximum airport arrival and departure rates.<sup>3</sup> We reviewed data for the 9-month period prior to the closure of runway 25L (July 29, 2006) and for the 3 months since runway 25L was closed for the core operational hours of 7:00 a.m. to 9:59 p.m. As shown in the table below, we found it was rare for actual air traffic operations to exceed the maximum hourly capacity rates.

**Table: Comparison of LAX Actual Hourly Arrival and Departure Rates Versus Maximum Capacity Hourly Arrival and Departure Rates**

| <b>Dates</b>                                | <b>Total 1-hour Periods Reviewed</b> | <b>Number of Arrivals and Departures That Exceeded the Maximum Capacity Hourly Rate</b> | <b>Average Actual Hourly Rate</b> | <b>Average Maximum Capacity Hourly Rate</b> |
|---|--------------------------------------|---|-----------------------------------|---|
| Pre-runway closure: Nov. 2005 to July 2006  | 4,095                                | 0 (0%)  | 96.78                             | 150.6                                       |
| Post-runway closure: Aug. 2006 to Oct. 2006 | 1,380                                | 21 (1.52%)  | 98.58                             | 130.85                                      |

Source: FAA's Aviation System Performance Metrics System

<sup>3</sup> The "airport arrival and departure rate" represents the maximum number of aircraft that can land and depart within a given hour at an airport based on weather conditions, runway configuration, and traffic mix.

## **Finding 4. Actions Taken To Mitigate Runway Incursions at LAX**

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Over the last several years, FAA and the airport operator have taken numerous actions to reduce the risk of runway incursions. These include issuing alert bulletins (lessons learned) to controllers after each incident, meeting with pilots, participating in runway safety meetings, and revising local air traffic control procedures. Examples of more recent actions include the following:

- In February 2006, two runway incursions occurred on the north side of the airport because a controller forgot that he had changed the runway assignment of an arriving aircraft from 24R to 24L, cleared an aircraft to cross this same runway at the far end, and instructed another aircraft to taxi into position for departure on the same runway. This incident occurred at 11:22 p.m. when only one controller was manning both local control positions (one for the north runways and one for the south runways).

In response, air traffic management issued alert bulletins (lessons learned) to all controllers detailing the incident.

## **Finding 4. Actions Taken To Mitigate Runway Incursions at LAX (Continued)**

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Management also mandated that the two local positions should remain open until approximately midnight and could no longer be combined without an assist position. Management issued a requirement that a supervisor will normally be on duty until midnight (versus the previous time of 10:00 p.m.).

- On September 30, 2006, a runway incursion occurred when the pilot of a Gulfstream aircraft deviated from the controller's instruction and taxied across an active runway as a Skywest regional jet was departing. The pilot of the Gulfstream indicated that he was confused as to which side of runway 25R he was to hold short of and that this was partly due to the closure of runway 25L.

In response to this incident, other runway incursions, and conversations with pilots, FAA air traffic management changed the phraseology used by controllers and eliminated any reference to runway 25L (since it is closed and under construction).

## **Finding 4. Actions Taken To Mitigate Runway Incursions at LAX (Continued)**

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Management also added wording to emphasize to pilots the requirement to hold short of runway 25R. This requirement will remain in effect until runway 25L is reopened.

Other significant actions taken include:

- The inclusion of a warning on the airport diagram map used by pilots to caution them about the closely spaced runways.
- Distribution of a hot-spot map that depicts where runway incursions have occurred at the airport.
- Distribution of an instructional compact disc for pilots that highlights the closely spaced parallel runways.
- Improved lighting, signage, and markings on the airfield.



The following pages contain textual versions of the graphs and charts found in this document. These pages were not in the original document but have been added here to accommodate assistive technology.

# Letter to Senator Boxer Regarding Runway Incursions at Los Angeles International Airport

## Section 508 Compliant Presentation

**Figure 1. Los Angeles International Airport Runway Incursions Fiscal Year 2003 to Fiscal Year 2006**

| Fiscal Year      | Total Runway Incursions  |
|------------------|--|
| Fiscal Year 2003 | 9  |
| Fiscal Year 2004 | 7<br>(These 7 include 1 serious Category B in August 2004 that was due to controller error.)                                   |
| Fiscal Year 2005 | 8  |
| Fiscal Year 2006 | 8<br>(These 8 include 2 serious incursions due to pilot errors: 1 Category B in July 2006 and 1 Category A in September 2006.) |

Source: Federal Aviation Administration

Figure 1 depicts the total number of runway incursions at Los Angeles International Airport by fiscal year. The number of runway incursions has remained relatively constant over the last 4 fiscal years. In total, there have been 32 runway incursions since fiscal year 2003, including 3 serious (Category A or B) runway incursions.

**Figure 2. Distribution of Runway Incursions by Operational Category Fiscal Year 2003 Through Fiscal Year 2006**

| Type of Runway Incursion | Number of Runway Incursions |
|--------------------------|-----------------------------|
| Operational Errors       | 6 (or 19 percent)           |
| Pilot Deviations         | 26 (or 81 percent)          |

Source: Federal Aviation Administration data

Note: There were no runway incursions caused by Vehicle/Pedestrian Deviations during the 4-year period.

As shown in figure 2, 26 of 32 (81 percent) runway incursions at Los Angeles International Airport were pilot deviations (errors). Of the 26, 18 were commercial pilots, 7 were general aviation, and 1 was military.

#### **Figure 4. Aircraft Operations**

| Year             | Number of Operations |
|------------------|----------------------|
| Fiscal Year 2001 | 783,160              |
| Fiscal Year 2006 | 653,181              |

Source: The Federal Aviation Administration's Air Traffic Activity Data System

As shown in figure 4, from fiscal year 2001 to fiscal year 2006, air traffic operations at Los Angeles International Airport have decreased from a total of 783,160 to 653,181, respectively. This represents a decrease of 129,979 operations or approximately 17 percent over the last 5 years.

#### **Figure 5. Runway Incursions**

| Year             | Number of Runway Incursions |
|------------------|-----------------------------|
| Fiscal Year 2001 | 9 (these include 3 serious) |
| Fiscal Year 2006 | 8 (these include 2 serious) |

Source: Federal Aviation Administration data

Figure 5 shows that from fiscal year 2001 to fiscal year 2006, runway incursions have remained at about the same level.