



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

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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: An Update"

**PURPOSE OF HEARING**

The Subcommittee on Aviation will meet on Thursday, September 25, at 10:00 a.m., in room 2167 of the Rayburn House Office Building, to receive testimony on Runway Safety: An Update. This hearing is a follow-up to the Subcommittee's February 13<sup>th</sup> hearing entitled "Runway Safety."

**BACKGROUND**

In 2007, U.S. airlines carried 769.4 million scheduled domestic and international passengers – a record number. The Federal Aviation Administration ("FAA") forecasts that, from 2008 through 2021, aviation passenger traffic will increase by 49 percent, to 1.16 billion passengers annually.<sup>1</sup>

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 FAA projections in January 2008 this number was expected to grow by 2 percent annually in the years ahead.<sup>2</sup> This growth has not materialized, in fact compared to 2007, operations in the first six months of 2008, decreased by almost 3 percent, according to the FAA. An increase or a decrease in air operations also affects 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 requires constant attention. The National Transportation Safety Board ("NTSB"), beginning as far back as 1990, has annually listed runway safety on its "Most Wanted List of Transportation Improvements."<sup>3</sup> Further, the Department of Transportation's Inspector General ("DOT IG") in its fiscal year ("FY") 2008 Department of

<sup>1</sup> FAA, 2009 – 2013 FAA Flight Plan (2008), at 30.

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

<sup>3</sup> 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.

Transportation *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 safety.”<sup>4</sup>

## I. Runway Incursions

The Government Accountability Office (“GAO”) issued a report in November 2007 on *Aviation Runway and Ramp Safety*.<sup>5</sup> A runway incursion is “any unauthorized intrusion onto a runway, regardless of whether or not an aircraft presents a potential conflict.”<sup>6</sup> GAO reports that the rate of runway incursions in FY 2007 increased to 6.05 incidents per million operations, and in the first three quarters of FY 2008 this increased to 6.72. This is a 12 percent increase over FY 2006 and the highest since FY 2001 when the rate reached 6.1 incidents per million operations.<sup>7</sup> At the same time, the number of severe runway incursions dropped from 53 incidents in FY 2001 to 24 in FY 2007.<sup>8</sup> However, 10 severe runway incursions occurred during the first quarter of 2008.<sup>9</sup> Since then, runway incursions have persisted at a slower rate than in the first quarter. Fourteen additional severe runway incursions have occurred through September 22, 2008, to yield the same number (24 total) as in FY 2007.<sup>10</sup> The GAO also notes that between FY 2005 and August 2008, a general aviation aircraft was involved in 67 percent of all runway incursions.<sup>11</sup>

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:<sup>12</sup>

Least Severe	→		Most Severe
Category D	Category C	Category B	Category A
No immediate safety consequences but meets the definition of a runway incursion.	Ample time and/or distance to avoid a collision.	Separation decreases and there is significant potential for collision, which may result in a time critical corrective action.	An accident (as defined by ICAO Annex 3) or a serious incident in which a collision was narrowly avoided.

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: (1) an operational error or deviation that involves an air traffic controller giving directions that fail to

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

<sup>5</sup> GAO, *Aviation Runway and Ramp Safety: Sustained Efforts to Address Leadership Technology, and Other Challenges Needed to Reduce Accidents and Incidents*, GAO-08-29 (November 2007).

<sup>6</sup> FAA, *Runway Safety Report: Trends and Initiatives at Towered Airports in the United States, FY 2004 through FY 2007* (June 2008), at 4.

<sup>7</sup> GAO *supra* note 5, at 9. Effective FY 2008, the FAA began categorizing runway incursions using the ICAO definition of incursions and severity of incursions. These statistics are based on FAA’s definition prior to FY 2008. Using FAA’s new definition of runway incursions, there have been 16.33 incidents per million operations during the first 3 quarters of FY 2008.

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

<sup>9</sup> Data provided by GAO (Feb. 4, 2008).

<sup>10</sup> Data provided by GAO (Sept. 22, 2008).

<sup>11</sup> *Id.*

<sup>12</sup> FAA, *supra* note 6, at 38.

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.<sup>13</sup> In FY 2007, 28 percent were operational errors, 57 percent were pilot deviations, and 15 percent were airport vehicles and pedestrian errors.<sup>14</sup>

## II. GAO Findings and Status of Previous Recommendations

The GAO's November 2007 Runway Safety Report identifies factors contributing to an increase in the runway incursion rate. The GAO found that the FAA National Runway Safety Plan was out of date and uncoordinated. It noted concerns with controller fatigue, delays in runway safety system deployment, ramp area safety, and data gathering and analysis of runway incursions. The report also made recommendations that FAA prepare a new National Runway Safety Plan with specific short and long-term goals, develop a mitigation plan to address controller overtime, create a non-punitive reporting system for controllers, and develop a mechanism to collect and analyze data on ramp accidents.<sup>15</sup>

GAO has praised FAA's progress on several fronts in its follow-up audit since the November 2007 report. Specifically, GAO noted that in FY 2008, the FAA hired a director for the Office of Runway Safety and re-evaluated its National Runway Safety Plan. The FAA issued new traffic procedures and promoted changes in airport layout, markings, signage, and lighting. The FAA deployed and tested new technology including technology deployed at 39 airports to allow air traffic controllers to identify aircraft on the ground and of those 22 with runway status lights. Forty-two airports were selected based on their incursion data to receive safety reviews and improved signage and markings were installed. The FAA also created and implemented an air traffic controller voluntary safety reporting program. However, GAO<sup>16</sup> indicated that the FAA could improve runway safety by further addressing human factors by increased training for pilots and air traffic controllers as well as revising procedures.<sup>17</sup>

## 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 and discussed in depth at the February 13, 2008, hearing. 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

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<sup>13</sup> Id. at 16.

<sup>14</sup> FAA, Runway Safety Data and Statistics, (September 22, 2008), [http://www.faa.gov/runwaysafety/data/ri\\_tot.cfm](http://www.faa.gov/runwaysafety/data/ri_tot.cfm).

<sup>15</sup> Currently the Airports Council International and the International Air Transport Association are developing this type of database for their membership.

<sup>16</sup> Data provided by GAO (Sept. 22, 2008).

<sup>17</sup> The U.S. Office of Special Counsel recently referred several whistleblower concerns regarding runway safety to the DOT for investigation and corrective action as warranted.

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 a surface surveillance system that processes information from radar and other sources to provide location and aircraft identification information to air traffic controllers. The ASDE-X system provides controllers with a visual representation of the traffic situation on the airport movement area and arrival corridors.

The ASDE-X system is currently operational at 17 airports and the remaining 18 systems are in various stages of the implementation process. The FAA expects to complete deployment of the majority of the remaining systems by the end of 2010. According to the FAA, deployment of ASDE-X systems is not based on the number of operations alone; airfield complexity and runway incursion risk were included in the September 2005 business case/site selection analysis.

The total cost of the 35 ASDE-X systems is \$806.4 million; \$549.8 million for system deployment and \$256.6 million to maintain the systems for their 30-year lifecycle. FAA has spent \$404.8 million. Since the ASDE-X system was designed to receive Automatic Dependent Surveillance Broadcast ("ADS-B") messages, these systems will continue in service when ADS-B systems come on-line.

**C. *Runway Status Lights ("RWSL")***

Runway Status Lights provide a direct visual warning to pilots when a runway is occupied. Through a set of in-pavement red lights, RWSL indicate to pilots and vehicle operators that a runway is unsafe for entry or crossing or that a runway is unsafe for departure. They operate automatically based on surface and approach surveillance without the need for controller input. In all cases, runway status lights indicate runway status only; they do not indicate clearance. Clearance continues to be provided by air traffic control. The system has been positively tested at Dallas/Fort Worth and San Diego and, according to the FAA, additional operational evaluations will be conducted at Los Angeles and Boston in 2009 and 2010. During June 2008, the FAA deployed RWSLs to 22 major airports.<sup>18</sup>

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

The FAROS extends the RWSL concept farther out to aircraft on final approach to a runway, providing a visual signal to indicate to aircraft on approach that a runway is occupied and may be unsafe for landing. In its current implementation, FAROS provides its visual signal by flashing Precision Approach Path Indicator lights. Basic FAROS capability using non-radar ground surveillance methods has been under evaluation at Long Beach since August 2006. An enhanced implementation of FAROS -- one that leverages ground and approach surveillance radar -- is being developed and began operational evaluation at Dallas/Fort Worth during 2008.<sup>19</sup>

**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

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<sup>18</sup> FAA, *supra* note 6, at C-18.

<sup>19</sup> *Id.* at C-19.

map display in the Electronic Flight Bag (“EFB”). It is a display that uses global positioning system (“GPS”) technology, which allows pilots to see their position on the airport surface,<sup>20</sup> similar to GPS map aids found in passenger cars and trucks. It is being installed on many new planes, while older fleets can use portable EFBs.

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.<sup>21</sup>

#### **F. *Lower Cost Ground Surveillance (“LCGS”) Systems***

The FAA is evaluating commercially available LCGS systems for potential application at airports that are not programmed to receive ASDE technology. Two such systems were evaluated at Spokane, Washington and based on the findings of those evaluations, the FAA conducted a formal market survey to identify potential companies of LCGS systems that could meet minimum operational requirements and not exceed a specified price target. Eight vendors responded to the survey and based on that response the FAA issued a request for proposals in July of 2008. The FAA intends to install selected products at various airports as part of a pilot project to determine which products satisfy minimum operational requirements; the results of the pilot project will be used to develop a plan for further deployment.<sup>22</sup>

#### **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 is installed at 35 runway ends at 24 airports in the United States, with plans to install 15 EMAS systems at 11 additional U.S. airports.<sup>23</sup>

#### **H. *Runway Safety Area Improvements***

Runway safety areas (“RSA”) provide additional open space that extends beyond the end and to the sides of the runway. This enhances safety should an aircraft undershoot or overrun the runway. In 2000, the FAA began improving RSA's for about 453 commercial service airports; 72 percent of the improvements are expected by the end of 2008, with the remainder to be completed by 2015.<sup>24</sup> According to the GAO, 76 percent of the 1,015 runways at 561 airports were in substantial compliance with runway safety area standards as of August 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

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<sup>20</sup> Id. at 39.

<sup>21</sup> Honeywell Corp., briefing on the RAAS (Jan. 30, 2008).

<sup>22</sup> FAA, Fact Sheet on Runway Safety (July 14, 2008).

<sup>23</sup> FAA, Fact Sheet on Engineered Material Arresting System (Aug. 11, 2008).

<sup>24</sup> FAA, *supra* note 22.

(e.g. “pull up,” “brake”). One such technology links ASDE-X (and eventually ADS-B) warning capability to an aircraft’s Traffic Collision and Avoidance System. This concept was tested at Syracuse, New York and is under consideration for future development.<sup>25</sup>

#### 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, an end-round taxiway was built that reduced the number of runway crossings each day by 560.<sup>26</sup> Another end-round taxiway is scheduled to open at Dallas/Fort Worth in 2009.

### IV. 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.<sup>27</sup> 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.

#### 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, which was completed.<sup>28</sup> FAA requested that this work be carried out on an accelerated basis. In addition, the FAA asked the 492 small certified airports to voluntarily complete the installation of enhanced markings – 428 agreed to make the marking enhancements, of those, 93 airports have already done so.<sup>29</sup>

Another action involves 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

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<sup>25</sup> Honeywell Corp., *supra* note 21.

<sup>26</sup> GAO, *supra* note 5 at 23.

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

<sup>28</sup> FAA, Actions to Improve Runway Safety and Reduce Runway Incursion Incidents, Progress Report to the Aviation Subcommittee, (July 11, 2008) at 3.

<sup>29</sup> *Id.*

for these personnel as well. The FAA circular governing this training went into effect on March 31, 2008. The FAA is undertaking a rulemaking process that will make this training mandatory.<sup>30</sup>

#### **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.<sup>31</sup> All 112 active air carriers are providing pilots with simulators or other training, as recommended by the FAA, to allow pilots to practice on realistic scenarios from pushback through taxi.<sup>32</sup>

#### **C. Air Traffic Organization:**

The FAA conducted a safety risk assessment of all of its taxi clearance procedures and more explicit instructions were implemented on May 19, 2008. In addition, the FAA signed a Memorandum of Understanding with NATCA, implementing a voluntary reporting system for air traffic controllers called the Air Traffic Safety Action Plan on March 27, 2008. The FAA describes this plan as a non-punitive information system that will allow controllers to input information about incidents, on-line, without fear of disciplinary action or retribution.<sup>33</sup>

#### **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 the FAA to identify the resources necessary to do this, and to 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.

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<sup>30</sup> Id. at 4.

<sup>31</sup> Air Transport Association, Information Sheet, FAA Runway Safety Initiative, (Jan. 29, 2008).

<sup>32</sup> FAA, *supra* note 28, at 1.

<sup>33</sup> Id. at 5.

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