



U.S. House of Representatives
Committee on Transportation and Infrastructure

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February 12, 2008

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SUMMARY OF SUBJECT MATTER

TO: Members of the Subcommittee on Aviation
FROM: Subcommittee on Aviation Staff
SUBJECT: Hearing on "Runway Safety"

PURPOSE OF HEARING

The Subcommittee on Aviation will meet on Wednesday, February 13, 2008, at 2:00 p.m., in room 2167 of the Rayburn House Office Building, to receive testimony regarding runway safety.

BACKGROUND

Record numbers of people are flying. In 2006, more than 740 million passengers flew in the United States and the Federal Aviation Administration (FAA) predicts that this figure will reach one billion by 2015, and 2 to 3 billion by 2025.¹

During 2007, in support of this growing activity, the nation's air traffic control towers handled a total of 63.1 million flights and, based on current FAA projections, this number can be expected to grow by 2 percent annually in the years ahead.² That growth represents not only a dramatic increase in the demand on the air traffic control system as a whole, but will also result in a substantial and continuing increase in ground operations.

These ground operations include take offs and landings, taxiing operations, movement to and from gates, and the movement of airport ground vehicles to support aircraft and airport operations. Maintaining safe operations in this environment is a major concern. The National Transportation Safety Board (NTSB), beginning as far back as 1990, has annually listed runway

¹ FAA, 2008 – 2012 FAA Flight Plan (2007), at 30.

² Data for both 2007 operations and projected growth provided by the FAA, Forecast and Statistics Branch, Aviation Policy and Plans (Jan. 14, 2008).

safety on its “Most Wanted List of Transportation Improvements.”³ Further, the Department of Transportation’s Office of the Inspector General (DOT IG) in its fiscal year (FY) 2008 DOT *Top Management Challenges* stated that “the seriousness of these incidents underscores the need for continual proactive and concerted efforts, including actions to address technological as well as programmatic solutions for improving runway incursions.”⁴

I. Runway Incursions

The Government Accountability Office (GAO) recently issued a report on *Aviation Runway and Ramp Safety*.⁵ In its report, the GAO defines a runway incursion as, “any occurrence in the 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 when an aircraft is taking off, intending to take off, landing, or intending to land.”⁶ GAO reports that the rate of runway incursions in 2007 had increased to 6.05 incidents per million operations. This is a 12 percent increase over 2006 and the highest since 2001 when the rate reached 6.1 incidents per million operations.⁷ At the same time, the number of severe runway incursions dropped from 53 incidents in 2001 to 24 in 2007.⁸ However, 10 severe runway incursions occurred during the first quarter of 2008.⁹ The GAO also notes that between 2003 and 2006 general aviation aircraft were involved in 72 percent of all runway incursions.¹⁰

Runway incursions are measured as the “rate of incidents per million operations.” However, FAA also categorizes each incident according to its severity using an A, B, C, and D scale. A is the most severe and D is the least. The following chart explains this classification system:¹¹

Least Severe	→		Most Severe
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 potential collision.	Separation decreases and there is significant potential for collision.	Separation decreases and participants take extreme action to narrowly avoid a collision, or the event results in a collision.

Runway incursions, in addition to being classified according to severity, are also grouped according to the “type” or “cause” of the incursion. There are three types of incidents, which are:

³ National Transportation Safety Board, *Most Wanted Safety Improvements* (November 2007) (The NTSB has recommended safer ground operating systems and direct warning to pilots of possible runway incursions).

⁴ DOT IG *Top Management Challenges for 2008*, Report PT-2008-008 (Nov. 15, 2007), at 24.

⁵ U.S. GAO, *Aviation Runway and Ramp Safety: Sustained Efforts to Address Leadership Technology, and Other Challenges Needed to Reduce Accidents and Incidents* (November 2007).

⁶ *Id.* at 8. (According to an Oct. 1, 2007, FAA Fact Sheet, beginning in FY 2008, the FAA will use the International Civil Aviation Organization’s more inclusive definition for runway incursions that covers “any unauthorized intrusion onto a runway, regardless of whether there is a potential conflict.”)

⁷ *Id.* at 9.

⁸ Data provided by the Air Traffic Organization, FAA (Feb. 6, 2008).

⁹ Listing of severe incursions, first quarter 2008, provided by the GAO (Feb. 4, 2008).

¹⁰ GAO *Runway Safety Report* at 10.

¹¹ FAA, *Runway Safety Report* (September 2007), at 16.

(1) an operational error or deviation that involves an air traffic controller giving directions that fail to maintain separation or cause an aircraft to use an unauthorized runway; (2) a pilot deviation where a pilot does not follow the direction of the controller or violates a Federal Aviation Regulation; or (3) a movement of airport vehicles (including pedestrians), whose failure to obey directions or instructions results in a possible incident.¹²

The following chart lists some of the runway incursion events that have occurred during 2007. Each of these was either a severity level A or B event and each involved commercial airliners with passengers on board. Where possible, the number of passengers is listed.

Examples of Recent Runway Incursion Incidents¹³

Date of Incident	Airport	Aircraft Involved	# of Passengers	Severity
Jan. 5, 2007	Denver	Key Lime Air Swearingen SW4 and Frontier Airbus A319	59	A
<i>Description: The landing Frontier aircraft conducted go-around procedure after seeing the Key Lime Air aircraft on the runway, missing each other by about 50 feet.</i>				
Feb. 2, 2007	Denver	United Airlines B-737 and Snowplow	101	A
<i>Description: The United aircraft was landing when it sighted a snowplow at the end of the runway. Crew reversed thrust and applied brakes to avoid colliding.</i>				
May 4, 2007	Virgin Islands	American B-757 and Cessna C208	N/A	A
<i>Description: The Cessna crossed a runway on which an American 757 was departing, causing the 757 to fly about 100 feet over the Cessna.</i>				
May 6, 2007	Los Angeles	Skywest Embraer 120 and Virgin Air A346	N/A	B
<i>Description: The Virgin Air aircraft received clearance and landed while the Skywest aircraft, which had just landed on the same runway, was still slowly exiting onto a taxiway</i>				
May 26, 2007	San Francisco	Republic Embraer 170, Skywest Embraer 120	27	A
<i>Description: The departing Republic aircraft flew over the Skywest aircraft at intersecting runways, missing each other by an estimated 30-150 feet.</i>				
July 11, 2007	Ft. Lauderdale-Hollywood	Delta B-757 and United Airbus A320	172	A

¹² Id. at 17.

¹³ GAO Runway Safety Report at 80 (This table includes data provided by the GAO on the December 2 and December 6 incidents received after the GAO report was published. It also includes more precise categorization and description data provided by the GAO).

<i>Description: The Delta aircraft touched down, but had to become airborne again when it sighted the United A320 approaching the same runway, missing each other by less than 100 feet.</i>				
July 19, 2007	Chicago O'Hare	United B-737 and US Airways B-737	N/A	A
<i>Description: The United aircraft exited the wrong taxiway and taxied underneath the path of the arriving US Airways aircraft, missing each other by 50 to 70 feet.</i>				
Aug. 16, 2007	Los Angeles	WestJet 737 and Northwest Airbus A320	296	B
<i>Description: The departing Northwest aircraft came within 37 feet of colliding with the taxiing WestJet aircraft that was about to cross the same runway.</i>				
Dec. 2, 2007	Baltimore- Washington	US Airways/ America West Airbus A320 and ComAir Regional Jet1	N/A	B
<i>Description: Two aircraft came within 300 feet of colliding at intersecting runways after the departing ComAir aircraft jet flew over the landing US Airways aircraft.</i>				
Dec. 6, 2007	Newark Liberty	Continental Airlines B-737 and Continental Express Embraer E145	N/A	B
<i>Description: Two aircraft came within 200-400 feet of colliding when the landing Continental aircraft flew over a Continental Express aircraft that was taxiing on the same runway.</i>				

II. GAO Runway Safety Report Findings

The GAO's Runway Safety Report discusses the factors that may be contributing to the current increase in the runway incursion rate. It also identifies concerns with FAA's runway safety efforts.

A. Findings:

- **FAA National Runway Safety Plan.** The GAO states that the FAA National Runway Safety Plan is out of date and that the agency's runway safety incursion efforts are uncoordinated.
- **Runway Safety Office Director's Position.** The report questions the Runway Safety Office's effectiveness during the two years it was without a director. The position was filled in August of 2007.
- **Controller Fatigue.** GAO states that controller fatigue may play a role in runway safety, noting that controllers are working 6-day weeks due to staffing shortages.¹⁴

¹⁴ The NTSB recommended that the FAA and the National Air Traffic Controllers Association (NATCA) work together to pursue strategies to reduce risks caused by controller fatigue. See April 10, 2007 memo from the Chairman of the NTSB to the FAA Administrator and the President of NATCA.

- ***Delays in Deployment of Runway Systems.*** The GAO raised concerns regarding delays in the deployment of runway safety systems. The Airport Surface Detection Equipment, Model X, (ASDE-X) was scheduled for deployment at 35 airports, but after four years, is only operational at eleven airports. GAO has also identified occasional problems with ASDE-X performance during periods of heavy rain and snow when it sometimes fails to locate an aircraft. However, FAA believes these are “break-in” problems associated with deploying a new system.
- ***Improve Data Gathering and Analysis.*** The GAO states that data gathered on runway incursion incidents is sometimes incomplete and does not provide analysts with enough information to draw conclusions about the cause and nature of an event. Gaps include the availability of more precise information on aircraft location, instrument settings, and conditions at the airport.¹⁵
- ***Ramp Safety.*** GAO states that incidents in the ramp areas are a potentially serious airport safety issue. However, there is insufficient data, and inadequate reporting, to make sound conclusions. Ramps are parts of the airport where controllers do not directly control aircraft and vehicle movements.

B. GAO Recommendations:

- ***The Office of Runway Safety Should Lead the Agency’s Runway Safety Efforts.*** The FAA should prepare a new a national plan, setting near and longer term goals, with timeframes and resource requirements.
- ***Develop a Mitigation Plan that Addresses Controller Overtime.*** The FAA should develop incentives to attract controllers to high demand airports to lessen workload and overtime requirements.
- ***Develop and Implement a Non-punitive Data Reporting System for Controllers.*** A non-punitive data reporting system would allow controllers involved in an incident to contribute information about an incursion without fear of discipline or retribution. GAO considers this a priority in assuring accurate and complete data.
- ***Develop a Mechanism to Collect and Analyze data on Ramp Accidents.*** The FAA should work with the Occupational Safety and Health Administration and the aviation industry to develop a mechanism for improving the collection of data on ramp accidents. If the data gathered indicates that there is a safety issue, the FAA and the aviation industry should work together to develop a plan to deal with the problem.¹⁶

¹⁵ DOT IG, FAA Needs to Improve ASDE-X Management Controls, Report Number AV-2008-004 (Oct 31, 2007), at IV.

¹⁶ Currently the Airports Council International and the International Air Transport Association are developing this type of database for their membership.

III. Technology

As a part of its overall strategy for improving runway safety the FAA has pursued several new technologies aimed at improving runway safety. These include:

A. *Airport Movement Area Safety System (AMASS)/Airport Surface Detection Equipment Model 3 (ASDE-3).*

AMASS/ASDE-3 is a radar-based system that tracks the movement of aircraft and ground vehicles in the airport environment and provides controllers with an automatically generated visual and audio warning of a possible runway incursion. The system is installed and operating at 34 airports.

B. *Airport Surface Detection Equipment Model X (ASDE-X)*

ASDE-X is being deployed as an upgrade to ASDE-3 equipped airports as well as for application at airports that currently do not have AMASS/ASDE-3 capabilities. ASDE-X is a surface surveillance system that processes information from radar and other sources to provide location and aircraft identification information to air traffic controllers. The FAA expects to complete system deployment in the next four years, but is considering accelerating this effort.¹⁷ The total cost of the ASDE-X system is \$806.4 million. The ASDE-X system was designed to operate using Automatic Dependent Surveillance Broadcast (ADS-B) supplied data as well so that these systems will continue in service when ADS-B systems come on-line. FAA has spent \$404.8 million or just under 50 percent of these funds.¹⁸ Deployment of ASDE-X systems is not based on the number of operations alone, airfield complexity and runway incursion risk play a significant role in deployment decisions.

C. *Runway Status Lights (RWSL)*

Runway Status Lights provide a direct visual warning to pilots when a runway is occupied. The concept behind this system is that colored lights on the runway, relying on input from ASDE-3 or ASDE-X, indicate whether or not it is safe for a pilot to proceed. RWSL systems provide "out of the loop" warnings to pilots that are supplemental to the verbal dialog with the controller. The system has been tested at Boston, Dallas/Fort Worth, and San Diego and, according to the FAA, the results have been positive. The FAA made an initial investment decision in July 2007 and is planning to make a final decision in June 2008.¹⁹

D. *Final Approach Runway Occupancy Signal (FAROS)*

FAROS, which is still in testing, uses the existing Precision Approach Path Indicator (PAPI) lights as a means to notify pilots of a possible incursion. The concept behind this system is that should ASDE-X or another surface detection system detect a possible incursion, the approach lights

¹⁷ Information provided by FAA Government and Industry Affairs Office (Jan. 29, 2008).

¹⁸ Information provided by FAA ASDE-X Program Office (Jan. 29, 2008).

¹⁹ DOT IG, FAA's Implementation of Runway Status Lights, Report Number AV-2008-021 (Jan. 14, 2008), at 2-5.

would begin flashing. A small scale evaluation has been underway at the Long Beach airport for over a year. The FAA is developing an application for larger airports and will begin operational trials at Dallas/Fort Worth by the end of FY 2008.²⁰

E. *Situational Awareness Tools*

One of the challenges for a pilot operating in a complex airport environment or in poor weather is maintaining situational awareness. A new tool, recently certified by the FAA, is the moving map display in the “automated flight bag.” It is a display that allows pilots to see where they are on the airport.²¹

Another tool is the Runway Awareness and Advisory System (RAAS). The product leverages the ground database capability of the Enhanced Ground Proximity Warning System. The RAAS provides audio updates on where the plane is at the airport, whether it is on a runway or a taxiway, and how much distance is between the aircraft and the end of the runway.²²

F. *Lower Cost Surveillance Systems*

The FAA is examining the potential of two relatively low cost systems that can provide surveillance capabilities for small and medium-sized airports. One of these is the adaptation of weather band radar systems to provide controllers with aircraft location information during ground operations. It does not “identify” the aircraft, but it does give controllers needed data on an aircraft’s location. The same is true for another technology that uses an array of millimeter wave sensors, positioned along taxiways and runways, to track aircraft position.²³

G. *Engineering Arresting Materials Systems (EMAS)*

EMAS is a special surface at the end of a runway that is made out of a crushable material. By absorbing the forward momentum of an aircraft it helps mitigate the damage caused by a runway overrun. EMAS systems are particularly helpful at geographically constrained airports where it is not possible to purchase additional land for runway protection areas. EMAS has been installed on 35 runways at 21 airports.²⁴

H. *Runway Safety Area Improvements*

Runway safety areas (RSA) provide additional open space that extends beyond the end of the runway. This enhances safety should an aircraft undershoot or overrun the runway. In 2002, the FAA developed a plan to extend RSA’s at 453 commercial service airports; 63 percent of these airports are expected to have RSA’s by the end of 2008, 88 percent will be completed by 2010, with the remainder to be completed by 2015.

²⁰ Fact Sheet, FAA, Final Approach Runway Occupancy Signal (FAROS) (Jan. 8, 2008).

²¹ GAO Runway Safety Report at 38.

²² Honeywell Corp., briefing on the Runway Awareness and Advisory System (Jan. 30, 2008).

²³ Fact Sheet, FAA, Low Cost Ground Surveillance (Jan. 16, 2008).

²⁴ Fact Sheet, FAA, Engineered Material Arresting System (Jan. 31, 2008).

I. *Other Technologies*

Industry is testing new technologies that will provide a direct warning of a runway incursion to the cockpit with audio instructions, supplied by safety logic software, on how to avoid the incursion (e.g. “pull up,” “brake”). One such technology links ASDE-X warning capability to an aircraft’s Traffic Collision and Avoidance System. This concept was tested at Syracuse and is under consideration for future development.²⁵

J. *Perimeter Taxiways*

Where land is available perimeter taxiways have proven an effective strategy for mitigating runway incursion risk. A perimeter taxiway allows landing aircraft to vacate the runway more quickly, and allows aircraft access to other parts of the airport without crossing an active runway. At Atlanta’s Hartsfield Jackson Airport, a new taxiway was built that goes around the end of the runway. This reduced the number of runway crossings each day by 560.²⁶

IV. **Recent FAA Runway Safety Initiatives**

On August 15, 2007, the FAA held a “Call to Action” meeting with industry, pilot unions, and aviation safety officials to address the issue of runway incursions.²⁷ Shortly after this session, on August 22, 2007, the FAA sent letters to key industry stakeholders outlining initiatives the FAA wants to undertake to improve runway safety. The letters recommended actions on the part of airports, air carriers, and the FAA’s Air Traffic Organization. On January 14, 2008, Acting Administrator, Bobby Sturgell, conducted a conference call with the chief executives of the major U.S. carriers to follow up on the agency’s call to action. Outlined below are the actions that the FAA has recommended:

A. **Airports:**

The FAA identified the top twenty airports that are considered to be at the greatest risk of surface accidents. The FAA requested that these airports convene a special meeting with all personnel involved in runway operations to review procedures, current runway markings, and other risk areas that need to be mitigated.

Two other airport related issues dealt with airport markings and the training of ground operations personnel. The FAA required all airports with emplanements of 1.5 million or more (approximately 75 airports) to upgrade their markings to the standard specified in the FAA’s Advisory Circular on Airport markings. The circular includes a requirement that these airports upgrade their centerline markings by June 30, 2008. FAA requested that this work be carried out on an accelerated basis. In addition, the FAA is planning to require that all commercial service airports meet this standard. According to the FAA, all airports required to upgrade their markings will be

²⁵ Honeywell Corp., briefing (Jan. 30, 2008).

²⁶ GAO Runway Safety Report at 23.

²⁷ Fact Sheet, FAA, Aviation Industry Responds to FAA’s Call to Action (Jan 24, 2008).

²⁷ Id.

completed well ahead of schedule, and more than half of the commercial service airports not currently required to do so, voluntarily agreed.

Another action concerns training for personnel involved in ground operations. While airport operational personnel are trained on a recurrent basis, other personnel, such as contractors and various service providers, are only trained once. The FAA requested that training be made recurrent for these personnel as well. The FAA circular governing this training is also in the process of being updated to reflect this expectation.²⁸

B. Air Carriers/Pilots:

The FAA asked air carriers to conduct reviews of their current procedures, specifically focusing on those activities undertaken by a flight crew between pushback and takeoff, with the objective of limiting the number of distractions for pilots during this critical phase of operations. These distractions can include check list activities, which should be done before pushback, conversations with airline dispatchers, as well as any other conversations not related to aircraft operations. The FAA requested that new procedures intended to reduce these distractions become a recurrent part of flight crew training. According to the Air Transport Association, air carriers have been supportive of these initiatives.²⁹

C. Air Traffic Organization:

The FAA is conducting a safety risk assessment of all of its taxi clearance procedures to identify areas where improvements can be made to help reduce risk. In addition, the FAA plans to implement a non-punitive information system that will allow controllers to input information about incidents, on-line, without fear of disciplinary action or retribution.

V. H.R. 2881

The FAA Reauthorization Act of 2007, H.R. 2881, which passed the House on September 20, 2007, contains several provisions that focus on runway incursion issues. This includes significant funding increases for runway reduction efforts. Section 102 (f) of H.R. 2881 provides \$42 million over four years for runway incursion reduction programs, as well as \$74 million for the acquisition and installation of runway status lights.

In addition, section 305 requires that the FAA develop a Strategic Runway Plan that addresses goals to improve runway safety that are focused on near and long term needs to reduce the runway incursion rate. It also requires that the FAA identify the resources necessary to do this, and that it develop runway safety metrics and a tracking system.

H.R. 2881 also includes a requirement that systems be developed that provide accurate and timely warnings to controllers and flight crews of potential incursions.

²⁸ Id.

²⁹ Air Transport Association Information Sheet, FAA Runway Safety Initiative (Jan. 29, 2008).

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