FAA Runway Safety Report

Runway Incursion Severity Trends at Towered Airports in the United States

1997–2000

FAA Office of Runway Safety

June 2001

PREFACE

The Federal Aviation Administration (FAA) Office of Runway Safety is responsible and accountable for leading initiatives to enhance runway safety at the nation's airports. The FAA Office of Runway Safety is the focal point for coordinating all activities associated with runway safety, both within and outside the FAA. The FAA has recently developed and published the *National Blueprint for Runway Safety*, which provides a structured plan to improve runway safety across the nation (www.faa.gov/runwaysafety). The Blueprint outlines several initiatives aimed at increasing runway safety. As part of implementing the Blueprint, the FAA has analyzed the severity of runway incursions for the first time. This analysis of runway incursion severity trends at towered airports in the United States will help guide implementation of these safety-related initiatives.

The FAA undertook this analysis to expand the understanding of runway safety trends within the aviation community. The FAA expects this information to clarify the understanding of runway safety issues. The FAA plans to use the findings to enhance runway safety to help reduce the rate, number, and severity of runway incursions, as well as the risk of runway collisions. Commissioned by the FAA Office of Runway Safety and performed in conjunction with aviation safety experts from industry, this report presents the findings from the analysis.

FAA RUNWAY SAFETY REPORT

Runway Incursion Severity Trends at Towered Airports in the United States: 1997–2000

EXECUTIVE SUMMARY

The U.S. National Airspace System collectively managed approximately 266 million flights, or airport operations, at the more than 450 towered airports in the United States during the past 4 years (1997–2000). Of these 266 million airport operations, 1,369 resulted in a runway incursion. That is approximately 5 runway incursions for every 1 million operations. Of the 1,369 incursions, 3 resulted in accidents. Last year the number of runway incursions increased by 110 events, from 321 to 431.

Until now, there was no characterization of runway incursion severity—the potential consequence of these incursions. Underlying variables, such as the proximity and speed of the aircraft involved, must be considered along with the frequency of runway incursions to accurately portray the risk posed by these events. The FAA commissioned this analysis to assess the relative severity of runway incursions.

A multidisciplinary team of aviation professionals reviewed the 1,369 runway incursions that occurred from 1997 through 2000, and systematically characterized the relative severity of each event based on specific operational dimensions. The nature of runway incursions range from relatively minor events where there is little or no chance of a collision to major events that result in a narrowly avoided collision or an accident. Nationwide, this analysis found that 81 percent of the runway incursions evaluated were minor in severity. These minor events accounted for the majority of the increase in runway incursions in 2000. The number of runway incursions considered to be major in severity remained relatively stable across the four-year period studied.

To assess the trends at towered airports with respect to their traffic volume, the rate of runway incursions was considered. This analysis found that the rate of runway incursions was not strongly correlated with the number of airport operations. When severity was considered, however, the average rate of major runway incursions at the 32 busiest U.S. towered airports was shown to be approximately twice the average rate for the rest of the airports.

Reducing the frequency of runway incursions hinges on the implementation of prevention strategies to reduce occurrences. Reducing the severity of runway incursions depends on the implementation of mitigation strategies to reduce the consequences of failures or human errors.

The findings of this analysis will help guide the development and implementation of mitigation strategies that target both the frequency and severity of runway incursions.

INTRODUCTION

The U.S. National Airspace System is the busiest in the world. There are over 450 towered airports that handle more than 180,000 airport operations —take-offs and landings— a day. The National Airspace System (NAS) relies on smooth coordination among 15,000 air traffic controllers, 600,000 pilots, and many other people and organizations to operate safely and efficiently.

The growing demand for air travel and NAS capacity limitations put increasing pressure on the aviation community—the FAA, airlines, airports, air traffic controllers—to operate with greater efficiency and flexibility to reduce air travel delays. At the same time there are demands to enhance aviation safety, with heightened attention to runway safety. In the airport environment, the FAA must balance pressures to increase operational efficiency with pressures to enhance runway safety. These goals are embodied in the FAA's Operational Evolution Plan, a strategy to improve efficiency and capacity, and in the National Blueprint for Runway Safety, a plan for enhancing runway safety.

In the airport environment, the FAA must balance pressures to increase operational efficiency with pressures to enhance runway safety.

One step toward finding solutions that accomplish both of these goals is to better understand the factors that affect runway safety. In executing its mission to ensure that aviation safety remains uncompromised, the FAA collects and analyzes safety-related data, such as information on runway incursions. The analysis of runway safety data is a necessary step toward developing approaches that will be used to anticipate emerging runway safety issues and institute preventative measures that are both timely and cost-effective. This analysis examined currently available runway safety data to better characterize the scope and severity of runway incursions.

U.S. airports with an air traffic control tower (towered airports) report the occurrence of runway incursions. From 1997 through 2000 there were over 450 towered airports which collectively averaged 66.7 million airport operations a year. Of the approximately 266 million airport operations at U.S. towered airports from 1997 through 2000, 1,369 resulted in a runway incursion. That is approximately 5 runway incursions for every 1 million operations. Of the 1,369 incursions, 3 resulted in accidents.

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This performance record is the product of a complex web of systems, procedures and well-trained professionals working in concert to prevent and mitigate aviation safety risks. Encompassing both technology and people, these measures are aimed at preventing runway incursions and mitigating the chance of incursions turning into accidents. Developed to protect against the consequences of human error and technical failure, airport operations are resilient and error tolerant by design. To continue to enhance runway safety, it is essential to understand not just the frequency but also the severity of runway incursions. This new understanding will guide the implementation of technologies and procedures to enhance runway safety and increase airport capacity.

BACKGROUND

Runway safety is managed according to rigorous protocols that pilots and air traffic controllers use to control aircraft on runways at all times. Imagine that an invisible bubble forms around an airplane when it enters a runway. This bubble acts as a buffer zone to protect the airplane from accidents or errors during take-off and landing. The depth of the bubble—the space between an airplane and another object on the runway—is referred to as separation. Maintaining the perimeter of the bubble is maintaining separation. Any penetration of the bubble is an incursion. The more deeply the bubble is compromised, the more serious the incursion. The formal definition of an incursion is any occurrence on an airport runway 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.

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PURPOSE

The purpose of this analysis is to assess runway incursion severity trends in the United States, providing a more comprehensive understanding of the risks runway incursions pose to the flying public. The FAA intends to use the information in this report to:

- Reduce the number, rate, and severity of runway incursions
- Enhance the error tolerance of the aviation system and further reduce the risk of accidents
- Refine runway safety benchmarks and metrics
- Improve the quality of runway safety data collection, analysis, and reporting
- Educate the aviation community and the public about runway incursions.

APPROACH

This analysis examined four years of runway incursion data. The data were drawn from the FAA's National Airspace Incidents Monitoring System (NAIMS) to assess the severity of runway incursion trends nationwide (1997-2000). This four-year time period provided the most complete and consistent FAA data for runway incursions at U.S. towered airports. The data pulled from the NAIMS database yielded the 1,369 incursion incidents that are the subject of this analysis.

The FAA convened a government-industry team of aviation analysts with expertise in air traffic control, airway facilities, airports, flight standards, human factors, and system safety to conduct this analysis. The team systematically reviewed all 1,369 reported runway incursions that occurred from 1997 through 2000.

Metrics

Three basic runway safety metrics are used to examine runway incursion trends: the number of runway incursions, the rate of runway incursions, and the type of runway incursion by attributable error. None of these metrics, however, provide reliable insight into the relative margin of safety associated with these events.

The severity of runway incursions, as well as the frequency of occurrence, must be considered to make accurate judgments about runway safety.

An additional metric was added to the analysis—runway incursion severity. The severity of runway incursions, as well as the frequency of occurrence, must be considered to make accurate judgments about runway safety. The importance of accurately assessing runway incursion severity is illustrated in the following example runway incursion profiles.

Types of Runway Incursions: *The FAA investigates runway incursions and attributes the occurrence to one or more of the following error types.*

Operational Errors

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 (obstacles include vehicles, equipment, personnel on runways).
- An aircraft landing or departing on a runway closed to aircraft.

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 Deviation

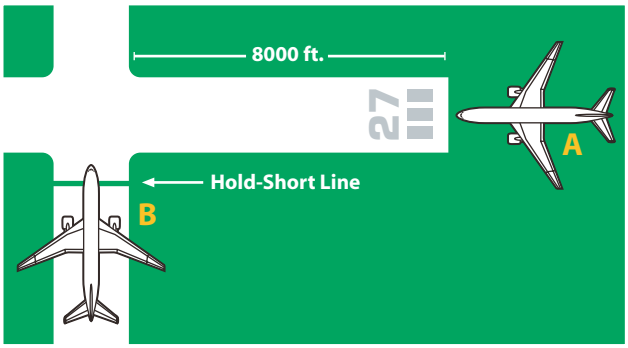
A vehicle or pedestrian deviation (VPD) includes pedestrians, vehicles, or other objects interfering with aircraft operations by entering or moving on the runway movement area without authorization from air traffic control.

Runway Incursion Profiles

To appreciate the varying margins of safety for runway incursions, consider the following examples.

CASE 1

This incident meets the definition of a runway incursion, but there is little or no chance of collision.



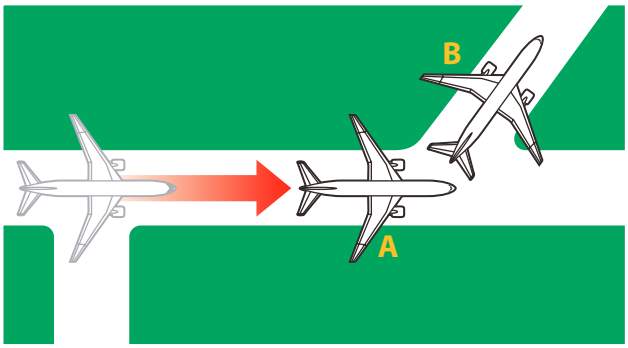
Aircraft A is on approach to Runway 27, an 8,000-foot runway. Aircraft B is taxiing to a parking area on the north side of the airport and has been instructed by air traffic control to "hold short of Runway 27" in anticipation of the arrival of Aircraft A. When Aircraft A is on a quarter mile final approach, Aircraft B's pilot informs the controller that he has accidentally crossed the hold-short line for Runway 27. Although he is not on the runway, the aircraft's nose is across the hold-short line, usually 175 feet from the runway.

A runway incursion has occurred since separation rules require that a runway be clear of any obstacle before an aircraft can land or take off on that runway. The controller instructs Aircraft A to "go around."

- The potential for a collision is low, but by definition, a runway incursion has taken place.
- This case exemplifies most frequently reported runway incursions.

CASE 2

This is a severe situation where the margin of safety is so low that a collision is barely avoided.



Aircraft A has been cleared to taxi into position and hold on Runway 9 following Aircraft B who has just landed on the same runway and is rolling out. Aircraft B is instructed to turn left at a taxiway. Aircraft B acknowledges. The controller observes Aircraft B exiting the runway and clears Aircraft A for takeoff. A moment later the controller notices too late that Aircraft B has not fully cleared the runway and in fact appears to have come to a complete stop with much of the aircraft still on the runway.

Aircraft A has accelerated to the point it cannot stop and has only the option to fly over the top of Aircraft B.

- The potential for a collision is high and typifies the common perception of a runway incursion.
- This case is more severe but occurs infrequently.

These examples demonstrate why more descriptive runway incursion categorizations were necessary to capture the different margins of safety—or, conversely, varying degrees of severity—associated with each runway incursion. An accurate portrayal of runway incursion trends is essential to successfully finding solutions that target prevalent errors and system deficiencies.

Defining Runway Incursion Severity

Underlying these simple case studies are a wide range of variables that dramatically impact the relative severity of a runway incursion. Of these many variables, five key parameters were selected to add dimension to the evaluation of relative severity. The five operational dimensions are interdependent; for example, aircraft speed will affect available reaction time (Figure 1).

These five operational dimensions formed the basis for developing runway incursion categories that capture the spectrum of severity. In other words, the runway incursion categories capture the relative margin of safety for a given runway incursion. The categories range from near collisions or accidents to incidental events, labeled A through D. Categories A and B represent major runway incursions where there was a high risk of a collision based on these operational dimensions. Categories C and D represent minor runway incursions where there was little or no risk of collision. A description of these four runway incursion severity categories follows (Figure 2).

Categorizing Runway Incursions Based on Relative Severity

The 1,369 reported runway incursions were reviewed individually. Each runway incursion event was reconstructed to the degree possible based on available information. The team reviewed and classified each incident into one of the four runway incursion categories based on its relative severity. Ten of the 1,369 events did not contain any information to support a reliable categorization of severity; therefore, these 10 events were excluded from further runway incursion severity analyses. The supporting data are provided in the appendix. Events that contained only limited information were categorized in a conservative manner and placed in a more severe category. Runway incursion locations were plotted on airport diagrams at the 32 busiest U.S. airports (ranked by total number of operations from 1997 through 2000) to visualize the circumstances involved in these events and assist in the categorization.

Analyzing Trends in Runway Incursion Severity

Using these runway incursion severity categories, the team performed an analysis of runway incursion trends. The distribution of runway incursions across the four categories was examined in aggregate for the four-year period studied. This aggregate distribution was then broken down by year to identify any annual trends. Annual pilot deviations, operational errors, and vehicle or pedestrian deviations were analyzed according to their respective runway incursion categorizations to determine whether trends varied according to the runway incursion type (error type).

Runway incursions were also broken out by aircraft operations. This differentiation was necessary to examine interactions among different kinds of aircraft operations from 1997 through 2000, as well as the annual variations. Using aircraft performance, size, and capacity as the primary criteria, aircraft operations were divided into the following three categories:

- Commercial operations (Comm)
  - Jet transport (JT) group
  - Commuter (CR) group
  - Commercially-operated general aviation (CGA) group

Figure 1. **Operational Dimensions Affecting Runway Incursion Severity**

Operational Dimensions	Description
Available Reaction Time	Available Reaction Time considers how much time the pilots, controllers, and/or vehicle operators had to react to the situation based on aircraft type, phase of flight, and separation distance
Evasive or Corrective Action	Evasive or Corrective Action considers the need for and type of evasive or corrective maneuvers required to avoid a runway collision by pilots and/or air traffic controllers
Environmental Conditions	Environmental Conditions considers visibility, surface conditions, and light conditions
Speed of Aircraft and/or Vehicle	Speed of Aircraft and/or Vehicle—speed as a function of aircraft type and phase of flight (taxi, takeoff, landing)
Proximity of Aircraft and/or Vehicle	Proximity of Aircraft and/or Vehicle, or their separation distance from one another

- General Aviation (GA) operations (generally small, private aircraft)
- Military operations (Mil).

Finally, runway incursions were analyzed to determine the potential trends in number, frequency and severity with respect to airport operations (see Appendix). The findings from this analysis are presented in the following sections.

Figure 2. **Runway Incursion Severity Categories**

Increasing Severity

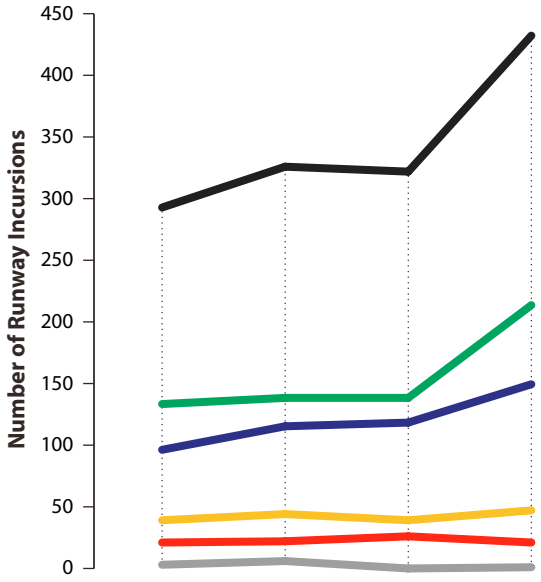
Category D	Category C	Category B	Category A	Accident
Little or no chance of collision but meets the definition of a runway incursion	Separation decreases but there is ample time and distance to avoid a potential collision	Separation decreases and there is a significant potential for collision	Separation decreases and participants take extreme action to narrowly avoid a collision	An incursion that resulted in a ***runway collision***
Available Reaction Time: Not a factor; adequate time to consider multiple alternatives	**Available Reaction Time:** Adequate; sufficient time to smoothly execute an unplanned action	**Available Reaction Time:** Minimal. Barely adequate to take an emergency action	**Available Reaction Time:** None. Instantaneous reaction was required	Three runway collisions occurred from 1997 through 2000. These three accidents were included in Category A for this analysis.
Need for Evasive/ Corrective Action: Evasive/Corrective action not necessary	**Need for Evasive/ Corrective Action:** Advisable. Definitive action was taken (or could have been taken)	**Need for Evasive/ Corrective Action:** Essential. Time-critical action required (or should have been taken) to ensure safety	**Need for Evasive/ Corrective Action:** Critical. Radical evasive action was the only reason that a collision was avoided	**(1) LaGuardia (LGA):** Operational Error involving a privately owned twin engine aircraft and an airport maintenance vehicle (1997).
Environmental Conditions: Good. Played no role in the event	**Environmental Conditions:** Fair. Minimal influence on operational performance	**Environmental Conditions:** Marginal. Likely a factor but not overridingly important	**Environmental Conditions:** Poor. Definitely a factor	**(2) Sarasota-Bradenton (SRQ):** Operational Error involving two small privately owned propeller aircraft (2000).
Aircraft / Vehicle Speed: Slow. Aircraft were traveling slowly; speed not a factor	**Aircraft/Vehicle Speed:** Moderate. Aircraft/ vehicle were moving fast enough to be of concern; speed was not a significant factor	**Aircraft/Vehicle Speed:** High. Potential for significant damage and injury	**Aircraft/Vehicle Speed:** Extreme. One or both aircraft/vehicle traveling at a speed sufficient to reduce pilot or ATC reaction time. Potential to cause catastrophic damage/loss of life in the event of a collision.	**(3) Fort Lauderdale (FLL):** A Vehicle/ Pedestrian Deviation involving an airport truck and a commercial passenger jet (2000).
Proximity of Aircraft/ Vehicle: Close. Aircraft/vehicle did not approach one another	**Proximity of Aircraft/ Vehicle:** Close. Aircraft/ vehicle approached one another at a low/ moderate rate of speed	**Proximity of Aircraft/ Vehicle:** Very Close. Aircraft/ vehicle approached one another at a high rate of speed	**Proximity of Aircraft/ Vehicle:** Near-Miss. Aircraft/ vehicle traveling at high speed narrowly missing one another	

Using the five operational dimensions to guide evaluation, each runway incursion was assigned to a category that best represented its relative severity. An incursion did not have to match all five dimensions in the category.

FINDINGS

Figure 3 depicts the number and severity of reported runway incursions at U.S. towered airports from 1997 through 2000. There was a marked increase in the number of reported runway incursions at U.S. towered airports in the year 2000 with the number of runway incursions rising from 321 to 431, an increase of 110 runway incursions from the previous year. Most of this increase comprised runway incursions that were minor in severity: 96 percent were in Categories C and D. That is, most incursions involved events where there was ample time and distance to avoid a potential collision, or there was little or no chance of a collision.

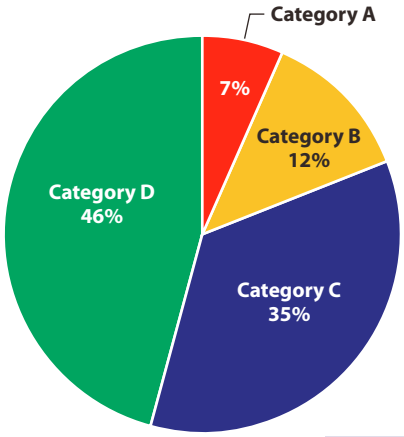
Figure 3.
Annual Number of Reported Runway Incursions by Severity



Year	1997	1998	1999	2000
Category A	21	22	26	21
Category B	39	44	39	47
Category C	96	115	118	149
Category D	133	138	138	213
Insufficient Data	3	6	0	1
Total	292	325	321	431

The number of runway incursions rose from 321 to 431 in 2000. This situation represents an increase of 110 runway incursions compared to the previous year. Most of this increase (96 percent) comprised runway incursions that were minor in severity (Categories C and D).

Figure 4.
Severity Distribution of Reported Runway Incursions 1997–2000



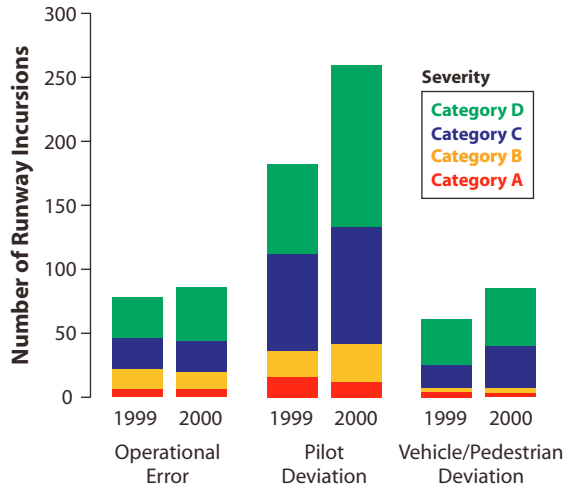
The distribution of runway incursion severity from 1997 through 2000 indicates that the majority of the incidents (81%) were Categories C and D events.

The distribution of runway incursions over the past four years was also examined in aggregate to assess the relative severity of all reported runway incursions. The findings indicate that the majority of the incidents (81 percent) were Categories C and D events (Figure 4).

To examine the increase in Categories C and D runway incursions in 2000, the three runway incursion types were investigated: pilot deviations, operational errors, and vehicle or pedestrian deviations. Figure 5 presents the number of reported pilot deviations, operational errors, and vehicle/pedestrian deviations with respect to runway incursion severity categories for 1999 and 2000. In 2000, 60 percent of reported runway incursions were attributed to pilot deviations, 20 percent to operational errors, and 20 percent to vehicle or pedestrian deviations. The increase in reported Categories C and D runway incursions in 2000 was primarily attributed to pilot deviations: airports reported 77 more pilot deviations, 9 more operational errors, and 24 more vehicle/pedestrian deviations compared to 1999.

Runway incursions were also analyzed according to aircraft operations within the NAS—commercial, general aviation, and military operations. Figure 6 depicts the distribution of aircraft operations within the United States from 1997 through 2000, and shows the distribution of reported runway incursions involving each type of aircraft operation.

Figure 5.
Severity Distribution by Runway Incursion Type: 1999–2000



The increase in reported runway incursions in 2000 was primarily attributed to pilot deviations. This increase comprises runway incursions that were relatively minor in severity (Categories C and D).

Reported runway incursions were distributed among aircraft operations as follows: 38 percent were commercial operations, 60 percent were general aviation operations, and 2 percent were military operations. This distribution of reported runway incursions among aircraft operations is consistent with these aircraft operations' represention in the NAS (Figure 6). In other words, the number of runway incursions for each type of aircraft operation (commercial, general aviation, military) was in proportion to their representation in the NAS.

Figure 6.
Comparisons of Runway Incursions for Aircraft Operations: 1997–2000

Aircraft Operations	Percentage of Aircraft Operations	Percentage of Runway Incursions by Aircraft Operations
Commercial Aircraft	38%	38%
General Aviation	58%	60%
Military	4%	2%

The number of runway incursions among aircraft operations was in proportion to their representation in the NAS.

The analysis was expanded to examine the interactions among pairs of aircraft operations involved in runway incursions (e.g., GA/GA, Comm/Comm, Comm/GA). This analysis also investigated the interactions between aircraft operations and vehicle/pedestrians. This analysis sought to determine whether trends in runway incursion severity varied according to the aircraft operations involved. Figure 7 shows aggregate runway incursion severity trends from 1997 through 2000 according to the combination of operations that were involved. Runway incursions most commonly involved two general aviation operations and were predominantly minor in relative severity (Categories C and D).

From 1997 through 2000, runway incursions primarily involved two general aviation operations and were predominantly minor in relative severity.

Figure 7.
Severity Distribution of Runway Incursions for Aircraft Operations: 1997–2000

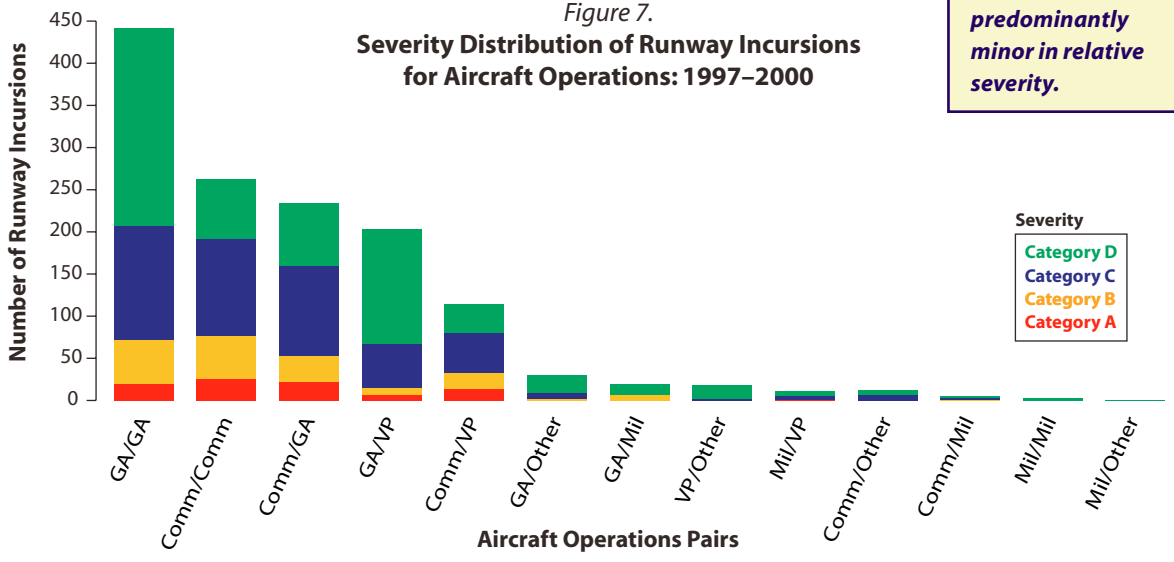
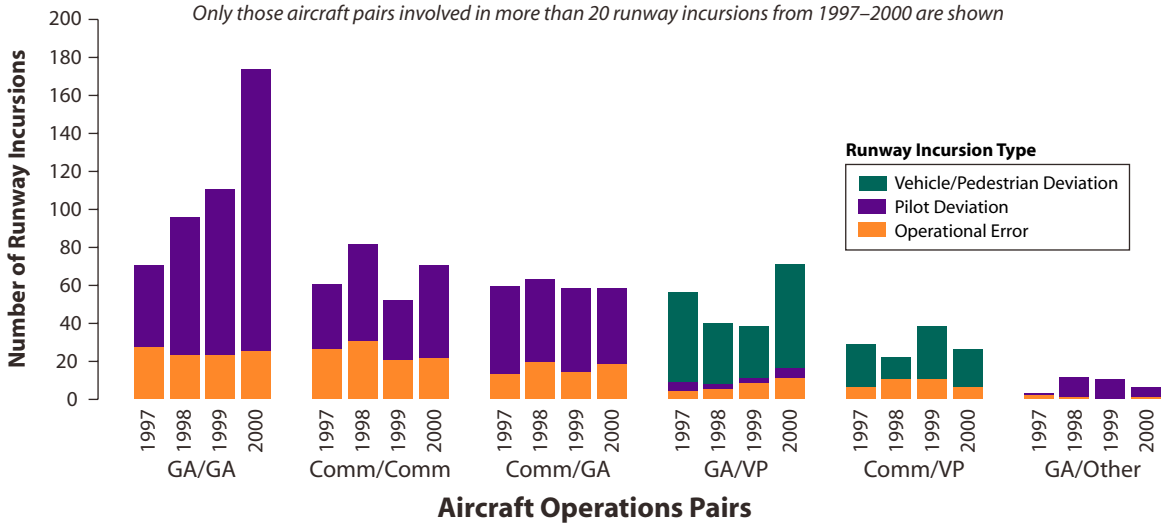


Figure 8.

Annual Number and Type of Runway Incursions for Aircraft Operations: 1997–2000

Only those aircraft pairs involved in more than 20 runway incursions from 1997–2000 are shown



There has been a steady rise in runway incursions involving two general aviation operations from 1997 through 2000, which can be attributed to an increase in pilot deviations.

Annual runway incursion data were analyzed to investigate yearly trends. Figure 8 shows the number and type of runway incursions by aircraft operations for each of the four years. There has been a steady rise in runway incursions involving two general aviation operations from 1997 through 2000, which can be attributed to an increase in pilot deviations.

Although there was a decline in runway incursions between general aviation operations and vehicle/pedestrians from 1997 through 1999, there was a noticeable reversal of this trend in 2000 (Figure 8). The majority of the increase in 2000 was attributed to vehicle or pedestrian deviations.

To perform a more detailed analysis of runway incursion trends involving commercial aircraft operations, the runway incursion data were broken down into commercial operations groups—Jet Transport (JT), Commuter (CR), and Commercial General Aviation (CGA). Figure 9 presents the distribution of runway incursion severity

For runway incursions that involved at least one aircraft from a commercial operations group, most incursions occurred between two jet transports. The majority of these runway incursions were minor in severity (Categories C and D).

Figure 9.

Severity Distribution of Runway Incursions for Commercial Operations Group

Only those Commercial Operations Group Pairs involved in at least 10 Runway Incursions from 1997–2000 are shown

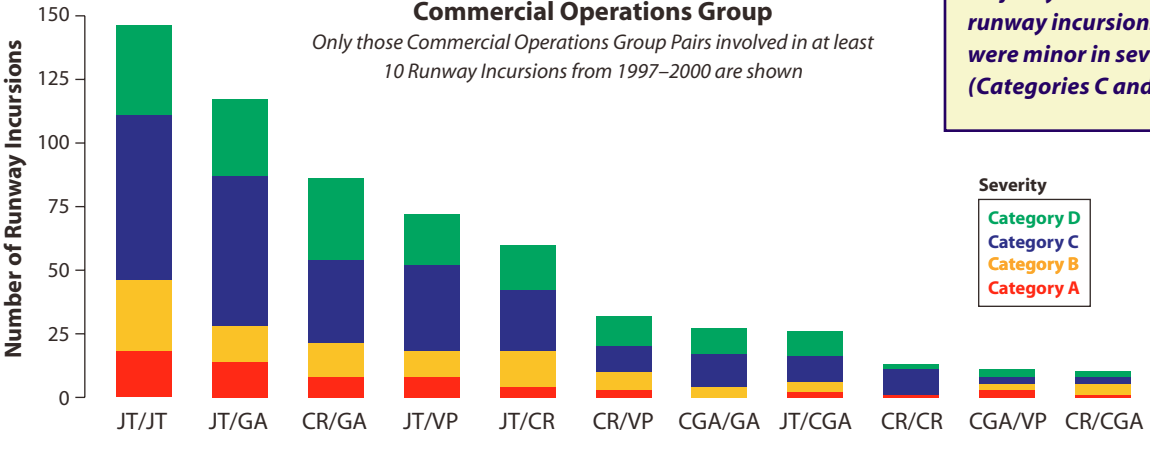
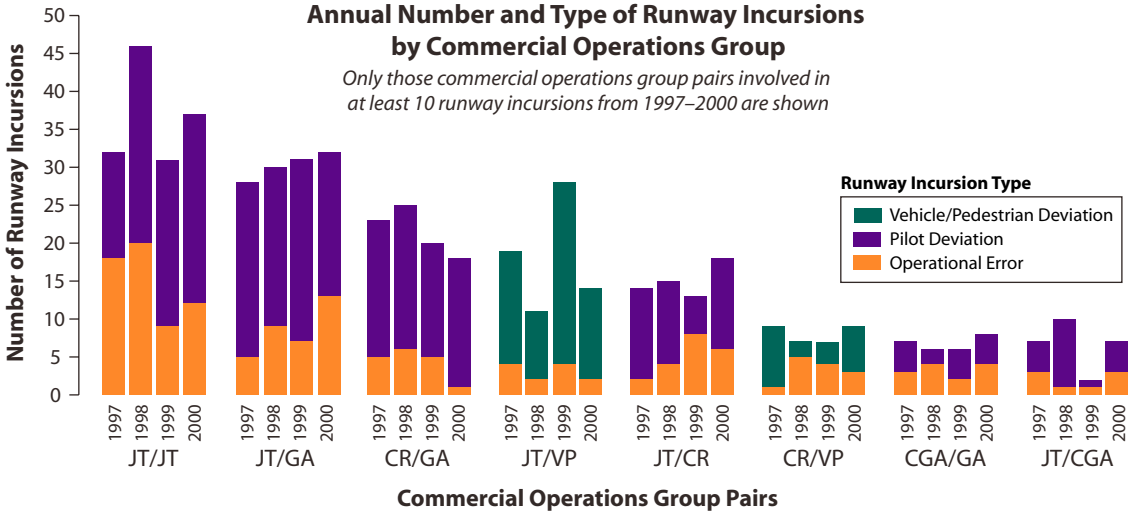


Figure 10.

Annual Number and Type of Runway Incursions by Commercial Operations Group

Only those commercial operations group pairs involved in at least 10 runway incursions from 1997–2000 are shown



Runway incursions involving a jet transport and a general aviation operation increased from 1997 through 2000.

for events involving commercial operations groups (e.g., JT/JT, JT/GA, CR/GA) from 1997 through 2000. For runway incursions that involved at least one aircraft from a commercial operations group, most incursions occurred between two jet transports. The majority of these runway incursions were minor in severity (Categories C and D).

Annual runway incursion trends were also analyzed by commercial operations group. Figure 10 shows the annual numbers and types of runway incursions by commercial operations group. Runway incursions involving two jet transports declined in 1999 but increased again in 2000. This variation is largely explained by the variation in the number of operational errors reported for these years. In addition, runway incursions involving a jet transport and a general aviation operation increased from 1997 through 2000 (Figure 10).

Runway incursions were then analyzed to determine their distribution across U.S. towered airports from 1997 through 2000. The 1,369 runway incursions from 1997 to 2000 were distributed across 297 out of the 459 U.S. towered airports in operation in 2000. Figure 11 shows that approximately 162 towered airports (35 percent) had no reported runway incursions during this four-year period; 220 airports

The 1,369 runway incursions from 1997 through 2000 were distributed across 297 out of approximately 459 U.S. towered airports.

Figure 11.

Distribution of the Number of Runway Incursions at U.S. Towered Airports: 1997–2000

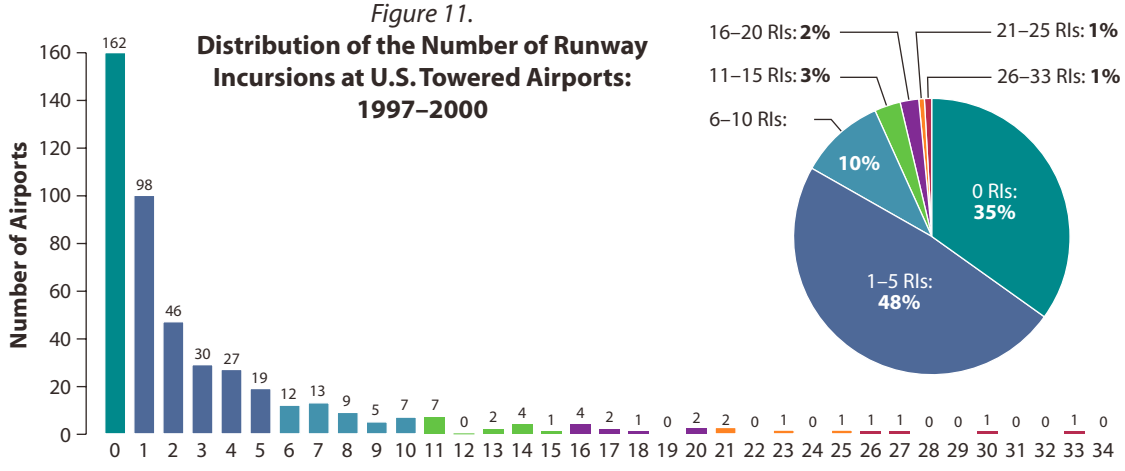
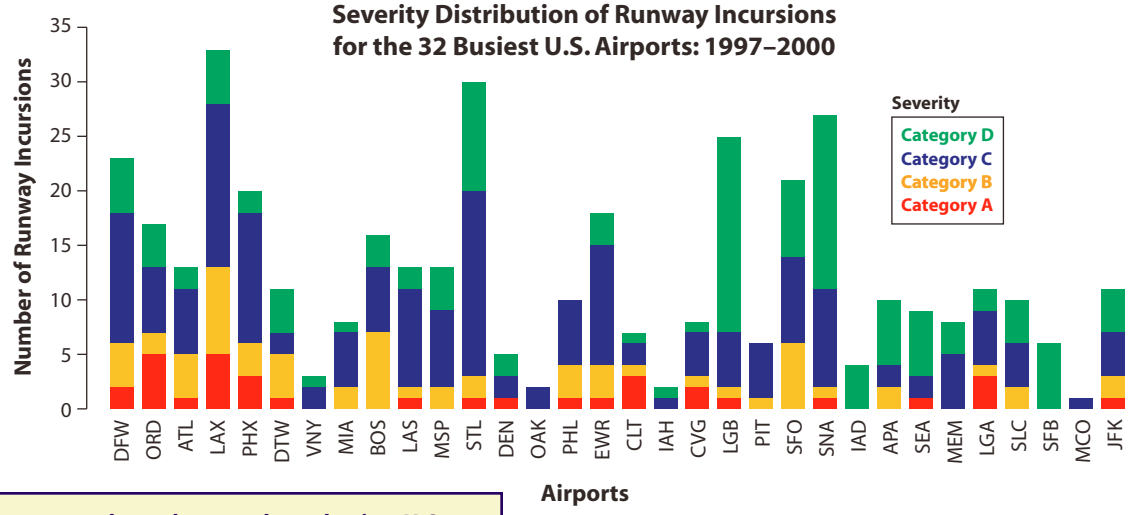


Figure 12.
Severity Distribution of Runway Incursions for the 32 Busiest U.S. Airports: 1997–2000



From 1997 through 2000, the 32 busiest U.S. airports accounted for 37 percent of all major runway incursions (Categories A and B), and 28 percent of all minor runway incursions (Categories C and D).

(48 percent) had between 1 and 5 runway incursions; 46 airports (10 percent) experienced between 6 and 10 runway incursions; and the remaining 31 airports (7 percent) had between 11 and 33 runway incursions.

Runway incursion trends were analyzed across U.S. towered airports to investigate how the number and rate of runway incursions vary with the number of airport operations (i.e., airport volume). The 32 busiest U.S. airports, representing 24 percent of the total operations at towered airports for this period, accounted for approximately 29 percent (403) of the 1,369 runway incursions from 1997 through 2000. Analysis showed that there was no strong correlation between the rate of runway incursions and the number of airport operations.

Runway incursion severity at U.S. towered airports was analyzed to determine where the most severe events occurred. Figure 12 shows the total number of runway incursions at the 32 busiest U.S airports and the distribution of runway incursion severity. From 1997 through 2000, the 32 busiest U.S. airports accounted for 37 percent of the 259 major runway incursions (Categories A and B), and 28 percent of the 1,100 minor runway incursions (Categories C and D). When the rate of incursions is considered, the average rate of major runway incursions at the 32 busiest airports (0.15 incursion per 100,000 operations) was approximately twice the average rate at the rest of the airports (0.08 incursion per 100,000 operations). There was, however, no substantial difference in the rate for minor incursions; the rate for minor incursions was 0.48 incursion per 100,000 at the 32 busiest airports versus 0.39 incursion per 100,000 at the rest of the airports.

The following section summarizes the findings from this analysis of runway incursion severity and discusses the associated conclusions and next steps.

SUMMARY and CONCLUSIONS

The FAA undertook this analysis to gain a better understanding of runway incursion severity trends at U. S. towered airports. Runway incursions range from relatively minor events involving little or no risk of collision to major events where an accident is narrowly avoided or occurs. The severity of the incidents, as well as the number and rate of runway incursions, must be considered in order to make reliable judgments regarding the risk posed by runway incursions.

Reducing the *frequency* of runway incursions hinges on the implementation of prevention strategies to reduce *occurrences*. Reducing the *severity* of runway incursions depends on the implementation of mitigation strategies to reduce the *consequences* of failures or human errors. Underlying, or causal factors represent vulnerabilities that permit runway incursions to occur and also affect the degree of severity.

Strategies to enhance runway safety and reduce the frequency and severity of runway incursions must target factors or dimensions that represent these vulnerabilities; specifically, factors that permit runway incursions to happen. Broad-based and airport-specific runway safety initiatives are needed, in light of the following findings.

Runway incursions are infrequent events, and runway collisions are rare occurrences. Of the approximately 266 million operations at U.S. towered airports from 1997 through 2000, 1,369 resulted in runway incursions—or approximately 5 runway incursions per 1 million operations. Three of these runway incursions resulted in runway collisions (accidents). Most runway incursions are minor in terms of severity. This is largely due to the rigorous margin of safety that is built into the aviation system, and represented by a network of technologies, procedures, and well-trained professionals.

The distribution of runway incursion severity from 1997 through 2000 indicates that the majority of the incidents (81 percent) were minor in terms of severity. In 2000, the number of reported runway incursions increased by 110 incidents compared to the previous year. Ninety-six percent of this increase comprised runway incursions that were relatively minor in severity.

Every airport is unique in terms of its configuration, traffic mix, and so forth. This diversity makes it difficult to establish a correlation between the number of runway incursions and the number of operations. The 1,369 runway incursions from 1997 through 2000 were distributed across 297 out of approximately 459 U.S. towered airports. There were no reported runway incursions for 162 of the towered airports during this period. The rate of runway incursions was not strongly correlated with the number of airport operations. When severity was considered, however, the average rate of major runway incursions at the 32 busiest U. S. towered airports was approximately twice the average rate for the rest of the airports.

FAA runway incursion data do not consistently show the level of detail necessary to reliably determine the root causes of runway incursions. Minimizing runway incursions requires effective coordination and communication among all participants in the aviation system (e.g., pilot, controller, vehicle operator). Since each participant relies on the others to operate safely and efficiently, using runway incursion data that focus on pilot deviations, operational errors, and vehicle or pedestrian deviations to pinpoint "fault" may be counter-productive to determining root causes. As currently defined, "runway incursion types" do not provide any insight into why runway incursions happened. Rather, these labels simply identify to whom the incursion was attributed: the pilot, controller, and/or a vehicle or pedestrian.

Specific types of aircraft operations (commercial, general aviation, military) are proportionately involved in runway incursions based on their representation in the NAS…

▶ *General Aviation operations:* The most common types of runway incursions involved two general aviation operations and were predominantly minor in severity. There has been a steady rise in the number of runway incursions involving two general aviation operations from 1997 through 2000, which can be attributed to an increase in pilot deviations. Although there was a consistent decline in runway incursions between general aviation operations and vehicles or pedestrians from 1997 through 1999, there was a reversal in this trend in 2000. The majority of the increase in 2000 was attributed to vehicle or pedestrian deviations.

▶ *Commercial operations:* For runway incursions that involved at least one aircraft from a commercial operations group, most incursions occurred between two jet transports. The majority of these runway incursions were minor in severity. The number of runway incursions involving two jet transports declined in 1999 but increased again in 2000. This variation is largely explained by the variation in the number of operational errors reported for these years. The number of runway incursions involving a jet transport and a general aviation operation have steadily increased from 1997 through 2000. This increase in 2000 represents a rise in operational errors and a decline in pilot deviations.

NEXT STEPS

These next steps describe the actions that the FAA is considering to guide the implementation of the runway safety initiatives already in progress or planned. *Next steps will involve identifying potential causal factors to quantify why runway incursions happen.* Only by understanding the circumstances that provoked errors leading to runway incursions can we hope to limit their recurrence.

Define an "airport complexity" metric. Airport-specific factors such as airport layout, configuration, traffic volume, traffic mix, local procedures, and construction may influence the complexity of airport surface movement operations. An airport complexity metric that accounts for these variables would be useful for identifying causal factors of runway incursions for more productive risk mitigation. This metric is analogous to the sector complexity metric, which is used in the en route and terminal environments to predict the effect of air traffic on workload and human performance. Since airport complexity factors will likely influence both the frequency and severity of runway incursions, these factors are essential for assessing risk as well as measuring the effectiveness of safety initiatives. Finally, focusing on airport complexity (in addition to airport volume, which is just one dimension of airport complexity) may offer valuable information to guide technology deployment strategies that will produce the earliest and largest impact on improving runway safety.

Analyze surface incidents, specifically focusing on those incidents that occur on the runway. Since major runway incursions occur far less frequently than minor incursions—and accidents occur at a rate that is not much greater than chance—it is important to focus on both the minor and major incursion trends to achieve runway safety improvements. Persistent trends in minor runway incursions may be harbingers for more major events. Minor runway incursions, if allowed to proliferate, may increase the likelihood of experiencing more major runway incursion in the future. Therefore trends in minor runway incursions signify opportunities for improving runway safety by targeting the more frequently occurring but less severe events. Accordingly, surface incidents that occur on a runway offer an even greater opportunity to uncover patterns and root causes of latent runway safety problems and identify causal factors. A surface incident that occurs on the runway is different from a runway incursion. Surface incidents involve a single aircraft or vehicle and a technical violation (or error) that does not result in loss of separation.

Improve both the quality of runway incursion data, and the data collection and reporting process. The FAA has placed a greater emphasis on reporting runway incursions in recent years. The FAA has worked to improve runway safety by implementing initiatives such as education and training programs for pilots, controllers and vehicle operators to increase awareness of potential hazards. Heightened awareness of runway safety has most likely translated into more frequent reports of runway incursions that were minor in severity and may have previously gone unreported.

There is still a pressing need to improve the quality of information provided to describe runway incursions. The need is for better information, not necessarily more of it. Steps that should be taken to improve the quality of runway incursion information involve:

- Revamping data collection forms to systematically capture more detailed information regarding human performance, procedural, technical, and environmental factors that may have interacted to contribute to runway incursions
- Improving the mechanism for sharing runway safety data among members of the aviation community
- Providing a more user-friendly system for analyzing runway incursion data according to specific parameters
- Enlisting the participation of aviation human factors experts in the data analysis process.

Diligent and complete reporting of both minor and major runway incursions, and the consistent collection of critical runway safety parameters, is vital for identifying underlying causes and contributing factors.

Define meaningful benchmarks and reliable performance indicators to measure progress toward runway safety goals. Perform an assessment of other industries that demand an extremely high level of safety, and also exhibit a low base rate of failures, errors and accidents. Identify benchmarks and best practices that may be applicable to improving aviation safety and, in particular, runway safety. Tailor best practices and measures of safety and risk to establish refined runway safety goals, and devise useful mechanisms for measuring progress toward these goals. Improve the fidelity of runway safety risk metrics by including measures of frequency and severity (as discussed in this report). Couple these measures with data on causal factors, and develop prospective risk assessment models to complement the current retrospective approach.

Implement solutions that attack human error on multiple fronts: that is, from a technology, procedural, and training perspective. The dual requirements to improve runway safety and airport capacity/efficiency will place new demands on the professionals involved in aviation operations. Every initiative must be analyzed to describe the impact on human error potential, and how the initiative will prevent or mitigate human error. Since human error plays a role in almost every runway incursion, reducing human error will reduce the frequency of runway incursions, and mitigating the impact of human errors that do occur will reduce the severity of runway incursions.

The FAA is encouraged by the findings of this report: a closer look at the severity of runway incursions shows that, while incursions are on the rise, the great majority are relatively minor and pose little chance of collision. The FAA will continue to pursue improvements to its runway safety record by targeting both the frequency and severity of runway incursions. For more information, contact the FAA Office of Runway Safety at (202) 267-9131. ◀

FAA RUNWAY SAFETY REPORT

Runway Incursion Severity Trends at Towered Airports in the United States: 1997–2000

APPENDIX

Appendix

- Glossary
- Acronyms
- Runway Incursion Data for The 10 Unclassified Events
- Airport Identifiers and 1997 – 2000 Runway Incursion Data by Airport

GLOSSARY

Commercial Operations – Consists of air taxis/commuters, cargo and air carriers. For the purpose of this analysis, three groups of commercial operations were defined: jet transport, commuters and commercially operated general aviation.

Commuter – Typically a medium size turbo prop that carries a maximum of 30 passengers (e.g., Embraer 120, DeHavilland DH8).

Error Tolerance – The degree to which a system detects and prevents the propagation of errors. In the context of runway safety, error tolerance is the degree to which the system detects and prevents the propagation of human error, procedural breakdowns, and technical failures to reduce the likelihood of a runway incursion becoming an accident.

FAA Office Of Runway Safety – The FAA office responsible and accountable for coordinating initiatives to enhance runway safety at the nations airports.

FAA Operational Evolution Plan – Integrates and aligns FAA activities with those of industry and the users to meet the growing capacity demand for the next ten years.

General Aviation – Non-commercially operated aircraft.

Hold Short – An air traffic control clearance to the pilot of an aircraft to not proceed beyond a designated point such as a specified runway or taxiway.

Jet Transport – Typically a large jet that can carry greater than 30 passengers.

Military Operation – Any aircraft operated by the United States military, or any visiting foreign military aircraft.

Non-Commercial Operation – Consists of general aviation and military operations.

Operational Error – An action by an air traffic controller which results in less than the required minimum separation between two or more aircraft or between an aircraft and obstacles (vehicles, equipment, personnel on runways).

Pilot Deviation – An action of a pilot that violates any Federal Aviation Regulation.

Runway Incursion – Any occurrence on an airport runway 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.

Runway Incursion Type – Operational error, pilot deviation or vehicle/pedestrian deviation.

Surface Incident – Any event where unauthorized or unapproved movement occurs within the movement area or an occurrence in the movement area associated with the operation of an aircraft that affects or could affect the safety of flight. A surface incident can occur anywhere on the airport's surface including the runway.

Taxi Into Position And Hold – An air traffic control instruction to a pilot of an aircraft to taxi onto the active departure runway, to hold in that position and not take off until specifically cleared to do so.

Towered Airport – One of approximately 459 airports in the United States with an FAA operated or FAA contracted air traffic control tower.

Vehicle/Pedestrian Deviation – Vehicles or pedestrians moving on the runway movement area without authorization from air traffic control that interferes with aircraft operations.

ACRONYMS

FAA – Federal Aviation Administration

NAIMS – National Airspace Incidents Monitoring System

NAS – National Airspace System

OEP – FAA's Operational Evolution Plan

OIG – Department of Transportation, Office of the Inspector General

RUNWAY INCURSION DATA FOR THE 10 UNCLASSIFIED EVENTS

				Aircraft Operations Pair		
Airport	Airport ID	Year	Runway Incursion Type	GA/GA	JT/GA	GA/VP
Oxnard Airport, Oxnard, California	OXR	1997	OE	1		
Teterboro Airport, Teterboro, New Jersey	TEB	1997	PD	1		
Santa Monica Municipal Airport, Santa Monica, California	SMO	1997	VPD			1
Chicago-Midway Airport, Chicago, Illinois	MDW	1998	OE		1	
Monterey Peninsula Airport, Monterey, California	MRY	1998	OE		1	
Minneapolis-St. Paul International Airport, Minneapolis, Minnesota	MSP	1998	OE	1		
San Antonio International Airport, San Antonia, Texas	SAT	1998	PD		1	
Deer Valley Municipal Airport, Phoenix, Arizona	DVT	1998	PD	1		
Purdue University Airport, Lafayatte, Indiana	LAF	1998	PD	1		
Pittsburgh International Airport, Pittsburgh, Pennsylvania	PIT	2000	OE		1	
Grand Total				5	4	1

Ten of the 1,369 runway incursions did not contain enough information to support a reliable categorization of severity. These events are identified in this table for completeness.

AIRPORT IDENTIFIERS AND 1997 – 2000 RUNWAY INCURSION DATA BY AIRPORT

Annual number, rate, and severity of runway incursions for U.S. towered airports from 1997 through 2000 are presented in the following table.

Sorted Alphabetically by State and Airport Name

State	Airport Name, City (Airport Code)	Year	Severity Category				Accident	ID	Total RI	Yearly Rate*
			A	B	C	D				
Alabama	Birmingham International, Birmingham (BHM)	1998		1					1	0.65
		1999	1		1	1			3	1.93
	Mobile Downtown Airport, Mobile (BFM)	1998		1					1	1.15
	Montgomery Regional Airport, Montgomery (MGM)	1998				1			1	1.12
Alaska	Anchorage - Ted Stevens International, Anchorage (ANC)	1997		1		1			2	0.63
		1998		1	1	3			5	1.60
		1999			1				1	0.32
		2000				2			2	0.63
	Fairbanks International, Fairbanks (FAI)	1999			1				1	0.76
		2000			1				1	0.72
	Juneau International, Juneau (JNU)	1997			1				1	0.73
		2000				1			1	0.68
	Merrill Field, Anchorage (MRI)	1997			1	6			7	3.74
		1998			1	1			2	0.97
		2000			2	6			8	4.20
American Samoa	Pago Pago Intenational, Pago Pago (PPG)	2000				1			1	6.92
Arizona	Chandler Municipal, Chandler (CHD)	2000				2			2	0.80
	Deer Valley Municipal, Phoenix (DVT)	1997	2	1		3			6	2.25
		1998			1	3		1	5	1.78
		1999		1		1			2	0.70
		2000			2				2	0.54
	Laughlin - Bullhead International, Bullhead City (IFP)	1998				1			1	NA
		2000				2			2	3.87
	Love Airport, Prescott (PRC)	1998			1				1	0.29
		2000		1		1			2	0.62
	Mesa - Falcon Field, Mesa (FFZ)	1997				1			1	0.48
		1998				1			1	0.45
		1999			1	1			2	0.76
		2000			1				1	0.36
	Phoenix - Sky Harbor International, Phoenix (PHX)	1997			4				4	0.75
		1998	1	1	4	1			7	1.32
		1999	1		1	1			3	0.53
		2000	1	2	3				6	0.94
	Phoenix GoodYear Airport, Goodyear (GYR)	2000				1			1	0.70
	Scottsdale Airport, Scottsdale (SDL)	1997				1			1	0.54
	Tucson International, Tucson (TUS)	1997			1	2			3	1.25
		2000		1		1			2	0.80
	Williams Gateway Airport, Phoenix (IWA)	2000				3			3	2.12
Arkansas	Fort Smith Regional Airport, Fort Smith (FSM)	1997		1					1	1.59
	Little Rock - Adams Field, Little Rock (LIT)	1998				2			2	1.17
		1999				1			1	0.55
		2000			1	1			2	1.14
California	Brackett Field, La Verne (POC)	1998			1				1	0.47
		1999			1				1	0.40
		2000		2					2	0.79
	Brown Field Municipal, San Diego (SDM)	1999			1				1	1.01
	Burbank - Glendale - Pasadena Airport, Burbank (BUR)	1997		2	1	1			4	2.23
		1998			2	1			3	1.65
		1999			1				1	0.57
		2000			1	1			2	1.24
	Camarillo Airport, Camarillo (CMA)	1997			2				2	1.11
		2000			1	2			3	1.61
	Chino Airport, Chino (CNO)	1997				1			1	0.51
		1998				1			1	0.53
		1999				1			1	0.56

State	Airport Name, City (Airport Code)	Year	Severity Category				Accident	ID	Total RI	Yearly Rate*
			A	B	C	D				
	Concord - Buchanan Field, Concord (CCR)	1998		1					1	0.46
		1999			3				3	1.29
		2000			1	6			7	3.47
	El Monte Airport, El Monte (EMT)	2000				2			2	1.49
	Fort Lauderdale - Hollywood International, Fort Lauderdale (FLL)	1997		1		1			2	0.81
		1999			1	1			2	0.71
		2000		1		2	1		4	1.37
	Fresno - Yosemite International, Fresno (FAT)	1998				1			1	0.58
		2000		1		2			3	1.16
	Fullerton Municipal Airport, Fullerton (FUL)	1999				2			2	2.14
	Hawthorne Municipal - Northrop Field, Hawthorne (HHR)	1999				3			3	3.52
		2000	1			1			2	2.55
	John Wayne - Orange County Airport, Santa Ana (SNA)	1997		1	1	6			8	1.73
		1998			1	2			3	0.72
		1999	1		4	4			9	1.91
		2000			3	4			7	1.80
	Long Beach - Daugherty Field, Long Beach (LGB)	1997			1	6			7	1.55
		1998		1	1	2			4	0.85
		1999	1		1	4			6	1.20
		2000			2	6			8	2.11
	Los Angeles - Whiteman Field, Los Angeles (WHP)	1998		1	1				2	1.68
		2000			2	1			3	2.20
	Los Angeles International, Los Angeles (LAX)	1997		1		2			3	0.38
		1998	1	1	7	3			12	1.55
		1999	3	2	5				10	1.28
		2000	1	4	3				8	1.02
	Meadows Field, Bakersfield (BFL)	1998	1						1	0.63
	Metropolitan Oakland International, Oakland (OAK)	1999			2				2	0.38
	Monterey Peninsula Airport, Monterey (MRY)	1998						1	1	1.03
		1999				1			1	0.92
		2000		1					1	0.98
	Napa County Airport, Napa (APC)	2000				1			1	0.69
	Ontario International, Ontario (ONT)	1997			2				2	1.26
		1998	2		1	1			4	2.76
		2000			1				1	0.65
	Oxnard Airport, Oxnard (OXR)	1997						1	1	0.83
	Palm Springs International, Palm Springs (PSP)	1999		1	2	1			4	3.85
	Palo Alto of Santa Clara County, Palo Alto (PAO)	1999				1			1	0.49
		2000				1			1	0.50
	Redding Municipal, Redding (RDD)	1997				1			1	1.08
	Reid-Hillview of Santa Clara County Airport, San Jose (RHV)	1999			1				1	0.46
	Riverside Municipal, Riverside (RAL)	1997		1					1	1.36
	Sacramento International, Sacramento (SMF)	1997			1				1	0.60
	Salinas Municipal Airport, Salinas (SNS)	1997				1			1	1.18
		1999	1						1	1.11
		2000			1				1	1.12
	San Carlos Airport, San Carlos (SQL)	2000			1				1	0.62
	San Diego - Gillespie Field, San Diego (SEE)	1997	1						1	0.54
		1999			1				1	0.48
		2000			2				2	1.07
	San Diego - Montgomery Field, San Diego (MYF)	1997			1	1			2	0.83
		1998			1	4			5	1.88
		1999			1	4			5	1.82
		2000		1	1	7			9	3.88
	San Diego International - Lindbergh Field, San Diego (SAN)	1997			1				1	0.45
		1998			1				1	0.45
		1999				1			1	0.45
		2000				2			2	0.96
	San Francisco International, San Francisco (SFO)	1997		2	2	2			6	1.33
		1998		1	2	1			4	0.93
		1999		2	2	3			7	1.59
		2000		1	2	1			4	0.93

State	Airport Name, City (Airport Code)	Year	Severity Category				Accident	ID	Total RI	Yearly Rate*
			A	B	C	D				
	San Jose International, San Jose (SJC)	1997		1	1	2			4	1.30
		1998		1	1	3			5	1.75
		1999			1	1			2	0.65
		2000		1	1	3			5	1.67
	Santa Barbara Municipal, Santa Barbara (SBA)	1997	1	1					2	1.14
		1998	1						1	0.62
		1999			1	1			2	1.19
		2000			2	4			6	3.58
	Santa Maria Public - Hancock Field, Santa Maria (SMX)	2000				1			1	1.31
	Santa Monica Municipal, Santa Monica (SMO)	1997				2		1	3	1.41
		1998				1			1	0.46
		1999			1				1	0.43
	Sonoma County Airport, Santa Rosa (STS)	2000			1	1			2	1.51
	Van Nuys Airport, Van Nuys (VNY)	1998			1				1	0.18
		2000			1	1			2	0.41
	Zamperini Field, Torrance (TOA)	2000			1				1	0.56
Colorado	City of Colorado Springs Municipal, Colorado Springs (COS)	1997			1				1	0.49
		1998			1				1	0.55
		1999				1			1	0.42
	Denver - Centennial Airport, Denver (APA)	1997				1			1	0.24
		1998		1		2			3	0.64
		1999		1	1	2			4	0.92
		2000			1	1			2	0.50
	Denver - Jeffco Airport, Denver (BJC)	1999			1				1	0.59
		2000		1		6			7	4.06
	Denver International, Denver (DEN)	1997	1			1			2	0.41
		1998			1				1	0.21
		2000			1	1			2	0.38
	Eagle County Regional Airport, Eagle (EGE)	1998				2			2	6.80
		2000			1				1	2.52
Connecticut	Bridgeport - Sikorsky Memorial, Bridgeport (BDR)	1999				1			1	1.07
		2000			2	2			4	4.43
	Danbury Municipal, Danbury (DXR)	1999		1		1			2	1.67
	Groton - New London Airport, Groton (GON)	2000			1	1			2	2.69
	Tweed-New Haven Airport, New Haven (HVN)	2000			1				1	1.63
	Windsor Lockes - Bradley International, Windsor Lockes (BDL)	1998			1				1	0.56
		2000		1	1	1			3	1.77
Delaware	New Castle County Airport, Wilmington (ILG)	1997			1				1	0.68
District of Columbia	Ronald Reagan Washington National, Washington (DCA)	1997		1					1	0.32
		1998			1				1	0.32
		1999		1					1	0.30
		2000				1			1	0.29
Florida	Craig Municipal, Jacksonville (CRG)	1998			1				1	0.74
		1999				1			1	0.70
	Daytona Beach International, Daytona Beach (DAB)	1997				2			2	0.72
		1998			1	2			3	0.98
		1999	3	1	1	1			6	1.65
		2000			1	2			3	0.81
	Fort Lauderdale - Executive, Fort Lauderdale (FXE)	1997			1	2			3	1.29
		1998			1	2			3	1.24
		1999			1	4			5	2.04
		2000			4	5			9	3.46
	Jacksonville International, Jacksoville (JAX)	1998				1			1	0.64
		2000	1						1	0.67
	Kendall-Tamiami - Executive Airport, Miami (TMB)	2000				1			1	0.52
	Key West International, Key West (EYW)	1998				1			1	0.84
	Kissimmee Municipal Airport, Orlando (ISM)	1999				1			1	0.70
		2000				1			1	0.82
	Lakeland - Linder Regional Airport, Lakeland (LAL)	1997				1			1	0.51
		1998		1					1	0.50
		1999		1		1			2	0.91
		2000			1	1			2	1.03
	Melbourne International, Melbourne (MLB)	1999			1				1	0.64

State	Airport Name, City (Airport Code)	Year	Severity Category				Accident	ID	Total RI	Yearly Rate*
			A	B	C	D				
		2000		1					1	0.52
	Miami International, Miami (MIA)	1997		1	1				2	0.38
		1998				1			1	0.19
		1999			2				2	0.39
		2000		1	2				3	0.58
	Naples Municipal, Naples (APF)	1999			1				1	0.81
		2000				1			1	0.84
	North Perry Airport, Hollywood (HWO)	1998		1					1	0.63
	Opa Locka Airport, Miami (OPF)	1998		1					1	0.97
	Orlando - Executive Airport, Orlando (ORL)	1997			1	1			2	1.09
		1998			1				1	0.50
		1999			1				1	0.44
		2000	1						1	0.44
	Orlando - Sanford International, Orlando (SFB)	1998				3			3	0.79
		1999				1			1	0.28
		2000				2			2	0.54
	Orlando International, Orlando (MCO)	1999			1				1	0.27
	Page Field, Ft. Myers (FMY)	1997	1						1	1.21
	Panama City - Bay County International, Panama City (PFN)	1998			1				1	0.95
	Sarasota - Bradenton International, Sarasota (SRQ)	1997	1		1	1			3	1.78
		2000			1	2	1		4	2.36
	St. Lucie County International, Ft. Pierce (FPR)	2000			1				1	0.57
	St. Petersburg - Clearwater International, St. Petersburg (PIE)	1999			1				1	0.44
	Tampa International, Tampa (TPA)	1998	2						2	0.78
		2000			1				1	0.36
	Vero Beach Municipal, Vero Beach (VRB)	1997			1				1	0.44
	West Palm Beach - Palm Beach International, West Palm Beach (PBI)	1998			2	3			5	2.58
		1999			2				2	1.01
		2000		1		1			2	0.93
Georgia	Atlanta - Dekalb - Peachtree Airport, Atlanta (PDK)	1998				1			1	0.44
		1999		2					2	0.86
		2000				1			1	0.42
	Atlanta - Hartsfield International, Atlanta (ATL)	1997			1	1			2	0.25
		1998		1		1			2	0.24
		1999		2	4				6	0.66
		2000	1	1	1				3	0.33
	Columbus Metropolitan, Columbus (CSG)	2000			1				1	1.62
	Fulton County Airport - Brown Field, Atlanta (FTY)	1999			1				1	0.87
		2000				1			1	0.85
	Gwinnett County Airport, Lawrenceville (LZU)	1998				1			1	0.93
	Savannah International, Savannah (SAV)	1997				1			1	1.04
		1998			1	1			2	1.87
		2000		1					1	0.89
	Valdosta Regional, Valdosta (VLD)	2000			1				1	1.74
Hawaii	Honolulu International, Honolulu (HNL)	1998			1				1	0.30
	Kahului International, Kahululi (OGG)	2000				1			1	0.57
Idaho	Boise Air Terminal - Gowen Field, Boise (BOI)	1997				1			1	0.51
		1999			2	1			3	1.67
		2000				2			2	1.17
	Fanning Field, Idaho Falls (IDA)	2000				1			1	2.37
	Pocatello Regional Airport, Pocatello (PIH)	1997	1						1	2.21
Illinois	Alton - St. Louis Regional Airport, Alton/St. Louis (ALN)	1997		1					1	1.24
	Bloomington - Central Illinois Regional Airport, Bloomington (BMI)	1997				1			1	1.39
		1999				2			2	3.07
	Chicago - Aurora Municipal, Chicago/Aurora (ARR)	1998				1			1	0.77
		1999			1				1	0.85
		2000	1						1	0.79
	Chicago - Du Page Airport, Chicago (DPA)	1997			1	1			2	0.93
		1998				1			1	0.46
		2000	1						1	0.50
	Chicago - Midway, Chicago (MDW)	1997			2				2	0.75
		1998		3	1			1	5	1.80
		1999		2	3				5	1.68

State	Airport Name, City (Airport Code)	Year	Severity Category				Accident	ID	Total RI	Yearly Rate*
			A	B	C	D				
		2000	1	1		2			4	1.34
	Chicago - O'Hare International, Chicago (ORD)	1997	1	1		1			3	0.34
		1998			4				4	0.45
		1999	3	1		2			6	0.67
		2000	1		2	1			4	0.44
	Chicago - Palwaukee Municipal, Chicago (PWK)	1997			1				1	0.53
		1998		2	1	1			4	2.10
		2000			1	3			4	2.22
	Decatur Airport, Decatur (DEC)	1999	1						1	1.84
	Greater Peoria Regional Airport, Peoria (PIA)	2000				1			1	1.18
	Quad City International, Moline (MLI)	2000				1			1	1.61
	Rockford - Greater Rockford, Rockford (RFD)	1997			1	1			2	1.97
		1999				1			1	0.99
		2000			1	3			4	4.45
	Springfield - Capital Airport, Springfield (SPI)	1997		1					1	1.00
		1999			2	2			4	4.50
	St. Louis Downtown - Parks Airport, Cahokia/St. Louis (CPS)	1998				1			1	0.62
	Waukegan Regional Airport, Waukegan (UGN)	2000			1	1			2	2.18
Indiana	Ft. Wayne International, Ft. Wayne (FWA)	1997			1				1	1.00
		1999		1					1	0.83
		2000				1			1	0.81
	Indianapolis International, Indianapolis (IND)	1998			2	3			5	2.06
		1999			1				1	0.40
	Purdue University Airport, Lafayette (LAF)	1998						1	1	0.59
	South Bend Regional Airport, South Bend (SBN)	1997			1	1			2	2.37
		1998				1			1	1.19
		1999			1	1			2	2.36
		2000				1			1	1.29
	Terre Haute International - Hulman Field, Terre Haute (HUF)	1999				2			2	3.61
Iowa	Cedar Rapids - The Eastern Iowa Airport, Cedar Rapids (CID)	1997			1	1			2	2.57
		1999				1			1	1.19
		2000				1			1	1.22
	Des Moines International, Des Moines (DSM)	1999				1			1	0.74
	Sioux Gateway Airport, Sioux City (SUX)	1997				1			1	2.01
		2000				1			1	2.43
	Waterloo Municipal, Waterloo (ALO)	1997		1	1				2	3.56
Kansas	Wichita Mid-Continent Airport, Wichita (ICT)	1997			1	2			3	1.54
		1998			1	1			2	0.97
		2000		1		1			2	0.92
Kentucky	Blue Grass Airport, Lexington (LEX)	1999				1			1	0.98
	Bowman Field, Louisville (LOU)	2000			1	1			2	1.43
	Covington -Cincinnati-Northern Kentucky Intnl, Covington (CVG)	1997				1			1	0.24
		1998	2						2	0.45
		1999			1				1	0.21
		2000		1	3				4	0.84
	Daviess County Airport, Owensboro (OWB)	1997			1				1	2.01
	Louisville International - Standiford Field, Louisville (SDF)	1997			1	2			3	1.69
		2000		1	1				2	1.10
Louisiana	Baton Rouge Metropolitan Airport, Baton Rouge (BTR)	1998				1			1	0.71
	Lakefront Airport, New Orleans (NEW)	1997		1					1	0.57
		1998		1					1	0.57
	Monroe Regional Airport, Monroe (MLU)	1999				1			1	1.61
		2000			1	1			2	3.22
	New Orleans International - Moisant Field, New Orleans (MSY)	1997				1			1	0.61
		2000			1	1			2	1.20
Maine	Bangor International, Bangor (BGR)	1998		1	1				2	2.03
		2000				1			1	1.12
	Portland International Jetport, Portland (PWM)	1997				1			1	0.78
		1998				1			1	0.78
		1999				2			2	1.60

State	Airport Name, City (Airport Code)	Year	Severity Category				Accident	ID	Total RI	Yearly Rate*
			A	B	C	D				
Maryland	Andrews Air Force Base, Clinton (ADW)	1997				1			1	0.82
		1998				3			3	2.42
		1999				2			2	1.99
		2000			1				1	0.96
	Baltimore - Washington International, Baltimore (BWI)	1998			1				1	0.34
		1999	1						1	0.33
		2000			2				2	0.63
	Hagerstown Regional - Henson Field, Hagerstown (HGR)	1998			1	2			3	5.05
		2000			1				1	1.90
Massachussetts	Barnes Municipal, Westfield (BAF)	1997				1			1	1.19
	Barnstable Municipal, Hyannis (HYA)	1998		1					1	0.74
	Bedford - Laurence G. Hanscom Field, Bedford (BED)	1998				1			1	0.55
		1999		1		1			2	1.01
		2000			2				2	0.94
	Boston - Logan International, Boston (BOS)	1997				1			1	0.20
		1998		2	1	1			4	0.78
		1999		2		1			3	0.60
		2000		3	5				8	1.57
	Lawrence Municipal, Lawrence (LWM)	2000			2	1			3	3.28
	Norwood Memorial Airport, Norwood (OWD)	1997				1			1	1.12
		1998				1			1	0.92
Michigan	Ann Arbor Municipal Airport, Ann Arbor (ARB)	2000			1				1	0.96
	Cherry Capital Airport, Traverse City (TVC)	1998			1				1	0.77
	Detroit - Willow Run Airport, Detroit (YIP)	1997			1				1	0.60
		1998			1	1			2	1.08
		1999				2			2	1.25
		2000	1			1			2	1.46
	Detroit Metropolitan Wayne County International, Detroit (DTW)	1997		1	1				2	0.37
		1998		1	1	4			6	1.11
		1999		1					1	0.18
		2000	1	1					2	0.36
	Gerald R. Ford International, Grand Rapids (GRR)	2000			1				1	0.73
	Jackson County - Reynolds Field, Jackson (JXN)	1999				1			1	1.42
		2000			1	1			2	3.22
	Kalamazoo - Battle Creek International, Kalamazoo (AZO)	1997	1			2			3	3.20
		2000				1			1	1.00
	Kellogg Airport, Battle Creek (BTL)	2000			1				1	1.01
Minnesota	Anoka County - Blaine Airport, Minneapolis (ANE)	1997				1			1	0.70
		1999				1			1	0.67
	Downtown Holman Field, St. Paul (STP)	1997				1			1	0.74
	Duluth International, Duluth (DLH)	1997				1			1	1.66
		2000		1	1				2	3.25
	Minneapolis - Crystal Airport, Minneapolis (MIC)	1997				1			1	0.57
		1998			1	2			3	1.67
		1999		1	1	2			4	2.14
		2000		1		1			2	1.13
	Minneapolis - Flying Cloud Airport, Minneapolis (FCM)	1997	1		1				2	1.01
		1998				2			2	0.95
		1999			2	2			4	2.08
		2000			1	1			2	1.07
	Minneapolis - St. Paul International, Minneapolis (MSP)	1997		1	2	3			6	1.22
		1998				1		1	2	0.41
		1999			3				3	0.59
		2000		1	2				3	0.57
	Rochester International, Rochester (RST)	1998	1			1			2	2.95
		2000			1	1			2	2.69
Mississippi	Gulfport - Biloxi Regional Airport, Gulfport (GPT)	1998				2			2	2.05
		1999				1			1	0.84
		2000				1			1	0.80
	Tupelo Regional Airport, Tupelo (TUP)	2000	1						1	2.11
Missouri	Columbia Regional Airport, Columbia (COU)	1999				1			1	2.41
	Joplin Regional Airport, Joplin (JLN)	1998				1			1	2.52
	Kansas City Downtown Airport, Kansas City (MKC)	1997		1	1				2	1.49

State	Airport Name, City (Airport Code)	Year	Severity Category				Accident	ID	Total RI	Yearly Rate*
			A	B	C	D				
		2000	1		1				2	1.56
	Springfield - Branson Regional Airport, Springfield (SGF)	1997	2						2	1.83
		1999				1			1	0.80
		2000				1			1	0.95
	St. Louis - Lambert International, St. Louis (STL)	1997			6	2			8	1.55
		1998	1	2	2	4			9	1.79
		1999			5	2			7	1.40
		2000			4	2			6	1.24
	St. Louis - Spirit of St. Louis Field, St. Louis (SUS)	1997				1			1	0.52
		2000		1	1	1			3	1.47
Nebraska	Lincoln Municipal Airport, Lincoln (LNK)	1998		1		1			2	1.62
		1999	1	1	1	1			4	3.18
		2000				1			1	0.87
	Omaha - Eppley Airfield, Omaha (OMA)	1997			1	1			2	1.20
		1998				1			1	0.58
		1999				1			1	0.53
		2000			2	1			3	1.79
Nevada	Elko Municipal, Elko (EKO)	1998				1			1	3.93
	Las Vegas - McCarran International, Las Vegas (LAS)	1997	1		1				2	0.42
		1998		1	3	1			5	1.06
		1999			3	1			4	0.74
		2000			2				2	0.38
	North Las Vegas Airport, Las Vegas (VGT)	1997	1	1					2	0.73
		1998		1	3				4	1.52
		1999		2		1			3	1.31
		2000		2	3	12			17	7.54
	Reno - Tahoe International, Reno (RNO)	1997			1	1			2	1.23
		1999				2			2	1.31
		2000		1					1	0.67
New Hampshire	Manchester Airport, Manchester (MHT)	1997				1			1	1.02
New Jersey	Caldwell Airport, Caldwell (CDW)	1997				1			1	0.52
		2000				1			1	0.50
	Millville Municipal, Millville (MIV)	1998		1					1	0.00
	Morristown Municipal, Morristown (MMU)	1998			1	1			2	0.76
	Newark International, Newark (EWR)	1997		1	1				2	0.43
		1998		1	6	1			8	1.73
		1999	1			2			3	0.65
		2000		1	4				5	1.09
	Teterboro Airport, Teterboro (TEB)	1997		2	1			1	4	1.93
		1998		1		1			2	0.89
		1999		1		2			3	1.20
		2000			2	3			5	1.77
	Trenton Mercer Airport, Trenton (TTN)	1998				1			1	0.82
New Mexico	Albuquerque International Sunport, Albuquerque (ABQ)	2000	1	1	1	1			4	1.72
	Four Corners Regional, Farmington (FMN)	1999		1					1	0.93
New York	Albany International, Albany (ALB)	1997				1			1	0.76
		2000			1	1			2	1.38
	Binghamton Regional, Binghamton (BGM)	1997	1						1	2.14
	Buffalo International, Buffalo (BUF)	2000			1				1	0.60
	Dutchess County Airport, Poughkeepsie (POU)	2000			1				1	0.81
	Farmingdale - Republic Airport, Farmingdale (FRG)	1997				1			1	0.42
		1998				1			1	0.42
		1999	1		4				5	2.09
		2000			1				1	0.47
	Long Island McCarthur International, Islip (ISP)	2000	1			2			3	1.26
	New York - John F. Kennedy International, New York (JFK)	1997		1	1	2			4	1.10
		1998		1	1				2	0.56
		1999	1		2	2			5	1.41
	New York - La Guardia International, New York (LGA)	1997		1		1	1		3	0.85
		1998	1		2				3	0.83
		1999			2				2	0.54
		2000	1		1	1			3	0.77
	Niagra Falls International, Niagra Falls (IAG)	1997				2			2	4.16
	Rochester - Greater Rochester International, Rochester (ROC)	1997			1				1	0.56

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			A	B	C	D				
		1998				1			1	0.53
		1999			1	1			2	1.05
		2000				2			2	1.12
	Stewart International, Newburgh (SWF)	1997			1				1	0.63
		2000			1				1	0.73
	Syracuse Hancock International, Syracuse (SYR)	1998			1	1			2	1.33
		2000			1				1	0.71
	Tompkins County Airport, Ithaca (ITH)	2000				1			1	1.91
	Utica International, Utica (UCA)	2000				1			1	1.86
	White Plains - Westchester County Airport, White Plains (HPN)	1998	1						1	0.51
		1999	1						1	0.45
		2000			1	2			3	1.38
North Carolina	Charlotte - Douglas International, Charlotte (CLT)	1997		1		1			2	0.44
		1998	2						2	0.44
		1999	1						1	0.22
		2000			2				2	0.43
	Greensboro -Piedmont Triad International, Greensboro (GSO)	1997		1	1	1			3	2.46
		2000			1				1	0.72
	Raleigh - Durham International, Raleigh (RDU)	1997			2				2	0.83
		1999				2			2	0.69
		2000	1		2				3	1.01
	Smith Reynolds Airport, Winston-Salem (INT)	2000				1			1	1.38
	Wilmington International, Wilmington (ILM)	1997				1			1	1.43
		1998			1	1			2	2.81
		1999				1			1	1.34
		2000		1		1			2	2.36
North Dakota	Fargo - Hector International, Fargo (FAR)	1997			1				1	1.23
		1998				1			1	1.12
		1999		1		3			4	4.38
	Grand Forks International, Grand Forks (GFK)	1997			1				1	0.56
		1998				1			1	0.47
		2000				1			1	0.42
Ohio	Akron Fulton International, Akron (AKR)	1999				1			1	0.00
	Bolton Field Airport, Columbus (TZR)	1997				2			2	0.00
	Cleveland - Hopkins International, Cleveland (CLE)	1997	1		4	1			6	1.93
		1998			3	3			6	1.94
		1999			2	1			3	0.93
		2000			1				1	0.30
	Dayton International, Dayton (DAY)	1997				1			1	0.69
		1998				1			1	0.65
	Ohio State University Airport, Columbus (OSU)	1997			1				1	0.88
	Toledo Express Airport, Toledo (TOL)	1997				1			1	1.02
	Youngstown-Warren Regional Airport, Youngstown (YNG)	1998			1				1	0.91
Oklahoma	Mc Alester Regional Airport, Mc Alester (MLC)	1997	1						1	0.00
	Tulsa - Richard Lloyd Jones Jr. Airport, Tulsa (RVS)	1998				2			2	0.73
		1999			1	4			5	1.84
		2000				1			1	0.39
	Wiley Post Airport, Oklahoma City (PWA)	2000				1			1	1.15
	Will Rogers World Airport, Oklahoma City (OKC)	1999			2				2	1.22
Oregon	Klamath Falls International, Klamath Falls (LMT)	1997			1				1	1.67
	Mahlon Sweet Field, Eugene (EUG)	1999		1		1			2	1.76
	Portland - Hillsboro Airport, Portland (HIO)	1998		1		1			2	0.87
	Portland - Troutdale Airport, Portland (TTD)	2000			3	2			5	6.66
	Portland International, Portland (PDX)	2000		1					1	0.31
	Roberts Field Airport, Redmond (RDM)	1997			1				1	2.49
		2000				2			2	3.58
Pennsylvania	Allegheny County Airport, Pittsburg (AGC)	1997				1			1	0.67
		1998				1			1	0.73
	Lancaster Airport, Lancaster (LNS)	1997		1		1			2	1.69
		1998				2			2	1.82
	Lehigh Valley International, Allentown (ABE)	1999			2				2	1.37
	Philadelphia International, Philadelphia (PHL)	1997			1				1	0.21
		1998	1	1	3				5	1.07

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			A	B	C	D				
		1999		1					1	0.21
		2000		1	2				3	0.62
	Pittsburgh International, Pittsburgh (PIT)	1997			1				1	0.22
		1998		1	3				4	0.89
		2000			1			1	2	0.45
	Reading Regional Airport, Reading (RDG)	1999			1	1			2	1.47
Puerto Rico	San Juan - Luis Munoz Marin International, San Juan (SJU)	1997			1	1			2	1.08
		1998			1				1	0.50
		1999			2	4			6	2.68
Rhode Island	Providence - Green State Airport, Providence (PVD)	1998			1	1			2	1.28
		1999	1		1	3			5	3.20
		2000			2	2			4	2.57
South Carolina	Charleston Air Force Base/International Airport, Charleston (CHS)	1997			1				1	0.74
		1999			2	1			3	2.18
		2000				2			2	1.47
	Myrtle Beach International, Myrtle Beach (MYR)	1997				1			1	1.74
South Dakota	Rapid City Regional, Rapid City (RAP)	2000				1			1	1.75
	Sioux Falls - Joe Foss Field, Sioux Falls (FSD)	1997			1				1	1.19
		1998		1	1	1			3	3.10
		2000				1			1	1.05
Tennesse	Knoxville - McGhee-Tyson Airport, Knoxville (TYS)	1998			3				3	2.02
		1999				1			1	0.67
		2000				4			4	2.69
	Lovell Field Airport, Chattanooga (CHA)	1997				1			1	1.10
	Memphis International, Memphis (MEM)	1997			1	2			3	0.81
		1998			2				2	0.55
		1999			1				1	0.27
		2000			1	1			2	0.52
	Nashville International, Nashville (BNA)	1997				1			1	0.46
		1998			1	1			2	0.88
		1999			2	1			3	1.24
		2000				1			1	0.40
Texas	Abilene Regional Airport, Abilene (ABI)	1997				1			1	1.30
		1998			1				1	1.22
	Amarillo International, Amarillo (AMA)	1997			1				1	1.36
		2000			1				1	0.83
	Austin - Bergstrom International, Austin (AUS)	1997		1	1	2			4	1.99
		1998			1				1	0.53
		1999	1						1	0.54
	Corpus Christi International, Corpus Chrisi (CRP)	1997				1			1	0.81
	Dallas - Addison Airport, Dallas (ADS)	1997		1		1			2	1.17
		1998	1		1	1			3	1.71
		1999			1	1			2	1.16
		2000			1				1	0.61
	Dallas - Love Field, Dallas (DAL)	1997		1	1	1			3	1.31
		1998			1	2			3	1.27
		2000				1			1	0.39
	Dallas-Ft. Worth International, Dallas (DFW)	1997	1	1	3	3			8	0.86
		1998		1	4				5	0.54
		1999	1	1	5				7	0.81
		2000		1		2			3	0.35
	El Paso International, El Paso (ELP)	1997				1			1	0.73
		1999			1				1	0.69
	Fort Worth Meacham International, Fort Worth (FTW)	1997				1			1	0.26
		1998		1					1	0.26
		2000				1			1	0.33
	George Bush Intercontinental, Houston (IAH)	1998				1			1	0.22
		1999			1				1	0.22
	Grand Prarie Municipal, Grand Prarie (GPM)	1998				1			1	1.11
	Gregg County Airport, Longview (GGG)	1997				1			1	1.15
		1998			1				1	1.05
	Houston - David Wayne Hooks Memorial Airport, Houston (DWH)	1999				3			3	1.09

State	Airport Name, City (Airport Code)	Year	Severity Category				Accident	ID	Total RI	Yearly Rate*
			A	B	C	D				
		2000			1	2			3	1.37
	Houston - Hobby International, Houston (HOU)	1997			1				1	0.38
		1998	1			1			2	0.78
		1999		1		1			2	0.77
		2000			1				1	0.40
	Laredo International, Laredo (LRD)	1998			1				1	1.35
	Lubbock International, Lubbock (LBB)	1997				1			1	1.14
		1999				1			1	0.82
		2000				2			2	1.56
	Mathis Field, San Angelo (SJT)	1999				1			1	1.03
	Midland International, Midland (MAF)	1997				1			1	1.19
	San Antonio International, San Antonio (SAT)	1997			4				4	1.56
		1998			2	1		1	4	1.46
		1999		1	1	2			4	1.56
		2000			2				2	0.81
	Southeast Texas Regional Airport, Beaumont - Port Arthur (BPT)	1997				1			1	1.83
		1999		1					1	1.80
	Sugar Land Municipal - Hull Field, Houston (SGR)	2000			1				1	NA
	Tyler Pounds Airport, Tyler (TYR)	2000			1				1	0.96
	Valley International, Harlingen (HRL)	1997				1			1	1.56
	Waco Regional Airport, Waco (ACT)	2000		1					1	1.75
Utah	Salt Lake City International, Salt Lake City (SLC)	1997		1	1				2	0.54
		1998				1			1	0.27
		1999			2	1			3	0.81
		2000		1	1	2			4	1.09
Vermont	Burlington International, Burlington (BTV)	1998	1						1	0.85
Virgin Islands	Charlotte Amalie - Cyril King International, St. Thomas (STT)	1998	1			1			2	1.90
		1999				1			1	0.99
Virginia	Manassas Regional Airport, Manassas (HEF)	1997				1			1	0.77
	Norfolk International, Norfolk (ORF)	1999			1				1	0.71
	Richmond International, Richmond (RIC)	1997			1	1			2	1.36
		1998				1			1	0.71
	Roanoke Regional - Woodrum Field, Roanoke (ROA)	1997			1				1	0.95
		1998			2	1			3	2.82
		1999				1			1	0.97
	Washington Dulles International, Dulles (IAD)	1997				1			1	0.29
		1998				2			2	0.50
		2000				1			1	0.21
Washington	Bellingham International, Bellingham (BLI)	1998				1			1	1.42
	Felts Field, Spokane (SFF)	2000				1			1	1.33
	Grant County International, Moses Lake (MWH)	1998				1			1	0.74
		1999	1						1	0.78
	Olympia Airport, Olympia (OLM)	1997				1			1	1.90
	Renton Municipal Airport, Renton (RNT)	1997				2			2	2.02
		1998				1			1	0.99
		2000				1			1	0.73
	Seattle - Boeing Field - King County International, Seattle (BFI)	1997		1	1				2	0.54
		1998	1			1			2	0.58
		1999		1	1				2	0.61
		2000			1	2			3	0.82
	Seattle - Tacoma International, Seattle (SEA)	1997	1		1	1			3	0.78
		1998				1			1	0.25
		1999			1	3			4	0.92
		2000				1			1	0.22
	Snohomish County - Paine Field, Everett (PAE)	1997				1			1	0.55
		1999				1			1	0.49
		2000				1			1	0.50
	Tri-Cities Airport, Pasco (PSC)	1998		1	1				2	2.26
		1999				1			1	1.04
		2000			1				1	1.08
	Walla Walla Regional Airport, Walla Walla (ALW)	2000				1			1	2.35

State	Airport Name, City (Airport Code)	Year	Severity Category				Accident	ID	Total RI	Yearly Rate*
			A	B	C	D				
	Yakima Air Terminal - McAllister Field, Yakima (YKM)	1998			1				1	1.82
West Virginia	Charleston - Yeager Airport, Charleston (CRW)	1997		1					1	0.99
		2000				1			1	1.13
	Morgantown Municipal, Morgantown (MGW)	2000		1					1	2.05
Wisconsin	Dane County Regional - Truax Field, Madison (MSN)	1997			1				1	0.69
		1998			1				1	0.69
		2000				1			1	0.80
	Green Bay - Austin Straubel International, Green Bay (GRB)	2000			1	2			3	4.58
	Kenosha Regional Airport, Kenosha (ENW)	1998				1			1	1.27
	Milwaukee - General Mitchell International, Milwaukee (MKE)	1997			1				1	0.47
		1998		2	1	1			4	1.83
		1999		2		1			3	1.35
		2000	1		1	1			3	1.35
	Outagamie County Regional Airport, Appleton (ATW)	1999			1	1			2	3.24
	Rock County Airport, Janesville (JVL)	1999				1			1	1.21
	Wittman Regional Airport, Oshkosh (OSH)	2000				2			2	1.92
Grand Total			87	169	478	622	3	10	1369	

*Rate of runway incursions per 100,000 operations
NA: Rate is not available due to unreported number of operations at the airport