Making Headway on the Runway

The FAA is meeting its performance targets for limiting runway incursions.

BY RICK DARBY

"For each of the FYs [fiscal years] 2003 through 2006, the FAA met its performance targets to reduce the most severe (category A and B) runway incursions," the U.S. Federal Aviation Administration (FAA) says in its latest report.[1,2] "The category A and B incursion rate for FY 2006 was 0.51 incursions per million operations, which is 7 percent less than the FY 2006 performance target of 0.55 incursions per million operations."

The FAA analyzes incursions according to safety metrics that include frequency, severity and type. Frequency is expressed both as numbers and rates. Severity considers factors such as the speed and performance characteristics of the aircraft involved, the proximity of the aircraft to another aircraft, vehicle, person or object, and the evasive action taken (Figure 1).

The FAA performance target is to limit category A and B incursions to a rate of no more than 0.45 per million operations by 2010 and maintain or improve that rate through 2011.[3]

FAA Severity Categories of Runway Incursion

Increasing Severity →

Category D	Category C	Category B	Category A
Little or no chance of collision but meets the definition of a runway incursion	Separation decreases but there is ample time and distance to avoid a collision	Separation decreases and there is a significant potential for collision	Separation decreases and participants take extreme action to narrowly avoid a collision, or the event results in a collision

FAA = U.S. Federal Aviation Administration

Source: U.S. Federal Aviation Administration

Figure 1

Runway Incursion Severity Distribution, U.S. Towered Airports, 2003–2006

	FY 2003		FY 2004		FY 2005		FY 2006		Total	
	Number	Rate per Million Operations	Number	Rate per Million Operations	Number	Rate per Million Operations	Number	Rate per Million Operations	Number	Rate per Million Operations
Category D	181	2.88	178	2.82	203	3.22	224	3.65	786	**3.14**
Category C	110	1.75	120	1.90	95	1.51	75	1.22	400	**1.60**
Category B	22	0.35	16	0.25	15	0.24	7	0.11	60	**0.24**
Category A	10	0.16	12	0.19	14	0.22	24	0.39	60	**0.24**
Total	**323**	**5.10**	**326**	**5.20**	**327**	**5.20**	**330**	**5.40**	**1,306**	**5.20**

FY = FAA fiscal year, Oct. 1 through Sept. 30.

Source: U.S. Federal Aviation Administration

Table 1

Severity of Commercial Aviation Runway Incursions, U.S. Towered Airports, 2003–2006

	FY 2003	FY 2004	FY 2005	FY 2006	Total
Category D	80	79	100	106	**365**
Category C	50	54	39	37	**180**
Category B	6	3	3	2	**14**
Category A	3	6	6	8	**23**
Total	**139**	**142**	**148**	**153**	**582**

FY = FAA fiscal year, Oct. 1 through Sept. 30.

Note: Incursions involve at least one commercial aviation aircraft.

Source: U.S. Federal Aviation Administration

Table 2

FAA Classification of Runway Incursions

Operational Errors/ Deviations	An operational error (OE) is an action of an air traffic controller (ATC) that results in: • Less than the required minimum separation between two or more aircraft, or between an aircraft and obstacles (e.g., vehicles, equipment, personnel on runways). • An aircraft landing or departing on a runway closed to aircraft. An operational deviation (OD) is an occurrence attributable to an element of the air traffic system in which applicable separation minima were maintained, but an aircraft, vehicle, equipment, or personnel encroached upon a landing area that was delegated to another position of operation without prior coordination and approval.
Pilot Deviations	A pilot deviation (PD) is an action of a pilot that violates any Federal Aviation Regulation. For example, a pilot fails to obey air traffic control instructions to not cross an active runway when following the authorized route to an airport gate.
Vehicle/ Pedestrian Deviations	A vehicle or pedestrian deviation (V/PD) includes pedestrians, vehicles, or other objects interfering with aircraft operations by entering or moving on the movement area without authorization from air traffic control. Note: This runway incursion type includes mechanics taxiing aircraft for maintenance or gate re-positioning.

FAA = U.S. Federal Aviation Administration

Source: U.S. Federal Aviation Administration

Table 3

Of the more than 500 U.S. towered airports, 215 (43 percent) had no runway incursions, 215 had one to five incursions and 47 airports (9 percent) had six to 10 incursions from 2003 through 2006. Twenty-seven airports (5 percent) had more than 10 runway incursions, including two airports that had more than 30.

The numbers and rates of incursions were little changed from 2003 through 2006, with an average of 5.2 incursions per million operations (Table 1, p. 49). The three more incursions in 2006 compared with 2005 brought the rate for that year to 5.4 per million operations, a 4 percent increase.

Runway Incursion Severity

From 2003 through 2006, 120 of the 1,306 runway incursions were category A or B. Four category A runway incursions ended in collisions during the four-year period — three in 2003 and one in 2005. One of those collisions involved a commercial aircraft, a freighter, and no fatalities resulted.

"The composition of runway incursions has changed over the four-year period," the report says. "Category B incursions decreased substantially from 22 in [2003] to seven in [2006]."

Commercial aviation operations accounted for 582 of the total 1,306 incursions, or 45 percent, in the 2003–2006 period.[4]

At least one commercial aircraft was involved in 23 category A incursions and 14 category B incursions during the four-year period (Table 2). The two categories combined

Numbers and Rates for Incursion Types, U.S. Towered Airports, 2003–2006

	FY 2003		FY 2004		FY 2005		FY 2006		Total	
	Number	Rate per Million Operations	Number	Rate per Million Operations	Number	Rate per Million Operations	Number	Rate per Million Operations	Number	Rate per Million Operations
Pilot Deviations	174	2.8	173	2.7	169	2.7	190	3.1	706	**2.8**
Operational Errors/Deviations	89	1.4	97	1.5	105	1.7	89	1.5	380	**1.5**
Vehicle/Pedestrian Deviations	60	1.0	56	0.9	53	0.8	51	0.8	220	**0.9**
Total									**1,306**	**5.2**

FY = FAA fiscal year, Oct. 1 through Sept. 30.

Source: U.S. Federal Aviation Administration

Table 4

represented 6 percent of commercial aircraft incursions. The annual number of category A incursions involving a commercial aircraft was largest — eight — in 2006. Category B incursions declined over the four years and represented a smaller percentage of the total for commercial aircraft than those of Category A.

Persistent Pilot Deviations

FAA categories split runway incursions into three error types: pilot deviations, operational errors/deviations and vehicle/pedestrian deviations. The criteria are in Table 3.

Pilot deviations were found in 706 of 1,306 incursions in the four-year period, or 54 percent (Table 4). "During that time, the FAA focused efforts on reducing pilot deviations through awareness, education, procedures and surface technology initiatives," the report says.

Nevertheless, the rate was 0.4 per million operations higher in 2006 than the period's lowest rate. The rate of pilot deviations was 2.8 or 2.7 per million from 2003 through 2005, rising in 2006 to 3.1 per million. During the four-year period, 55 of 120, or 46 percent, of incursions in categories A and B involved pilot deviations, the FAA says.

Limiting the picture to commercial aviation, pilot deviations were responsible for 273 incursions, or 47 percent of the total of 582 in all categories (Table 5). Operational errors/deviations accounted for 222 incursions, or 38 percent, and 87 incursions, or 15 percent, were ascribed to vehicle/pedestrian deviations.

"The total number of combined category A and category B operational errors/deviations involving a commercial aircraft increased from [2003] through [2005] and decreased by one in [2006]," the report says. "Category A incursions increased during the four-year period, with a total of four commercial aviation operational errors/deviations in [2006] compared to one in [2003]." No commercial operational errors/deviations in category B occurred in 2006.

Numbers and Types of Runway Incursions, Commercial Aviation, U.S. Towered Airports, 2003–2006

	FY 2003	FY 2004	FY 2005	FY 2006	Total
Pilot Deviations	63	67	74	69	**273**
Operational Errors/Deviations	50	58	54	60	**222**
Vehicle/Pedestrian Deviations	26	17	20	24	**87**
Total					**582**

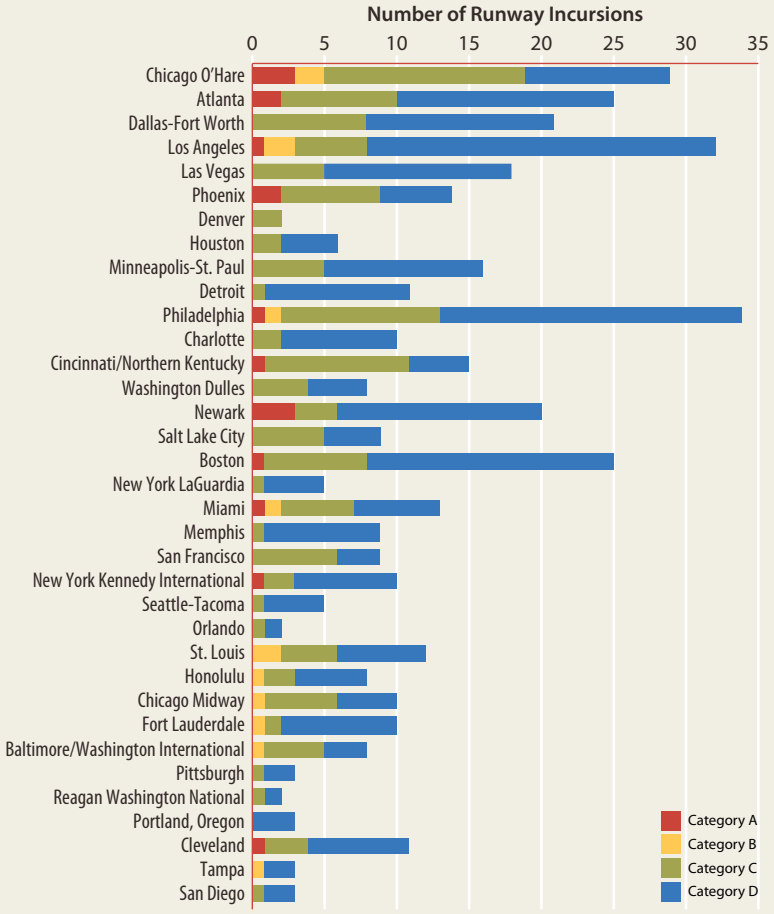
FY = FAA fiscal year, Oct. 1 through Sept. 30.

Note: Incursions involve at least one commercial aviation aircraft.

Source: U.S. Federal Aviation Administration

Table 5

Numbers and Severity of Runway Incursions at 35 U.S. Airports, 2003–2006



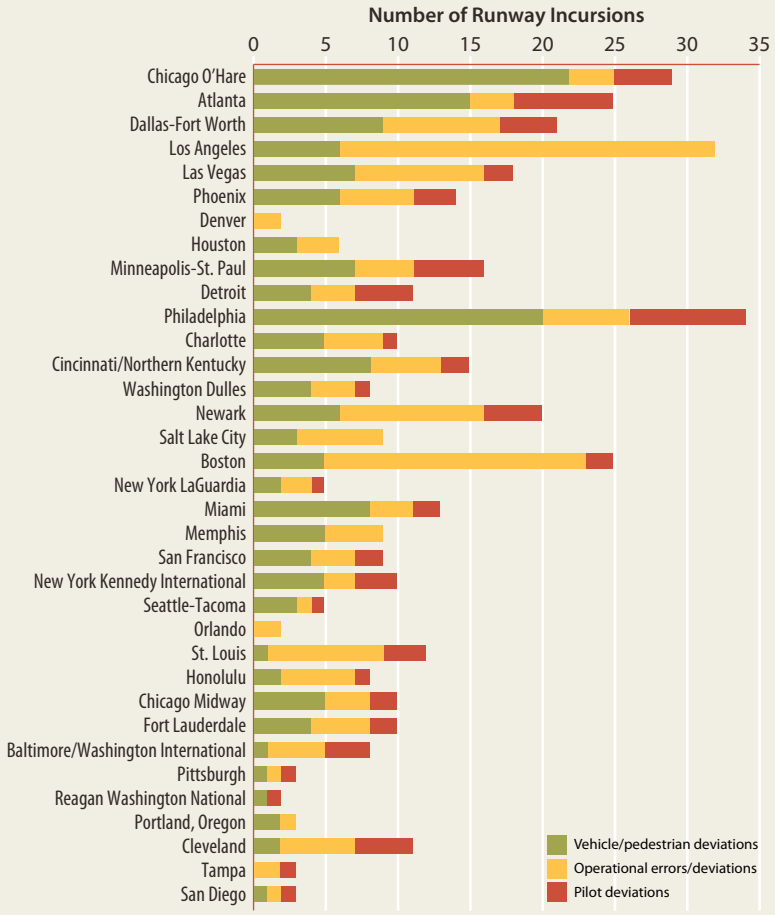
FY = U.S. Federal Aviation Administration fiscal year, Oct. 1 through Sept. 30.

Notes: The 35 airports are those identified in the FAA Operational Evolution Partnership. Airports arranged in decreasing number of operations (FY 2003 through FY 2006).

Source: U.S. Federal Aviation Administration

Figure 2

Numbers and Types of Runway Incursions at U.S. Airports, 2003–2006



FY = U.S. Federal Aviation Administration fiscal year, Oct. 1 through Sept. 30.

Notes: The 35 airports are those identified in the FAA Operational Evolution Partnership. Airports arranged in decreasing number of operations (FY 2003 through FY 2006).

Source: U.S. Federal Aviation Administration

Figure 3

Of the 87 commercial aviation vehicle/pedestrian deviations in the four-year period, seven, or 8 percent, were in category A or B.

"Five of these seven incursions were in category A; the number of category A incursions fluctuated during this period," the report says. "Category B commercial aviation incursions classified as vehicle/pedestrian deviations decreased from two in [2003] to zero in each of the following years included in this period."

Airports identified in the FAA Operational Evolution Partnership (OEP), known as OEP-35 airports, primarily handle commercial aviation and have a large traffic volume. Their runway incursion records were analyzed for correlations between incursions and traffic. Figure 2 (p. 51) shows the numbers and severity of incursions at the OEP-35 airports for the 2003–2006 period. At these airports, category A and B incursions accounted for 4 percent and 3 percent, respectively, of the total.

The numbers and types of incursions at the OEP-35 airports are shown in Figure 3. Operational errors/deviations were the largest single category, at 42 percent of the total. Pilot deviations, at 40 percent, and vehicle/pedestrian deviations, at 18 percent, were next in the ranking. ●

Notes

1. FAA. *FAA Runway Safety Report: Runway Incursion Trends and Initiatives at Towered Airports in the United States, FY 2003 through FY 2006.* Accessible via the Internet at <www.faa.gov/runwaysafety/pdf/rireport06.pdf>.
2. Throughout the study period, the FAA defined a runway incursion as "any occurrence in the airport runway environment involving an aircraft, vehicle, person or object on the ground that creates a collision hazard or results in a loss of required separation with an aircraft taking off, intending to take off, landing or intending to land." According to the definition, an aircraft could mistakenly enter a runway without a clearance, but that would not be classified as an incursion if no conflict were created. On Oct. 1, 2007, the FAA adopted the International Civil Aviation Organization's definition, which refers to the "incorrect presence" of an aircraft, regardless of whether there is a conflict.
3. For the sake of readability, fiscal years from this point on are referred to in the text as calendar years. The FAA fiscal year is Oct. 1 through Sept. 30. The reader should keep in mind that, for example, "2006" actually means "fiscal year 2006."
4. Commercial operations, as used in the report, involve airlines, charter services and air cargo.