RUNWAY SAFETY: AN UPDATE

(110–174)

HEARING

BEFORE THE

SUBCOMMITTEE ON
AVIATION

OF THE

COMMITTEE ON
TRANSPORTATION AND
INFRASTRUCTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED TENTH CONGRESS

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September 24, 2008

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 13th 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.[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 FAA projections in January 2008 this number was expected to grow by 2 percent annually in the years ahead.[2] 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."[3] Further, the Department of Transportation's Inspector General ("DOT IG") in its fiscal year ("FY") 2008 Department of

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[1] FAA, 2009 – 2013 FAA Flight Plan (2008), 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).
[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.

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."[4]

I. Runway Incursions

The Government Accountability Office ("GAO") issued a report in November 2007 on *Aviation Runway and Ramp Safety*.[5] A runway incursion is "any unauthorized intrusion onto a runway, regardless of whether or not an aircraft presents a potential conflict."[6] 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.[7] At the same time, the number of severe runway incursions dropped from 53 incidents in FY 2001 to 24 in FY 2007.[8] However, 10 severe runway incursions occurred during the first quarter of 2008.[9] 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.[10] The GAO also notes that between FY 2005 and August 2008, a general aviation aircraft was involved in 67 percent of all runway incursions.[11]

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:[12]

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

4 DOT IG, Top Management Challenges for 2008, PT-2008-008 (Nov. 15, 2007), at 24.
5 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).
6 FAA, Runway Safety Report: Trends and Initiatives at Towered Airports in the United States, FY 2004 through FY 2007 (June 2008), at 4.
7 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.
8 Data provided by the FAA, Air Traffic Organization (Feb. 6, 2008).
9 Data provided by GAO (Feb. 4, 2008).
10 Data provided by GAO (Sept. 22, 2008).
11 Id.
12 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.[13] In FY 2007, 28 percent were operational errors, 57 percent were pilot deviations, and 15 percent were airport vehicles and pedestrian errors.[14]

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.[15]

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[16] 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.[17]

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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[13] Id. at 16.

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

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

[16] Data provided by GAO (Sept. 22, 2008).

[17] 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.[18]

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.[19]

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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[18] FAA, *supra* note 6, at C-18.
[19] 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,[20] 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.[21]

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.[22]

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.[23]

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.[24] 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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20 Id. at 39.
21 Honeywell Corp., briefing on the RAAS (Jan. 30, 2008).
22 FAA, Fact Sheet on Runway Safety (July 14, 2008).
23 FAA, Fact Sheet on Engineered Material Arresting System (Aug. 11, 2008).
24 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.[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, an end-round taxiway was built that reduced the number of runway crossings each day by 560.[26] 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.[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.

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.[28] 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.[29]

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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[25] Honeywell Corp., *supra* note 21.
[26] GAO, *supra* note 5 at 23.
[27] FAA, Fact Sheet, Aviation Industry Responds to FAA's Call to Action (Jan 24, 2008).
[28] FAA, Actions to Improve Runway Safety and Reduce Runway Incursion Incidents, Progress Report to the Aviation Subcommittee, (July 11, 2008) at 3.
[29] 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.[30]

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.[31] 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.[32]

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.[33]

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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[30] Id. at 4.
[31] Air Transport Association, Information Sheet, FAA Runway Safety Initiative, (Jan. 29, 2008).
[32] FAA, *supra* note 28, at 1.
[33] Id. at 5.

WITNESS LIST

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HEARING ON RUNWAY SAFETY: AN UPDATE

Thursday, September 25, 2008,

HOUSE OF REPRESENTATIVES,
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,
SUBCOMMITTEE ON AVIATION,
Washington, DC.

The Subcommittee met, pursuant to call, at 10:00 a.m., in Room 2167, Rayburn House Office Building, the Honorable Jerry F. Costello [Chairman of the Subcommittee] presiding.

Mr. COSTELLO. The Subcommittee will come to order. The Chair will ask all Members, staff, and everyone to turn electronic devices off or on vibrate.

The Subcommittee is meeting today to hear testimony on Runway Safety: An Update. I will give a brief opening statement, call on the Ranking Member, Mr. Petri, to give remarks or his opening statement, and then hopefully we will go directly to our witnesses.

I welcome everyone here today to our hearing on Runway Safety: An Update. Runway safety continues to be an aviation safety concern, appearing on the National Transportation Safety Board's Most Wanted List since the list was created in 1990. While we will hear today that the United States has the safest air transportation system in the world, we cannot become complacent about our safety. One accident or near accident is one too many.

According to the General Accountability Office, the overall rate for runway incursions for the first three quarters of 2008 has increased slightly compared to 2007. That, in conjunction with three near misses within three weeks over the summer, at two of our busiest airports and one last Friday at Lehigh Valley International Airport, causes me and I think everyone else concern, especially with operations decreasing almost three percent in the first six months of 2008 compared with 2007, according to the FAA.

At our February 2008 hearing on runway safety, I requested quarterly reports from the FAA on runway safety to ensure this issue remains at the top of the FAA's agenda. Further, while I am pleased that the FAA has filled its Runway Safety Office Director position after nearly two years being vacant, and that they have taken many of the recommendations from the GAO, we still need to have an update on the FAA's plans to improve runway safety.

The GAO also cites human factors, such as controller fatigue and miscommunication, as factors in runway safety, and I am interested in hearing more from the panelists, including Mr. Pat Forrey, the President of the National Air Traffic Controller Association, on this issue.

As our June 2008 hearing demonstrated, we have a controller staffing shortage and the FAA has been slow to acknowledge the problem or find a solution. As a result, controllers are being asked to work longer hours to handle increasingly congested runways and airspace. And, according to the GAO, by 2011, up to 50 percent of the controller workforce will have less than five years experience, which could affect runway safety.

The near miss this last Friday clearly demonstrates how staffing has an effect on safety. According to some reports, the Lehigh Valley International Airport near miss was a result of an inexperienced controller or trainee allowing both aircraft on the same runway. Those planes missed each other by about 10 feet. I am interested in hearing both from Mr. Krakowski and Mr. Forrey concerning that particular near miss.

I am also interested in learning more about the implementation and use of technology such as the airport surface detection equipment model ASDE-X, runway safety lights and low-cost surveillance systems. I am pleased that the Dallas/Fort Worth Airport is here to give us their perspective on these technologies.

While the House of Representatives provided $42 million for runway incursion reduction programs, $74 million for runway status light acquisition and installation, and required the FAA to submit a runway safety plan that includes a road map for the installation and deployment of systems to alert controllers and flight crews in H.R. 2881, unfortunately, the FAA Reauthorization Act that we passed on September 20th of 2007 containing those provisions and authorizations, the Senate has failed to act on that legislation. The Subcommittee will continue to provide aggressive oversight on this and other issues until these provisions become law.

As I have stated time and time again, safety must not be compromised in an effort to save money or for a lack of resources or attention. The FAA and the entire aviation community must work together so that we can do better to ensure our safety efforts remain on track. The American public deserves no less.

With that, I want to welcome our witnesses here today, and I look forward to hearing their testimony. Before I recognize Mr. Petri for his opening statement, I ask unanimous consent to allow two weeks for all Members to revise and extend their remarks, and to permit the submission of additional statements and materials by Members and witnesses. Without objection, so ordered.

At this time, the Chair would recognize the distinguished Ranking Member of the Subcommittee, Mr. Petri.

Mr. PETRI. Thank you very much, Mr. Chairman. Let me, first of all, thank you and actually the Chairman of this Full Committee for having scheduled in this Subcommittee and I think in some of the other Subcommittees an aggressive schedule of safety oversight on different aspects of transportation. It is an important subject and one that certainly our involvement in can help keep in the forefront of everyone involved in the safety system. It is clear we can have zero accidents and zero mistakes if we just close down transportation, so that is not the answer. The problem is to figure out how to take intelligent risks and also to minimize mistakes and opportunities for human error and all the rest.

This hearing is another occasion to help us learn more about what we can do and what is being contemplated to do an even better job of managing this wonderful system of mobility that we have in the United States, air mobility and all the rest, in as responsible a fashion as possible.

I certainly would like to thank the witnesses for appearing before the Subcommittee to provide an update on runway safety initiatives and on the ongoing efforts to decrease runway incursions. Though work, as has been pointed out, currently in the safest period in aviation history, as long as humans fly aircraft—and even if they are replaced by machines, which is no longer beyond the possibility—as long as aircraft fly, there will always be the potential for mechanical failure and for human error and for accidents. But the FAA, this Subcommittee, and the entire aviation community are responsible for ensuring that the U.S. has the safest national airspace system possible.

A recent Government Accountability Office report on runway incursions and runway and ramp safety found that while the rate for the most serious category of runway incursions is down from last year, 24 events out of 61 million aircraft operations, there was an anomalous—at least we hope it was an anomalous—up-tick in total runway incursions in the first quarter of this year. Therefore, we must remain vigilant in our oversight of this issue.

I am looking forward to hearing about the steps that airports, pilots, controllers, and the FAA are taking to mitigate the risk of these potentially deadly runway incursions. Clearly, there is no silver bullet to eliminate all runway incursions, but I believe that there are many ways to address runway safety, and I am interested in hearing about the many technologies currently deployed or under development to reduce incursions.

During our hearing in February, the FAA discussed several technologies, such as runway status lights, low-cost surface surveillance, that would have the potential to drastically reduce the number of runway incursions. I am interested in hearing about the progress of testing and deploying these technologies so vital to assisting controllers and pilots during critical phases of a flight.

In addition to technological innovation, I am interested in hearing about the bricks and mortar solutions, crushable concrete engineered material arresting systems that have been installed at 21 airports, improved markings and signage at airports and around perimeter taxiway like the ones at Atlanta's Airport, where runway crossings have been reduced from roughly 640 to less than 100 per day.

I am interested in hearing about what the witnesses think about these strategies and also look forward to hearing about the status of the FAA's evaluation of these measures and their plan to deploy them.

It is also important to explore whether the expected drop in enplanements will affect the funding streams necessary to continue these important projects.

I would also like to hear an update on the FAA's call to action on runway safety. I join the GAO in applauding the FAA for making runway safety a priority, but it would be important for the agency to keep programs on schedule and to continue to maintain the vigilant oversight that we are seeing now.

Beyond the flashing lights, radar, alerting systems, and concrete, it is important we address human factors that affect runway safety. Pilot alertness and situational awareness are critical to safe flights. Also, we need to get more information to pilots. It is important that we strike a balance that does not overload or distract them.

Although the National Transportation Safety Board has not cited controller fatigue as a factor causing any of the runway incursions that they have investigated, including the tragic accident in Lexington, Kentucky, some have cited controller fatigue as an area of concern, and I am certainly interested in hearing about these concerns, as well as plans to address them.

As with all safety issues, it is critical that this discussion be based on facts. We must be cautious, when discussing safety, to avoid confusing emotion with real safety concerns. Both labor and management must build a cooperative and collaborative relationship to achieve the safety benefits that we are seeking, and I am concerned that the combative posture employed by both sides will only lead to trouble.

The number if enplanements has dropped since last year, but serious runway incursions have persisted, which indicates that the risk of runway incursions has not yet been completely addressed, and it will take everyone's continued effort and cooperation to get us to the goal.

I appreciate all of our witnesses' efforts to address this important safety issue and I look forward to your testimony and thank you for being here today.

Mr. COSTELLO. The Chair thanks the Ranking Member and now will recognize the witnesses. Mr. Hank Krakowski, who is the Chief Operating Officer of the Air Traffic Control Organization, Federal Aviation Administration. He is accompanied by Mr. Wes Timmons, who will not be offering testimony, but who will be accompanying Mr. Krakowski for questions. Mr. Timmons is the National Director of Runway Safety, Federal Aviation Administration.

Dr. Gerald Dillingham, who has testified before our Subcommittee more times than he probably likes, but he has been here many times and I think has done an outstanding job. He is the Director of the Physical Infrastructure Issues with the U.S. Government Accountability Office. Mr. Patrick Forrey, who is the President of the National Air Traffic Controllers Association; Mr. John Prater, who is the President of the Air Line Pilots Association, International; and Mr. James Crites, who is the Executive Vice President for Operations, Dallas/Fort Worth International Airport.

Gentlemen, we, as you know, have a five minute rule. We will recognize you. We would ask you to summarize your testimony. Your entire statement will appear in the record.

The Chair now recognizes Mr. Krakowski.

TESTIMONY OF HANK KRAKOWSKI, CHIEF OPERATING OFFICER, AIR TRAFFIC ORGANIZATION, FEDERAL AVIATION ADMINISTRATION, ACCOMPANIED BY WES TIMMONS, NATIONAL DIRECTOR OF RUNWAY SAFETY, FEDERAL AVIATION ADMINISTRATION; DR. GERALD DILLINGHAM, DIRECTOR, PHYSICAL INFRASTRUCTURE ISSUES, U.S. GOVERNMENT ACCOUNTABILITY OFFICE; PATRICK FORREY, PRESIDENT, NATIONAL AIR TRAFFIC CONTROLLERS ASSOCIATION; CAPTAIN JOHN PRATER, PRESIDENT, AIR LINE PILOTS ASSOCIATION, INTERNATIONAL; AND JAMES M. CRITES, EXECUTIVE VICE PRESIDENT FOR OPERATIONS, DALLAS/FORT WORTH INTERNATIONAL AIRPORT

Mr. KRAKOWSKI. Good morning, Mr. Chairman, Ranking Member Petri. It is good to be here and see everybody again. Thank you for this testimony to update you on the efforts since we last met in February.

With me today is Wes Timmons, and what is important about Wes being here is that Wes is bringing leadership and stability as he continues to build up the runway safety office. I am happy to report that we have made solid progress since February and I am confident that our strategies will continue to reduce risk.

Just a reminder that at the beginning of fiscal year 2008 the FAA did adopt a new ICAO standard, which is more risk-inclusive. Therefore, year over year, from last year, you will see more events reported, because we were not reporting less serious events. I think that actually adds to the risk assessment.

Of course, Category A incursions are the most serious incidents, in which a collision is narrowly avoided; Category B are ones when you have a separation decrease, where there is a significant potential for a collision; and, of course, Category C and D are the serious events.

If the chart can be brought up, either electronically or——

Mr. COSTELLO. There it is.

Mr. KRAKOWSKI. Very good. Thank you.

I would like to just draw your attention to that. I recall being here last February, Mr. Chairman, and the concern that you had, and we had as well, is if you look at the gray line, which is the lower line on this chart, you can see that last year, which is what that line represents, the serious incursions were beginning to increase in early summer, and, as we entered the fall period, they continued to increase at an alarming rate.

Given the rate of increase that we were seeing, we had to do something to arrest that change, and what we did is, through the Call to Action, through very specific things that the Acting Administrator did in January to refocus this effort, we intended to put a tourniquet on that rate of change, and I think you can clearly see that we did arrest the increase, and we have settled the situation down.

Now, this year we still have 24 events, which is equal to what we had last year. The event in Allentown was categorized as an A, so we are 24 for 24. I would like to remind you that the 2007 24 event figure represents the safest we ever had, so we are at least on par with that. Obviously, we are not sanguine with that type of statistic; we are still having serious events going on.

The event in Allentown was a human factors issue, and one of the things we try to do is mitigate human factors through the use of technology as a safety net. ASDE-X is now being deployed in 17 towers. Sixteen additional towers are scheduled to be operational by the end of October 2010; two more in 2011. Runway status lights, which has clearly shown safety benefit, are scheduled to be installed at 22 airports beyond the ones we have in Dallas and San Diego. We have also initiated memoranda of understanding at 18 airports for runway status lights configuration and construction.

Based on our evaluations in Spokane of low-cost ground surveillance system, we have issued a request for proposal across industry to offer low-cost alternatives for those airports who do not have the funding mechanisms or the traffic density for ASDE-X deployment. Several offers are currently under review and we expect to complete those evaluations in the next few months.

We also sent, over this year, our Runway Safety Action Team to 20 of our busiest airports. These visits identified common sense opportunities for curbing runway incursion, such as new improved signage, markings, driver training, and airport training. We identified a second tier of 22 airports to visit, and we completed the analysis in July.

As part of the Administrator's Call to Action last year, the FAA required 75 of the largest airports to enhance airport markings by June of this year, and they have completed those. We have also completed rulemaking requiring enhanced markings at all part 139 airports by 2010.

Now, we can do everything right, but we still have human factors issues to tackle.

At the last hearing, I disclosed our intention to work with NATCA to implement ATSAP, the non-punitive voluntary reporting system for our traffic controllers. The ATSAP demonstration is now up and running at all the Chicago facilities, and we are gathering valuable safety information regarding events and incidents that previously have gone unreported. We intend to expand this program beyond Chicago once the program is proven.

One major component, as you mentioned, was fatigue. The FAA recently had a Fatigue Seminar and we do have a number of follow-ups in the works right now to look at controller schedules, particularly time off between shifts and how much time is needed after working a midnight shift.

We also are going to start the Runway Safety Council this fall, which we committed to, and we want to thank ALPA, NBAA, AOPA, all the user groups and communities, for working with us this year to give us the success that we showed in the chart.

Mr. Chairman, as you said, constant pressure is needed. I personally appreciate the pressure that this Committee gives on us to keep us to stay focused. Thank you.

Mr. COSTELLO. I thank you, Mr. Krakowski.

The Chair now recognizes Dr. Dillingham.

Mr. DILLINGHAM. Thank you, Chairman Costello, Mr. Petri. My testimony this morning focuses on actions FAA has taken to reduce runway incursions since we testified on this issue before you last February. I will also identify some further actions we think should be undertaken.

With regard to the actions of last year, we agree with Mr. Krakowski, FAA has given a higher priority to improving aviation safety. For example, it is establishing a Runway Safety Council to analyze the root cause of serious incursions, and it has continued to deploy and test new technologies, conduct runway safety airport reviews, and issue new air traffic procedures. FAA has also begun testing a voluntary safety reporting program for air traffic controllers. Many of the FAA initiatives are responsive to the recommendations that we made to the agency.

Mr. Chairman, despite these actions, the risk of runway collision is still high. The number of serious incursions is about the same, or the same now, this year, as it was last year. In both years, a third of the serious incursions involved a commercial aircraft. Moreover, the rate for incursions in all categories of severity increased by 10 percent. Using the ICAO definition of incursions that it recently adopted, FAA has counted nearly 1,000 incursions during fiscal year 2008. Most of these incursions involved a general aviation aircraft. These statistics do not include incursions that may have occurred at non-towered airports.

The primary causes of incursions are human factors issues, such as fatigue, miscommunication between pilots and air traffic controllers, and loss of situation awareness on the airfield by pilots. Going forward, air traffic controllers may need to be a particular focus because FAA is hiring large numbers of controllers, and the ratio of new hires to veterans is increasing. Newly certified controllers will have much less exposure to potential incursions and, therefore, may be less efficient in mitigating them. Any loss in efficiency could negatively affect runway safety.

Now, Mr. Chairman, I would like to briefly discuss some additional actions we think need to be undertaken.

First, FAA and other stakeholders must give sustained attention to runway safety, even if the number and rate of incidents decline.

Second, FAA's emphasis on serious incursions should not detract attention from less serious incursions. Serious incursions are only the tip of the iceberg. Less serious incursions can lead to more serious incursions. Therefore, the entire scope of incidents should be part of the search for solutions.

Third, FAA and the airlines could further improve runway safety by addressing human factors issues such as fatigue, expediting the deployment of technologies, and increasing training for pilots and air traffic controllers.

Finally, some version of the House FAA reauthorization bill would provide more than $100 million for runway safety initiatives.

Mr. Chairman and Members of the Subcommittee, by 2025, air traffic is projected to double or even triple. That could equate to 100,000 to 150,000 flights each day, significantly increasing the risk of incursions. The efforts that are underway today by FAA, controllers, and pilots are very promising, but must be sustained to meet the challenges of today and enhanced to meet the challenges on the horizon.

Thank you, sir.

Mr. COSTELLO. Thank you, Dr. Dillingham.

The Chair now recognizes Mr. Forrey.

Mr. FORREY. Thank you, Chairman Costello, Ranking Member Petri for the opportunity to testify today. Let me again thank you for your leadership on FAA reauthorization and express my deep disappointment that the Senate failed to pass their own bill, thus ignoring the current demise of the NAS and neglecting the needed infrastructure improvements for a safe and efficient airspace system.

Last Friday, I received news from Allentown, Pennsylvania. A Cessna landing at Lehigh Valley International Airport was given instructions to exit the runway, missed its taxiway, and was still on the runway when the tower control cleared a Mesa Airlines regional jet for takeoff. The two planes came so close to collision that the RJ actually had to swerve to avoid the Cessna and miss it by 10 feet. There were two employees in the tower at the time. Both were trainees.

On June 10th, there was a runway incursion at New Orleans Airport. There were three controllers in the tower at the time, all trainees, and the cumulative FAA experience of all three was 20 months. Supervising the operation was a controller in charge who had been in the agency for a total of all of eight months, and there was no supervisor on duty in the tower.

When I testified before this Committee in February, I implored the FAA to ensure the proper staffing of air traffic control towers. Working conditions continue to deteriorate and experienced controllers are leaving the workforce at an alarming rate. Over 3,000 controllers have left in the past 24 months since the FAA imposed their working payrolls.

The FAA is so desperate to staff its towers that it must rely on untrained and uncertified controllers to work traffic without the support of more experienced personnel. This is true not only in Allentown and New Orleans, but in some of the busiest and most complex facilities in the Nation.

The FAA has created a perfect storm. Controllers are working longer days and weeks, and fewer opportunities for rest and recovery. They are working combined positions and given more training. Fewer and fewer trainees have the luxury of learning from those with years of experience, and they are even being trained by other trainees.

Yet, the FAA refuses to meaningfully address this issue. At New Orleans, they fired the probationary controller working local control instead of the manager who allowed that situation to happen. And the terminal leader's answer to runway safety is to order controllers to state I will participate in preventing operational errors when they give a relief briefing.

The agency prefers to offer incentives designed to entice controllers to leave one understaffed facility to go work at another one. They have created a meaningless staffing standard designed to mislead Congress and the flying public into believing that no staffing problem exists. These so-called standards are based not on scientific evaluation of necessary staffing, but on the agency's financial goals.

Not surprisingly, runway incursions are up this year. Whether we compare the old FAA or the new ICAO rules, runway incursions are up. The rate of serious Category A and B incursions is also up, and operational errors in the terminal environment are up as much as 20 percent over last year.

But the FAA has done very little to substantively improve runway safety. In addition to their failure to address the staffing crisis, they have not formed local runway incursion prevention committees; they have not worked with local stakeholders to identify runway incursion hot spots; they have no new plans to construct additional end-around taxiways; they refuse to work with NATCA on new technology projects and have subsequently encountered implementation problems that might have been avoided from frontline controllers.

The only area where there has been any progress is in the development of low-cost ground surveillance systems, which may prove useful to airports where the installation of the superior ASDE-X model type system is not a viable option. It seems that only when a near catastrophic incident makes it into the evening news does the FAA react, and even then change is cosmetic more than substantive.

This July, there were two well publicized near collisions in a one-week span at JFK Airport. Both these incidents were caused by unsafe usage of perpendicular runways. Each time, controllers were forced to contend with a last second go-around incident, which, in this configuration, forces aircraft aborting a landing to cross the flight path of a departing aircraft, creating a potential for collision.

NATCA representatives at JFK have been trying for years to convince the FAA to change this procedure, but until this summer their warnings fell upon deaf ears. Only after hundreds of passengers were nearly killed did the FAA finally act and discontinue this operation.

The new rule is a no-brainer for safety; however, it barely scratches the surface. The staggering of arrivals and departures on these perpendicular runways does nothing to address the dangers when they are both being used for arrivals. Nor does it address the reciprocal application. It certainly fails to address other issues at other airports facing the same dangers.

In Detroit, for example, the FAA's Office of Aviation Oversight found that similar operations were not compliant with FAA regulations, and the operation had been halted. Yet, throughout the Country, similar unsafe operations continue unchanged. In Memphis, Boston, Newark, Philadelphia, Las Vegas, Washington-Dulles, and Houston, perpendicular runways cause the same danger and the FAA refuses to change it.

Controllers concerned about the safety of the airports under their watch are speaking out in the only arena left to them: by seeking asylum under the whistleblower protection program. The Office of Special Council has issued a letter to the Department of Transportation in response to the whistleblower findings about unsafe runway operations at Memphis and about Newark Airport, saying there is a substantial likelihood that conditions at these two airports create a substantial and specific danger to public safety. But the FAA has dismissed these claims and retaliated against the controllers.

When this panel met six months ago, we discussed serious and growing problems in runway safety. The FAA chose to ignore the warning signs presented to this Committee and disregard the advice offered by panelists. Instead, it has continued the same well-trodden FAA path, allowing the safety of the national air space system to take a back seat to bottom-line management, and their cozy relationship with the private aviation industry, and put capacity over safety.

Thank you for this opportunity to testify.

Mr. COSTELLO. Thank you, Mr. Forrey.

Captain Prater?

Mr. PRATER. Good morning, Mr. Chairman, Ranking Member Petri. Thank you for the opportunity to provide the 53,000 pilots that I represent's perspective on runway safety.

While Government and industry stakeholders have begun a number of initiatives and made some improvements in runway safety since the last hearing in February, I think we can all agree that we can make our runway environments safer.

Less than a week ago, two of my members rejected a high-speed takeoff when they saw a small Cessna still on the runway, swerving their airliner to avoid a collision in Allentown. According to the NTSB, the crew of the airliner estimated that they missed the Cessna by as little as 10 feet. I will remind that typical takeoff speeds in excess of 175 feet per second, 200 feet per second are normal, so 10 feet is less than a blink of an eye.

The truth is that any one of us could be on a flight that faces a similar threat. And, remember, there are approximately 60,000 commercial flights in U.S. airspace every day.

To make sure that the next close call or worse doesn't happen, the environments we work in every day have to catch up to the 21st century. That is why, today, the Air Line Pilots Association will challenge both Government and industry to join us in establishing a goal of zero serious runway incursions involving commercial airliners. I propose that we focus our resources and attention on that goal until it is achieved and maintained, before any catastrophic event occurs.

As you know, technological solutions are available today. They include everything from moving map displays in ADS-B to runway status lights and digital data link clearances. The testing, development, and requirements and actual implementation of these solutions are moving at a pace that won't speed up without Congress's assistance, especially in the already strapped-for-cash airline industry.

While these technologies hold the most promise for reaching our industry reach the eventual goal of zero serious incursions, they do little to address it in the near term due to funding challenges. But we don't need to sit around and wait for technology. There are simple and cost-effective steps that can improve runway safety now.

Airports around the U.S. can help pilots navigate airfields better with something as simple as a can of paint. The FAA intends to require that all Part 139 airports provide enhanced markings by no later than 2010. We would urge the airport operators to not wait for a regulation that requires these needed markings, but to include them immediately in their next facility upgrade plans during the next construction season.

Airlines can do their part by standardizing operating procedures to allow pilots to complete as much heads-down activity as possible prior to the taxi phase before takeoff and after landing and taxying to the gate. Following the guidance in the FAA's advisory circular on standard operating procedures for ground operations will reduce pilots' distractions during the taxi phase, enabling both of them to focus entirely on maintaining situational awareness.

The runway and taxiway and ramp environment demands two sets of eyes scanning for trouble at all times, with both pilots monitoring an ATC frequency instead of company radios. Using the same words and phrases around the world when navigating airfields here at home would help pilots during taxi operations as well. ALPA welcomes the FAA's recent adoption of the ICAO lineup and wait phraseology and encourages the FAA to take it one step further by adopting the ICAO phraseology for runway crossings as well. Doing so will reduce the possibility of a pilot inadvertently crossing a runway without clearance.

Let me be clear. I can attest that the potential for confusion in airport environment is already inherently high, and we shouldn't increase that confusion for foreign flight crews operating in the U.S. by using different phrases from what they hear elsewhere in the world. ALPA continues to communicate directly with our pilots and will expand that to other airline pilots through our Hold Sharp for Runway Campaign. We have encouraged our pilots to increase their vigilance when they are sitting at the controls of their airliner on the ground or in the air. We will continue to put out newsletters and other interactive tools to keep high focus on this very dangerous situation.

When it comes to airline safety, the bottom line is that demanding schedules, inadequate rest periods, and insufficient or inaccurate information can degrade the performance of even the most seasoned pilot or controller. We operate in complex and demanding environments, where the risk for a runway incursion is ever-present and growing. All of us must renew our commitment to improve safety throughout the operational environment. Together, we can make the goal of zero serious runway incursions involving commercial airliners a reality. Today, I pledge our union will work towards that goal.

Thank you.

Mr. COSTELLO. Thank you, Captain Prater.

Now, the Chair recognizes Mr. Crites.

Mr. CRITES. Chairman Costello, Ranking Member Petri, Congressman Johnson, good morning and thank you for inviting me to participate in this important hearing. I am Jim Crites, Executive Vice President of Operations for the Dallas/Fort Worth International Airport. I also serve as the Aviation Group Chair for the Transportation Research Board, part of the National Academy of Sciences.

As in security runway safety must be addressed in a multi-layered approach with numerous checks and balances, at DFW we have implemented this very approach through our partnering efforts with the FAA, NASA, and our tenant airlines to implement the latest technology, as well as deploy low-tech improvements to increase and enhance safety.

Situational awareness is critical to establishing a safe runway operating environment. As such, DFW partnered with the FAA to successfully test runway status lights. These lights provide a real-time visual reference for pilots, air traffic controllers, and vehicle operators as to the current status of the runway, that is, whether it is safe to make use of the runway for either an aircraft departure or runway crossing. I find it best to think of this system as traffic lights for runways which provide clear, simple to understand, real-time visual situational awareness.

This system has had an immediate and positive effect on runway safety. In fact, we believe that the runway status light system prevented at least two runway incursions at DFW airport in its first year alone. This system has won high praise from the entire aviation community and we are grateful for its expedited deployment by the FAA.

Eliminating the need to cross a runway is the ideal situation. We have discovered a way to accomplish this while simultaneously restoring airport capacity and efficiency, and, in so doing, reducing aircraft emissions as well. Perimeter or end-around taxiways are now being constructed at high operational temp airports after having proven that they can accomplish all three goals. DFW, along with its partners, using NASA's human-in-the-loop simulation capability, demonstrated that the use of perimeter taxiways results in a significant reduction in required air traffic controller and pilot communications, as well as a 30 percent increase in overall capacity at DFW.

Our first of four perimeter taxiways will become operational this year. Once completed, these perimeter taxiways are expected to eliminate as many as 1,500 runway crossings per day, as well as to save air carriers approximately $100 million per year through increased efficiency, while significantly reducing aircraft emissions.

In response to the FAA Administrator's Call to Action Safety Summit in the summer of 2007, DFW held a runway safety workshop wherein aviation stakeholders at all levels of their organizations were invited to participate. Pilots and air traffic controllers, along with airport operations personnel who work side-by-side in the aircraft movement area, joined with senior representatives of the FAA, airport, and airlines. Local issue identification and development of creative, empowered solutions enabled immediate action on issues of concern while simultaneously providing valuable insight for the development of long-term solutions.

The insights gleaned from these workshops and conferences not only have resulted in prompt resolution of issues through the fielding of low-tech, low-cost physical improvements, such as additional signage and markings, but, more importantly, they have provided operators with an insight as to how valued they and their ideas are, as exemplified by the actions taken by their senior management. We believe these efforts have also led to a heightened state of vigilance of everyone operating on the airfield.

Concern remains regarding vehicle deviation-induced runway incursions, whereby a vehicle operator driving in the aircraft movement area will lose track of where they are in relationship to an active runway and inadvertently cause an incursion. Twenty-nine percent of runway incursions are caused by vehicle deviations, most of which we find are due to a loss in situational awareness.

In search of a solution, we have partnered with our local FAA representatives, the University of Texas-Arlington, the Texas Workforce Commission, and local businesses to explore the leveraging of the off-the-shelf technologies which will provide visual and audible alerts to vehicle operators who come within a defined safety area surrounding a runway. We are discovering a wide variety of promising technologies that leverage the use of the vehicles' existing onboard systems. In short, we are constantly looking at new ideas and are proud to report that we have one of the most advanced safety programs in the world.

In closing, as Chairman of the Aviation Group for the Transportation Research Board, I want to express my sincere appreciation to this Committee, which helped to create and fund the highly effective Airport Cooperative Research Program. We are currently entering our fourth year of research aimed at finding practical, near-term solutions to the aviation safety, security, and environmental challenges facing airports today.

Again, thank you for the opportunity to participate in this hearing. I look forward to responding to your questions.

Mr. COSTELLO. Thank you, Mr. Crites.

Dr. Dillingham, on page 12 of your testimony, you say, "Despite ongoing efforts, FAA risks not meeting its current plans to meet the deployment of ASDE-X by 2010." You have touched on that in your oral and written testimony. I wonder if you might expand upon that and indicate why you have concerns that they may not meet their current plans by 2010.

Mr. DILLINGHAM. Mr. Chairman, I think FAA was able to deploy a small number of ASDE systems in the first few years of the program. They now have around a dozen that they need to put in within the next two years, and just time-wise it doesn't seem like it is something that they will be able to accomplish, or they would have great difficulty. We talked to FAA about it and FAA has a plan whereby they will not be putting these systems in one by one, as they did early on, but they will be doing them simultaneously so the possibility is there. But since so much depends on this, for example, runway safety lights are hooked to this system, and until you get the systems in you can't get the runway safety lights, which Dallas has indicated has been a plus for safety.

Our concern is that this is a pretty aggressive schedule that they have set for themselves.

Mr. COSTELLO. Mr. Krakowski, if you would comment on the schedule and if you feel that you are going to meet the schedule by 2010.

Mr. KRAKOWSKI. Indeed, Mr. Chairman. We want an aggressive schedule. The situation, as described in this hearing thus far, demands that we stretch ourselves and that we try to put as much out there as we can. If we miss the goal, it won't be because of our intention not to try as hard as we can.

To Mr. Dillingham's point, when you put these systems out early on, you want to do them one by one sequentially, but as you get experience and confidence that the system works and you have got the bugs worked out, you can actually start ramping up multiple deployments. That is how these typically go. So we are just trying to pedal as hard as we can, sir.

[Information follows:]

Insert for the record at page 36, line 766, in response to Chairman Costello's question:

In September 2007, the FAA Acting Administrator committed to accelerating the overall ASDE-X deployment schedule from 2011 to 2010. The FAA is pleased to report that there has been significant progress in the ASDE-X system deployment, even more than originally anticipated. Seventeen ASDE-X systems, nearly half of the 35 planned systems, are operational.

Sixteen additional systems are scheduled to be operational by the end of October 2010, and the remaining two systems are scheduled to be operational by Spring 2011. These last two systems are dependent on and aligned with their respective new airport traffic control tower (ATCT) schedules. The ASDE-X surface movement radar will be installed on top of the new ATCT.

The FAA is aggressively working towards meeting the accelerated schedule. We are confident that we will meet the schedule. Work has begun on all of the remaining sites; the 18 remaining sites are in various stages of the implementation process. This process includes site survey, site design, lease approval, completion of environmental requirements, site preparation and construction, installation, system optimization, training, and acceptance and commissioning activities.

Mr. COSTELLO. And the schedule for the next either fiscal year or calendar year, how many do you anticipate will be installed?

Mr. KRAKOWSKI. Sir, we have 13 systems now. We are anticipating 35 by the end of 2010, sir.

[Information follows:]

Insert for the record at page 36, line 771, in response to Chairman Costello's question:

In the next fiscal year, two additional ASDE-X systems are scheduled to be operational.

Mr. COSTELLO. And you have a schedule?

Mr. KRAKOWSKI. Yes, we do.

Mr. COSTELLO. How many do you intend to have installed by this time next year?

Mr. KRAKOWSKI. I will have to take a look at that and get back to you, sir.

Mr. COSTELLO. Okay.

Mr. KRAKOWSKI. I don't have it at the tip of my tongue.

Mr. COSTELLO. We would like that information.

[Information follows:]

Insert for the record at page 36, line 777, in response to Chairman Costello's question:

By this time next year (November 30, 2009), the FAA plans to have four additional systems operational for a total of 21 operational systems.

Mr. COSTELLO. Captain Prater referred to a number of things and he said one of the things that can be done immediately is airports can assist by just using a can of paint, and gave some examples. I wonder, Mr. Crites, if you would comment on airports taking the initiative to go forward and do what Captain Prater is suggesting.

Mr. CRITES. Today, we are have already deployed or followed Captain Prater's guidance and suggestions and we have done that. We find airports are leaning forward as a result of the Runway Safety Summit of 2007 and I think they are on track expediting and putting forward those very basic, fundamental things. I would call it maintaining Part 139 compliance 365 days a year is kind of the call to order, and we are taking that very seriously and concur quite a bit with Captain Prater's remarks.

Mr. COSTELLO. We had a discussion, Mr. Krakowski, about Allentown, and I think that Mr. Forrey indicated that there were two trainees on duty at the time. You were going to look into the matter and get back to us. We have not heard from you, so I would ask you now to explain what you know about Allentown and the near miss that happened there.

Mr. KRAKOWSKI. Yes, sir. In fact, I received the final information I was looking for right before the hearing, so I apologize for the delay. It is an NTSB investigation, so we are trying to be respectful of that process as we go through.

Mr. COSTELLO. We understand that, but you have to know who was in the tower and who wasn't.

Mr. KRAKOWSKI. Indeed. So we did have a very fresh developmental controller who was working the traffic at the time, who was just certified on position in August. That was the controller that was working the traffic. The developmental, though, that was the controller in charge actually is a transfer in from the Grand Forks tower with over five years of experience there, ten months on duty in Allentown, about six months as a CIC, controller in charge, duty there. So the controller, while being a developmental for all the positions in Allentown, actually is a seasoned controller.

Mr. COSTELLO. I wonder if you would comment, Mr. Forrey.

Mr. FORREY. Yes. You know, it takes years of experience to learn an operation at a particular airport, and the seasoned controller that Mr. Krakowski speaks to was five years at, I think—what did you say, North Dakota?

Mr. KRAKOWSKI. Grand Forks, yes.

Mr. FORREY. Grand Forks, but still not certified at the facility all the way through. All he was certified in was the tower, not the TRACON. So both people that were working that tower had very limited experience of working that tower in particular.

Mr. COSTELLO. Were they the only two in the tower at the time? Was there a supervisor?

Mr. KRAKOWSKI. Yes, there were actually five people on duty. Three of them were on break at the time, sir.

Mr. COSTELLO. So three of them were on break and the trainees were there at the time of the incident.

Mr. KRAKOWSKI. Actually, there were eight on duty. Three were on break, the other two were in the radar room. Sorry.

Mr. COSTELLO. Is that the information you have, Mr. Forrey?

Mr. FORREY. No, I don't know how many were on duty at the time. I do know there were a couple on break, but I think there were three working in the tower and five working in the TRACON; and the two in the tower were left there, the two trainees were left in the tower while the fully certified controllers was on break. He just went on break at the time.

Mr. COSTELLO. Does that concern you, Mr. Krakowski?

Mr. KRAKOWSKI. It does. It does. And to be completely candid here, we do want to work with the NTSB to completely understand there, but there is a concern here how we ended up in that configuration.

Mr. COSTELLO. And ending up in that configuration, if in fact it is the case, is that a violation of your internal policies within the FAA?

Mr. KRAKOWSKI. We don't believe it is, sir, because the CIC who was in the charge or the developmental who was in charge was, again, a seasoned controller, had been checked out in those positions up in the tower cap, had the amount of time necessary to qualify for the CIC position. So everything that we know at this time suggests there was no violation.

Mr. COSTELLO. I will give you the final comment on this, then I have some other questions, Mr. Forrey.

Mr. FORREY. Well, I guess if we are going to rely on regulations all the time, instead of common sense, I guess what he says is true. But you don't leave a facility staffed with people who have very limited experience in it and leave them alone to work the operation. A perfect example of this is Charlotte tower. They have an ASDE-X system that is not working properly.

There was one controller working in the tower; it happened to be a very experienced controller, thank God. He was redoing stuff, the aircraft counts and RNP procedure and we have to change that in the FIDO and the flight data processing. The aircraft was told to hold short of the runway. He drifted right out onto the runway while an aircraft was inbound.

Had he not looked up, had he not been experienced enough to realize that I better double-check this, that would have probably been a pancake situation on a runway or a possible death of all those people on those two aircraft. But because he was experienced, he was able to catch something like that. His opinion as if they had an experienced controller up there that was limited in control ability of that facility, they might not have known better to look up. So I think it is a bad policy to have people sitting in a tower that aren't fully certified all by themselves.

Mr. COSTELLO. Let me ask you about New Orleans. In your testimony, oral testimony as well, you indicated that there were three trainees on duty with no supervisor, and one of the trainees was fired, but not the supervisor. I wonder if you would elaborate on that.

Mr. FORREY. I would be happy to expand on that. That particular trainee was still in his first year of training, was not fully certified in the facility. He had an operational error just a couple months prior to that, where he made a mistake on a potential runway incursion or an error as well, so they had put him on notice that we are going to put you on opportunity to demonstrate performance.

He then had this incident, where this aircraft went over the hold short line of the runway. He verified that he went over the hold short line and still allowed the aircraft to land that was coming onto the runway, so they removed him. So why would you leave someone who is on a performance plan in the tower as a developmental with other developmentals, instead of not being supervised much more closely? So he was removed. Maybe it was a good idea; maybe it wasn't.

But my opinion is the agency, in their reckless abandon, put that person in that position, and that is just not the way we should be doing business as an agency. We should be making sure that these experienced controllers are there to teach these inexperienced controllers so they do the job right. There is no safety net. They are deteriorating the safety net of the system and they think it is okay, and I think that is a huge problem.

Mr. COSTELLO. Well, I have some other questions, but there are some other Members that I need to yield to at this time, but I will come back for a second round. Before we leave the issue of controllers, I think I made clear many times my concern. I think the GAO has, as far as staffing levels and the fact that the most experienced controllers are leaving, and in Dr. Dillingham's report I think he indicates that in the not too distant future we are going to be down to having well over half of the controllers that are working in the towers and the TRACONs with very little experience.

So with that, Mr. Petri, you are recognized.

Mr. PETRI. Thank you very much, Mr. Chairman.

Thank all of you, again, for your testimony. Before I ask specific questions, you have each had an opportunity, I expect either personally or with your office, to review the others' testimony and listen to it, and I don't know if there are any follow-up comments or anything that anyone on the panel would have about anything that another member of the panel said that would help us to understand the situation. I certainly would give you all an opportunity to do that.

Mr. FORREY. I think the only thing I would comment on—because I really haven't seen anyone else's testimony, I will just base it on what I heard here today. Certainly, the FAA always has a plan, they always have a plan, they always have a plan, but they never seem to get it done. So I just would caution you that they have some great ideas, but they never follow through with those great ideas, and I think that is what this Committee should do, is make sure they follow through with those plans.

Mr. KRAKOWSKI. May I comment on that? Actually, thank you for the compliment that we do have some great ideas. We do intend to follow up. That is one of the reasons that I am in the job, is that we take this really seriously, what is happening here, what the risks are. We are doing a lot of things to build up the safety effort within the ATO and we intend to stay on task.

Mr. PETRI. I do have a couple of questions. One, we are all aware that there is not the happiest labor management relationship, at the current time, between the air traffic controllers and the agency, for a whole variety of reasons. There is no point in getting into that or pointing fingers, but I would just be interested in knowing whether that has any impact on safety at all or whether it is a totally isolated—not totally, but basically an isolated or separate issue. I don't know if any of you would care to comment on that.

Mr. FORREY. I would be happy to comment. It permeates everything we do. It is a distraction on the job. The fact that we argue about staffing all the time because FAA says we have enough and we say we don't. We keep bringing these examples out to the public of why the staffing is a problem in this agency and what danger it is causing to the flying public, and the agency just says safety is never compromised, there are no problems, we have it under control, we are hiring new people. That is great, hire new people, but find a way to keep the veterans in place.

It permeates through everything. It is a distraction for our workforce; it is a distraction on what we do. And it goes so far more into just the contract issues; it goes into the way they are treated. They are disrespected. Our professional opinions are not taken into consideration with new technology, with procedures. Look at the JFK incident. We have been arguing about this at Detroit and JFK and other airports for years, and they just disregard us out of hand. And until there is a near catastrophe is the only time they are going to change it.

So the runway safety call to action issue. We were invited to that and yet they go on without us on several of the committees, without even inviting us to participate, because they don't feel they need to. That is the kind of attitude that permeates throughout the workforce and it is a huge distraction on the safe operation of the system.

Mr. PETRI. But is it really all one-sided or is there blame to go around? We have the retention bonus issue and various other things that could contribute as well.

Mr. FORREY. There are all kinds of issues. Is there both sides problems? Sure. When you start getting frustrated, people start acting up. What else are they going to do? That is why they are leaving. This retention bonus thing and that kind of stuff does nothing more than divide the workforce even more. You have an A scale and a B scale, so now you have people trying to do the same for considerably different pay.

Then you are going to pay someone even more money to go from one understaffed facility to work at another understaffed facility, and then, therefore, pay someone else to come back to the other understaffed facility. What a waste of money. They need to fix the system, and they need to fix the system by building a system where there creates the incentive for career improvement and career progression. They got rid of all that when they imposed what they imposed. So that kind of stuff, again, like I said, it does everything to inhibit a good operation and experience the mood throughout the system and, instead, stifles it.

Mr. COSTELLO. If you would yield, Mr. Petri.

Mr. PETRI. Sure.

Mr. COSTELLO. Let me just say for the record—I think we have said this before, but to remind people and to remind Members—when we were in the last session negotiating a settlement that we had had high hopes that we could get an agreement between the union and the FAA, the FAA said what it would take in order to settle this contract and this dispute. They gave a dollar figure and they told us—they told Mr. Mica, Chairman Oberstar and myself and Mr. Petri—what that dollar amount was that it would take, and NATCA said they didn't see how they could agree to that.

But in the final session, when we sat down, NATCA said if that is what it takes to get this done, then we will give it, and the acting director now, Bobby Sturgell, said, well, there are other issues. And that is when I became convinced that the Administration did not want a settlement. They laid down exactly what they needed. When NATCA agreed to it, we thought we had a settlement, and Mr. Sturgell then said, well, there are other issues.

So I think it is important to keep that on the record and I think it is important that Members of this Subcommittee continue to remain engaged to try and get the Administration. I think Mr. Krakowski has at least reached out somewhat to Mr. Forrey and to the union, but, frankly, I think we are going to have to wait until the results of the November 4th election to determine where we are going forward as far as labor issues and morale issues within the FAA.

Thank you, Mr. Petri.

Mr. PETRI. If I can add to that, it is my understanding there is an offer pending that goes until September 30th that some have valued at some $300 million figure. I don't know how they figured that. I don't know if you share that valuation number or are intending to do anything between now and September 30th about it.

Mr. FORREY. The FAA's generous offer you are referring to? Is that what you are talking about, that generous offer that doesn't do anything? Yes, I have rejected it and will continue to reject it because it doesn't solve the problem. It is not a comprehensive contract that deals with all the other myriad of issues that we have to work through. It is just something that is not going to do any good. It doesn't meet anyone's needs.

Mr. PETRI. Well, this is a safety hearing. I thought it would be interesting to point out that there are aspects to it which may heighten and color somewhat the whole subject, and that is unfortunate.

I have a question for Mr. Crites. If you could talk about some of the low-tech solutions that you are implementing to improve runway safety at airports around the Country and just kind of expand on them, both big and small, it would be helpful.

Mr. CRITES. Yes, sir. I think the key to it is what I indicated in what we learned from the Runway Safety Summit that we held at DFW Airport, where we invited in rank and file controllers, operators, pilots, and the like to share their real world experiences at our airport as to what they were encountering. From that, we invited all Members to take tours of the airport from the airfield, so you could see it from the airfield perspective, so that all parties could understand what each other was talking about from a first-hand view. And what that led to were things simple as Captain Prater mentioned earlier, that is, taking Part 139 certification seriously, 24 hours a day, 365 days a year. So if there is a signage outage or if a sign is blown down, or something needs to be addressed, address it then and there. If it is a can of paint that needs to be applied to renew some markings, we do that.

In addition to that, we decided to go forward and all of our Surface Movement Guidance systems, our runway guard lights and that, we have that on 24 hours a day so as to highlight when you are approaching a runway. Things as simple as additional non-standard signage for vehicle operators to let them know to yield, signs that they are used to on a regular road, so that when they see those on an airfield, which they are very familiar with, the signs provide them with situational awareness.

In addition to that, you have heard about the hot spot maps and things of that nature. What came from the hot spot map at DFW Airport and the shared collaboration was the development of some standard taxi path routings. If we can circumvent those areas that are problematic and that are causing pilots or controllers or vehicle operators that much of an issue we will.

Other types of things such as when there is a runway closure for, let's say, an hour for immediate maintenance or something of that nature, we place our airport operations vehicles down at the end of the runway to visually see and to be on the radio traffic for the tower just in case there is a miscommunication or something, to be another set of eyes to safeguard the operation.

We also use extensive use of escort vehicles, follow me vehicles, things of that nature, so as to say that anyone who is not familiar in the airfield at all, to make sure that they are safeguarded when they are out there operating.

So it is a wide variety of things. It is the whole thing, but it is a continuous thing, whether it be yearly runway or driver certification training, whether it is I Brake for Runways campaign. Captain Prater mentioned something they are doing for pilots. We have an I Brake for Runways campaign where it is a video followed up with training, followed up with the bumper stickers for the dashboard of your vehicle and others, just to better ensure safety.

But the largest issue that we have gone after lately is what I mentioned in my testimony, and that is this vehicle operator-induced runway incursion. Runway status lights are wonderful for the pilots, the controllers, and they are on an exception basis, so when it is not safe and it is an exception, it gets your notice. We have noticed great success with vehicle operators familiar with operating on the airfield, picking up trash, attending to maintenance issues and that.

You can get too familiar with your environment and forget where you are. So we are starting to work with very low-tech, low-cost items to equip a vehicle similar to what we are seeing with runway status lights, to help address the 29 percent of runway incursions that are caused by vehicles.

Mr. COSTELLO. The Chair thanks the Ranking Member and now recognizes the gentlelady from Texas, Ms. Johnson.

Ms. JOHNSON. Thank you very much, Mr. Chairman.

First, I would like to ask Mr. Crites. You indicated that, at DFW, FAA, NASA, airlines, pilots, and air traffic controllers all meeting to address runway safety and efficiency. Who pulled that meeting together?

Mr. CRITES. That was led by the airport, it was a partnership of all those entities as well.

Ms. JOHNSON. Have you continued to meet or this was one meeting?

Mr. CRITES. Indeed. We meet now on a quarterly basis to obtain input. The notion is, if the situation changes or the players change out there, to go ahead and get their ideas.

Ms. JOHNSON. Okay.

Now, Mr. Krakowski, in your testimony you discuss the voluntary reporting program for air traffic controllers, called the Air Traffic Safety Action Program, that you began in the Chicago area facilities. How long has this program been running?

Mr. KRAKOWSKI. Just about a month, month and a half. We started at the Midway control tower and moved it to all the other facilities. It is a very tricky program to execute properly. The airlines have been doing it for about 15 years and it takes a lot of both sides or all sides of this to get used to how the program will go. But we are pretty happy with what we see so far. I am quite pleased, at Chicago Center we have over 100 reports right now, which does speak to the fact that people are participating, which is exactly what you want.

In all candor, when I started this position 11 months ago, it was clear there was more of a punitive safety culture within the ATO. It is my fervent intention to change that. This program will be the cornerstone of doing that.

Ms. JOHNSON. Mr. Forrey, would you like to comment on this?

Mr. FORREY. Sure. The ATSAP program, I think, is a good program. It needs a lot of work. We are looking at expanding at other places, but at this point in time we want to make sure it is working properly where we have it, at some facilities where there are some fairly good relationships that are taking place. In the end, it is going to enhance the safety of the system. It is going to be good for my controllers, it is going to be good for the system safety, and it will be something we are looking for.

The reason we haven't moved out right now is because of what Mr. Krakowski said: we have a punitive safety culture in the FAA. Discipline is the name of the game. Fear and intimidation is the way you stop people from having errors, and it doesn't work real well. So we have to change some of those attitudes before we move out and Dallas, unfortunately, and the whole Southern Texas area is a problem right now, and we need to get out hands around that issue with the management down there, in my opinion, anyway, before we move down there with the safety program to try and help those facilities out.

So that is kind of where we are at right now.

Ms. JOHNSON. Dr. Dillingham, do you have any insight on this program, the effectiveness it might be?

Mr. DILLINGHAM. Yes, Ms. Johnson. As Mr. Krakowski said, the program, as implemented in other areas of aviation, has been very effective. I think what Mr. Forrey alluded to is a part of the previous discussion about the relationship between FAA management and the controllers. As we talked to all parties, one of the things that came up was a concern on the controllers' part that if in fact they reported, that it could in fact turn into a punitive situation. So we agree that it has a potentially positive effect on safety. Getting past these issues is not going to be easy.

Ms. JOHNSON. One last question. Mr. Forrey, you mentioned in your testimony about the widespread understaffing as being a concern for runway safety. Would you explain that a little further?

Mr. FORREY. Well, I will give you a prime example. The agency, right now, is in the process of trying to split certain major towers and TRACONs, and leaving standalone towers in Memphis and Orlando. They are looking at Miami and Philadelphia and other places to do it. What you are going to end up with is you are going to end up with inexperienced, very time-limited controllers in the towers running those runways, and all the experienced controllers are going to move into the TRACONs.

That is going to create a situation what we just saw in Lehigh, up at Allegheny County, and what we saw in New Orleans, and what we are seeing all over the Country, where you have inexperienced controllers working at these very busy terminal facilities and these towers with very little experience, that are not fully certified, so they don't even understand the full operation. In fact, we have Southern California TRACON we have eight incidents of controllers being ordered to work radar positions that they are not even certified on.

So this is a situation that is affecting staffing, because you have low staffing or you have controllers working long hours on position without breaks, inexperienced controllers, no veterans, it is going to create a very unsafe situation at these very complex facilities.

Ms. JOHNSON. Now, we have been talking about understaffing for a long time. What efforts are we putting forth to improve that?

Mr. FORREY. What efforts are we putting forth? Well, we are trying to call attention, certainly, to the situation. We have been working with this Committee and Chairmans Costello and Oberstar to try and make the FAA get back to the table so that we can stop the flood of experienced controllers out of the FAA and stay and tray these new persons coming in. That is kind of what we are doing.

Ms. JOHNSON. I should have directed that to Mr. Krakowski.

Mr. KRAKOWSKI. Thank you. First of all, I do want to take exception to the split situation down in Orlando and places like that. By our estimation, when you split a facility like that, what you do is you take the controllers who are working there and you reduce their responsibility for more positions, so they have fewer positions to be responsible for. That creates better currency, it creates better stability within that workforce, and we actually think it increases and enhances safety.

The other thing, particularly with Orlando, we actually believe that some of the overtime will be reduced as well. So we think it is a very good business practice in some facilities. So we take these facility by facility, but we actually think it has a better effect on the workforce and on safety, in our opinion.

We are hiring almost 2,000 controllers a year right now. Right now, we have over 200 more than we need. Now, a lot of them are trainees. We have about 25 percent trainees out in the system right now. But we are aggressively hiring people. About a third of the controllers come from the CTI schools, the air traffic control schools; another third from the military; and another third from the general population. We have to keep that pace up for the age

56 retirements that we have been anticipating. We have problems out there in some facilities, but, overall, we have enough people. Getting the right people, the right experience level will continue to challenge us for the next year or two.

Ms. JOHNSON. Thank you very much. My time has expired.

Mr. COSTELLO. The Chair thanks the gentlelady and now recognizes the gentleman from Pennsylvania, Mr. Dent.

Mr. DENT. Thank you, Mr. Chairman, and thank you for conducting this very important hearing on runway safety. I happen to represent Lehigh Valley International Airport, call letters ABE. I have flown in and out of that airport on many, many occasions. As has been discussed, there was a very serious near collision or incursion that occurred just a few days ago.

I guess my main question would be to Mr. Krakowski. I assume that this incident would be categorized as the most severe type of runway incursion. Would that be a fair statement?

Mr. KRAKOWSKI. Without question. In fact, we did the severity analysis yesterday, and it was a Category A, which is the most serious.

Mr. DENT. Thank you. A few other things, too. I know that the GAO did a runway safety project report in November 2007. They concluded that the FAA National Runway Safety Plan was out of date and uncoordinated. I have also noticed, too, that the FAA has deployed technology and has tested new technology, including technology deployed at, I think, 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.

Did LVIA receive any of this technology that was referred to?

Mr. KRAKOWSKI. I will have to look directly. In fact, I just flew there myself. I do remember seeing the enhanced markings, but let me get back to you on that. Certainly, the really big, busy airports had the highest level of attention, and we will check into that and get back to you.

[Information follows:]

Insert for the record at page 57, line 1296, in response to Representative Dent's question:

The FAA plans to deploy Airport Surface Detection Equipment, Model X (ASDE-X) systems to 35 airports. Lehigh Valley International Airport is not scheduled to receive an ASDE-X system. The airports scheduled to receive ASDE-X systems were finalized in September 2005. At that time a business case was completed, including an "alternatives analysis" of the sites scheduled to receive ASDE-X equipment. The analysis showed that the sites providing the greatest return on the agency's investment were the airports with larger traffic counts and/or more complex operations, e.g., airports that use the same runway(s) for arrivals and departures.

The Runway Status Lights (RWSL) program depends on prior implementation of the ASDE-X, a surface surveillance system, to command the field lighting system. Since Lehigh Valley International Airport is not scheduled to receive an ASDE-X system, it was not considered for a RWSL system during the cost benefit analysis.

Mr. KRAKOWSKI. On the issue of the Runway Safety Plan, when I walked into the position 11 months ago, Wes Timmons here, the Director of Runway Safety, was just entering the job. It was a position that was unfilled for over two years, and the position and the effort of runway safety lacked stability and leadership. Wes expects to have the revised document, the updated document out next month; it is under review right now.

Mr. DENT. As I understand the incident in Allentown, there were three controllers who were on break at the time of the incident, and I believe a controller supervisor determines who is on duty at what time, meaning that someone in the tower made the decision to have the two developmentals—or trainees, depending on your perspective—on duty in the tower at the same time. I guess that is the question I have. Who determined that the trainees or the developmentals would be staffing a control tower at the same time?

Mr. KRAKOWSKI. Typically, it is the supervisor or the operating manager at the time. The NTSB is looking at this as they do their investigation. It is an area of concern to us as well, so we will be working with them to sort out why this happened and what issues we need to address.

Mr. DENT. Mr. Forrey, do you have any comments that you would like to make at this time with respect to the incident in Allentown? I think you have talked a little bit about it, but further elaborate?

Mr. FORREY. Just very briefly. You asked about the technology or the equipment, the radar on the ground and stuff like that. There is no ground radar at Allentown. They may have runway markings, but I am not even sure of that. That is one of those third-tier facilities that the agency doesn't really put a whole lot of effort into, unfortunately. I believe the staffing is pretty good there.

As we see, there were a few people on break, but, again, the supervisor—and I don't even know if one was on duty that night—was supposed to be the one rotating controllers to positions and that left a developmental, who, by the way, was also in charge of that tower. So it is not a good situation, in our opinion.

Mr. DENT. I have been in that tower, actually, and I just was curious about the incident itself, the fact that the Cessna missed its exit and then the commercial jet was permitted to take off. The sight lines aren't that great. I was just curious if somebody would comment on that. Could the commercial jet see the Cessna that was still on the runway, even if was given clearance to take off?

Mr. FORREY. Cessnas are a pretty small profile, and you have got to understand he is 3,000 or 4,000 feet down the runway. He probably thought he was off when he got the clearance. But the significant point here is the controller, who had very little experience, knew—the pilot said I did not stop short of the runway, and he looked in the binoculars and saw that the front wheel gear did not go over the line, but the nose was sticking out into the runway.

Because he didn't have any experience, okay, he didn't cross the runway threshold line or the hold short line, I am going to go ahead and clear that guy to land. An experienced controller would not have done that, they would have made that aircraft go around. That is the basic issue here because experienced and inexperienced.

Mr. DENT. I guess anyone who wants to answer, what is the lesson learned from the incident at LVIA?

Mr. KRAKOWSKI. Well, if I may, the NTSB has control of the investigation. I think you asked a very good question about the conspicuousness of the light aircraft and whether the lights on the aircraft were visible enough. They are fairly dim on some aircraft, and where they were relative to the control tower, I think that the sighting issue is certainly a valid thing for NTSB to look at, so we will look at all of this.

Typically, these types of incidents aren't just one thing—a controller error, a pilot error, a technological error—it is usually a chain of events, and that is what we have to really look at with this incident.

Mr. DENT. Mr. Forrey, do you want to make a further comment?

Mr. FORREY. I lost my train of thought when Hank started talking, but the bottom line is the inexperience of that controller to clear someone on, that is a problem. You have to have experienced controllers working with new trainees all the time. You cannot leave people that are partially certified to work by themselves in operations. It should be a no thing. But the problem is they don't have enough veterans to do it.

Mr. DENT. Thank you. I see my time has expired.

Mr. COSTELLO. If I can ask for a clarification on a couple of points concerning this incident. One, Mr. Krakowski, we all understand the NTSB has an investigation going on which will last for many, many months, but there are some things we do know. We know how many people were in the tower; we know the level of their experience. A couple of things that I am confused on that I would like to have clarified, number one, is the communication between the pilot in the Cessna and the air traffic controller. What was the communication, the last communication? Mr. Forrey, and then Mr. Krakowski.

Mr. FORREY. The controller cleared the Cessna to depart off of a taxiway, probably a high speed taxiway. After that had happened—well, when he got to the taxiway, the pilot of the Cessna said I missed it.

Mr. COSTELLO. He told the controller that?

Mr. FORREY. He told the tower he missed it and he went down. The issue at hand is the aircraft was cleared to depart. I don't think I am mixing two incidents up. The aircraft was cleared to depart when he thought that aircraft had actually gotten off the taxiway at that point in time, but he did not.

Mr. COSTELLO. The regional jet was cleared to depart?

Mr. FORREY. Because he thought that the Cessna had gotten off the runway at that time.

Mr. COSTELLO. And isn't it the controller's responsibility, before that controller clears, in this case, the regional jet, to know exactly where that Cessna is?

Mr. FORREY. He needs to ensure where that Cessna is at. And I did make a mistake earlier with the one going over the threshold, that was at the New Orleans Airport, that is where that incident was.

Mr. COSTELLO. Mr. Krakowski?

Mr. KRAKOWSKI. Our understanding of the sequence of events, which, again, the NTSB will clarify as they do this, is that the controller thought the aircraft had cleared the runway, cleared the RJ for takeoff, the regional jet, and after the regional jet began the takeoff roll, the Cessna pilot reported that he missed the taxiway. The regional jet was already under power when that occurred, so the controller instructed the Cessna to exit the runway immediately, and it was that delay which caused the event to get as close as it did.

Mr. COSTELLO. So, again, just for clarification here, there may be a number of factors, but in this case, if the Cessna was still on the runway, the controller should have known exactly where that Cessna was before he gave clearance for the regional jet to take off.

Mr. KRAKOWSKI. Mr. Chairman, there is no dispute that controllers should not clear airplanes for takeoff unless they are absolutely assured that the runway is clear.

Mr. COSTELLO. So we know if in fact he did in this case, it was controller error. There may have been other factors, but we know that that controller erred if he cleared the regional jet to take off, if in fact he did so when the Cessna was on the runway.

Mr. KRAKOWSKI. The current evidence is pointing that direction. We will let the NTSB do their work.

Mr. COSTELLO. Let me ask, as far as disciplinary action, has any disciplinary action been taken? I realize this was last Friday, but either against the trainee or against the supervisor in charge?

Mr. KRAKOWSKI. My understanding is the controller was decertified, which is a standard practice in a situation like that, with a return to work plan that will have to be developed after all the complete understandings are——

Mr. COSTELLO. That was the trainee or the supervisor?

Mr. KRAKOWSKI. The trainee, sir.

Mr. COSTELLO. And the supervisor?

Mr. KRAKOWSKI. Supervisor, I don't have that information.

Mr. COSTELLO. Okay. But if in fact two trainees were in the tower at the time and there was no supervisor there at the time, doesn't that concern you, that your supervisor was on break and not in the tower?

Mr. KRAKOWSKI. Mr. Chairman, I think we just have to, once again, remember that the other developmental controller—and these are people who are certified to work traffic alone, they are. When you certify in a position——

Mr. COSTELLO. They are not fully certified.

Mr. KRAKOWSKI. They are not fully certified in all positions, but the positions that they were working in the control tower were fully certified. The controller in charge was over a five-year veteran, transfer in, had ten months in the facility already, six months already doing controller-in-charge duty. That is not necessarily an unusual situation, but we have some work to do to understand this whole picture, sir.

Mr. COSTELLO. Mr. Forrey?

Mr. FORREY. You know, when I checked out as a controller, as a CPC, I didn't know everything. I barely knew anything, just to keep my head above water. It is invaluable to not have an experienced controller to help you learn your task and your profession as you go, even though you certify and them deem you safe, because you make mistakes and you make bad judgment calls. It is just invaluable to have an experienced controller on duty all the time with trainees.

Mr. COSTELLO. The Chair now recognizes the gentlelady from California, Ms. Richardson.

Ms. RICHARDSON. Yes, thank you, Mr. Chairman.

Mr.. Krakowski, how successful has the Airport Movement Area Safety System been since its implementation? It is my understanding that the system is currently located at 34 airports. Have there been any incidents of severe runway incursions at those locations?

Mr. KRAKOWSKI. The AMASS system is kind of one of the earlier iterations of the Runway Safety Systems. The ASDE-X ones that are going to be deployed going forward are the much more sophisticated, much more robust systems. So, for a while, we will have those legacy systems, but they have served good purposes. I can recall, in Atlanta, we had an event where an aircraft began to cross the runway, it alerted exactly like it should have. For the most part, the system works. I can remember events in Denver where snow plows were crossing runways and alerted appropriately. But, again, they don't have the predictive capability as the new systems do, so we are looking forward to getting the new systems out there.

Ms. RICHARDSON. Okay. In your testimony, sir, it says that we had only—I want to reiterate—we had only 23 serious runway incursions as of September 15, a full year, 2008 as compared to 24 last year. That is not good news to me.

Mr. KRAKOWSKI. No, it is not good news. Quite frankly, that word shouldn't have been there; it is inappropriate.

Ms. RICHARDSON. Absolutely, I would agree. My last question is about the status of the lights at the 22 major airports. We, right now, this Country, are going through a very serious financial situation—gas prices, of course, airlines. Everyone has issues. You know that we all fly, most of us two times a week. I have been on planes where they are telling us to put the shades down so they can turn the motor off so they don't have to run the air. I mean, every one is obviously doing at the bare bones of what they can do.

What assurance does this Committee have that the implementation and the actual distribution and putting in these lights as promised is going to happen, the cockpit information? How do we know that, given the next crisis tomorrow, that you guy aren't going to put this on the shelf and say, hey, we don't have enough money, we can't do this?

Mr. KRAKOWSKI. Well, I certainly hope that we don't find ourselves in that situation. These programs——

Ms. RICHARDSON. Well, we cannot find ourselves in that situation.

Mr. KRAKOWSKI. I don't disagree with that. When you start to put these systems in airports, you have got to tear up runways and put taxiway lights in and all kinds of new technology. So when you commit to programs like this and you actually start working with them, you actually have a pretty good feeling that they will be reliably funded before you actually start doing the work.

Perhaps Mr. Crites from Dallas could shed some light from the airport perspective on that.

But we feel confident with the announcements that we have made for the acceleration of this technology that we have the money to get that done.

Ms. RICHARDSON. Have you provided to this Committee a list of these 22 airports when the installations are supposed to occur?

Mr. KRAKOWSKI. I believe it was in the GAO report, but we will make sure you get that.

[Information follows:]

Insert for the record at page 67, line 1545, in response to Representative Richardson's question:

Runway status lights will be deployed at:

1. Hartsfield-Jackson Atlanta International Airport
2. Baltimore/Washington International Thurgood Marshall Airport
3. Boston Logan International Airport
4. Charlotte (NC) Douglas International Airport
5. Chicago O'Hare International Airport
6. Dallas-Fort Worth International Airport
7. Denver International Airport
8. Detroit Metropolitan Wayne County Airport
9. Dulles International Airport
10. Fort Lauderdale/Hollywood International Airport
11. George Bush Intercontinental/Houston Airport
12. John F. Kennedy International Airport
13. LaGuardia Airport
14. Las Vegas McCarran International Airport
15. Los Angeles International Airport
16. Minneapolis-St. Paul Wold-Chamberlain International Airport
17. Newark International Airport
18. Orlando International Airport
19. Philadelphia International Airport
20. Phoenix Sky Harbor International Airport
21. San Diego International Airport
22. Seattle-Tacoma International Airport

Ms. RICHARDSON. And will you be tracking that to ensure we meet it?

Mr. KRAKOWSKI. Always do.

Ms. RICHARDSON. Okay.

Mr. Chairman, I yield back the balance of my time.

Mr. COSTELLO. The Chair thanks the gentlelady and now recognizes the gentleman from Arkansas, Mr. Boozman.

Mr. BOOZMAN. Thank you, Mr. Chairman.

Dr. Dillingham, has the FAA seen improvement on false targets problems noted in the beginning of the ASDE-X deployment program? In November I believe you cited Atlanta and Seattle as problem spots. Has the FAA addressed the issues at these busy airports and does the agency appear to be learning lessons from those early deployments?

Mr. DILLINGHAM. Thank you for the question. Yes, in preparation for this hearing, we checked to see how things had developed at both of those airports, and in both cases we found that there was a reduction of over 80 percent of the false alerts at both of those airports. We have not been able to determine to what extent things have changed with the subsequent installations of that technology, but we would assume that the lessons learned from Seattle and so forth would in fact be carried forth with the subsequent installations.

Mr. BOOZMAN. Thank you very much.

Captain Prater, could you describe the ATSAP program that pilots use to report mistakes to the FAA? How has the program helped to address safety issues facing the aviation community compared to the period before the program existed? How do you evaluate the Air Traffic Safety Action Program the FAA is piloting in Chicago for controllers?

Mr. PRATER. First of all, we have had quite a bit of varied reports on our ATSAP programs. At the airlines where the cooperation between the FAA, management, and the union representatives have been high and have been based on safety, it has been excellent. It has removed the threat of discipline to the point that pilots readily come in, and other employees, to report things before they happen, things that they saw.

I will just give you one quick case. When I flew in on Monday, the crew told me that they had been on duty for four days in a row; they had been on their 16th hour of on duty, and they landed without clearance. After they cleared the runway, they realized they had touched down without traffic control. They turned themselves in and reported all of the factors that went into that air so that it would try to be caught.

Other places where discipline is the rule of the day, or even litigation against the union—it goes to Congressman Petri's concern about labor management relations—where labor management relations are bad, you see an effect on safety. While we try, every tries to split it, the fact is we are all human beings. So where there is bad labor management relations, there will be an impact on safety.

At the FAA, we have pushed very hard for our partners, both the FAA management, as well as our brothers and sisters at NATCA, to try this because we believe very much that the more information that is out there, the better. On the other hand, you are not going to turn yourself the second time if you get beat across the knuckles or fired for turning yourself in the first time. So that is what we have to break.

Mr. BOOZMAN. That is good to know.

Mr. Chairman, I had the opportunity to visit the new bridge that had failed in Minneapolis, and that bridge was completed in a year, versus the regular nine or ten years. But one of the things that they felt like made the difference was getting rid of the adversarial relationships that we see often with OSHA and this and that. Instead of it being an adversarial relationship, they actually came out on the job in a proactive manner and said, guys, you need to be doing this and that. So it is good to hear that this is also working in this regard. Certainly, those things don't cost money, they save money, and hopefully that is something we, as a Committee, can continue to push forward.

Thank you very much.

Mr. COSTELLO. I thank the gentleman and assure you that we will continue to do that.

The Chair now recognizes the gentleman from Tennessee, Mr. Cohen.

Mr. COHEN. Thank you, Mr. Chairman.

I am not sure if this should be directed to Mr. Krakowski or to Mr. Timmons, but whoever feels more comfortable fielding it, please. I am from Memphis and there are several issues in Memphis, but the most current is a whistleblower discussed the problems with, he believes, the landing patterns there. I believe one of the runways is perpendicular to the other three.

Mr. Krakowski, can you assure me that that system is safe and that we won't be seeing a story in the paper that has a crash in Memphis and goes back to this close call that we had where USA Today highlighted that problem and said that it was a concern and a safety factor?

Mr. KRAKOWSKI. Sure. I will ask Mr. Timmons to add any comments he would like to as well, but the CRDA program and the procedures we have in place at Memphis evolved over the past few years out of some safety concerns that we judged were legitimate, and we put the technology of CRDA in place. We think it works. We believe it works. We have deemed it safe and continue to believe so. We think we have some people in Memphis who don't agree with that and will work with the IG's office to make sure that they understand our point of view on this. But we believe it is safe, sir.

Wes, do you have any comments?

Mr. COHEN. Do either FedEx and Northwest/Delta concur? Do they have any concerns?

Mr. KRAKOWSKI. They have not raised any to me.

Mr. COHEN. Okay. And you are familiar with Mr. Nesbitt, who is the gentleman that is the "whistleblower"—and I guess he is a whistleblower—who said he witnessed this twin turbo prop approaching Runway 27, the crossing runway when a DC-9 was on approach to the left and the pilot informed they were going around to an unsafe gear indication and that, I think, made people aware of the possible problem? Are you aware of that?

Mr. KRAKOWSKI. If I may, I think when we think about a future so we don't have events actually drive us into action, I think of these programs like the ATSAP program we were talking about, because under those programs people are able to give us data to bring these problems up to light before events actually happen. That is the whole purpose of them.

So it is our intention, with the new Runway Safety Office, with the new leadership within the safety organization, to make sure that we are constantly evaluating what is going on there not just from a technological performance point of view, but with the people actually working the traffic as well.

Mr. COHEN. Do you know who Mr. Scott Block is?

Mr. KRAKOWSKI. Yes, sir.

Mr. COHEN. I have a note here that Special Counsel Block said in three letters to Transportation Secretary Mary Peters that the FAA did not adequately respond to complaints from air traffic controllers about the potential for collisions involving planes taking off and landing on intersecting runways at airports in Memphis and Newark. Do you have a comment on Mr. Block's allegation?

Mr. KRAKOWSKI. Those are fairly recent letters to the Secretary. We actually disagree with his premise. We will be going through the process to respond to him through the Secretary's office.

Mr. COHEN. Thank you. And I don't mean to necessarily convey any opinion on the issue, I am concerned, as I think we all are—I know we all are—about safety, and Memphis prides itself on being a transportation center. Our airport is very important to us and certainly our citizens' lives are.

The air traffic controllers have expressed a concern to me about decoupling, and they believe if we decouple Memphis, that there will be a danger to safety. I met with some of your people and they were with the air traffic controllers, and the gentleman who came down was most helpful. We talked about some people may be having the ability to know both the tower and dual capabilities in case they needed such a person.

Do you believe there are any possibilities that what the air traffic controllers are saying is accurate, that this could be a safety hazard if we decouple the tower?

Mr. KRAKOWSKI. We have talked with them extensively through this process, not just at Memphis, but at Orlando, West Palm Beach, Miami, places like that. We believe this actually enhances safety because we are asking controllers to be qualified on fewer positions, which increases their currency, familiarity with less complexity.

Mr. COHEN. Is it accurate that in other areas—I think they mentioned Palm Beach and Philadelphia—that you held possibly because of safety concerns?

Mr. KRAKOWSKI. We held off because the local management teams were able to work together with the union to find some interesting compromises of sectorization. That doesn't work at Memphis because the facilities are so physically split, versus the other locations where they are very, very close and you can actually work traffic better between——

Mr. COHEN. Mr. Chairman, can I have another 30 seconds?

Mr. COSTELLO. Sure.

Mr. COHEN. Thank you.

Mr. Forrey, do the air traffic controllers have a proposal they can bring to the FAA to possibly have a situation in Memphis that would be similar to Philadelphia and Palm Beach and to make this thing work?

Mr. FORREY. Not only do they have a proposal, they have given it without a response from the agency. And I just want to make one thing clear, because it was stated earlier. Orlando, Memphis, Philadelphia, Miami are safer operations, cost less per operations than all the other facilities the agency split already. When you split that facility, it is going to require more controllers to work the tower and more controllers to work the approach control than they have right now at a combined facility. It is called economy of scale, when you have them together; you can now move people up and down, in and out, wherever you need them to go.

When you split it apart, you are going to have the less experienced people working the tower only than the ones working in the TRACON. Now you are going to have an experience where these people don't understand what it is to clear aircraft into a tower controller and a tower controller clearing one out to an approach controller. It is an inefficient operation that is going to cause more controllers to be needed and it is "unsafer." It truly is unsafer. And that is the FAA's statistics, not mine.

Mr. COHEN. Mr. Chairman, would it be possible for you and/or one of your more senior staff people to possibly work with Mr. Krakowski and Mr. Forrey to see if there is some way that we can protect the flying public in this situation?

Mr. COSTELLO. We have in the past and we will continue to, yes.

Mr. COHEN. Thank you, Mr. Chairman.

And thank you, gentlemen.

Mr. COSTELLO. Mr. Forrey, you indicate in your testimony, in both oral and written, about the Runway Safety Council and that NATCA has been, I guess, invited and included in the Runway Safety Council. Elaborate for me. What has your participation been and what role do you have?

Mr. FORREY. One of the premises of the agency and one of the things that Hank has brought—and that is a good thing—is the safety management system to the FAA. It is a worldwide thing through the ICAO. We are all for it, but we want to be a stakeholder in the process, and the problem is the agency is conducting safety management panels throughout the Country on changing in procedures, changing in equipment, and they are not including NATCA or the controllers in that process as a stakeholder.

We were invited to do the runway safety thing last year by the Administrator. We participated in the meeting the had for the one or two days. They subsequently had several panels meetings after that original one and we were not invited to most of those at all. In fact, I think the comment from the Vice President of Terminal, the person that works under the Vice President of Terminal was when I want NATCA's opinion and input, I will ask for it.

So that is the kind of attitude that permeates up at headquarters, and we are trying to change that, I am trying to change that, and we are trying to do that through an agreement on how this process is going to work, which has stalled for the time being.

So, as we are trying to work that nationally, locally, they are doing these things all over the place and basically ignoring the input of the controller workforce.

Mr. COHEN. Mr. Krakowski, you know—it was prior to your time, but it is apparently happening as well, if in fact what Mr. Forrey indicates is true that these meetings are going on all over the Country and NATCA's representatives are not involved—we have had this problem with NextGen. We had other stakeholders saying the GAO has identified that this is a problem, we are designing a system, NextGen, that the people who are going to have to run the system are not involved with input. Hopefully, we have changed that and NATCA has been involved in NextGen and some of the decisions.

In fact, I just read an article yesterday, talking about NextGen versus Euro Control, what they are doing in Europe, and it said one of the things that some believe that they are ahead of us now, and one of the reasons that they point out is because they have all the stakeholders involved and all the stakeholders, people who are involved the system, who will use the system and who will run the system are in fact helping design the system. That has been a problem in the past with NextGen. I am going to ask the question has that been resolved and do we have adequate input from the stakeholders.

But before I ask that question, tell me about Runway Safety Council. Mr. Forrey has indicated NATCA has been involved at the national level, but not in these meetings that are going on around the Country.

Mr. KRAKOWSKI. Sir, the Runway Safety Council, the actual council that we have committed to, is not up and running yet; it will be up and running in the next month or two. NATCA will be invited as full participating stakeholders in it, that is our intention.

Mr. COHEN. What are these meetings that are going on around the Country that Mr. Forrey refers to, then?

Mr. KRAKOWSKI. This was from the Call to Action. These are where we went out and surveyed airports to look for markings, risks out there, signage, sighting issues, all of that. The statistics we have show that about 43 percent of those did have direct participation of NATCA people.

Wes, you have got probably a good feel for this.

But, in general, we have invited NATCA to all of those with the exception of one. In general, if you look at all of the activities around runway safety, we can demonstrate NATCA has participated in about 25 percent of them. That is not enough, in my opinion, so we need to work harder at making that happen.

Mr. COHEN. And tell me why that is. Why have they only participated in 25 percent? Are you saying that they haven't been invited in the other 75 percent or they have refused to participate?

Mr. KRAKOWSKI. Or scheduling conflicts, things like that. It is kind of a mix. I think Wes could probably help us with a little bit of data on that.

I do want to say, though, to one thing Pat said, is we are trying to craft that agreement on the safety management working group. I believe we are very close. Based on conversations he and I had yesterday, we think we can bridge this.

Mr. COHEN. I am going to give Mr. Forrey an opportunity to comment on the other 75 percent, but before I do, let me ask you, Mr. Krakowski, on the issue of NextGen and the problem that we have had with stakeholders not participating, in particular, NATCA. Has that been corrected?

Mr. KRAKOWSKI. Yes. Sir, we have the old OEP, Operational Evolutionary Partnership, which is now the NextGen board. I go to many of these meetings, and, typically, Pat has one of his safety people there all the time, so they are there.

Mr. COHEN. NextGen, Mr. Forrey?

Mr. FORREY. NextGen, yes. The only participation we have with the FAA with NextGen is the fact that we go to these OEP meetings once every week or once every two weeks and hear the progress of where they are going. We are not participating in any of their workgroups or anything of that nature.

Mr. COHEN. Is that correct?

Mr. KRAKOWSKI. They are going to at least those meetings.

Mr. COHEN. But the point that he is making is, you know, we can get into a whole other issue here about the reorganization of NextGen as well, but that will be for another day. But the point is—I mean, let's not kid each other here—either they are involved and they are giving input and they are actively involved in helping to design the system or they are not.

Mr. KRAKOWSKI. Sir, let's be clear, if we could, about one thing. We have controller involvement in all of the critical areas where controller involvement is needed. Now, are they necessarily representing NATCA's institutional interest? No. But that is what we are trying to build back in from the vestiges of the labor dispute that has created a separation here. That is what I am trying to do, sir.

Mr. COHEN. Mr. Forrey, I asked you about NextGen and now would ask you about the Runway Safety Council.

Mr. FORREY. The 75 percent that you referred to we are not asked. We are asked when the agency finds it convenient to bring us onboard, like when they want to split these towers and TRACONs, when they want to institute something else that is politically a hot potato for them that they want NATCA's involvement in. Taking a controller off the floor is not serving the interests of what the union does, and that is to protect and make sure the systems run safe and efficient and the controllers are considered.

The fact that they are taking someone who essentially would say yes or no, whatever the agency tells them to do so they can go work this project, is not the kind of person we want representing the interests of the workforce. So to say that they have controller involvement, they had controller involvement when they did ISSS and invest automation system, and that was only about a $3 billion or $4 billion waste of money.

So to say they are going to have controller involvement or that they have had controller involvement means they have taken their people that want to be supervisors or managers, or whatever they want to be, their yes men and women, and say, okay, we will take to get the controller input. That doesn't work for me, it doesn't work for my membership, and it doesn't work for the system.

Mr. COSTELLO. The Chair now recognizes the gentleman from New York, Mr. Hall.

Mr. HALL. Thank you, Mr. Chairman.

Sorry I was double-booked and missed our statements, but I have the written statements.

Mr. Krakowski, you state that the FAA will continue to examine the information from the fatigue symposium it hosted to determine next steps. What are some of these next steps? Did NATCA participate in the fatigue symposium? And maybe Mr. Forrey could respond also to that question.

Mr. KRAKOWSKI. Sir, NATCA and all the labor unions—pilots unions, flight attendants unions—were at the symposium and it was really a good event. One of the takeaways that we had looking at it is how controllers are scheduled and, more importantly, the time off between shifts that may be kind of close together or, after you work a midnight shift, how much time do you really need off to be completely refreshed for the next shift.

So all of that is under review by FAA right now and will be continuing to hopefully roll out some guidance here in the next future. Some of this could potentially create a bargaining issue with the union; we don't know yet.

Mr. HALL. Mr. Forrey?

Mr. FORREY. Mr. Hall, yes, we did participate in the forum. We think it is very important. We have been asking the agency to include us and work together with us to build a fatigue management system, which includes a lot more than just what time you work in between schedules; it includes stuff as educating your membership on how to stay rested in between shifts, what you can do with scheduling, what you can do with on-duty rest periods.

There are a whole myriad of issues that you have to do or have to come up with to formulate a fatigue management system, and the agency met with us one time, and that was before this seminar. We discussed several different issues that could cause fatigue or that would add towards fatigue of a controller workforce, which went well beyond just schedules, and that was the last we ever met with the FAA. Then they had the fatigue symposium and then they briefed information at the fatigue symposium that they wouldn't even give us when we met with them the first time.

So we told the FAA—and I have told Hank this personally—you go do what you want to do; we are going to build our own fatigue management system. So we are working with IFATCA, which is the International Federation of Air Traffic Controllers, the ITF, International Transportation Federation. We are working with other countries and other air traffic service providers to find out what they are doing and we are going to develop our own fatigue management system. We are in the process of doing that right now and then we will present it to the FAA and say do you want to participate or not.

Mr. HALL. Thank you.

Captain Prater, in your testimony, you mentioned the lack of adequate weather information as a factor in runway incursions. Could you explain that, please?

Mr. PRATER. Certainly, sir. I would tag on to the fatigue comments that tired human beings, tired pilots make mistakes, and trapping those mistakes is what we try to concentrate on right now. Making sure that another pilot or a controller catches a mistake to prevent it from becoming a runway incursion is one of our focuses.

We need more information, certainly, about the friction of the airport. If there has been rain, freezing precipitation, snow, we do not have adequate information on our stopping ability on that particular runway, much less we are using an ancient system, if you will, of what did the other guy feel, what did he report. Well, he may not have touched down in this exact same area of the runway that we did. There are vehicles out there that can provide us with some information, but they are not standard enough. We do need an increase in information on what that runway feels like to the airplane itself, how fast can we stop.

Mr. HALL. Thank you.

Mr. Crites, your testimony states that the perimeter end-around taxiways result in a two minute per operation time reduction savings in Atlanta, $27 million a year, and also that there is a significant reduction in emissions from the perimeter end-around runway. Would you comment on those factors?

Mr. CRITES. Yes, sir. The perimeter taxiways is a system solution. There are arrivals, departures, and runway crossings, aircraft and vehicles trying to cross a runway, and perimeter taxiways addresses all of those. By taking the aircraft that are going to cross a runway, you now have a consistent in-trail separation for all arrivals and all departures; simplify the communication, the complexity of the situation.

So you may have a longer taxi-in time by having a taxi-around the end of a runway, but your out-to-off time and your airspace time have been reduced. So the net-net is a benefit. In our NASA human-in-the-loop simulations, we added roughly two minutes and seven seconds on a taxi in, but reduced taxi outs by four minutes and 37 seconds, so a net of about 2 minutes and 21 seconds per operation. That is where we get our figures from. It is a great solution.

Mr. HALL. Thank you very much.

Since my time is about to expire, I want to ask a parochial question of Mr. Krakowski. There was just announced a two hour a day reduction in staffing at the Duchess County, ,New York airport, which, in a county that is attempting to do economic development and to attract more businesses and people who would fly in and out from their residences to do business around the Country, this is a problem for us that we have heard from our community leaders and business leaders, as well as from the airport management and pilots and controllers about it, and I think it is unfortunately going to have a detrimental effect on our ability to use that airport as an attraction for economic development in the Hudson Valley.

Are you familiar with this or could you——

Mr. KRAKOWSKI. I am not, but I would be happy to research it and get back to you.

[Information follows:]

Insert for the record at page 86, line 2011, in response to Representative Hall's question:

Staffing has not been reduced at Dutchess County Airport, but operating hours were reduced as of September 15, 2008. The reduction in operating hours was based on a study that the FAA conducted to assess air traffic operations at the facility. The study found that Dutchess Airport runs approximately one operation per hour between 9 p.m. and 10 p.m., and runs less than one operation per hour between 10 p.m. and 11 p.m. Since this was based on primarily seasonal traffic, the study was expanded to include the entire year. Even with the expanded coverage of the assessment, the results indicated the facility was well within the range for a reduction in hours.

In March 2007, the FAA advised members of the Airport Rules and Regulations Committee about the potential change. They raised concerns about the economic impact this would have in attracting new tenants. As a compromise, the FAA opted to institute seasonal hours, rather than close the facility year around at 9 p.m. We also offered to reconsider the operating hours if a prospective tenant intended to conduct late evening operations.

Mr. HALL. I would appreciate that.

Thank you very much, Mr. Chairman.

Mr. COSTELLO. The Chair thanks the gentleman. Now I understand the gentleman from Michigan has one question, Dr. Ehlers.

Mr. EHLERS. Thank you, Mr. Chairman. Relatively brief one.

Dr. Dillingham, you cited that there are about 957 runway incursions. I assume that is for this year?

Mr. DILLINGHAM. Yes, sir, that is for this year. That includes all runway incursions, all severity levels.

Mr. EHLERS. Okay. Now, my question is how many of those would you consider serious or likely to cause accidents and so forth, and how many are just a plane wandering off onto a runway and then quickly getting off, with no other airplanes in sight?

Mr. DILLINGHAM. Mr. Ehlers, I think the number this year of serious ones are 24, but I also want to say that a point that we made earlier is that even though the 24 are the more serious ones, FAA shouldn't lose sight of the others because they can in fact turn into serious ones.

Mr. EHLERS. Okay. I just wanted to check and get some idea what the total number was.

Mr. DILLINGHAM. Yes, sir.

Mr. EHLERS. With that, I will yield back. Thank you.

Mr. COSTELLO. The Chair thanks the gentleman.

Final question that I have, Dr. Dillingham, on a positive note, you indicate that you believe that the FAA and pilots and controllers are on the right track to address the problems of runway incursions. What would you name as the top three priorities going forward from here, what they should be doing?

Mr. DILLINGHAM. Chairman Costello, I think focusing on what has been determined to be the leading causal factors, human factors, in fact, is the direction in which FAA and the other stakeholders should go, and included in that are the things that we have all talked about today: accelerating the technology and doing the low-cost things.

But I would also argue that there should be some focus on making sure that all these initiatives that have been started or planned, that they actually take place and that FAA follows up and takes what information, lessons learned from those and folds it back into the process for continued improvement. I think look at the factors that are contributing factors: GA aircraft are involved in two-thirds of the runway incursions, so a focus needs to be there; Pilots are involved in a significant number, so the focus needs to be there. So those would be the things would be the things that I would suggest, Mr. Chairman.

Mr. COSTELLO. The Chair thanks you.

Let me just say, as you know, and I think Mr. Krakowski indicated, we have provided aggressive oversight, and we are going to continue to, not only in runway incursions, but also on some of the projects, as was noted today, the FAA has started and may not have completed or may not be on track to complete. That is one of the responsibilities that this Subcommittee takes seriously and we are going to continue to do so.

At this time, the Chair recognizes the distinguished Chairman of the Full Committee, Chairman Oberstar.

Mr. OBERSTAR. Mr. Chairman, I had indicated earlier I just came to listen, but can't participate in an aviation hearing without getting something stirred or stimulated. Earlier this morning, I participated and spoke to a rail labor management conference hosted by the National Mediation Board and talked about exactly what Captain Prater referenced and Pat Forrey has talked about, that is, fatigue—fatigue of pilots, fatigue of air traffic controllers. Fatigue, as Vince Lombardi put it in a different context, makes cowards of us all. What he meant by that is it takes away our strength, our reserves of energy, our alertness, our ability to stay at the top of our game, and that is true whether it is you are a locomotive engineer, whether you are a captain of a towboat, or driving a truck, managing the air traffic controller, route center, the TRACON, or the airplane.

But, separately, over many years we have had hearings on runway incursions and, for that reason, I very much appreciate Mr. Costello staying on top of the issue and raising the visibility level on it and getting all this splendid testimony.

Aren't there too many vehicles on the runway surface? Mr. Forrey?

Mr. FORREY. There are a lot of vehicles on the runway surface, yes, and——

Mr. OBERSTAR. I see an increasing number, no matter which airport I am at, and I get to a lot of them all over the Country, as I know my colleagues do. But there are way too many vehicles moving at remarkable speeds, and with no apparent traffic direction.

Mr. FORREY. Well, anyone that gets on the active surface, control surface, has to be in contact with the towers. I mean, that is there. There are a lot of service vehicles that probably in the tarmac areas and by the gates that are driving all over the place as well, but on the runways we are in contact with those vehicles, just like we are with airplanes.

Mr. OBERSTAR. Yes, but how many people does it take in the tower to track those vehicles moving on the surface to keep them away from this, that, or the other?

Mr. FORREY. Well, for every vehicle you add, you are adding the workload to a controller that has got to separate the planes from the service vehicles.

Mr. OBERSTAR. Mr. Krakowski, what have you done to take notice of this issue and to limit the number or vehicles and to manage their movements better?

Mr. KRAKOWSKI. Well, one of the things that I think if you look at the Call to Action that we started on runway safety beginning last year, we did take a strong emphasis with the airports on vehicle training, recurrent training, which was not a standard that was being held up at a lot of the airports, to make sure that everybody that does drive on the surface of the airport knows what the procedures are, knows about calling the control tower. I think it was an unfocused effort until then.

The airports helped us a lot over this past year in getting to those communities, and not just the people at the airports, but the airlines that have ground staff running around in vehicles as well.

So the first thing is to make sure people are properly trained, certified to operate in that environment, and have recurrent training.

And perhaps our gentleman from Dallas would like to add to that.

Mr. CRITES. Certainly. I would just like to echo that, Mr. Chairman. Recurrent training, familiarization for all folks out there on the airfield. But to your point, trying to keep them off the airfield I think is job number one for us.

Mr. OBERSTAR. Captain Prater, what do your members say about the number of vehicles on the runway?

Mr. PRATER. Well, the number of distractions certainly have increased, but I think the runway environment itself, while there may be maintenance, whether it is construction crews or grass cutting or snow removal crews, I believe that those are controlled well by the controllers. As you get closer to the ramps, however, you get a lot more equipment being driven by people who may be out there without very much training. The turnover in many of our ground personnel, because they are no longer working for the airlines, they may be contract, the turnover is tremendous, so keeping people aware that, you know what, you better yield to the big airplane and not cut in front of it. We see far too many of those incidents. Fortunately, they are usually on the ramp, versus being close to the runway.

Mr. OBERSTAR. That ramp area is very congested. Exactly my concern.

Mr. Krakowski, I think that it behooves the FAA to step up the effort with airports, one, to limit the number of vehicles, especially in the ramp area; two, improve the training and the coordination with air traffic control and give us a report in another couple months about your progress on that. I have been a few places that just really have startled me, and I have watched this for 35 years. Twenty-five years I have been doing aviation oversight and I see an increased number of vehicles; just my visual observation of it, no scientific counting. I know when there are too many, and there are too many out there.

Now, what is happening with the hold short procedure and is that contributing, Mr. Forrey, to difficulties? You notice what we found some years ago, creep with the aircraft in the hold short position.

Mr. FORREY. I think the hold short position in and of itself isn't necessarily, the problem it is the taxying to the hold short position that is the problem. The agency has, again, unilaterally implemented that we have to start doing progressive taxiways. Instead of saying a taxi to runway 27 via taxiway Romeo, now they have got to say taxi to runway 27 via taxiway Romeo, turn right on taxiway Whiskey, turn left on taxiway Tango, hold short of runway.

So there is added verbiage to this thing that is going on now. It is creating more room for error; it has got to be read back exactly the way it is, so now you have got congestion tie-up. It is just a problem. It is something that they didn't ask us for our opinion on, they didn't allow us to participate in that SMS panel that we were talking about earlier; they just did it.

So it is a problem for us. It is going to create delays in the system. It creates an unsafe situation where now there is a misreadback that can happen, more human error can take place. It is just that kind of stuff that is a problem. But the actual holding short isn't necessarily the issue.

Mr. OBERSTAR. Thank you.

Captain Prater?

Mr. PRATER. I think we need to focus, Mr. Chairman, on the fact that we need the same verbiage, whether I am coming from Spain or whether I am flying to Spain, whether I am coming from Holland or traveling to Holland. The hold short procedures and the taxi procedures need to be common across the world. Just like English is the common language, we need to bring in our standards up to the world ICAO standards. It will take some retraining of controllers, of pilots, but I think, overall, that would be a step that we could take to improve the system.

Mr. OBERSTAR. Mr. Krakowski, can you take action on these matters?

Mr. KRAKOWSKI. We already are doing the analysis on the ICAO verbiage standards, and we should have that done within the next few months so we can actually start working on it. And I absolutely agree with Captain Prater. I disagree with Mr. Forrey, though, on the detailed——

Mr. OBERSTAR. Well, you usually do, don't you?

[Laughter.]

Mr. KRAKOWSKI. Well, but I come from a position, honestly, in my previous employer, it was one of my aircraft that got disoriented last year and caused a very serious runway incursion. If the pilots had a pathway in their mind on what taxiways specifically to get to, we believe that that would have mitigated that type of an issue. Another thing that we have recently done is we will not allow an aircraft to receive its takeoff order until all other runways that it is crossing going to that runway have been crossed.

So we are doing procedural things as we learn through the Call to Action that are good practices. They are different. They are different for the pilots and they are different for the controllers, but we will get used to them. We changed how we displayed weather to pilots and we went to the international format many, many years ago. Everybody complained about it and it was a distraction, but now we have a common worldwide system. We are good, we are adaptable. Pilots and controllers are good at these sorts of things. So to standardize, to have specific instructions we believe is the right way to go.

Mr. OBERSTAR. Mr. Chairman, I would recommend, in your continuing vigilance, a follow up on this matter of standardization and compatibility with ICAO, and I will distribute for Subcommittee Members relevant portions of a hearing I held 22 years ago on common language in aviation. Unfortunately, the text doesn't relate what I said at the outset. I repeated a number of commands in the various accents that you hear in the flight deck.

English is indeed the common language of aviation, with a French accent, with a German accent, Dutch, who have a different accent, and by the time you get through it and then you tune in on entering French airspace and every now and then there is a pilot talking to the tower in French. He is supposed to be speaking in English.

Last question. What happened to precision runway monitoring technology?

Mr. KRAKOWSKI. Sir, we have had it in a couple occasions like San Francisco and Minneapolis and in Detroit.

Mr. OBERSTAR. Detroit, yes.

Mr. KRAKOWSKI. Right. We use it quite extensively, or I should say regularly, in San Francisco, where you have those really two close runways. We don't use it quite as often.

Mr. OBERSTAR. Has it proven effective in fog?

Mr. KRAKOWSKI. At certain levels of visibility we can use it. We can't use it down to the very lowest minimums, typically. But I think the answer to that is the work we are doing on RNAV and RNP and NextGen all begins to really get at that very issue. I think the PRM program is going to be obviated by the new technology.

Mr. OBERSTAR. That was sort of the prediction for it when it came into effect after that tragic accident, the DC-9 on the tarmac at Detroit.

Mr. Forrey, do you and your members have ideas about technology improvements that make your workload better and the runway area safer?

Mr. FORREY. Yes, there is a lot of technology that we could use. The PRM, by the way, the problem with it mostly is it only gives you a little bit more, maybe a couple aircraft more an hour, and they don't have the staffing to open the extra positions, so that is why it is not used a lot of places. But there is a lot of technology in the cockpit. I mean, there is ADS-B with in and out, where pilots can actually see the moving map of the runways, instead of having to give all kinds of long clearances.

By the way, I would expect that from a pilot, to not agree with a controller. Typically, that is the scenario that goes these days.

The problem is I am all for standardizing this stuff in phraseology and technology, but why are we going after the rest of the world that doesn't work the kind of traffic this Country does? You don't have O'Hares and you don't have Kennedys and you don't have Newarks and you don't have Miamis and Atlantas and Dallases over in Europe. Maybe they have one airport over there. So using their standards for our kind of operation isn't necessarily the best thing to do.

But there are all kinds of new technology with the ADS-B or ASDE-X, even the light version of it, that we can start putting down. The cockpit ADS-B, where pilots can see the moving taxiways, where they can see other aircraft on the runways. That can come into them as well, so that there is another redundant system available so that we can avoid accidents and incursions and all sorts of other safety issues. So there is a lot of technology that we could using; we would just like to get involved to use it.

Mr. OBERSTAR. Thank you.

Thank you, Mr. Chairman. If the Senate had passed our House-passed aviation authorization bill, we would be underway with funding to advance the state of the art of technology for a good many of these systems that we are talking about here. If the Senate doesn't act on it by the end of this session, I know that Mr. Costello is going to have that bill, have a quick review of it in Committee, will have it on the Floor, and we will have it through the House before the next administration, whichever it is, can screw it up.

[Laughter.]

Mr. COSTELLO. Well, Mr. Chairman, thank you. We have had discussions about next year, if in fact the Senate does not act, and we intend to have the Subcommittee and the Full Committee move on the FAA reauthorization as soon as possible and very early in the next session if in fact the Senate does not act by the end of this session.

This has been a good hearing. I think we need to continue, and will continue, to focus on this issue to make certain.

I think, Mr. Krakowski, you acknowledge that there was a point when the FAA took their eye off the ball, did not fill the position as Director, and now that it is filled and has been filled, some progress is being made. I would encourage you to continue. We have had this discussion before, and I would encourage you to continue to involve all of the stakeholders, including the controllers, and to make certain that it is not only at the national level, but around the Country, as well, as these meetings are taking place.

I made mention of the article that talked about Euro Control and NextGen, and about how the stakeholders there are actually involved in designing the system and all have a stake in it and a voice, and that is what we need to see here, not only with NextGen, but runway incursion issues and with the Runway Safety Council as well.

Again, we thank all of you for your testimony today, and the Subcommittee stands adjourned.

[Whereupon, at 12:08 p.m., the Subcommittee was adjourned.]

Subcommittee on Aviation

Hearing on "Runway Safety: An Update"
Thursday, September 25, 2008

Statement – Congressman Jason Altmire (PA-04)

Thank you, Chairman Costello, for holding today's hearing to reexamine the issue of runway safety. The recent incident at the Lehigh Valley International Airport – located in my state of Pennsylvania – highlights many of the immediate challenges that must be overcome to provide passengers with first class runway safety. I look forward to discussing these challenges with Mr. Kakowski.

Last year alone nearly 770 million domestic and international passengers traveled on U.S. airlines. These passengers deserve to be protected from careless accidents during take offs and landings, taxiing operations, and movement to and from gates. Unfortunately, 24 incidents known as runway incursions occurred in 2008. Runway incursions are defined as unauthorized intrusions onto a runway and range in severity from "no immediate safety consequence" to "an accident or as serious incident in which a collision was narrowly avoided".

Runway incursions can and must be avoided if we are to provide the flying public with the highest level of aviation safety. While I have been pleased with a number of steps recently taken by the FAA, I remain concerned with our nation's air traffic controller staffing shortage and how it is impacting aviation safety. The FAA had for some time refused to acknowledge this problem and as a result controllers are now being forced to work extended hours and take on responsibilities that would generally be reserved for more experienced controllers. I believe that this is having a real impact on our aviation safety. As cited by a 2007 GAO report, controller fatigue and miscommunication – which likely occurs due to inexperience – have a very direct impact on runway safety.

Chairman Costello, I would like to again thank you for holding this important hearing. I look forward to hearing from each of our witnesses today and working with the entire committee to ensure passengers remain safe during travel.

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OPENING STATEMENT OF
THE HONORABLE RUSS CARNAHAN (MO-3)
SUBCOMMITTEE ON AVIATION
TRANSPORTATION AND INFRASTRUCUTRE COMMITTEE

Hearing on
Runway Safety: An Update
September 25, 2008

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Chairman Costello and Ranking Member Petri, thank you for holding this hearing on improvements made to runway safety. I want to thank our witnesses for joining us today and look forward to hearing from you about what progress has been made on improving runway safety.

As noted by the Government Accountability Office (GAO) report there were several factors contributing to the increases in runway incursions. Since the last hearing the FAA needed to make considerable improvements on several runway safety issues. It is a positive sign that the FAA hired a director for the Office of Runway Safety and re-evaluated its National Runway Safety Plan. The results were new traffic procedures and promotional changes in airport layout, markings, signage, and lighting. However, there is more that needs to be done. At the previous hearing on this matter I was specifically concerned with the large number of controllers forced to work overtime because of the vast staffing shortages. The GAO report indicated that the FAA still needed to make improvements in runway safety by further addressing human factors. This needs to be a principal concern in future endeavors on runway safety, and I would like to see some of the GAO suggestions pursued on this matter.

I very much appreciate today's testimony and look forward to working with the Chairman Costello and Ranking Member Petri to continue addressing this important issue.

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Russ Carnahan

OPENING STATEMENT OF
THE HONORABLE JERRY F. COSTELLO
AVIATION SUBCOMMITTEE
RUNWAY SAFETY: AN UPDATE
SEPTEMBER 25, 2008

- I want to welcome everyone to our hearing today on Runway Safety: An Update.

- Runway safety continues to be an aviation safety concern, appearing on the National Transportation Safety Board's (NTSB) Most Wanted List since the List was created in 1990. While we will hear from the FAA and others today that the United States has the safest air transportation system in the world, we cannot become complacent about safety -- one accident or near accident is one too many.

- According to the Government Accountability Office (GAO), the overall rate for runway incursions for the first three quarters of 2008 has increased slightly compared to 2007.

That, in conjunction with three near misses within three weeks over the summer at two of our busiest airports and one last Friday at Lehigh Valley International Airport, causes me concern. Especially with operations decreasing almost 3 percent in the first 6 months of 2008 compared with 2007, according to the FAA.

- At our February 2008 hearing on runway safety, I requested quarterly reports from the FAA on runway safety to ensure this issue remains at the top of FAA's agenda. Further, while I am pleased that the FAA has filled its Runway Safety Office Director position and taken many of the recommendations from the GAO, I want to know what the FAA's plan is to improve runway safety, given the rate increase.

- The GAO also cites human factors, such as controller fatigue and miscommunication, as factors in runway safety, and I am interested in hearing more from the panelists, including Pat Forrey, President of the National Air Traffic Controllers Association, on this issue.

- As our June 2008 hearing demonstrated, we have a controller staffing shortage and the FAA has been slow to acknowledge we have a problem and find a solution. As a result, controllers are being asked to work longer hours to handle increasingly congested runways and airspace. And, according to GAO, by 2011 up to 50 percent of the controller workforce will have less than 5 years experience, which could affect runway safety.

- The near miss last Friday clearly demonstrates how staffing has an effect on safety. According to some reports, the Lehigh Valley International Airport near miss was a result of an inexperienced controller, or trainee, allowing both aircraft on the same runway. Those planes missed colliding by about 10 feet. We need to do more on runway safety now to avoid a catastrophe in the future.

- I am also interested in learning more about the implementation and use of technologies such as the Airport Surface Detection Equipment, Model X, (ASDE-X), runway safety lights and low-cost surveillance systems and I am pleased the Dallas Fort Worth Airport is here to give us their perspective on these technologies.

- While the House of Representatives provided $42 million for runway incursion reduction programs; $74 million for runway status light acquisition and installation; and required the FAA to submit a Runway Safety Plan that includes a roadmap for the installation and deployment of systems to alert controllers and flight crews in H.R. 2881, the FAA Reauthorization Act of 2007, -- the Senate has failed to act on that legislation. The House will continue to keep pressure on our colleagues in the Senate to act this year, and we will continue to provide oversight and interest on this issue until these provisions become law.

- As I have stated time and again, safety must not be compromised in an effort to save money or for a lack of resources and attention. The FAA, and the entire aviation community, must work together so that we can do better to

- With that, I want to again welcome the witnesses today and I look forward to your testimony.

- Before I recognize Mr. Petri for his opening statement, I ask unanimous consent to allow 2 weeks for all Members to revise and extend their remarks and to permit the submission of additional statements and materials by Members and witnesses. Without objection, so ordered.

Harry E. Mitchell

Statement of Rep. Harry Mitchell
House Transportation and Infrastructure Committee
Subcommittee on Aviation
9/25/08

--Thank you Mr. Chairman.

--According to the Government Accountability Office ("GAO") the number and rate of runway incursions increased by 12 percent between fiscal years 2006 and 2007.

--This is unsettling.

--The Federal Aviation Administration ("FAA") is deploying and testing new technology to help prevent runway collisions, but it appears more may need to be done.

--In particular, the GAO recommends that the FAA do more to address human factors, such as fatigue and distraction.

--I look forward to hearing from our witnesses today about how we can make our nation's runways safer.

--I yield back.

Opening Statement of
The Honorable James L. Oberstar
Subcommittee on Aviation
Hearing on Runway Safety: An Update
September 25, 2008

I want to thank Chairman Costello and Ranking Member Petri for calling today's hearing on Runway Safety: An Update.

The issue of runway incursions has been a matter of continuing concern to this Committee. One of our first hearings on runway incursions was in 1987 when I was Chair of the Investigations and Oversight Subcommittee. During the hearing, we investigated a disturbing trend, just as we are experiencing today, of an increase in the annual rate of runway incursions.

The Federal Aviation Administration's (FAA) approach to managing runway safety, and reducing the runway incursion rate, seems to follow a predictable pattern. When runway incursions become a serious issue, as they were in the late 1980's and early 90's, the FAA takes aggressive action. However, once there is improvement, the emphasis quickly shifts to another problem. While FAA has made some progress on this issue in the past year, we need to make sure that attention remains focused on runway safety.

The nation's air traffic system continues to face a serious safety issue from runway incursions. In fiscal year 2007, there were 24 "severe" incursions. In the current fiscal year, we have hit that number again. Just this past Friday in Allentown, Pennsylvania, a Mesa Airlines plane was taking off when it aborted the takeoff to swerve around a Cessna jet that had missed its taxiway turn-off.

Without aggressive and decisive action, this problem is only going to get worse. Despite capacity cuts by carriers of approximately 3 percent in the first half of 2008, this fiscal year we have seen the same number of severe incursions as 2007. By 2016, one billion passengers are expected to be flying. That means more takeoffs and landings and more chances for runway incursions.

The FAA has placed considerable emphasis on technology as the means to improve runway safety. This is a step in the right direction. Airport Surface Detection Equipment, Model X (ASDE-X), a platform which integrates radar and sensor information to provide runway incursion warnings, is operational at 17 airports, according to the FAA. The initial response to the system has been generally positive. The FAA ultimately plans to install the technology at 35 airports. I am concerned about the FAA's ability to install these systems at the remaining 18 airports in a timely manner.

Another important technology that is being deployed at 22 airports is runway status lights. This gives pilots a visible warning when runways may be crossed. I am also encouraged by the number of additional technologies and options being explored. I look forward to the testimony by the Dallas/Fort Worth International Airport regarding some of these initiatives.

Although technology is extremely important to mitigate runway incursions, human factors cannot be overlooked. We need additional training for pilots, controllers, ground crews, and anyone else who comes in contact with runways. The GAO has also identified controller fatigue as an issue in runway safety. There are serious concerns regarding the current level of controller staffing, the percentage of developmental controllers at a facility, and the amount of overtime controllers work. The amount of time being logged by pilots and air crews is also a major concern; they too are working longer and more difficult schedules.

The FAA must leverage new technologies to improve runway safety while addressing the human factors of aviation. GAO has readily pointed this out, and I look forward to hearing from Dr. Dillingham. I am pleased to hear that the FAA has enlisted the help of human factors experts to explore what can be done to improve safety in this area.

To this end, the *FAA Reauthorization Act of 2007*, H.R. 2881 authorized $43 million for runway incursion programs through 2012, with an additional $74 million for the acquisition and installation of runway status lights. H.R. 2881 also directed the FAA to prepare a strategic plan for runway safety. We will continue to hold runway safety as a top priority in our legislative initiatives.

I am pleased to see some of the progress that the FAA has made since our February hearing: increased markings, signage on runways and a permanent director of runway safety. But we must have a commitment from the FAA that reducing runway incursions is a long-term commitment, even if the rate declines.

Thank you again Mr. Chairman for holding this hearing. I look forward to the testimony of our witnesses.

Congresswoman Laura Richardson
Statement at Full Committee on Transportation & Infrastructure
Hearing on "National Mediation Board Oversight of Elections for Union Representation"
Thursday September 25, 2008
2167 Rayburn House Office Building 2PM – 4PM

Thank you Chairman Oberstar for holding this important hearing today. I would also like to thank our witnesses, the three board members of the National Mediation Board ("NMB") for their attendance.

The purpose of today's hearing is to discuss the NMB's oversight of elections for union representation. The NMB has a unique role in overseeing labor-management disputes in the aviation and rail industry because of the significant impact on United States commerce. Any disruption in service would have a detrimental impact on the national economy, but the right to form a union and the protection of that right is still a valid and fundamental priority of the NMB. Working under the guidance of the Railway Labor Act, the NMB serves as a mediator between management and labor. It should be noted that workers in industries other than rail and aviation are governed by the National Labor Relations Act ("NLRA") and they take their grievances before the National Labor Relations Board ("NLRB").

One of the more controversial issues surrounding NMB is their decision in the dispute between the Association of Flight Attendants-CWA The NMB ruled that it could not find that "the level of carrier activity rises to a level requiring further investigation of employee choice of representation." However the NMB did state that "there were isolated incidents of inappropriate conduct on the part of certain supervisors" and "the Board is troubled by the number of reported incidents of 'surveillance'".

I look forward to a productive discussion that sheds light on the rationale behind previous decisions regarding the incident at Delta, and the entire process in general. Both management and labor depend on the NMB to make an unbiased, objective decision. I trust that the board members before me today adhere to those standards.

Mr. Chairman I yield back my time.

DFW

Testimony of James M. Crites

Executive Vice President of Operations

Dallas / Fort Worth International Airport

Before the Subcommittee on Aviation

Committee on Transportation and Infrastructure

U.S. House of Representatives

September 25, 2008

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Statement of James M. Crites

Statement of

James M. Crites
Executive Vice President Operations
Dallas/Fort Worth International Airport
Before
The Subcommittee on Aviation
Committee on Transportation and Infrastructure
U.S. House of Representatives

September 25, 2008

Chairman Costello, Ranking Member Petri and members of the House Transportation and Infrastructure Subcommittee on Aviation, thank you for inviting me to participate in this hearing. I am James M. Crites, the Executive Vice President of Operations for Dallas/Fort Worth International Airport, the third busiest airport in the world in terms of flight operations, making use of seven runways to ensure sufficient capacity and safe flight.

I am also proud to serve as the Aviation Group Chair for the Transportation Research Board, one of the National Academies of Sciences. As part of my chairmanship duties, I also serve on the Airport Cooperative Research Program Oversight Committee which is providing real world solutions to present day issues facing airport operators of all size airports. I am sincerely grateful for your empowerment of, and continued commitment to, this important research program.

I greatly appreciate this subcommittee's leadership for holding this hearing on runway safety as it provides an opportunity for major aviation stakeholders to share with you the progress we are making in this most important endeavor, as well as providing an opportunity for us to collaboratively explore the challenges that still face us as a community, thus enabling us to identify new approaches for achieving safer flight.

Enhanced Communication, Collaboration and Coordination of Airports, Airlines, Pilots, Air Traffic Controllers, FAA and Aviation Stakeholders to Improve Runway Safety

I would first like to echo the remarks of my colleague, John K. Duval, Airport Safety and Security Coordinator, at the Beverly Municipal Airport, who testified before this committee during your February 13, 2008 hearing. He stated that, "there is no easy fix and no magic bullet to improving runway safety and reducing runway incursions. As in security, runway safety must be a multi-layered approach with numerous checks and balances. Airports, airlines, FAA and industry must continue to work together to make safety improvement." I believe he provided keen insight into both the challenge we face and approach to addressing the challenge. I would also offer that I have experienced more communication, collaboration and coordination of activities across all aviation stakeholder communities now than I have seen in my prior twenty years in this industry, and I believe it is bearing significant fruit. I would now like to provide you with additional information for your consideration.

The Challenge Posed by Runway Crossings: Runway crossings are probably the most complicated activity for air traffic controllers, pilots and drivers of ground vehicles to collaboratively and safely execute. This is primarily due to the communications challenges posed by the number of parties whose activities must be coordinated in order to affect a runway crossing. This is also due to the high volume and tempo of other runway operations that are occurring simultaneously on the same runway where a crossing is taking place, namely high speed runway arrival and departure operations.

Furthermore, as the tempo of operations builds, so does the volume and rate of communications and complexity of conducting a runway crossing. As such, aviation stakeholders have worked to enhance situational awareness as well as reducing communications and complexity through a number of runway safety initiatives.

Situational Awareness: Situational awareness, as it relates to knowing one's current location, is critical to all parties involved in a runway crossing. As such, the enhanced visual references called for by the FAA in their Advisory Circular of 2005, and extended to all Part 139 airports as recommended by the NTSB, has been well received by the entire aviation community. This approach is proving beneficial as it addresses the needs expressed by pilots for enhanced signage visibility and consistency across airports of all sizes and complexity.

Situational awareness also refers to knowing the status of active runways. The FAA's successful testing of Runway Status Lights at both DFW and San Diego International Airport represents a marked improvement in runway status as it provides a real-time visual reference for pilots, air traffic controllers and vehicle drivers. The status lights provide the current status of the runway, that is, whether it is safe to make use of the runway for either an aircraft departure or a runway crossing. I find it best to think of this system as a traffic light for runways which provides clear, simple to understand, real-time visual situational awareness that is having an immediate positive effect on runway safety. Although Air Traffic Controller clearance of an operation is still required prior to performing any activity, the runway status system serves as a significant, additional layer of safety.

Statement of James M. Crites

This technology is a clear demonstration that the FAA and aviation industry have crossed a threshold of technological capability whereby both airborne and surface navigation systems can be integrated to provide solutions to highly complex situations. Together, the FAA and industry are developing the capability to leverage existing systems to provide solutions to long standing safety and capacity issues. Specifically, this system works on the concept of "data fusion" whereby aircraft transponder data is combined and analyzed with Airport Surveillance Radar 9 (ASR-9) and Airport Surface Detection Equipment – X (frequency) band (ASDE-X) to automatically control the runway status lights. This sounds quite complicated, and it is.

We believe that the Runway Status Light System commissioned by the FAA in 2006 prevented two runway incursions at DFW in that year alone. The system has won high praise from the entire aviation community, and we are grateful that expedited deployment of the system by the FAA is being pursued.

Reducing Communications and Complexity: Runway crossings also impact the overall arrival and departure capacity of an airport. This is due to the need to create additional separation in the aircraft arrival or departure stream to allow time for aircraft to safely cross a runway. This is extremely challenging at airports reaching the limits of their peak arrival and departure capacity, where more and more aircraft need to be communicated with and coordinated. This is further complicated when available airspace capacity is already consumed by the high volume of aircraft demand. The increased separation between aircraft results in reduced arrival rates and departure rates at the airport, as well as creating a more complex operating environment for both pilots and air traffic controllers.

Perimeter/End-Around Taxiways are now being constructed at high operational tempo airports in an effort to reduce the likelihood of runway incursion. These taxiways also have the additional benefit of regaining the peak operating capacity of both the airfield and the airspace.

DFW, along with the FAA, NASA, as well as pilots and air traffic controllers, conducted human-in-the-loop simulations at the NASA Ames Research Center in 2001. The demonstration test identified a 27% reduction in air traffic controller and pilot communication as well as a 30% increase in the overall capacity of the airport resulting in a 2 minute per operation reduction in overall taxi time. In short, perimeter taxiways reduced communications and complexity while providing consistent operating flows resulting in enhanced safety as well as capacity and efficiency.

Statement of James M. Crites

The Hartsfield-Jackson Atlanta International Airport, the world's busiest airport, installed an end-around taxiway in 2007. The FAA indicates that the new taxiway is "expected to eliminate an average of 700 runway crossings per day...." Aviation officials expect that the taxiway will also save the airlines at least $27 million per year.

At DFW, we will be commissioning and placing into operation our first of four perimeter taxiways this November. The first perimeter taxiway is estimated to eliminate between 750 to 1,000 runway crossings per day during south flow operations with the entire project eliminating as many as 1,500 runway crossings per day for all runway configurations. In addition, the taxiways, when fully built out, are expected to save airline operating costs of approximately $100 million per year through increased efficiency. Finally, perimeter taxiways will significantly reduce aircraft emissions; approximately 1.6 Tons Per Year of NOx and 0.9 Tons Per Year of VOCs.

Perimeter Taxiways are receiving high marks, once again, from the entire aviation community as demonstrated first and foremost by airports around the world undertaking efforts to implement them at their airports. Additionally, the Flight Safety Foundation presented its annual Airport Safety Award in 2007 to DFW International Airport for advancing safety issues and for advancing the concept of perimeter taxiways.

We believe that this award reflects great credit upon the entire aviation community because all stakeholders played a role in their development, beginning with the financial empowerment provided by Congress via Airport Improvement Program funding, as well as Passenger Facility Charges that are being used to fund these taxiways. The FAA, NASA, DFW, airlines, pilots and air traffic controllers all came together to address a complex issue by developing a user-oriented, and easy to operate enhancement to runway safety and efficiency.

In addition to these important advancements, the FAA is currently conducting operational testing on a Final Approach Runway Occupancy Signal system. The purpose of this system is to alert pilots of arriving aircraft of a possible runway incursion. When the runway is occupied by a potentially hazardous target, the system, without controller input, automatically flashes the Precision Approach Path Indicator lights as a visual indicator to pilots on approach. We are excited about this new system and believe it will be an important addition to any safety program.

Partnering For Success: Both Runway Status Lights and Perimeter Taxiways exemplify how the aviation community is partnering to address complex runway safety issues through the development of new technologies and the construction of additional infrastructure. However, these examples take considerable time and effort to successfully implement. The question that remains is, "what is the aviation community doing to address today's issues today?"

The FAA Administrator's Call to Action Safety Summit in the summer of 2007 resulted in the FAA, as well as organizations such as AAAE and ACI-NA, holding numerous workshops and conferences regarding runway safety. What made these activities different than past endeavors was that all aviation stakeholders at all levels of their organizations were invited to participate. Pilots and air traffic controllers along with airport operations personnel who work side-by-side in the aircraft movement area joined with senior representatives of the FAA, airports and airlines. This enabled a clearer dialog of local issue identification along with the development of creative, empowered solutions enabling immediate action to take place to address issues of concern while simultaneously providing valuable insights for the development of longer-term solutions.

The insights gleaned from these workshops and conferences not only have enabled the immediate resolution of issues through the fielding of physical improvements such as additional signage and markings, but more importantly, they have provided operators with an insight as to how valued they and their ideas are as exemplified by the actions taken by senior management.

Vigilance and Human Factors: A critical issue that remains is how to consistently maintain a heightened state of vigilance. It is the nature of highly repetitive routine tasks that complacency is prone to set in, and exceptions to a normally safe environment can go unnoticed by an operator leading to an inadvertent runway incursion. Both the Runway Status Lights and Perimeter Taxiways, we believe, will go a long way in addressing this critical issue.

Runway Safety Action Teams have been formed at most airports to consistently address local safety issues and general vigilance issues with considerable success through the development of "Hot Spot Maps" and special communiqués that bring special attention to the specific challenges operators encounter at an airport.

Enhanced computer-based interactive training capabilities are now available to airport operators as well as computer-based driver training simulators designed to provide a real experience of the actual operating environment that vehicle drivers will encounter prior to allowing them to operate in the Aircraft Movement Area. Both types of systems are proving to be quite effective in validating a vehicle operator's abilities and capabilities while simultaneously reducing the overall cost of driver training and certification.

However, concern remains regarding vehicle-deviation-induced runway incursions, whereby a vehicle operator driving in the Aircraft Movement Area will lose track of where they are in relationship to an active runway and inadvertently cause an incursion. It should be noted that 29% of runway incursions are caused by vehicle deviations, most of which we find are due to lost situational awareness.

As such, we have partnered with the University of Texas, Texas Workforce Commission, and local businesses to explore the leveraging of off-the-shelf technologies which will provide both visual and audible alerts to vehicle operators who come within a defined safety area boundary surrounding a runway. The intent is to provide an early warning to vehicle operators so as to preclude a runway incursion. Given the high number of vehicles that operate in the aircraft movement area, our secondary goal is to find a product that is relatively inexpensive.

We are discovering a wide variety of promising technologies from somewhat expensive independent computer-based systems to low cost systems that leverage the use of the vehicle's existing onboard computer system, lights, radio, and traffic horn. Our hope is to identify a small subset of candidate systems to further explore and certify with the FAA within the next year or so.

Additional Low-Tech Improvements: In addition to the important safety improvements described above, DFW has also implemented a host of low-tech solutions that combined have greatly increased safety on our runways. These technologies are all integrated into what we term our Runway Safety Plan. The significance of these integrated practical initiatives is evidenced by the International Civil Aeronautics Organization (ICAO) adopting our Runway Safety Plan in 2003 as the model for best practices for airports.

All of the initiatives fall under the leadership umbrella of our Runway Safety Action Team (RSAT) comprised of representatives from the FAA, airlines and various airport staff who work collaboratively to coordinate and oversee all of our collective runway safety programs. The RSAT also reviews all runway safety incidents, and as part of their efforts, has developed what they term a "Hot Spot" chart which outlines specific areas of the airport or operating conditions that pose challenges to pilots, air traffic controllers and vehicle operators. This simple chart provides guidance as well as instilling a heightened state of awareness to all operators.

Continuous inspection and maintenance of the airport operations area infrastructure is a significant aspect of our Runway Safety Plan as it ensures the safest operating environment for both pilots and vehicle operators. Coupled with this is the vehicle escort service (Follow-me Cars) to escort all non-airport or non-FAA vehicles operating in the aircraft movement area to better ensure that operators unfamiliar with the complex operating environment of DFW can safely conduct their business without jeopardizing flight safety.

Runway closures provide their own set of challenges due to the fact that they change the normal operating environment. As such, for short runway closures of one hour or less, we position Airfield Operations Staff at the approach end of a closed runway to monitor FAA Tower transmission and to observe aircraft movement toward a closed runway. For longer duration closures we place a lighted "X" at both ends of the closed runway.

Enhanced signage and visibility initiatives have been undertaken to ensure better situational awareness for pilots during inclement weather and periods of darkness. We have placed runway hold position signs, combined with yellow strobes, at various critical runway/taxiway intersections and high speed exits, along with Runway Guard Lights (red in color) that are functional 24 hours per day. Additionally, we have widened runway hold position markings, outlined all pavement markings in black, and use beaded glass in pavement marking paint to enhance visibility during periods of precipitation. Alternating amber and green centerline line lights on all exit taxiways serve as an aid for pilots to recognize when a Runway Obstacle Free Zone and/or ILS Critical Area has been cleared. Finally, we changed High Speed Taxiway centerline light lens from bi-directional to uni-directional leading off of runways to ensure no ambiguity for pilots as to what direction they may taxi.

Special attention has been paid to safety enhancements that have proven quite beneficial to vehicle operators. Non-standard augmentation signage such as "Stop," "Yield," and "Contact Tower" signs have been installed at Aircraft Rescue Fire Fighting roads intersecting runways. Enhanced interactive training has been specifically tailored to aircraft mechanics that taxi or tow aircraft, as well as air traffic controllers who receive familiarization tours of the aircraft movement area so as to see the airfield through the eyes of a pilot. Finally, we have developed a video for safe ramp driving criteria with an instructional pamphlet augmented by periodical runway safety awareness programs such as "I Brake for Runways" so as to periodically reinforce the importance of vigilance in affecting runway safety.

These are just of few of the low-tech, low-cost improvements we have implemented to increase safety on the DFW airfield. Combined with the more sophisticated and complex technologies, these improvements have had a significant impact. And, we are constantly working to improve.

What Congress Can Do
To Help Airports Improve Runway Safety

Invest in the Airport cooperative Research Program: As Chairman of the Aviation Group for the Transportation Research Board, I want to express my sincere appreciation to this subcommittee which helped to create and fund this highly effective program as part of Vision 100. We are currently entering our fourth year of research aimed at finding practical, near-term solutions to the aviation safety, security and environmental challenges facing airports today.

Statement of James M. Crites

The ACRP is in high gear with over 100 topics under study today and a consistent stream of operator-oriented solutions being deployed to the entire aviation community. Once again, the format for this program is similar to that of the highly successful FAA Runway Status Lights and Perimeter Taxiways where all aviation stakeholders actively participate in research problem definition as well as solution identification, yielding research with a high degree of practicality, relevance and acceptance by airports of all sizes.

Congress appropriated $10 million for ACRP in FY08. Airports are most grateful that the House-passed version of the FAA reauthorization bill authorized another $15 million per year for the program between FY09 and FY11. The reauthorization bill also includes specific recommendations endorsed by the House Science and Technology Committee that would specify how that funding is distributed. In FY09, for instance, the bill calls for $5 million for capacity research, $5 million for environmental research and $5 million for safety research.

Some of my colleagues who are involved with the ACRP have expressed concerns that the bill would unnecessarily prescribe how limited funding for the program is to be spent. Given the wide variety of engagement in the selection and development of research problem statements, they would prefer that the final version of the FAA reauthorization bill eliminate those restrictions so funding could be spent on the various categories of research the airport community has identified as important. We hope that you will consider making this modification in conference and truly appreciate your support of this highly regarded research program.

Again, thank you for the opportunity to participate in this hearing.

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Dallas/Fort Worth International Airport Perimeter Taxiway Demonstration

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July 2003

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16. Abstract
Currently, the Dallas/Fort Worth International Airport (DFW) experiences about 1,700 runway crossings per day, which contribute to arrival and departure delays and the potential for runway incursions. In an effort to enhance DFW operations, a perimeter taxiway (PT) concept was proposed that included new PTs on the East and West sides of the airport. DFW, the Federal Aviation Administration, and the National Aeronautics and Space Administration (NASA) conducted a real-time human-in-the-loop simulation that demonstrated the effect of adding new PTs to DFW. The demonstration was conducted in February 2003 at the NASA Ames Research Center (ARC). The primary objective was to provide the airlines, air traffic controllers, pilots, and their associated unions the opportunity to observe and participate in a demonstration of the proposed airport improvements at high fidelity levels with the goal of gaining their acceptance of PTs. The secondary objective was to collect and analyze operational data to derive descriptive statistics. NASA ARC facilities were used to simulate DFW tower and flight deck operations. The simulators were integrated and ran simultaneously for all runs during 4 days of demonstration. Five Certified Professional Controllers from DFW and seven representatives from the airlines participated. Two taxiway configurations were simulated to represent the current DFW configuration and the proposed configuration with the new PTs. All controller and pilot participants agreed the demonstration was a good representation of operations at DFW and the proposed new taxiways. Overall, the data collected from the participants and the simulators demonstrated that the PTs would improve operations at DFW, if implemented. Improvements were observed in many areas including average departure rates, average outbound taxi duration and associated runway occupancy times, average inbound and outbound stop rates and duration times, the number of runway crossings, and the amount of controller and pilot communications.

17. Key Words
DFW, Perimeter Taxiways, DAPT Demonstration, Virtual Reality Demonstration, Real-Time Simulation

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Executive Summary

Currently, the Dallas/Fort Worth International Airport (DFW) typically experiences about 1,700 runway crossings per day, which contribute to arrival and departure delays and the potential for runway incursions. In an effort to enhance DFW operations, a perimeter taxiway (PT) concept was proposed that would include new PTs on the East and West sides of the airport. Many fast-time simulations and paper studies have been conducted that support the cost benefit, efficiency, and safety aspects of the proposed airport improvements. However, prior to the Dallas/Fort Worth International Airport Perimeter Taxiway (DAPT) Demonstration, the improvements had not been observed or assessed in an operational setting using high fidelity simulation with human operators. Therefore, a partnership effort involving DFW, the Federal Aviation Administration (FAA), and the National Aeronautics and Space Administration (NASA) was formed to conduct a real-time human-in-the-loop simulation that demonstrated the effect of adding new PTs to DFW. The DAPT Demonstration was conducted in February 2003, at the NASA Ames Research Center (ARC) in Moffett Field, California. The FAA William J. Hughes Technical Center acted as Principal Investigator and provided support for the research team.

The primary objective of this endeavor was to provide the airlines, air traffic controllers, pilots, and their associated unions (i.e., the National Air Traffic Controllers Association, Airline Pilots Associations, and Allied Pilots Association) the opportunity to observe and participate in a demonstration of the proposed airport improvements at high fidelity levels with the goal of gaining their acceptance of PTs. In particular, there were four "views" of special interest for the demonstration 1) the controller view, 2) the pilot-on-taxi view, 3) the pilot-on-arrival view, and 4) the pilot-on-departure view. The secondary objective was to collect and analyze operational data for the purpose of deriving descriptive statistics for runway crossings, taxi times, and pilot and controller transmissions.

NASA ARC's FutureFlight Central (FFC) Facility and Crew Vehicle Systems Research Facility (CVSRF) were used to simulate DFW tower operations and flight deck operations respectively, at high fidelity levels. FFC and CVSRF were integrated and ran simultaneously for all runs. There were 4 days of demonstrations (including training). East-side, South flow, day time traffic operations at DFW were simulated. Traffic scenarios were created using DFW operations data modified as needed to create future demand levels and the desired traffic mix.

Five Certified Professional Controllers from DFW staffed the FFC simulator. Two taxiway configurations were simulated during 13 runs. The Baseline (BL) condition represented current DFW configuration, whereas the PT condition included the proposed new PTs, the extension of Runways 17C, and a new high speed exit on 17C (exiting to the East).

One staff pilot and seven representatives from the airlines flew the Boeing 747-400 flight simulator. The participating pilots engaged in at least 1 of the 4 days of the demonstration. Pilots were encouraged to experience all "views" defined in the objective of the demonstration, in addition to certain predefined typical views.

Controller and pilot subjective ratings, objective data captured from the simulators, and communications data were obtained throughout the demonstration. The objective data captured included taxi time durations, various arrival and departure data, runway occupancy times, inbound and outbound taxi statistics, runway crossing data, and pilot and controller communications data.

In general, the subjective and objective data demonstrated that the PTs would improve operations at DFW, if implemented. The results revealed many interesting distinctions between the BL and PT conditions. However, because this was a demonstration, it is imperative to recognize that all results should be used and interpreted with caution.

All controller and pilot participants agreed the demonstration was a good representation of operations at DFW and the proposed new taxiways, and all perceived a marked improvement from BL to PT conditions. The participating controllers believed that the implementation of PTs in the demonstration enabled an overall more efficient operation. They felt the PTs provided for a smoother flow of traffic, afforded better ability to move aircraft to and from the runways, improved situation awareness, and decreased workload demands. Pilot participants thought the PTs improved efficiency and increased safety by reducing the potential for runway incursions. They also speculated that PTs would improve airline performance rates and reduce both pilot and controller workload due to less frequency congestion and a reduction in hold-short instructions.

The objective data resulting from the demonstration supported the participants' verbal comments. Both indicated that the PTs would improve operations at DFW if implemented. Arrival rates for the BL and PT conditions remained consistent (by design), but there was a substantial increase in the departure rate per hour for the PT condition. The average inbound taxi duration increased in the PT condition. However, the average outbound taxi duration and associated runway occupancy times showed improvements with PTs compared to BL runs, as did inbound and outbound stop rates and duration times. Furthermore, by design, PTs completely eliminated runway crossings at DFW in the demonstration.

Controller and pilot communications for the most critical frequency were clearly reduced with the addition of PTs. On the Local East 1 (LE1) frequency, significantly fewer transmissions were made (22% relative reduction) with fewer words spoken (27% relative reduction). This resulted in the controllers and pilots spending less time on frequency (24% relative reduction) when compared to BL runs. Words were also spoken slightly slower on average during PT runs. In addition to being operationally relevant, these results were also statistically significant for the LE1 frequency. Such findings were consistent with controller debrief comments; controllers felt that the volume of communications was significantly reduced and that they used less verbiage because concerns about crossings and reliance on pilot readbacks were alleviated. Many of the positive data results were also apparent in the findings of the other frequencies, but generally to a lesser degree.

Based on the results of the data collected from the demonstration, it was clear that all objectives of the exercise were met successfully. The controllers and pilots were afforded the opportunity to observe and experience the proposed airport improvements with realism and high fidelity, and a considerable amount of valuable data was available for analysis and is presented in this report.

1. Introduction

This report describes the results of a real-time human-in-the-loop (HITL) simulation that demonstrated the effect of adding new perimeter taxiways to the Dallas/Fort Worth International Airport (DFW). The Dallas/Fort Worth International Airport Perimeter Taxiway (DAPT) Demonstration was a partnership effort involving DFW, the Federal Aviation Administration (FAA), and the National Aeronautics and Space Administration (NASA). The DAPT Demonstration was conducted February 10-13, 2003, at the NASA Ames Research Center (ARC) in Moffett Field, California. The data presented in this report are results from controller and pilot subjective ratings, objective data captured from the simulators, and communications data.

This research endeavor was primarily designed to be a demonstration and was not focused on providing data with high fidelity or statistical rigor (i.e., there is limited power for the use of statistical data analysis). The data provide a snapshot of the impact of the proposed DFW perimeter taxiway (PT) operation with human operators (i.e., controllers and pilots) included. It is acknowledged that the data sample is small, participants were limited, and the runs were of variable length. Due to the variable run lengths, objective data were often converted to hourly rates. Inferential statistics were used as appropriate. For most of the data, however, inspection of descriptive statistics (e.g., frequencies, medians, and means) was used as the primary method for evaluation.

Because this was a demonstration, it is imperative that all results presented are to be used and interpreted with great caution. Results should not be generalized or accepted as conclusive.

In addition to this report, an informational video of the demonstration and proposed airport improvements was developed and will be shared with the National Air Traffic Controllers Association (NATCA), International Civil Aviation Organization (ICAO), National Academy of Sciences, International Council of Airports, Airline Pilots Associations (ALPA), the Allied Pilots Association (APA), and others. The video can be obtained by contacting DFW (perimetertaxiways@dfwairport.com).

1.1 Background

Currently DFW typically experiences approximately 1,700 runway crossings per day. The existing configuration at DFW requires that aircraft arriving on the East-side Runway 17C-35C cross the departure Runway 17R-35L, and aircraft arriving on 17L-35R cross both the arrival Runway 17C-35C and the departure Runway 17R-35L. The aircraft arriving on Runway 31R must also cross both Runways 35C and 35L. Similarly, the aircraft arriving on the West-side Runway 13R must cross both the arrival Runway 18R-36L and the departure Runway 18L-36R, and aircraft arriving on 18R-36L must cross the departure Runway 18L-36R. Figure 1 depicts the DFW runways, terminals, three control towers, and existing taxiways and bridges.

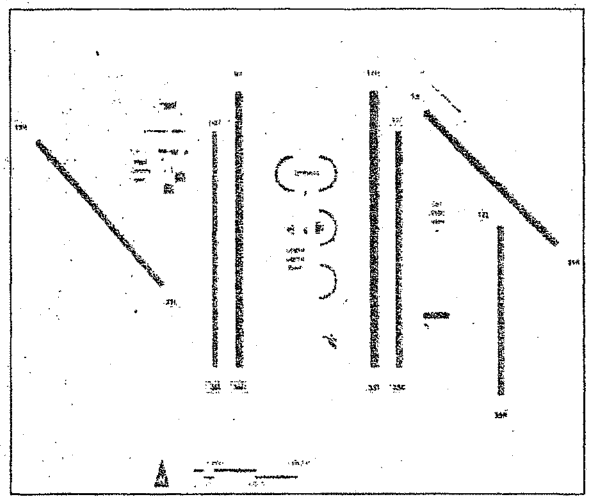


Figure 1. DFW current configuration.

Under current operations, the local controller must conduct all runway crossings before the aircraft can be released to the ground controller. This situation increases the local controller's workload in meeting airport demand mainly due to frequency congestion and challenges the local controller to fully utilize the available runways. During major arrival and/or departure pushes, tradeoffs are sometimes made to safely balance all operations. When the local controller maintains the airport departure demand, runway crossings for arriving aircraft can be delayed due to having to cross the departure runway. Similarly, when arrivals stack up at the various runway-crossing points forcing the local controller to meet this demand, departures are 'gapped' to accommodate these crossings. These situations are most evident during the peak traffic times.

In an effort to reduce arrival and departure delays and the number of active runway crossings (with the added benefit of reducing runway incursion potential), a PT concept is proposed. The concept includes new PTs on the East and West sides of the airport, and two new high speed exits each on 17C and 18R. Figure 2 shows an aerial perspective of the proposed new PT concept.

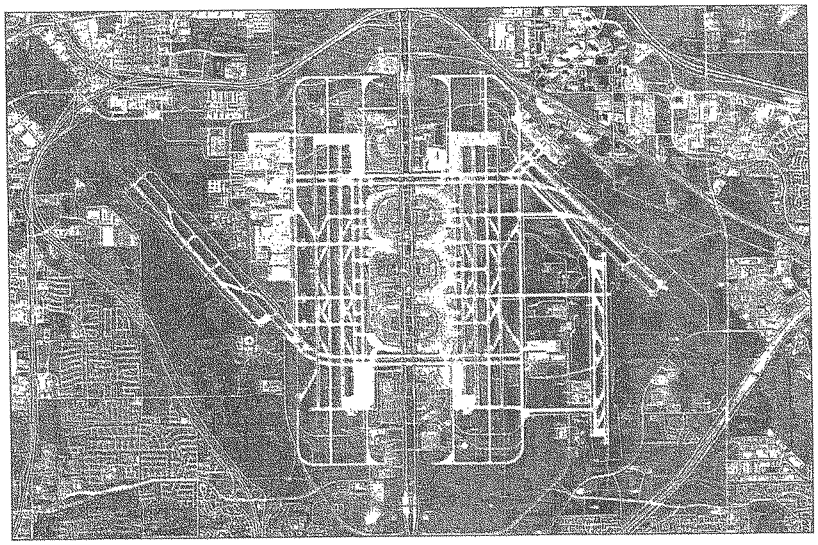


Figure 2. DFW with proposed PTs.

Many fast-time simulations and paper studies have been conducted over the last 7 years that support the cost benefit, efficiency, and safety aspects of the proposed airport improvements. It has also been determined that no waivers will be needed for the new taxiways. However, prior to the DAPT Demonstration, the improvements had not been observed or assessed in an operational setting using high fidelity simulation with human operators. In particular, there were four "views" of special interest for the demonstration: 1) the controller view, 2) the pilot-on-taxi view, 3) the pilot-on-arrival view, and 4) the pilot-on-departure view.

An Experiment Working Group (EWG) was formed to plan, conduct, and analyze the DAPT Demonstration to examine the proposed new PTs. Organizations represented on the EWG were DFW, DFW Tower/TRACON, FAA Southwest Region Charter Program Office (ASW-1C1), FAA Office of System Capacity (ASC-100), NASA ARC, the FAA William J. Hughes Technical Center Simulation and Analysis Group (ACB-330), and NATCA. Other organizations involved in the effort included FAA Flight Standards Service (AFS), FAA Office of Runway Safety (ARI), ALPA, APA, and American Airlines, American Eagle Airlines, Atlantic Southeast Airlines, Comair, Delta Airlines, and United Parcel Service Airlines. DFW and the FAA sponsored the study.

1.2 Objectives

The primary objective of this real-time HITL demonstration was to provide the airlines, air traffic controllers, pilots, and their associated unions (i.e., NATCA, ALPA, APA) the opportunity to observe and participate in a demonstration of the proposed airport improvements at high fidelity levels with the goal of gaining their acceptance of PTs. The secondary objective was to collect and analyze operational data for the purpose of deriving descriptive statistics for runway crossings, taxi times, and pilot and controller transmissions.

2. Method

The demonstration was conducted at NASA ARC in Moffett Field, California. FAA ACB-330 acted as Principal Investigator and provided support for the research team. NASA ARC's FutureFlight Central (FFC) facility and Crew Vehicle Systems Research Facility (CVSRF) were used to simulate DFW tower operations and flight deck operations respectively, at high fidelity levels. FFC and CVSRF were integrated and ran simultaneously for all runs. Table 1 highlights key aspects of the demonstration design.

Table 1. Summary of the Demonstration Design

Summary of the Demonstration Design
• Five Certified Professional Controllers from DFW staffed the FFC simulator
• One staff pilot and seven representatives from the airlines flew the Boeing 747-400 (B744) flight simulator
• 25 pseudo-pilots flew all other simulated aircraft targets
• There were 4 days of demonstrations (including training)
• East-side tower operations at DFW were simulated
• South flow traffic operations at DFW were simulated
• Two taxiway configurations were simulated – Baseline (BL) represented current DFW configuration and operations – PT included the proposed PTs, the extension of Runways 17C, and a new high speed exit on 17C (exiting to the East)
• For the PT conditions, 17C was lengthened on the approach end and a Precision Approach Path Indicator (PAPI) was installed for the newly lengthened runway for visual glideslope guidance
• Traffic scenarios were built to be approximately 45 minutes in duration
• Traffic scenarios were created using DFW operations data modified as needed to create future demand levels and the desired traffic mix – The arrival and departure rates for both BL and PT reflected future demand levels of DFW operations that exceeded current peak demand by approximately 20 to 30% – The fleet mix represented a realistic projection for the 2003-2006 time frame. Regional Jets, Boeing-757s, and heavy aircraft were increased, and the number of large jets (non- Regional Jets) and turboprops were decreased
• Aircraft taxi speeds were limited to the following for all runs: – "Fast" speed: 50 kts (limited to extended taxiing on runways) – "Normal" speed: 20 kts (for standard taxi operations) – "Slow" speed: 10 kts (cornering, ramp operations, congested traffic, etc.) • These speeds were applied to all aircraft in the simulation, regardless of airline company or aircraft type
• All conditions represented daytime visual meteorological conditions reflecting VFR conditions with a ceiling of 5000 ft and 5 miles visibility
• During BL conditions, the tower was staffed with five positions: Ground East 1 (GE1), Ground East 2 (GE2), Local East 1 (LE1), Local East 2 (LE2), and Cab Coordinator East 1(CCE1)
• During PT conditions, the tower was staffed with five positions: GE1, GE2, Ground East 3 (GE3), LE1, and LE2

For further details and information about the demonstration including methods used, experimental design, laboratory platforms, participants, scenarios, procedures, schedules, and so on, please see the DAPT Demonstration Experiment Plan Version 8 (dated 9/6/2002). The document can be obtained by contacting the FAA (karen.buondonno@faa.gov). The following paragraphs describe the only notable deviations from the experiment plan.

Originally, the demonstration intended to complete a total of 12 data collection runs during which pilots of the B744 flight simulator would fully interact with controllers in the tower simulator. The B744 simulator was to be fully linked to the FFC tower and simulated flights were to be incorporated to interact with the tower for nine of the runs. Each day, pilots were intended to fly the B744 simulator in two data collection runs for a total of six pre-defined flight segments. During each flight segment, the flight crew was to experience one of the following desired "views": an arriving flight passing over taxiing traffic on the Northeast perimeter; a departing aircraft passing over taxiing traffic on the Southeast perimeter; an aircraft taxiing on the Northeast perimeter with arrivals passing over it; or, an aircraft taxiing on the Southeast perimeter with departing traffic passing over it. Flight segments were intended to last approximately 5-15 minutes per run. The third and final run of each day for the pilots was to be an unstructured "Free Form" run that lasted for 45 minutes. During the Free Form run, the B744 flight simulator was not to be visible to the Air Traffic Control (ATC) side of the operation. The flight crew was to be given a menu of options from which they selected to experience a variety of additional conditions of interest. Menu items were to include such options as an arriving flight passing over taxiing traffic on the perimeters, a departing aircraft passing over taxiing traffic on the perimeters, an engine-out departure, IFR or VFR conditions, day or night environments, and eye point adjustments to simulate different aircraft types.

Due to technical difficulties, there were several changes. The original plan called for 2 of the 12 planned runs to be simulated as nighttime runs in FFC. The EWG decided to eliminate nighttime runs. In the end, there were 13 data collections runs instead of 12, and the runs were of variable length. As planned, the B744 simulator pilots participated in the demonstration at least 1 of the 4 days of the pilot demonstration. However, the original two-way link designed for the pilots to fully interact with the tower was degraded, and the link was adjusted to transmit data one-way. Therefore, pilots received information from the tower, but the B744 was not visible or audible to the controllers. The experiment design was adjusted to have the pilots run "Free Form" (as discussed previously) throughout the entire demonstration. They were encouraged to experience all "views" to be demonstrated from the original scenarios in addition to the "menu items." Pilots rotated throughout positions during and after each run. Preliminary procedures for PT operations were developed for use in the demonstration and presented in the experiment plan. Prior to the demonstration more detailed operational procedures for standard taxi routes were developed and briefed to the controllers. Therefore, the following procedures serve to replace those found in the DAPT Demonstration Experiment Plan Version 8.

Figure 3 and the following describe the new standard taxi routes for arrivals used by ATC during PT runs.

- ARRIVALS to 17L
  - Arrivals from 17L joined the Southeast Perimeter Taxiway from Taxiway P and turned North on Taxiway JS

- ARRIVALS to 17C
  - Non-heavy aircraft joined the Southeast Perimeter Taxiway from Taxiway M and turned North on Taxiway JS
  - Heavy aircraft joined the PT from Taxiway P (heavy aircraft were required to exit the runway to the East due to tail height) and turned North on Taxiway JS
- After joining Taxiway JS, aircraft were segregated based on their destination terminal
  - Aircraft parking at Terminals A and C – these aircraft transitioned from Taxiway JS to Taxiway L at Taxiway ER and held short of Taxiway EL
  - Aircraft parking at Terminals E & West side – these aircraft transitioned from Taxiway JS to Taxiway K and held short of Taxiway A
- All arrival aircraft on the Southeast Perimeter Taxiway changed frequencies to monitor GE2 turning North on Taxiway JS

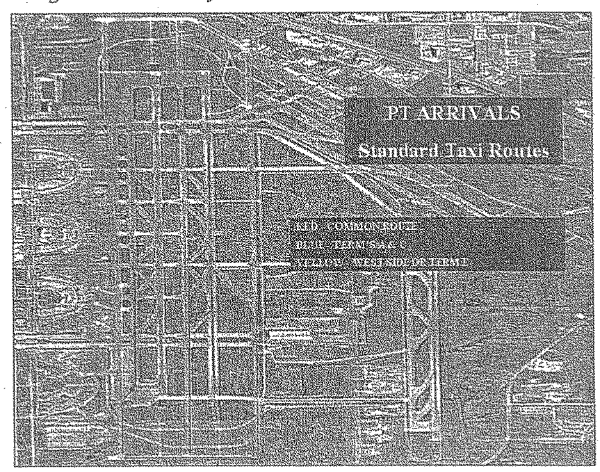


Figure 3. PT arrivals standard taxi routes.

Figure 4 and the following describe the new standard taxi route for departures used by ATC during PT runs.

- DEPARTURES
  - Aircraft taxiing to Runway 13L for departure taxied North on Taxiway K, transitioned to Taxiway J via Taxiway Y, and joined the Northeast Perimeter Taxiway. These aircraft held short of Taxiway N and changed frequencies to contact LE2 after crossing Taxiway M

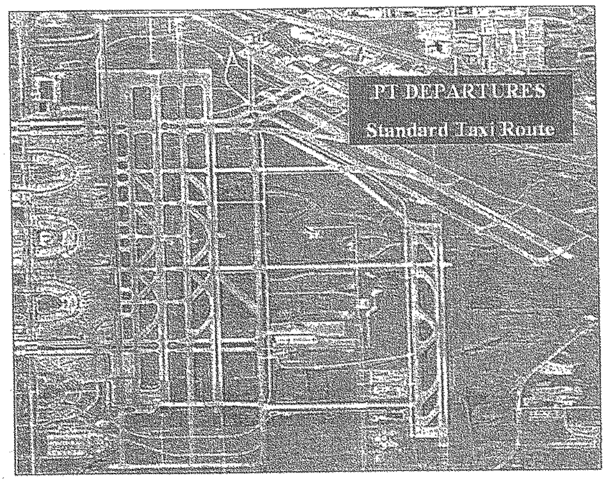


Figure 4. PT departures standard taxi route.

2.1 Limitations and Constraints

Simulation is a powerful tool for analyzing, designing, and operating complex systems. It enables hypotheses testing without having to compromise safety in the real world. It is a cost-efficient method to check the understanding of the surrounding world and can help produce better results faster for a research question. It can also be a very effective way to show how an operation works while stimulating creative thinking about how it can be improved. However, all simulation techniques make assumptions about the environments they are representing. It is very important to understand and realize the impact of such assumptions as they also often include limitations and constraints that must be considered when examining the results and conclusions.

The DAPT Demonstration employed a real-time method of simulation, that is, human participants (i.e., controllers and pilots) interacted with and reacted to the simulated aspects of the operational environment in real-time. Because it was purposely designed to be a demonstration (i.e., less data rigor and limited experimental design), it is particularly important to recognize and consider the implication of its limitations. The following is a list of the limitations and constraints experienced in the DAPT Demonstration (note: all participants were advised of the potential for these irregularities prior to the start of the exercise).

- The Digital Bright Radar Indicator Tower Equipment (D-BRITE) was available to controllers but was not as informational as the field version (e.g., no time share, no groundspeed, no heavy designator, departures do not tag until 2.5 nm South);
- The Airport Surface Detection Equipment (ASDE) -3 orientation was off by about 90 degrees (North-South orientation);

- The ATC communications system was a "touch screen" emulation of the field system. There was no intercab communications and there were no West-side coordination calls because only the East-side tower operations were simulated;
- There was a slight delay (0.5 second) inherent in the digital communications system;
- Pseudo-pilot software anomalies occasionally caused aircraft to appear to stop or jump while taxiing;
- Pseudo-pilots were responsible for "flying" multiple aircraft in the simulation. Their task load demand caused an increase in controller repetition of clearances and calls, and pilot voices for different aircraft were often the same;
- Visual cues occasionally appeared odd to the controllers. For example, objects appeared slightly farther or closer than normal and controllers occasionally had difficulty discerning aircraft type;
- Technical glitches in the software caused a few aircraft to "wheelbarrow" (i.e., nose-down landing) down the runway on arrival, or "spin" on their tail at the ramp. These aircraft were removed from the runs when encountered;
- The aircraft simulator is a high fidelity representation of a B744. Because there are so few Boeing 747 aircraft at DFW, the eye point of the aircraft was lowered to better represent the experience of a McDonnell Douglas 80 (MD-80);
- In the aircraft simulator, the visual software limited the out-the-window view to the 16 closest aircraft, occasionally causing surrounding aircraft to mysteriously appear or disappear;
- A Traffic Alert and Collision Avoidance System (TCAS) issue was identified in the simulator cockpit during the demonstration. Because pilots flew "free form" the whole demonstration (moving about freely, invisible to FFC controllers, hovering, parking on the end of the runway, etc.), unlikely traffic situations were showing up on the display and distracting the pilots. It was felt that TCAS was not crucial to the experience of the participating pilots, therefore, TCAS was turned off to reduce the distraction, and;
- There were technical issues with the simulation software that caused several runs to be terminated prematurely. Four of the 13 runs in the dataset terminated prior to the approximate 45-minute design time for the exercises. Based on pre-set criteria, two of those runs were too short (i.e., less than 30 minutes) to be included in the data analyses.

Though the list may seem long, in general, these limitations were normal for a demonstration of this complexity. For example, though it may seem to skew the results because there was increased controller repetition of clearances, it happened in both conditions (PT and BL), so the comparison of interest was not significantly affected. It is certainly important to identify such potential sources of bias, but in actuality, those listed previously only minimally affected the data and the experience of the participants. When asked, the participating controllers and pilots indicated these limitations and constraints only slightly affected their experience.

3. Results

There were 13 runs in the demonstration that included six BL runs and seven PT runs. Table 2 describes the condition and duration of each run. Run order was sequential as listed in the table. Though data for the 13 runs have been recorded, retained, and analyzed, two of the runs (Runs 1 and 9) did not meet the pre-set 30-minute minimum run length criterion to be included in the final data results. Shorter runs would not accurately capture the affect of surges, lulls, or build up in the traffic flow. For example, a short run would not experience the typical cumulative build up of delay, which could distort measurements such as taxi durations, runway crossings, stop durations, frequency congestion, and so on. Also, due to an isolated technical issue, communications data for one PT run (Run 2) were not captured. All other Run 2 data were included in the results.

Table 2. Summary of Runs

Run	Condition	Duration (min:sec)
1[a]	BL	22:38
2	PT	47:28
3	PT	44:07
4	BL	45:16
5	PT	35:48
6	BL	45:12
7	PT	32:46
8	PT	45:10
9[a]	BL	16:36
10	PT	43:30
11	BL	45:21
12	BL	45:20
13	PT	47:41

[a]* Not included in results reported due to run lengths less than 30 minutes.

3.1 Subjective Data

Questionnaires were distributed to participating controllers and pilots to elicit opinions about their demonstration experience. Responses from controller and pilot participants are presented in both descriptive and graphical formats in the following sections. Debrief sessions and comments on questionnaires were summarized and included where appropriate, with particular emphasis on interesting or recurring themes.

All questionnaires, including ATC Post-Run, ATC Post-Demonstration, and End-of-Day Pilot Questionnaires were designed using 7-point Likert scales. Therefore, all rankings ranged from 1 to 7; however, the anchors varied according to the accompanying statement or question. In the following sections, anchors are provided both in the graphs and discussion of each specific question.

Data analysis for the questionnaires consisted of deriving descriptive statistics for each individual question. For the purpose of reporting responses, the overall median scores were used to describe the data. The median score is the most appropriate measure of central tendency when using ordinal data or when scores are not normally distributed. The median is the value above or below which one half of the observations fall. When there is an even number of observations, no unique center value exists, so the mean of the two middle observations is taken as the median value. The charts and tables in the following sections provide the frequency and median to further describe the distribution and allow for an assessment of the responses.

3.1.1 ATC Results

3.1.1.1 ATC Post-Run Questionnaires

Post-Run Questionnaires were administered to participating controllers after each run. Overall ratings for the Post-Run Questionnaires were positive and, in general, the controllers perceived a marked improvement from BL to PT conditions. Table 3 provides a summary of the questions and results. More detailed results and summaries for individual questions (or groups of questions) follow.

Table 3. ATC Post-Run Questionnaire Summary

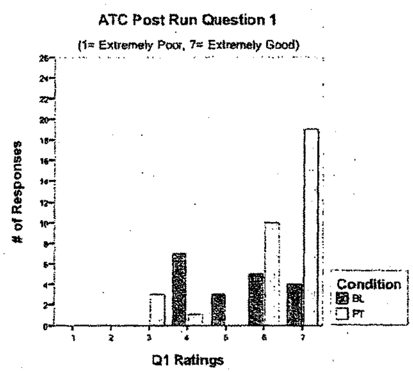
	Question		n[1]	Median	Scale
1	Rate your ability to move aircraft "to and from the runways" during this run.	BL	19	5	1= extremely poor
		PT	33	7	7= extremely good
2	Rate your overall level of situation awareness[2] during this run.	BL	20	6	1= extremely poor
		PT	35	7	7= extremely good
3	Rate your situation awareness for current aircraft locations during this run.	BL	20	6	1= extremely poor
		PT	35	7	7= extremely good
4	Rate your situation awareness for projected aircraft locations during this run.	BL	20	6	1= extremely poor
		PT	35	6	7= extremely good
5	How much coordination was required with the other controllers during this run?	BL	20	1.5	1= very little
		PT	35	1	7= a great deal
6	Rate the difficulty of this run.	BL	20	6	1= extremely easy
		PT	35	4	7= extremely difficult
7	What was the level of traffic complexity under your control during this run?	BL	20	5.5	1= extremely low
		PT	35	5	7= extremely high
8	How would you rate the overall level of efficiency of this operation?	BL	20	5	1= extremely poor
		PT	35	7	7= extremely good
9	Rate the performance of the pseudo-pilots in terms of their responding to your control instructions, providing readbacks, etc.	BL	20	5	1= extremely poor
		PT	35	7	7= extremely good

[1] n = number of observances (e.g., controllers who answered, pilots who answered, runs included)

[2] Because there are various interpretations of the term "situation awareness", for this demonstration, the participants were instructed that to have good situation awareness was to maintain awareness of the present state of events (at the lower end of the scale) and to be able to predict and anticipate future events (at a higher end of the scale) in the dynamic environment. In other words, a rating of 1 to 3 would indicate more of a reactionary control strategy perhaps due to traffic volume, frequency congestion, etc., whereas a higher rating of 5 to 7 would reflect an approach that was more proactive in nature.

Question 1

Controllers reported that they felt better able to move aircraft "to and from the runways" in the PT condition than during BL runs. As shown in Figure 5, the median rating for the PT condition was 7 or "extremely good", whereas the BL median score was 5. Controllers generally believed that the elimination of runway crossings better enabled them to smoothly transition aircraft to their respective gates and/or to the runways. This was particularly true when taxiing turboprops to 13L. Controller comments indicated that during PT conditions they felt workload was lighter and aircraft flows were "smooth and steady."

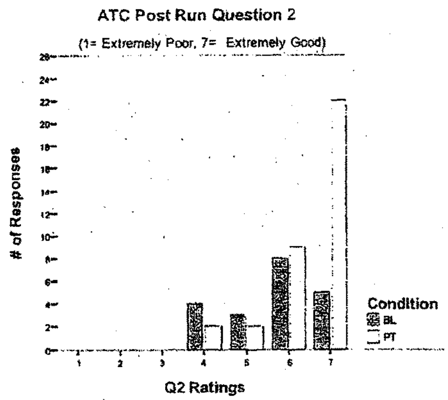


Condition	n	Median
BL	19	5
PT	33	7

Figure 5. Q1- Rate your ability to move aircraft "to and from the runways" during this run.

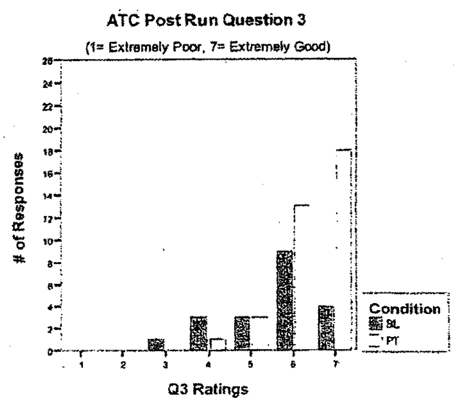
Questions 2-4

For Question 2, participants reported that their overall level of situation awareness improved as a result of PT implementation. Figure 6 shows a median response of 7 for PT conditions as compared to the BL median of 6. In their comments, they attributed this to the reduced complexity of scanning tasks that required them to ensure runways were clear to cross. With PTs they were able to re-focus their attention to other tasks because there were no runway crossing queues. This was particularly true for the Local Controllers. As shown in Figure 7, responses to Question 3 indicated that situation awareness was also perceived to improve for current aircraft locations under the PT condition (median = 7) as compared to a BL score of 6. As Figure 8 depicts, Question 4 responses to situation awareness concerning projected aircraft location did not show an improvement or degradation with PTs. Both of these ratings had a median of 6.



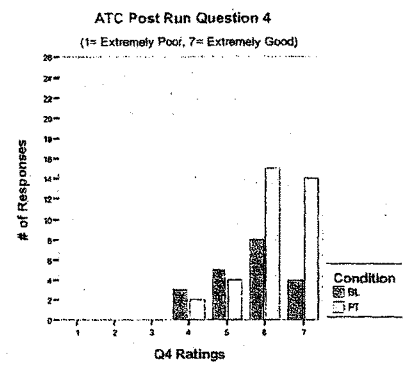
Condition	n	Median
BL	20	6
PT	35	7

Figure 6. Q2- Rate your overall level of situation awareness during this run.



Condition	n	Median
BL	20	6
PT	35	7

Figure 7. Q3- Rate your situation awareness for current aircraft locations during this run.

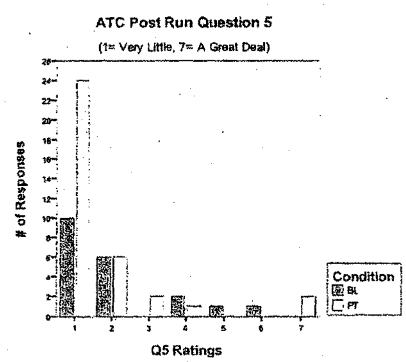


Condition	n	Median
BL	20	6
PT	35	6

Figure 8. Q4- Rate your situation awareness for projected aircraft locations during this run.

Question 5

As shown in Figure 9, the amount of controller-to-controller coordination required received a median score of 1 or "very little" for PT runs, and a median score of 1.5 for BL runs. Controllers remarked that due to the nature of the tower control environment, the need for controller-to-controller coordination is normally minimal.

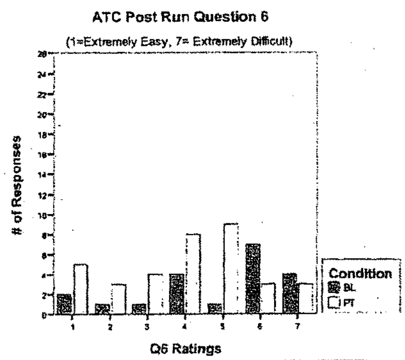


Condition	n	Median
BL	20	1.5
PT	35	1

Figure 9. Q5- How much coordination was required with other controllers during this run?

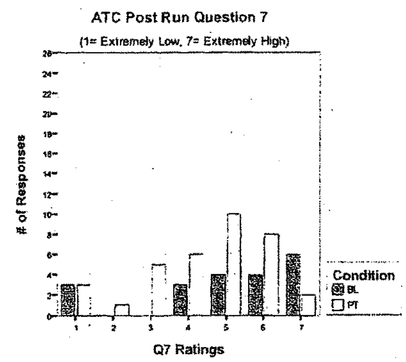
Questions 6-7

Responses to Question 6 show that ATC participants generally perceived the BL runs to be more difficult than PT runs. As shown in Figure 10, the median score for BL difficulty was 6, whereas the median for PT difficulty was 4. Figure 11 shows that the ratings of traffic complexity from Question 7 remained fairly stable for both BL and PT runs (median = 5.5 and median = 5, respectively) indicating that the complexity was perceived as moderate to high for all runs. It is interesting to note that these two questions had responses that ranged from 1 to 7 over the course of the demonstration indicating that different controllers experienced varying levels of difficulty and complexity. The runs were all built with the same or similar traffic, therefore this could be due to several things such as differences in roles and responsibilities between the positions, or simply varying opinions on the meaning of "difficult and complex."



Condition	n	Median
BL	20	6
PT	35	4

Figure 10. Q6- Rate the difficulty of this run.

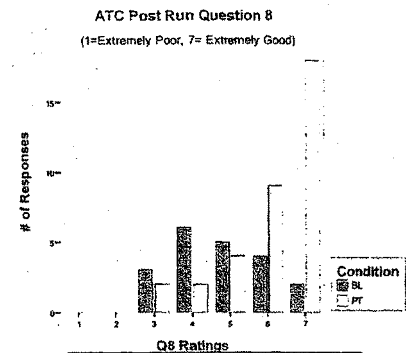


Condition	n	Median
BL	20	5.5
PT	35	5

Figure 11. Q7- What was the level of traffic complexity under your control during this run?

Question 8

Controllers believed that the PT operations were more efficient than the BL condition. PT efficiency was rated as "extremely good," with a median score of 7 as shown in Figure 12. BL runs were perceived as less efficient with a median score of 5, indicating acceptability somewhat above average. PT ratings were consistent with recorded comments that indicated the controllers felt PTs eased operational demands, improved situation awareness by reducing the complexity of scanning activities, provided for a smooth flow of traffic, decreased workload demands, and allowed for more effective strategies to be implemented (e.g., sequencing departures more efficiently in order to increase departure rates). It is interesting to note the distribution of responses once again. Both sets of responses actually had a wide distribution on the rating scale, but BL ratings were more evenly distributed from 3 to 7, whereas PT ratings swayed more prominently to the higher rakings.

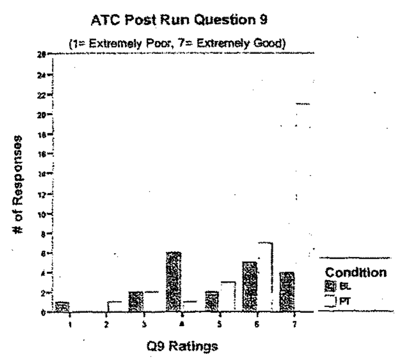


Condition	n	Median
BL	20	5
PT	35	7

Figure 12. Q8- How would you rate the overall level of efficiency of this operation?

Question 9

Controllers rated pseudo-pilot performance regarding their response to control instructions during the demonstration. Figure 13 shows that they rated a median score of 7 (extremely good) for the PT condition, and a median score of 5 (moderate to high) for the BL condition. The decline in scores from PT to BL could be attributed to the fact that fewer readbacks and controller commands were required in the PT environment. Controllers commented that they felt the pseudo-pilots did a very good job, overall.



Condition	n	Median
BL	20	5
PT	35	7

Figure 13. Q9- Rate the performance of the pseudo-pilots in terms of their responding to your control instructions, providing readbacks, etc.

3.1.1.2 ATC Post-Demonstration Questionnaires

Post-Demonstration Questionnaires were administered to participating controllers at the conclusions of the demonstration. All of the controllers believed PTs would be advantageous to implement at DFW, and the demonstration provided a good representation of operations. Table 4 provides a summary of the questions and results. More detailed results and summaries for individual questions (or groups of questions) follow.

Table 4. ATC Post Demonstration Questionnaire Summary

	Question	n	Median	Scale
1	What effect, if any, did the new PTs have on the amount of frequency communications?	5	2	1= decreased greatly 7= increased greatly
2	Did your communication strategies change when you were able to utilize the PTs?	5	6	1= not at all 7= a great deal
3	What effect, if any, did the PTs have on your control strategies?	5	6	1= negative effect 7= positive effect
4	Based upon your experience in the demonstration, do you feel that adding the PTs improves operations at DFW?	5	7	1= not at all 7= a great deal
5	Rate the realism of the overall demonstration experience compared to actual ATC operations.	5	6	1= extremely unrealistic 7= extremely realistic
6	Rate the realism of the simulated hardware compared to actual equipment.	5	5	1= extremely unrealistic 7= extremely realistic
7	Rate the realism of the simulated software compared to actual functionality.	5	5	1= extremely unrealistic 7= extremely realistic
8	Rate the realism of the simulated traffic runs compared to actual National Airspace System (NAS) traffic.	5	4	1= extremely unrealistic 7= extremely realistic
9	Rate the realism of the simulated airport compared to the actual airport.	5	5	1= extremely unrealistic 7= extremely realistic

Question 1

Figure 14 shows controllers perceived that PTs reduced the amount of frequency communications in comparison to the BL scenarios. Their median response was 2, indicating a marked improvement. This rating is consistent with verbal feedback provided by the controllers. Along with several comments about reduced frequency communications, one controller felt "workload and frequency congestion was lower due to reductions in hold-short instructions and readbacks." Furthermore, controllers reported that PTs eliminated the need for calls to turboprops from the GE1 position.

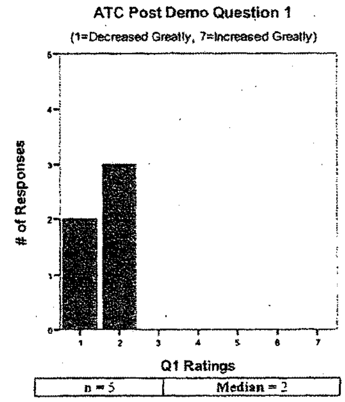


Figure 14. Q1-. What effect, if any, did the new PTs have on the amount of frequency communications?

Question 2

A median response of 6 indicated that controllers felt that communication strategies changed quite a bit when PTs were available for use, as shown in Figure 15. However, no feedback was provided to specify how, in fact, they had changed. Inferences can be made that fewer controller-to-pilot transmissions and less frequency congestion allowed for more efficient communication strategies.

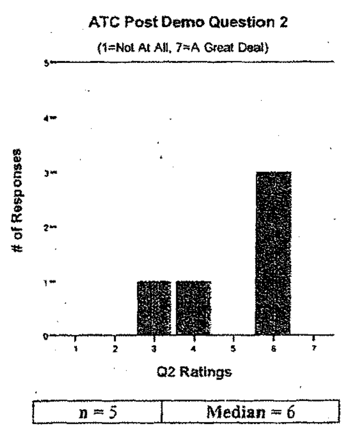
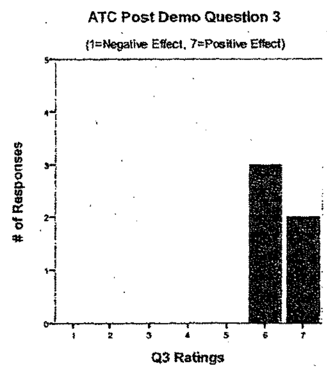


Figure 15. Q2- Did your communication strategies change when you were able to utilize the PTs?

Question 3

As Figure 16 depicts, participant responses to whether PTs imposed positive or negative changes in control strategies resulted in a median response of 6, indicating that controllers believed PTs had an overall positive effect. Controller comments revealed that they felt they were able to increase departure rates because the need for 'gapping' for runway crossings was eliminated. The controllers reported that without gapping restraints they were able to sequence aircraft more efficiently, resulting in more 'nose-to-tail' departures. In addition, the elimination of runway crossings and the resulting ease of taxiing aircraft to their destinations (particularly for turboprops going to 13L) also improved control strategies.

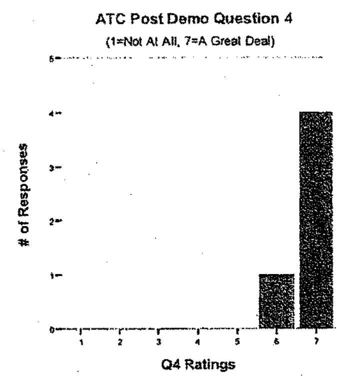


n=5	Median=6

Figure 16. Q3- What effect, if any, did the PTs have on your control strategies?

Question 4

Nearly all controllers thought that adding PTs improved operations at DFW "a great deal," which was a median response of 7, as depicted in Figure 17. Controllers further felt that PTs reduced frequency communications and that the operation was much smoother and less work intensive. In their opinion, the elimination of aircraft crossings reduced workload demands, decreased scanning complexity, and allowed controllers to sequence departures more efficiently in order to increase departure rates. Common comments were that PTs offered "greater efficiency", created a "smooth and steady" environment, and "cut workload in half."

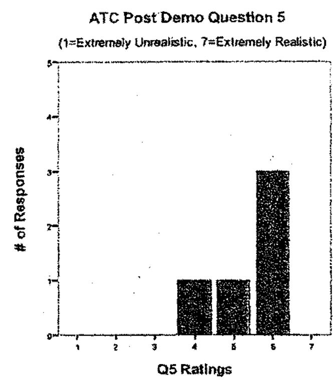


n=5	Median=7

Figure 17. Q4- Based upon your experience in the demonstration, do you feel that adding the PTs improves operations at DFW?

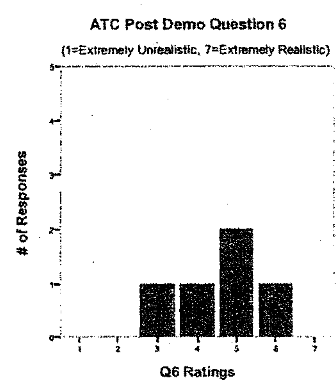
Questions 5-9

Question 5 realism ratings for the overall demonstration ranged from 4 to 6, as shown in Figure 18. The median response from controllers was a 6, on the high end of realistic representation. Questions 6 and 7 addressed the realism of hardware and software components, which received a median score of 5 (moderate to high realism), as did the realism of the simulated airport environment (Question 9). The traffic sample realism ratings addressed in Question 8 were not as favorable; the median response for simulated traffic runs compared to actual NAS traffic was 4. Controller comments indicated that the lower scores were due to some of the following difficulties: Controllers had some difficulty in discriminating the types of the most distant aircraft, largely due to the resolution of the screens. One controller's opinion was that increased traffic contributed to the problem. (Note: Traffic was intentionally increased by 20 to 30% to emulate future demand levels). Another confounding difficulty reported by the controllers was that pilots did not respond to crossing clearances as quickly as they would be able to in actual conditions. They thought that large workload demands on pseudo-pilots (who were "flying" multiple aircraft at one time), unrealistic repetition of controller clearances, and increased calls contributed to crossing delays. Controllers felt these complications might skew the BL run data, making them less representative of actual operations. In addition, the ASDE produced more clutter than actual operations, making the screen less readable and more confusing to the controllers. Controllers developed a strategy to enlist GE3's assistance by writing down the call signs for arrivals coming off the PTs for GE2. Figures 18 through 22 depict the controller's responses to Questions 5 through 9.



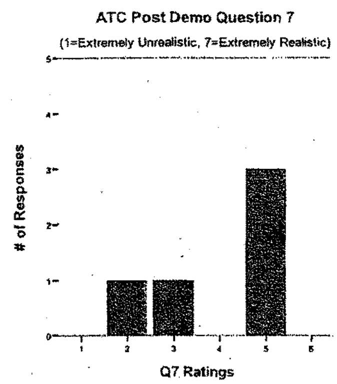
n=5	Median=6

Figure 18. Q5- Rate the realism of the overall demonstration experience compared to actual ATC operations



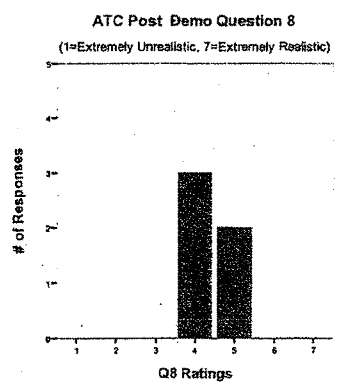
n=5	Median=5

Figure 19. Q6- Rate the realism of the simulated hardware compared to actual equipment.



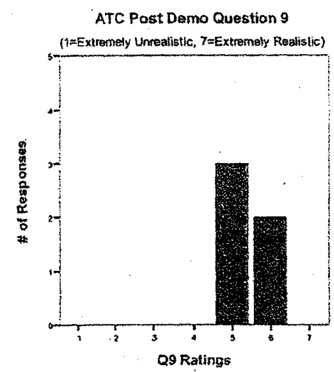
n=5	Median=5

Figure 20. Q7- Rate the realism of the simulated software compared to actual functionality.



n=5	Median=4

Figure 21. Q8- Rate the realism of the simulated traffic runs compared to actual NAS traffic.



n=5	Median=5

Figure 22. Q9- Rate the realism of the simulated airport compared to the actual airport

<u>3.1.2 Pilot Results</u>

A total of seven pilots participated in the DAPT Demonstration at the CVSRF. All pilots were asked to complete a Biographical Questionnaire to provide researchers with information about their range of skill and other attributes. The results indicated that pilot participants varied widely in terms of demographics, skill levels, and experience. Of the seven participants, five were active Federal Aviation Regulations (FAR) Part 121 pilots. The remaining two inactive pilots held administrative positions and had a vested interest in PT operations. Participant ages ranged from 33 to 56, and all were male. The experience of the part 121 pilots ranged from 0 to 600 total hours experience in the past 12 months. Time as commercial and military aircraft pilots ranged from 0 to 30 years. In addition to demographic information, pilots were asked to rate their skill levels, current level of stress, and level of motivation to participate in the study using Likert scales ranging from 1 to 7 (anchors were adjusted as appropriate). Pilots' self-assessed skill levels ranged from 2 to 7 (1 = *Not Skilled*, 7 = *Extremely Skilled*). Their level of stress ranged from 2 to 4 (1 = *Not Stressed*, 7 = *Extremely Stressed*) indicating that outside stressors should not have affected the pilots' ability to effectively participate in the demonstration. All reported they were largely motivated to participate in the study with scores ranging from 4 to 7 (1 = *Not Motivated*, 7 = *Extremely Motivated*).

Pilots were encouraged to experience their three "views" outlined in the test plan, specifically, pilot-on-taxi, pilot-on-arrival, and pilot-on-departure. In addition, the pilot community had specific concerns about aircraft landing overhead of taxiing perimeter traffic and aircraft departing overhead of taxiing perimeter traffic. To alleviate these concerns, all participating pilots requested views of a "worst case" scenario for the pilot takeoff view, specifically an engine loss at maximum gross weight takeoff. Participants were reportedly comfortable that traffic cleared PTs by several hundred feet on departure. The pilots also set out to ease concerns regarding the clearance between aircraft landing over the Northeast Perimeter Taxiway and the aircraft taxiing on the PT. To experience this perspective, they "froze" the B744 simulator directly above the northern perimeter on the 17C glideslope during final approach to Runway 17C. Then, they switched viewpoints and froze as a taxiing aircraft directly below the approaching aircraft so they could experience overhead crossings. From the perspective of the aircraft taxiing on the PT, participants noted the height of the arriving aircraft above them. They also noted the clearance between arriving aircraft on both 17C and 17R and the PTs. Pilots felt that adequate distance existed between the aircraft taxiing on the PTs and landing traffic. As a whole, all pilot participants were satisfied and comfortable with what they observed. One participant did comment he thought that despite the adequate distance between aircraft, passengers and pilots alike may need to adjust to the new experience of aircraft passing overhead.

3.1.2.1 Pilot Debrief Comments

All pilots reported being satisfied that the goals of the demonstration were met. Two of the seven were disappointed that FFC and CVSRF were not integrated, whereas the remaining five reported that integration would have deprived them of more beneficial use of their time in the simulator. All pilots believed that the PTs would be an improvement to current operations in terms of efficiency and safety, but were awaiting data analyses results to confirm. Several participants said they felt that even if taxi times were identical between BL and PT conditions, PTs would eliminate risks and decrease controller workload, making a safer and more efficient operation. The general perception was that PTs would save both fuel and time. Consensus was that controller and pilot workload and communications would also benefit through less radio traffic and a reduction in hold-short instructions.

In general, the pilots all held positive and confident opinions about the benefits of adding PTs. Some pilots also gave their opinions on building the PTs. For example, one pilot expressed that he would like PTs sooner than several years from now. Another pilot felt that the "virtual elimination of runway incursions justifies the expense," whereas another speculated that it would be difficult to justify the expense and complications of building the PTs in today's environment.

The majority of the pilot participants expressed positive comments, not only about the high fidelity and overall impressions of the demonstration, but also concerning the ramifications of the demonstration. Based on their experience in the demonstration, the pilots believed the PT concept may be of benefit to other facilities as well.

3.1.2.2 Pilot End-of-Day Questionnaire Ratings

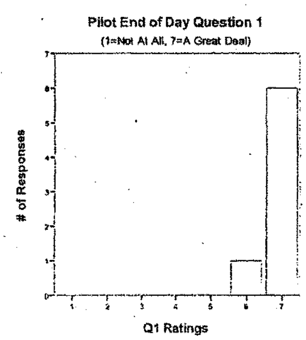
End-of-Day Questionnaires were administered to participating pilots at the end of each demonstration day (pilots typically participated for 1 day). In general, pilots believed PTs would be advantageous to implement at DFW and that the demonstration was a good representation of operations. Table 5 provides a summary of the questions and results. More detailed results and summaries for individual questions (or groups of questions) follow.

Table 5. Pilot End of Day Questionnaire Summary

	Question	n	Median	Scale
1	Based upon your experience in the demonstration, do you feel that adding the **PTs improves operations** at DFW?	7	7	1= not at all 7= a great deal
2	Rate the **realism of the overall demonstration experience** compared to actual ATC operations.	7	5	1= extremely unrealistic 7= extremely realistic
3	Rate the **realism of the simulated hardware** compared to actual equipment.	7	6	1= extremely unrealistic 7= extremely realistic
4	Rate the **realism of the simulated software** compared to actual functionality.	7	5	1= extremely unrealistic 7= extremely realistic
5	Rate the **realism of the simulated traffic runs** compared to actual NAS traffic.	7	7	1= extremely unrealistic 7= extremely realistic
6	Rate the **realism of the simulated airport** compared to the actual airport.	7	6	1= extremely unrealistic 7= extremely realistic

Question 1

Figure 23 shows a median score of 7, which indicated that pilots felt adding PTs would improve operations at DFW "a great deal." This is consistent with the positive comments expressed during debrief sessions. Pilots unanimously felt that PTs would not only improve the efficiency of DFW, but would also reduce the potential for runway incursions and enhance safety and airline performance rates.



n=7	Median=7

Figure 23. Q1- Based on your experience in the demonstration, do you feel that adding the PTs improves operations at DFW?

Question 2-6

Results from Question 2 indicate that pilot participants felt the overall realism of the demonstration experience was moderately to highly realistic (median = 5) in comparison to actual operations. In Question 3, hardware components received high scores for realism (median = 6), whereas software received moderate to high scores (median = 5) in Question 4. The traffic sample realism ratings addressed in Questions 5 and 6 were favorable. Pilots felt that the traffic runs were extremely realistic (median = 7), and that the simulated airport environment was highly realistic (median = 6). Figures 24 through 28 depict pilots' responses to Questions 2 through 6.

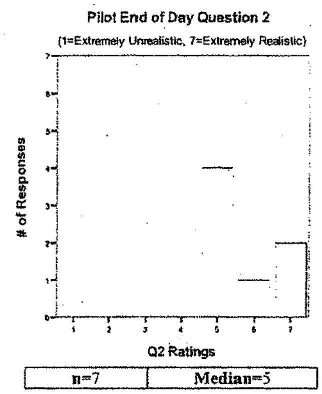


Figure 24. Q2- Rate the realism of the overall demonstration experience compared to actual operations.

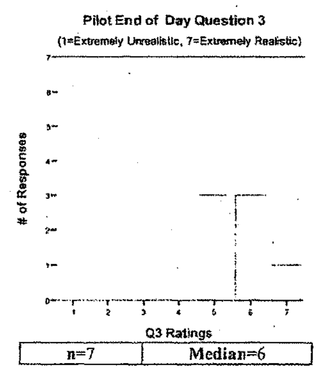
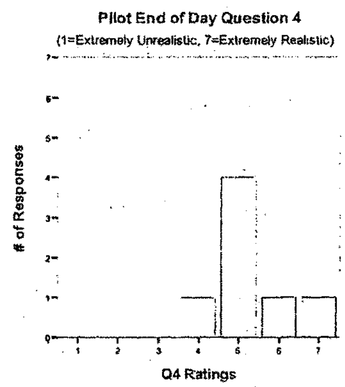
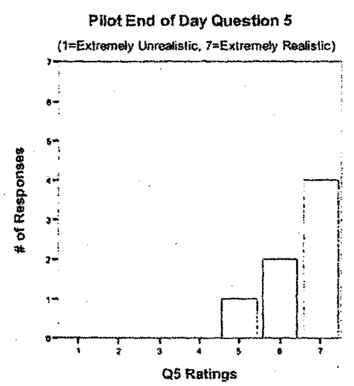


Figure 25. Q3- Rate the realism of the simulated hardware compared to actual equipment.



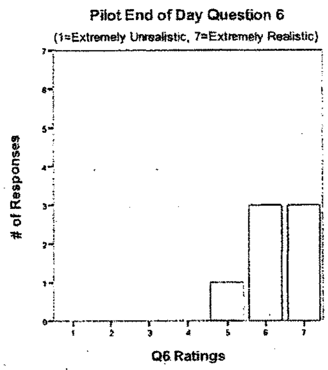
n=7	Median=5

Figure 26. Q4- Rate the realism of the simulated software compared to actual functionality.



n=7	Median=7

Figure 27. Q5- Rate the realism of the simulated traffic runs compared to actual NAS traffic.



n=7	Median=6

Figure 28. Q6- Rate the realism of the simulated airport compared to the actual airport.

3.2 Subjective Results Summary

The subjective data collected from participating controllers and pilots indicated that the primary objective of the exercise was met. That is, the participants were afforded the opportunity to observe and experience the proposed airport improvements with high fidelity and realism. The controllers and pilots indicated they felt the overall demonstration realism was good. In particular, they rated the realism level of the hardware, software, traffic, and the airport as moderately high to high.

The participating controllers gave all positive feedback on the proposed new PTs. Based on their experience they unanimously indicated that PTs would improve operations at DFW. They believed that the implementation of PTs in the demonstration enabled a more efficient operation. They felt the PTs provided for a smoother flow of traffic, afforded better overall ability to move aircraft to and from the runways, improved situation awareness, and decreased workload demands. Departure rates increased and aircraft were sequenced more efficiently because the need to create 'gaps' for runway crossings was eliminated. Furthermore, the controllers said that the complexity of scanning activities was reduced due to the elimination of runway crossing queues. The result of this was an enhanced awareness of current aircraft locations and the opportunity to refocus attention to other tasks. They also reported their communications workload was reduced due to less frequency congestion resulting from a reduction in hold-short instructions and pilot readbacks.

Pilot participants thought the PTs improved efficiency and increased safety by reducing the potential for runway incursions. They also speculated that PTs would improve airline performance rates and reduce both pilot and controller workload due to less frequency congestion and a reduction in hold-short instructions.

3.3 Objective Data

Objective data related to arrival and departure information and voice communications were collected. To allow for exploring the effect of adding PTs to DFW operations, all data and results are presented and compared by condition (BL or PT). Table 6 summarizes the data presented.

Table 6. Objective Data

Data Type	Measured by Condition
Number of times PTs are used	Overall
West side departures and arrivals	Overall, by bridge
Arrival rate / hour	Overall, by runway
Number of arrivals	Overall, by runway, 10-min increments
Inbound taxi duration	Overall, by runway
Arrival runway occupancy time	Overall, by runway
Inbound stops / hour	Overall
Inbound stop durations	Overall
Active runway crossings	Overall, by runway, 10-min increments
Active runway crossings / hour	Overall
Departure rate / hour	Overall, by runway
Number of departures	Overall, by runway, 10-min increments
Outbound taxi duration	Overall, by runway
Departure runway occupancy time	Overall, by runway, (for behind a heavy, and not behind a heavy)
Outbound stops / hour	Overall
Outbound stop durations	Overall
Controller & pilot communications	Includes transmission duration and word count

3.3.1 Arrival and Departure Data

The following sections present departure and arrival information obtained from the demonstration. The data are presented for each condition (BL and PT) overall and by runway.

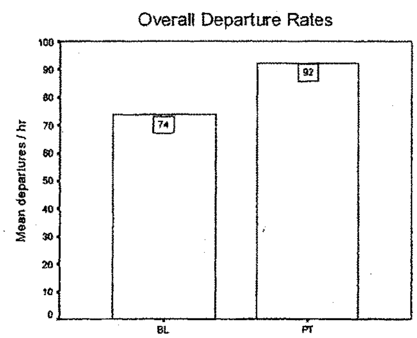
By design, 100% of arrivals and departures that flew in runs with PTs utilized the new PTs. Of course, the new PTs did not exist in the BL condition, and therefore, they were not used in these runs.

As previously mentioned, the demonstration emulated East-side tower operations; however, elements of West-side traffic were included for realism. Bridge traffic and arrivals and departures affecting the West-side were built into each run. Table 7 shows the average number of departures and arrivals per hour that taxied to/from the West side of the airport and the respective bridges they crossed.

Table 7. Arrivals and Departures that Crossed to/from the West-side

Start	Bridge Crossed	To	BL (avg/hr)	PT (avg/hr)
East departures	Z	West	16	16
East departures	B	West	5	6
West departures	Y	East	10	13
West arrivals	A	East	46	46
West arrivals	Y	East	4	4
East arrivals	B	West	9	9

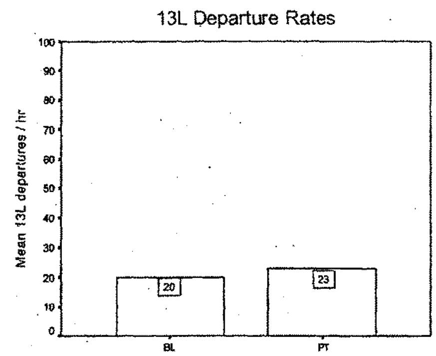
Mean arrival rates for BL and PT conditions remained consistent at about 79 aircraft per hour. However, Figure 29 indicates a substantial increase of about 18 departures per hour on average (or 24% relative increase) in the departure rate for the PT condition.



% Change BL to PT	+ 24 %

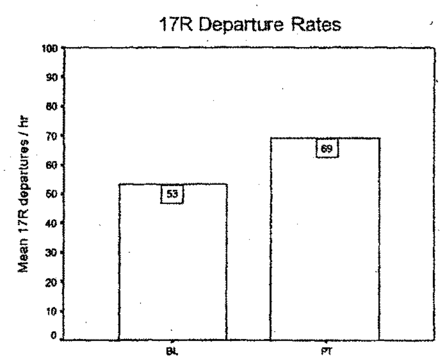
Figure 29. Overall departure rates.

When examined by runway, both 17L and 17C arrival rates were consistent at about 39 to 40 aircraft per hour. There was an average increase of three departures per hour on 13L with PTs (a 15% relative increase), however, the difference seen in the overall departure rate was mostly due to the substantial improvement on 17R, which increased 16 departures per hour on average (a 30% relative increase). Figures 30 and 31 illustrate these findings.



% Change BL to PT	+ 15 %

Figure 30. 13L departure rates.



% Change BL to PT	+ 30 %

Figure 31. 17R departure rates.

Tables 8 and 9 present average counts of arrivals and departures by runway in 10-minute increments for each condition. These tables allow for inspection by smaller units of time and these data also show increased PT departure rates over BL.

Table 8. BL Arrival/Departure Data in 10-Minute Increments

	17C arr mean #	17L arr mean #	13L dep mean #	17R dep mean #	TOTAL arr mean #	TOTAL dep mean #
0-10 min	6	6	4	9	12	13
10-20 min	7	7	4	10	14	13
20-30 min	8	8	3	9	16	12
30-40 min	6	6	5	8	12	12

- **Numbers in cells are averages across runs and are rounded to whole numbers.**
- **n varies from 4 - 6 for each cell.**

Table 9. PT Arrival/Departure Data in 10-Minute Increments

	17C arr mean #	17L arr mean #	13L dep mean #	17R dep mean #	TOTAL arr mean #	TOTAL dep mean #
0-10 min	6	6	5	12	12	18
10-20 min	7	7	4	13	14	18
20-30 min	8	8	5	11	16	16
30-40 min	6	6	1	12	12	13

- **Numbers in cells are averages across runs and are rounded to whole numbers.**
- **n varies from 5 - 7 for each cell.**

Inbound taxi duration for this demonstration was measured as presented in Table 10.

Table 10. Description of Inbound Taxi Duration

Lands on:	**Taxis to:**	**Inbound Taxi Duration** Start	End
East	East	Touchdown	Upon reaching Spot (i.e., entrance/exit apron point)
East	West	Touchdown	~2/3 across B bridge
West	East	West end of A or Y Bridge	Upon reaching Spot

As can be seen in Table 11, the average inbound taxi duration per aircraft increased by about 2:07 minutes (or 18%) from the BL to the PT condition. Looking at the data by runway, it appears that the increase was exclusively due to the marked increase in 17C taxi duration times (4:56 minutes or 54% increase over BL). In fact, during PT conditions, 17L taxi durations decreased by about 1:16 minutes or 8% on average.

Table 11. Inbound Taxi Duration

ARRIVALS	BL mean n=4 runs (min:sec)	PT mean n=7 runs (min:sec)	Change from BL to PT	
			(min:sec)	% Change
OVERALL				
Inbound taxi duration /aircraft	11:52	13:59	+2:07	+ 18 %
BY RUNWAY				
17C inbound taxi duration /aircraft	9:12	14:08	+4:56	+ 54 %
17L inbound taxi duration /aircraft	15:07	13:51	- 1:16	- 8 %

- Numbers in cells are averages across runs.

Outbound taxi duration for this demonstration was measured as presented in Table 12.

Table 12. Description of Outbound Taxi Duration

Departs from:	Taxis to:	Outbound Taxi Duration	
		Start	End
East	Runways 17R, 13L	Upon reaching Spot	Takeoff (airborne)
East	Runway 18L	Upon reaching Spot	~2/3 across B or Z bridge
West	Runway 17R	West end of Z bridge	Takeoff (airborne)

Table 13 indicates that the average outbound taxi duration and associated runway occupancy time (when behind a heavy jet) showed substantial improvement with PTs compared to the BL conditions, decreasing on average 4:28 minutes (27%) and 41 seconds (44%), respectively. In addition, taxi-out runway occupancy time (when not behind a heavy) showed a lesser improvement of about a 2 second decrease (or 4%) with PTs. Examining the data by runway indicated that with PTs, 17R showed the most improvement in outbound taxi duration times (6:19 minutes or a 32% relative decrease), with 13L gaining a smaller improvement (41 seconds or a 7% decrease). Heavy aircraft do not depart off of 13L, therefore the observed 44% decrease in runway occupancy time when behind a heavy was due exclusively to the decreased time spent on 17R. Also, when not behind a heavy, 17R runway occupancy times decreased about 5 seconds (or 12%) with PTs and 13L times decreased by an average of 3 seconds or about 4%.

Table 13. Outbound Taxi Duration and Departure Runway Occupancy Data

DEPARTURES	BL mean n=4 runs (min:sec)	PT mean n=7 runs (min:sec)	Change from BL to PT	
			(min:sec)	% Change
OVERALL				
Outbound taxi duration /aircraft	16:36	12:08	- 4:28	- 27 %
• Departure rwy occupancy time /aircraft (behind a heavy)	1:31	0:51	- 0:41	- 44 %
• Departure rwy occupancy time /aircraft (not behind a heavy)	0:51	0:49	- 0:02	- 4 %
BY RUNWAY				
13L outbound taxi duration /aircraft	9:26	8:45	- 0:41	- 7 %
• 13L departure rwy occupancy time/aircraft (behind a heavy)	n/a	n/a	n/a	n/a
• 13L departure rwy occupancy time/aircraft (not behind a heavy)	1:10	1:07	- 0:03	- 4 %
17R outbound taxi duration /aircraft	19:42	13:23	- 6:19	- 32 %
• 17R departure rwy occupancy time/aircraft (behind a heavy)	1:31	0:51	- 0:40	- 44 %
• 17R departure rwy occupancy time/aircraft (not behind a heavy)	0:41	0:36	- 0:05	- 12 %

- Numbers in cells are averages across runs.

Inbound and outbound stops and their associated durations were calculated for all aircraft in the scenarios. This included aircraft coming from and going to the West-side of the airport, as well as the aircraft originating and/or terminating on the East-side. All stops made by aircraft while taxing at any point on the airport were included. Table 14 shows that the average inbound stop rate and the duration of stops decreased substantially when PTs were available (-49% and -28% respectively). The average outbound stop rate decreased by about 14% for PTs runs, and the average duration of these stops were 29% shorter than in the BL runs on the whole.

Table 14. Aircraft Stop Rates and Duration

	BL n=4 runs	PT n=7 runs	% Change BL to PT
Inbound stops mean # / hour	293	150	- 49 %
Inbound stops mean duration /stop (sec)	72	52	- 28 %
Outbound stops mean # / hour	470	405	- 14 %
Outbound stops mean duration /stop (sec)	111	79	- 29 %

- Numbers in cells are averages across runs and are rounded to whole numbers.

The data in Table 15 present runway crossing data for BL runs. The results include mean counts per 10-minute intervals by runway and mean number of crossings per hour by runway. BL runs had an average of 154 runway crossings an hour (about 94 aircraft crossed 17R per hour and 60 crossed 17C). By design, PTs completely eliminated runway crossings at DFW in the demonstration.

Table 15. Baseline Runway Crossing Data

	17C mean #	17R mean #	Total mean #
0-10 min	13	17	29
10-20 min	8	13	20
20-30 min	11	18	29
30-40 min	12	21	34
mean # xings/hour	60	94	154

3.3.2 Communications Data

Many different measures can be analytically explored to assess the workload of a human operator in any system. The frequency and duration of controller/pilot communications are well-known major contributors to overall workload associated with ATC operations. New procedures can often affect communications by either increasing or reducing the demands placed on the operators to perform associated tasks. These effects can have a significant impact on the acceptance of a new concept.

A detailed assessment of the impact of communications workload and frequency congestion in the DAPT Demonstration is provided in this section. There are, however, potential caveats to bear in mind. When examining the communications data, it is crucial to consider that the information was derived from demonstration data (not operational data). Several things could potentially affect the data precision; for example, pseudo-pilots handled more than one aircraft at a time, controllers experienced PT operations and procedures for the first time, and the analysis itself was mostly manual (i.e., potential for human error). Keeping these issues in mind, there are many interesting observations.

BL runs in the demonstration included the four controller positions and frequencies that exist in the East Control Tower today. However, for the PT runs a new controller position was added to ground operations. The new position, GE3, was added to manage the high volume of traffic that utilized the PTs and southern portion of the airport. Table 16 depicts the frequencies emulated in the DAPT Demonstration.

Table 16. Positions and Frequencies

Controller Position	Frequency
LE1	126.55
LE2	127.5
GE1	121.65
GE2	121.8
GE3	121.6

Results of the communications data were derived from counting the number of transmissions, transmission durations, and the number of words spoken by the controllers and pilots during the demonstration. Approximately 20,500 transmissions, including over 200,000 words, were analyzed for the analyses. Because the runs were of variable lengths, some results were converted to hourly rates and then averaged across runs. Tables 17 through 19 show a summary of results including means (rounded) for each frequency and *relative* changes from the BL condition to the PT condition in terms of percentage increases and decreases. Discussion of results compares the common frequencies of the two conditions (i.e., LE1, LE2, GE1, and GE2). GE3 data were provided for informational purposes.

Table 17. Summary of Communication Results (Controllers and Pilots Combined)

Data	Statistic	Frequency				
		LE1	LE2	GE1	GE2	GE3
# of transmissions / hour	Mean BL	433	174	302	352	n/a
	Mean PT	338	174	275	348	207
	% Change BL to PT	- 22.0 %	- < 1 %	- 9.0 %	- 1 %	n/a
Time spent talking (% / hr)	Mean BL	58.5	30.1	42.2	53.86	n/a
	Mean PT	44.6	25.5	36.5	52.85	29.8
	% Change BL to PT	- 23.8 %	- 15.3 %	- 13.5 %	- 1.9 %	n/a
Length of transmissions (sec)	Mean BL	2.4	3.1	2.5	2.8	n/a
	Mean PT	2.4	2.7	2.4	2.7	2.7
	% Change BL to PT	- 2.1 %	- 14.3 %	- 2.4 %	- 2.5 %	n/a
Time between transmission starts (sec)	Mean BL	4.2	10.4	6.0	9.9	n/a
	Mean PT	5.4	10.4	6.7	10.0	1906
	% Change BL to PT	+ 28.6 %	+ < 1 %	+ 12.3 %	+ < 1 %	n/a
# of words / hour	Mean BL	4543	2179	2528	4563	n/a
	Mean PT	3328	1904	2337	4402	9
	% Change BL to PT	- 26.7 %	- 12.6 %	- 7.6 %	- 3.5 %	n/a
# of words / transmission	Mean BL	11	13	8.4	10.5	n/a
	Mean PT	10	11	8.4	10.4	3.8
	% Change BL to PT	- 5.7 %	- 13.1 %	+ < 1 %	- < 1 %	n/a
Speed of speech (words/sec)	Mean BL	4.4	4.3	3.5	3.9	n/a
	Mean PT	4.2	4.2	3.6	4.0	3.8
	% Change BL to PT	- 3.4 %	- 1.5 %	+ 2.8 %	+ 1.5 %	n/a

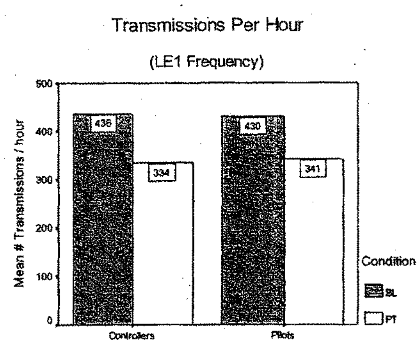
Table 18. Summary of Communication Results for Controllers (only)

Data	Statistic	Frequency				
		LE1	LE2	GE1	GE2	GE3
# of transmissions / hour	Mean BL	436	163	326	369	n/a
	Mean PT	334	162	293	363	175
	% Change BL to PT	- 23.4 %	- < 1 %	- 10.1 %	- 1.6 %	n/a
Time spent talking (% / hr)	Mean BL	35.4	17.4	24.8	32.7	n/a
	Mean PT	27.3	15.0	20.4	31.3	13.3
	% Change BL to PT	- 23.0 %	- 14.1 %	- 18 %	- 4.2 %	n/a
Length of transmissions (sec)	Mean BL	2.9	3.8	2.8	3.3	n/a
	Mean PT	2.9	3.3	2.5	3.2	2.8
	% Change BL to PT	0 %	- 14.3 %	- 8.9 %	- 3.9 %	n/a
# of words / hour	Mean BL	5778	2555	3102	4563	n/a
	Mean PT	4292	2184	2714	4402	1757
	% Change BL to PT	- 25.7 %	- 14.5 %	- 12.5 %	- 3.5 %	n/a
# of words / transmission	Mean BL	13	16	10	13	n/a
	Mean PT	13	13	9	12	10
	% Change BL to PT	- 3.2 %	- 14.9 %	- 5.0 %	- 2.5 %	n/a
Speed of speech (words/sec)	Mean BL	4.7	4.3	3.8	4.1	n/a
	Mean PT	4.5	4.1	3.9	4.2	4.0
	% Change BL to PT	- 3.7 %	- 2.9 %	+ 3.2 %	+ 1.2 %	n/a

Table 19. Summary of Communication Results for Pilots (only)

Data	Statistic	Frequency				
		LE1	LE2	GE1	GE2	GE3
# of transmissions / hour	Mean BL	430	185	278	335	n/a
	Mean PT	341	186	256	334	239
	% Change BL to PT	- 20.6 %	+ < 1 %	- 7.7 %	- < 1 %	n/a
Time spent talking (% / hr)	Mean BL	23.1	12.7	17.4	21.2	n/a
	Mean PT	17.3	10.9	17.0	21.2	16.8
	% Change BL to PT	-25.3 %	- 14.4 %	- 2.2 %	- < 1 %	n/a
Length of transmissions (sec)	Mean BL	1.9	2.5	2.3	2.3	n/a
	Mean PT	1.8	2.1	2.4	2.3	2.5
	% Change BL to PT	- 5.8 %	- 14.3 %	+ 5.5 %	- < 1 %	n/a
# of words / hour	Mean BL	3308	1802	1955	2770	n/a
	Mean PT	2365	1624	1959	2821	2054
	% Change BL to PT	- 28.5 %	- 9.9 %	+ < 1 %	+ 1.8 %	n/a
# of words / transmission	Mean BL	8	10	7	8	n/a
	Mean PT	7	9	8	8	9
	% Change BL to PT	- 10.0 %	- 10.2 %	+ 7.4 %	+ 1.2 %	n/a
Speed of speech (words/sec)	Mean BL	4.1	4.3	3.2	3.8	n/a
	Mean PT	3.9	4.3	3.3	3.8	3.6
	% Change BL to PT	- 3.3 %	- < 1 %	+ 2.2 %	+ 1.7 %	n/a

Currently at DFW, the LE1 controller talks to the greatest number of aircraft with the least amount of time to spare, resulting in the highest frequency congestion. The LE1 position is also critical because it currently experiences the greatest number of runway crossings, and consequently has the greatest potential for delays and runway incursions. Therefore, it was of particular interest to closely evaluate the frequency associated with the LE1 controller position in the demonstration. Figures 32 through 34 graphically depict observances of the transmission data (means are rounded) for this position. Inferential statistics (i.e., *t*-tests and Tests of Homogeneity) were used as appropriate to substantiate observed results.

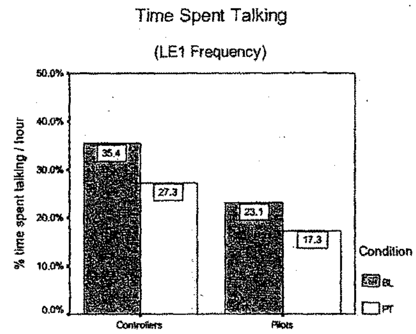


Mean BL	433
Mean PT	338
% Change BL to PT	- 22.0%

Figure 32. LE1 frequency transmissions per hour.

Table 17 and Figure 32 indicate a substantial relative reduction (-22%) from BL to PT pertaining to the average number of transmissions per hour for the LE1 frequency. A *t*-test for independent samples (equal variances assumed) confirmed the result indicating that the difference was also statistically significant (t=8.41, df=18, p<.05). Based on feedback during debrief sessions, the reduction in frequency congestion for this position was distinctly felt by the controllers. One controller commented that he thought it felt like he experienced "about half the transmissions with PTs." When considering the controllers only, the hourly number of transmissions dropped by about 23% (from 436 transmissions to 334) with PTs, which was again backed by statistical significance (t=4.97, df=8, p<.05). Average pilot transmissions amply decreased by about 21% (from 430 to 341 per hour) with the difference between conditions being statistically significant (t=7.37, df=8, p<.05).

Though Tables 17 through 19 show that LE2 and GE2 varied little between the BL and PT conditions, the frequency for GE1 had a noticeable reduction in the average number of transmissions per hour. Transmissions decreased 9% overall, 10% when listening to the controllers only, and close to 8% when examining the pilot transmissions alone.

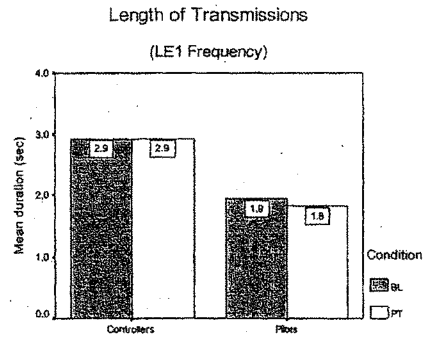


Mean BL	58.5 %
Mean PT	44.6 %
% Change BL to PT	- 23.8 %

Figure 33. LE1 frequency time spent talking.

Table 17 and Figure 33 indicate that the percentage of time the LE1 controllers and pilots talked was reduced by about 24% with PTs relative to BL. A *t*-test for independent samples (equal variances assumed) confirmed that the substantial difference was also statistically significant (t=8.409, df=18, p<.05). The time controllers (only) spent talking dropped 23% (from 35% to about 27%) with PTs as compared to BL. A *t*-test indicated the observed reduction was again statistically significant (t=3.74, df=8, p<.05). Average pilot transmissions decreased considerably by about 25% (from 23% to about 17 %) with the difference between conditions being statistically significant (t=7.78, df=8, p<.05).

Tables 17 through 19 show the other common frequencies (i.e., LE2, GE1, and GE2) also experienced noticeable differences between the BL and PT conditions. LE2 and GE1 had overall reductions of 15% and 14% respectively. However, the highest relative reduction from BL to PT for these remaining frequencies was for GE1 controllers who had an 18% decrease in the time they spent on frequency.



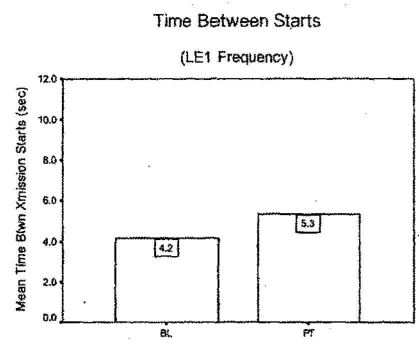
Mean BL	2.4
Mean PT	2.4
% Change BL to PT	- 2.1 %

Figure 34. LE1 frequency length of transmissions.

When considering controller and pilot communications together, Table 17 and Figure 34 do not suggest a noticeable difference for the average duration of transmissions between the BL and PT conditions. The relative decrease from BL to PT was only about 2%, which is not likely to be considered operationally meaningful. A *t*-test (equal variances assumed) designated that this result was also not statistically significant (t=1.34, df=5403, p>.05). No difference between conditions can be seen when controllers were analyzed separately, but there was a small relative decrease of about 6% for pilots when there were PTs. An average difference of about a tenth of a second is not likely to be operationally relevant as an independent measure; however, it is possible that the cumulative effect of many such small reductions collectively could relieve frequency congestion and communications workload. A *t*-test indicated the result to be statistically significant (t=3.44, df=2705, p<.05).

Table 17 shows that the ground frequencies had similar results to LE1 when considering controllers and pilots together, but LE2 demonstrated a relative decrease of transmission duration with PTs of about 14%. Table 18 shows that GE1 controllers had a 9 % decrease, but Table 19 shows that the pilots had a slight increase of about 6% in the average length of communications.

The average time between the *beginnings* of transmissions was calculated. Specifically, if the measurement of Time Between Starts was 4.2, it is interpreted that, on average, there was a new transmission that started every 4.2 seconds. Figure 35 depicts the observed Time Between Starts for transmissions on the frequency associated with the LE1 position.

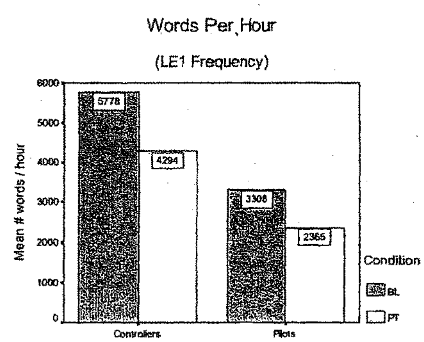


Mean BL	4.2
Mean PT	5.4
% Change BL to PT	+ 28.6 %

Figure 35. LE1 frequency time between transmission starts.

Table 17 and Figure 35 indicate that the average time between the beginnings of transmissions was stretched further by about 29% for PT runs. This result is evidence that the participants had longer breaks between frequency communications. A *t*-test (equal variance assumed) verified that the difference was also statistically significant (t=-5.43, df=8, p<.05).

Figures 36 though 38 indicate observances of word data (means are rounded).

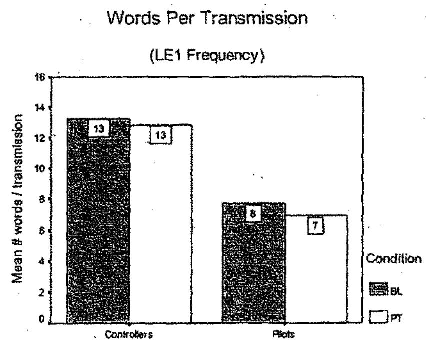


Mean BL	4543
Mean PT	3328
% Change BL to PT	- 26.7 %

Figure 36. LE1 frequency number of words per hour.

As can be seen in Table 17 and Figure 36, the average number of overall words per hour for the LE1 frequency was reduced by 26% with PTs relative to BL. A *t*-test for independent samples (equal variances assumed) confirmed the result indicating that the difference was also statistically significant (t=2.19, df=18, p<.05). These findings are consistent with comments from the controllers during debrief sessions. For example, they indicated that they were able to use less verbiage because they did not have to concentrate on crossings or rely on pilot readbacks for hold-short instructions. When evaluating the data for controllers only, the hourly number of words dropped by about 26% (from 5778 words to 4292) with PTs, which was again backed by statistical significance (t=3.74, df=8, p<.05). Average pilot words decreased considerably by about 29% (from 3308 to 2365 per hour) with the difference between conditions being statistically significant as well (t=7.93, df=8, p<.05).

Tables 17 through 19 show that LE2 also experienced a notable difference overall between the words spoken in PT versus the BL conditions (about 13% relative reduction). Looking at controllers by themselves, LE2 and GE2 had noteworthy reductions in the words spoken (about 15% and 13% respectively). Examining pilots by themselves, only LE2 showed a noticeable difference of about a 10% relative reduction with PTs.

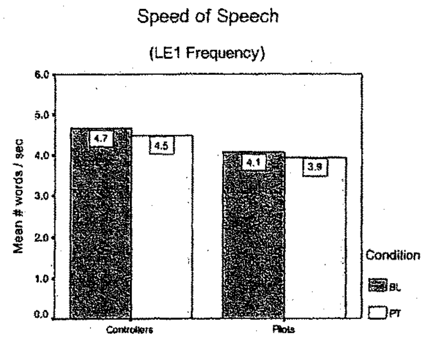


Mean BL	11
Mean PT	10
% Change BL to PT	- 5.7 %

Figure 37. LE1 frequency number of words per transmission.

When assessing controller and pilot communications together, Table 17 and Figure 37 reveal a rather small reduction in the average number of words per transmissions from BL to PT operations. The relative decrease was only about 6% per transmission, but the cumulative effect of such a subtle reduction could collectively have a favorable influence on overall frequency congestion. A *t*-test (equal variances assumed) designated that this result was, in fact, statistically significant (t=4.25, df=5403, p<.05). An even smaller difference between conditions was seen when controllers were analyzed separately. The 3% decrease with PTs for controllers seems quite minor and could be due to "noise" in the data. The *t*-test (equal variances not assumed) indicated the result was not statistically significant (t=1.84, df=2652, p>.05). However, there was about a 10% decrease for pilots when there were PTs, which was statistically significant (t=6.10, df=2560, p<.05).

Table 17 shows that the ground frequencies had negligible results when considering controllers and pilots together, but LE2 demonstrated a relative decrease with PTs of about 13%. The controller data in Table 18 show that LE2 controllers had a 15% decrease, and Table 19 shows that the pilots in the PTs conditions had about a 10% relative decrease in the average number of words per transmission. Interestingly, the ground frequencies indicated small increases in the number of words per transmission for pilots.



Mean BL	4.4
Mean PT	4.2
% Change BL to PT	- 3.4 %

Figure 38. LE1 frequency speed of speech.

Table 17 and Figure 38 do not suggest a consequential difference for speed of speech between the BL and PT conditions regardless of whether the data for the LE1 frequency were examined overall or with controllers and pilots separated. The relative decreases from BL to PT ranged from only about 3 to 4%, results that at first glance do not appear to be operationally meaningful. Interestingly though, t-tests (equal variances assumed) indicated that all three differences were statistically significant (controllers and pilots combined $t=6.22$, $df=5403$, $p<.05$; controllers only $t=5.16$, $df=2696$, $p<.05$; pilots only $t=3.63$, $df=2705$, $p<.05$). This finding is difficult to explain, but it is possible that because the sample size for this particular data was so large and consistent, even such a minute difference could produce significant results.

Tables 17 shows that the LE2 frequency also had a very small, likely negligible, decrease when considering controllers and pilots together. However, the ground positions actually demonstrated slight increases in the words spoken per second with PTs. Looking at controllers in Table 18 and pilots in Table 19, GE1 and GE2 also showed very slight increases in their speed of speech.

3.3.3 Communications Summary

The figures and tables presented in this section suggest that controller and pilot communications for the LE1 frequency were clearly reduced with the addition of PTs. In general, there were significantly fewer transmissions made with fewer words spoken. This resulted in the controllers and pilots spending less time on frequency during the PTs conditions compared to BL. Words were also spoken slightly slower on average in PT runs. In addition to being operationally relevant, these results were also statistically significant for the LE1 frequency. Such findings were consistent with controller debrief comments; controllers felt the volume of communications was significantly reduced, and they used less verbiage because concerns about crossings and reliance on pilot readbacks were alleviated. Many of the positive data results were also apparent in the findings of the other frequencies, but generally to a lesser degree.

3.4 Objective Results Summary

The objective data resulting from the demonstration supported the participants' verbal comments. Both indicated that the PTs would improve operations at DFW if implemented.

Arrival rates for the BL and PT conditions remained consistent (by design). However, there was a substantial increase in the departure rate per hour for the PT condition (about 18 departures/hour or 24% relative increase). There was a small increase in the 13L average departure rates for PTs (about 3 departures/hour or 15% relative increase), but the difference seen in the overall departure rate was mostly due to the substantial increase in the 17R average departure rates for PTs (about 16 departures/hour or 30% relative increase).

The average inbound taxi duration increased by about 2:07 minutes (or 18%) from the BL to the PT condition. The average outbound taxi duration and associated runway occupancy time (when behind a heavy jet) showed substantial improvements with PTs compared to the BL runs, decreasing on average 4:28 minutes (27%) and 41 seconds (44%) respectively. Taxi-out runway occupancy time (when not behind a heavy) showed a lesser improvement of about 4% with PTs.

On the whole, inbound stop rates and the duration of stops decreased substantially when PTs were available (-49% and -28 % respectively). Outbound stop rates decreased by about 14% for PT runs, and the average duration of these stops were 29% shorter than in the BL runs.

BL runs had an average of 154 runway crossings an hour (about 94 aircraft crossed 17R per hour and 60 crossed 17C). By design, PTs completely eliminated runway crossings at DFW in the demonstration.

Controller and pilot communications for the most critical frequency were clearly reduced with the addition of PTs. On the LE1 frequency, significantly fewer transmissions were made (22% relative reduction) with fewer words spoken (27% relative reduction). This resulted in the controllers and pilots spending less time on frequency (24% relative reduction) when compared to BL runs. Words were also spoken slightly slower on average during PT runs. In addition to being operationally relevant, these results were also statistically significant for the LE1 frequency. Such findings were consistent with controller debrief comments; controllers felt that the volume of communications was significantly reduced and they used less verbiage because concerns about crossings and reliance on pilot readbacks were alleviated. Many of the positive data results were also apparent in the findings of the other frequencies but generally to a lesser degree.

4. Conclusion

Based on the results of the data collected from the demonstration, it is clear that the stated objectives of the exercise have been met successfully. The controllers and pilots were afforded the opportunity to observe and experience the proposed airport improvements with realism and high fidelity. Despite the fact that this exercise was a demonstration, a considerable amount of data was available for analysis and presented in this report. The results revealed many interesting distinctions between the BL and PT conditions. However, because it was a demonstration, it is imperative to recognize that all results should be used and interpreted with due caution.

In conclusion, all controller and pilot participants agreed the demonstration was a good representation of operations at DFW and the proposed new taxiways; they perceived a marked improvement from BL to PT conditions; they all felt that the addition of PTs improved efficiency and reduced potential for runway incursions as demonstrated; and nearly all of the objective data showed that PTs would be advantageous to operations.

5. Experiment Working Group Observations

Members of the EWG were present throughout the demonstration. This section serves to capture their observances and interpretations of the events.

The EWG witnessed significant differences between BL and PT departure operations. To allow for comparisons, all traffic scenarios for the BL and PT conditions included approximately the same number of aircraft (a 20 to 30% increase over current operations). BL runs consistently resulted in the build up of substantial departure queues at the runway. These queues were large enough to impact the North bridge system accesses resulting in numerous aircraft still waiting to depart at the end of BL runs. Conversely, departure operations with the PTs produced very noticeable improvements. There were significant reductions in the queuing of aircraft at the end of the runway. During the PT runs, the controllers routinely had all aircraft out of the problem (i.e., departed) up to 5 to 7 minutes earlier than BL runs. Though a separate issue outside the scope of this demonstration, PT runs demonstrated that it may no longer seem necessary to require aircraft with tail heights of 47 feet or greater to exit the runway away from the departure runway. Departing aircraft were observed to be clear and well above the taxiing aircraft on the PTs.

Arrival operations also appeared to be favorably impacted by PT utilization. BL arrival operations demonstrated similar 'start/stop' patterns to those experienced in the field. This activity was created by the requirement to cross runways, resulting in choppy operations and delays. However, PT arrival operations showed a significant reduction in start/stop actions for the aircraft, allowing for more smooth and steady aircraft surface movement.

The tower cab environment appeared to change between the BL and PT runs. During the BL runs, the tower cab reflected the typically noisy and hectic activities of the controllers as they attended to the operations of the airport. The PT environment appeared to result in a calmer and less chaotic experience for controllers. There seemed to be a reduction of the noise level in the cab, less coordination between positions, less movement by the controllers to view the airport, and less tension and stress experienced by the controllers.

Reduced frequency congestion during PT runs also seemed to contribute to enhanced service by the controllers. The reduction in frequency activity allowed for additional services to be provided more frequently, for example, communicating departure sequences or weather restrictions to pilots awaiting departure.

Even though the controllers had limited exposure to PTs, the EWG felt that the taxi flows became more predictable and consistent, and that the execution of procedures progressively improved throughout the 4 days of the demonstration. They believe it is reasonable to expect continued improvements in the operation as exposure and familiarity is increased and repetition occurs. Because departure queues were depleted much more rapidly with PTs during the demonstration, the EWG also speculated that more opportunities could potentially be created to utilize the inboard runway for arrival aircraft in actual operations. Finally, after observing the South flow PT demonstration, greater PT benefits could be foreseen by the EWG. The Northeast Perimeter Taxiway could potentially provide even greater taxi flow and departure capacity gains during North flow conditions because there are currently three arrival flows that must cross Runway 35L that would experience benefit.

After the demonstration was complete, DFW representatives subjectively compared results from the DAPT Demonstration to earlier findings of fast-time simulation efforts. The out-to-off and on-to-in (oooi) times from fast-time simulations were very similar to the statistics of the inbound/outbound taxi times in this report. This exercise was purposely designed to be a demonstration, and consequently had limited statistical rigor and data fidelity, therefore, the findings of this report are best used for example and discussion purposes. However, the consistency in comparisons to the other research suggests that the demonstration data show some external validity and reliability.

Based on the observations and results of the demonstration, the EWG believes that the stated objectives of the DAPT Demonstration were successfully met. The controllers and pilots were afforded the opportunity to observe and experience the proposed airport improvements with realism and high fidelity, and a considerable amount of valuable data was available for analysis and presented in this report. In conclusion, the EWG believes that the proposed PT system for DFW provides for enhanced airport operations and a safer, more efficient environment.

Acronyms

ALPA	Airline Pilots Associations
APA	Allied Pilots Association
ASDE	Airport Surface Detection Equipment
B744	Boeing 747-400
BL	Baseline
CCE1	Cab Coordinator East 1
CVSRF	Crew Vehicle Systems Research Facility
DAPT	Dallas/Fort Worth International Airport Perimeter Taxiway
D-BRITE	Digital Bright Radar Indicator Tower Equipment
DFW	Dallas/Fort Worth International Airport
EWG	Experiment Working Group
FAA	Federal Aviation Administration
FFC	FutureFlight Central
GE1	Ground East 1
GE2	Ground East 2
GE3	Ground East 3
HITL	human-in-the-loop
ICAO	International Civil Aviation Organization
LE1	Local East 1
LE2	Local East 2
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NASA ARC	National Aeronautics and Space Administration Ames Research Center
NATCA	National Air Traffic Controllers Association
PAPI	Precision Approach Path Indicator
PT	Perimeter Taxiway
TCAS	Traffic Alert and Collision Avoidance System

United States Government Accountability Office

GAO

Testimony
Before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives

For Release on Delivery
Expected at 10:00 a.m. EDT
Thursday, September 25, 2008

AVIATION SAFETY

FAA Has Increased Efforts to Address Runway Incursions

Statement of Gerald L. Dillingham, Ph.D.
Director, Physical Infrastructure Issues

GAO
Accountability * Integrity * Reliability

GAO-08-1169T

September 25, 2008

AVIATION SAFETY

FAA Has Increased Efforts to Address Runway Incursions

GAO Accountability · Integrity · Reliability

Highlights

Highlights of GAO-08-1169T, a testimony before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives

Why GAO Did This Study

Despite a recent reduction in air traffic due to economic factors, congestion on airport runways remains a safety concern. The nation's aviation system is still expected to grow and become more crowded in the coming years, exacerbating concerns about ground safety issues, including runway incursions, which occur when aircraft enter runways without authorization. This statement addresses (1) recent trends in runway incursions, (2) steps taken to improve runway safety, and (3) what more could be done. This statement is based on GAO's November 2007 report issued to this Subcommittee on runway safety. GAO's work on that report included surveying experts on the causes of runway incidents and accidents and the effectiveness of measures to address them, reviewing safety data, and interviewing agency and industry officials. This statement also contains information from FAA on recent incursions and actions taken since November 2007.

What GAO Recommends

In prior work, GAO recommended that FAA take several measures to enhance runway safety, such as updating its national runway safety plan, collecting more complete data on runway incidents, and addressing air traffic controller fatigue. The agency is taking actions to implement them.

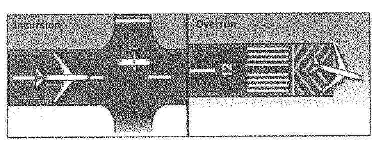
To view the full product, including the scope and methodology, click on GAO-08-1169T. For more information, contact Gerald L. Dillingham, Ph.D., at (202) 512-2834.

What GAO Found

While the number of serious incursions this fiscal year is slightly lower than last year, the rate (measured by the number of incidents per 1 million takeoffs and landings) has increased. The number of serious runway incursions—incidents in which collisions were narrowly or barely avoided—decreased from 24 in fiscal year 2007 to 23 in fiscal year 2008 through September 16, 2008. The rate of serious incursions increased by 5 percent during fiscal year 2008 through September 16, 2008, compared with fiscal year 2007. For all categories of severity, the total number and rate of incursions increased at a slightly slower pace during fiscal year 2008, compared with the prior year. The total number of incursions during the first three quarters of fiscal year 2008 increased by 7 percent and the rate increased by 10 percent, compared with the same period during fiscal year 2007.

During fiscal year 2008, FAA has given higher priority to improving runway safety than it did during the previous 2 years when it did not have a permanent director for its Office of Runway Safety, which it created to lead and coordinate the agency's runway safety efforts. FAA's recent actions to improve runway safety include continuing to deploy and test new technology designed to prevent runway collisions; promoting changes in airport layout, markings, signage, and lighting; and issuing new air traffic procedures.

FAA could further improve runway safety by ensuring the timely deployment of technology, encouraging the development of new technology, and increasing its focus on human factors issues, which aviation safety experts identified as the primary cause of incursions. For example, experts said that technology such as the FAA's planned installation of runway status lights at 22 major airports and the development of an incursion warning system in the cockpit are promising technologies and that increased training for pilots and air traffic controllers could help address human factors issues.



Source: Lincoln Laboratory, Massachusetts Institute of Technology, and GAO.

Mr. Chairman and Members of the Subcommittee:

Thank you for the opportunity to testify today on runway safety. Although air traffic has declined as economic factors, among others, have led airlines to reduce service, congestion on the movement areas—runways and taxiways[1]—remains a matter of concern. Since we last testified on runway safety before this Subcommittee, in February 2008, 11 more serious runway incursions—incidents in which collisions were narrowly or barely avoided—have occurred at U.S. airports, including 4 incursions involving commercial aircraft. On August 28, 2008, for example, a SkyWest commuter jet that was landing at the Fresno Yosemite International Airport in California came within 15 feet of colliding with a general aviation aircraft that was still on the runway.

My testimony today focuses on (1) recent trends in runway incursions, (2) steps FAA has taken to improve runway safety, and (3) what more could be done. This statement is based on our November 2007 report and February 2008 testimony on runway safety[2] and is updated with information we gathered in August and September 2008 on recent incursions and actions taken by FAA. Our work on the November 2007 report included surveying experts on the causes of runway incidents and accidents, the effectiveness of measures that are being taken to address them, and additional measures that could be taken. We conducted this work in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Summary

- While the number of serious incursions this fiscal year is slightly less than last year, the rate (measured by the number of incidents per 1 million takeoffs and landings) has increased because of a decline in air traffic

[1]Taxiways are routes that aircraft follow to and from runways.

[2]GAO, *Aviation Runway and Ramp Safety: Sustained Efforts to Address Leadership, Technology, and Other Challenges Needed to Reduce Accidents and Incidents,* GAO-08-29 (Washington, D.C.: Nov. 20, 2007) and *Runway Safety: Progress on Reducing Runway Incursions Impeded by Leadership, Technology, and Other Challenges,* GAO-08-481T (Washington, D.C.: Feb. 13, 2008).

operations. The number of serious runway incursions—incidents in which collisions were narrowly or barely avoided—decreased from 24 in fiscal year 2007 to 23 in fiscal year 2008 as of September 16, 2008. However, the rate of serious incursions increased by 5 percent during fiscal year 2008 through September 16, 2008, compared with fiscal year 2007. For all categories of severity, the total number and rate of incursions increased by 12 percent from fiscal year 2006 through fiscal year 2007, but grew at a slightly slower pace during fiscal year 2008. In fiscal year 2008, FAA started using a new definition of incursions that captures greater numbers of less serious types of runway incidents, but even under the previous definition, the number and rate increased. Using its new definition, FAA had counted 957 incursions during fiscal year 2008 as of September 16, 2008. Under the previous definition, the total number of incursions during the first three quarters of fiscal year 2008 increased by 7 percent and the rate increased by 10 percent, compared with the same period during fiscal year 2007.

- During fiscal year 2008, FAA has given higher priority to improving runway safety than it did during the previous 2 years when it did not have a permanent director for its Office of Runway Safety, which it created to lead and coordinate the agency's runway safety efforts. FAA's recent actions to improve runway safety include continuing to deploy and test new technology designed to prevent runway collisions; promoting changes in airport layout, markings, signage, and lighting; and issuing new air traffic procedures. FAA has now deployed technology at 39 major airports that is designed to provide air traffic controllers with alerts of potential collisions. In addition, the agency recently decided to install runway status lights at 22 of those airports. These lights give pilots a visible warning when runways are not safe to enter, cross, or depart on. This year, FAA also conducted safety reviews at 42 airports that were selected on the basis of incursion data and wrong-runway-departure data. The findings from its reviews were used to improve signage and markings. In addition, FAA began testing a voluntary safety reporting program for air traffic controllers—a program we had recommended that the agency implement. FAA has also made further progress on addressing runway overruns, increasing the percentage of commercial service airports that are in substantial compliance with standards for runway safety areas—unobstructed areas that surround runways to enhance safety in case an aircraft overruns, overshoots, or veers off a runway—from 70 percent in May 2007 to 76 percent in August 2008. Compliance with these standards reduces the chances of aircraft accidents resulting from overruns.
- FAA could further improve runway safety by addressing human factors issues, such as fatigue and distraction, which aviation safety experts

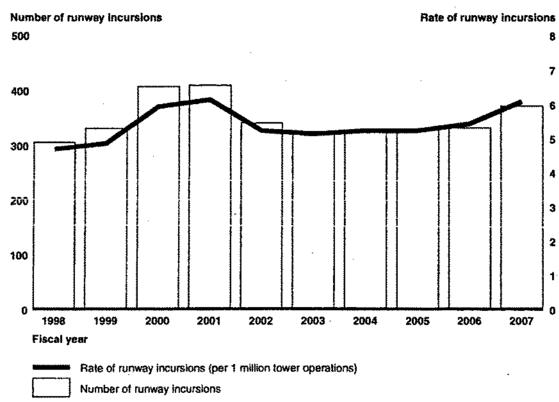
identified as the primary cause of incursions. This could be done by encouraging the development of new technology, revising additional procedures, and adopting best practices. Experts said that a combination of improvements in technology, increased training for pilots and air traffic controllers, and revised procedures could help address these human factors issues. For example, experts said that technology such as FAA's planned installation of runway status lights and the development of an incursion warning system in the cockpit could help address these human factors issues.

The Overall Number and Rate of Incursions Increased This Fiscal Year

Runway safety is a long-standing major aviation safety concern. The prevention of runway incursions, which are precursors to aviation accidents, has been on the National Transportation Safety Board's (NTSB) list of most wanted transportation improvements since 1990 because runway collisions can be catastrophic. The number and rate[3] of incursions reached a peak in fiscal year 2001 and remained relatively constant for the next 5 years. However, from fiscal year 2006 through fiscal year 2007, the overall number and rate of incursions increased by 12 percent and nearly regained the 2001 peak (see fig. 1).

[3]FAA determines the rate of incursions by calculating the number of incursions per 1 million air traffic control tower operations (takeoffs and landings).

Figure 1: Number and Rate of Runway Incursions from Fiscal Year 1998 through Fiscal Year 2007



Source: FAA.

Note: Table 1 in app. I shows the data for fig.1.

Data for the first three quarters of fiscal year 2008 show that the number of incursions counted increased substantially after FAA adopted a definition of incursions developed by the International Civil Aviation Organization (ICAO), a United Nations specialized agency.[4] Using the ICAO definition, FAA is now counting some incidents as incursions that the agency

[4]ICAO's definition of an incursion is any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing or takeoff of aircraft. Through September 2007, FAA defined 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."

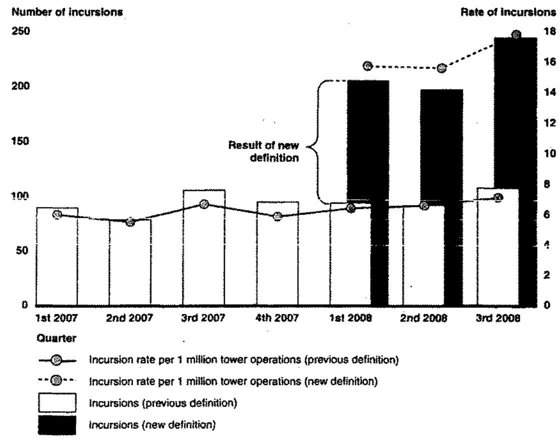
formerly classified as surface incidents.[5] Using its new definition, FAA had counted 957 incursions during fiscal year 2008 as of September 16, 2008, 712 of which occurred during the first three quarters.

If FAA had continued using its previous definition, that data would have shown an increase in the number and rate of incursions, with the rate exceeding the earlier peak in 2001. Using the previous definition, FAA would have counted 293 incursions during the first three quarters of fiscal year 2008, compared with 275 for the first three quarters of fiscal year 2007, an increase of 7 percent. Under FAA's previous incursion definition, the overall rate of incursions for the first three quarters of fiscal year 2008 was 6.72 per 1 million air traffic control tower operations, compared with 6.11 for the first three quarters of fiscal year 2007 and 6.1 for fiscal year 2001. Thus, the first three quarters of fiscal year 2008 represent a 10 percent increase in the rate over both the first three quarters of fiscal year 2007 and fiscal year 2001, an earlier peak year for the number and rate of incursions. Figure 2 shows the number and rate of incursions, by quarter, during fiscal year 2007 and during the first three quarters of fiscal year 2008.[6]

[5]Runway incidents that were classified as surface incidents can be serious, including an August 2006 crash of a Comair regional jet in Lexington, Kentucky. That aircraft crashed after taking off on a runway that was too short for the aircraft, killing 49 of the 50 people on board. FAA had defined a surface incident as any event in which authorized or unapproved movement occurs within a movement area associated with the operation of an aircraft that affects or could affect the safety of flight.

[6]The number of air traffic control tower operations declined from 45 million operations during the first three quarters of fiscal year 2007 to 43.6 million during the first three quarters of fiscal year 2008, a decline of 3 percent.

Figure 2: Incursions, by Quarter, during Fiscal Year 2007 and Fiscal Year 2008



Source: FAA.

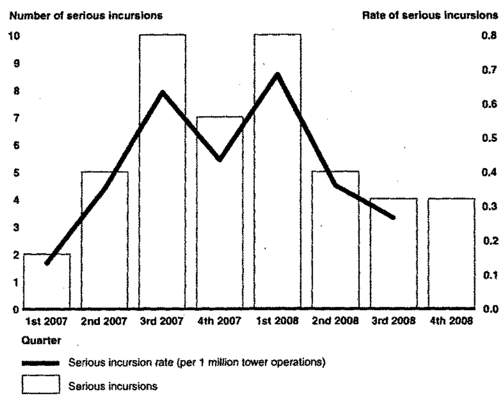
Note: Table 2 in app. I provides the data for fig. 2.

From fiscal year 2001 through fiscal year 2007, the number of serious incursions—incidents in which collisions are narrowly or barely avoided—decreased from 53 to 24, or by about 55 percent. The number of serious incursions,[7] which is not affected by FAA's adoption of a new incursion definition, has decreased from 24 in fiscal year 2007 to 23 in fiscal year

[7]FAA currently classifies the severity of runway incursions into four categories. Category A is defined as a serious incident in which a collision was narrowly avoided; category B, an incident in which separation decreases and there is a significant potential for a collision, which may result in a time-critical corrective or evasive response to avoid a collision; category C, an incident characterized by ample time and/or distance to avoid a collision; and category D, an incident that meets the definition of a runway incursion such as the incorrect presence of a single vehicle, person, or aircraft on the protected area of a surface designated for the landing and takeoff of aircraft, but with no immediate consequences.

2008 as of September 16, 2008,[8] but the rate has increased. The rate of serious incursions for fiscal year 2008 through September 16, 2008 was 0.41 per 1 million tower operations, compared with 0.39 for fiscal year 2007, an increase of 5 percent. The number and rate of serious incursions, by quarter, during fiscal year 2007 and fiscal year 2008 are shown in figure 3.

Figure 3: Serious Incursions, by Quarter, during Fiscal Year 2007 and Fiscal Year 2008



Source: FAA.

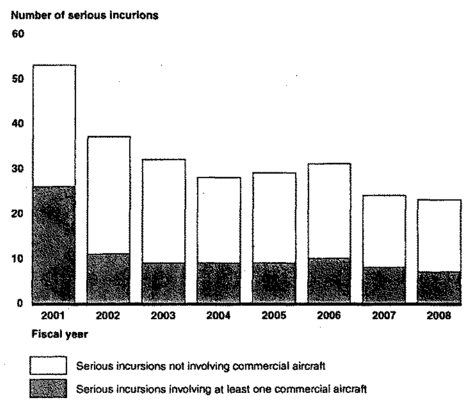
Note: The number of serious incursions during the fourth quarter of fiscal year 2008 is through September 16, 2008. The rate of serious incursions for the fourth quarter of fiscal year 2008 is not yet available. FAA's adoption of the ICAO definition of incursions during the first quarter of fiscal year 2008 did not affect the number or rate of serious incursions. Table 2 in app. I provides data for fig.3.

[8]An FAA official said that an additional potentially serious incursion occurred on September 19, 2008, in Allentown, Pennsylvania, involving a Mesa regional jet and a general aviation aircraft. According to NTSB, the Mesa crew estimated that they missed colliding with the general aviation aircraft by about 10 feet. FAA has not yet formally classified the severity of this incident.

Most runway incursions involve general aviation aircraft. According to FAA, about 67 percent of incursions from fiscal year 2005 through August 2008 involved at least one general aviation aircraft. However, about one-third of the most serious incursions during fiscal year 2002 through August 2008—about 9 per year—involved at least one commercial aircraft. The involvement of commercial aircraft in incursions is of particular concern because they can carry many passengers. For example, on April 6, 2008, a Boeing 777, which was being towed from a maintenance facility at the Dallas-Fort Worth International Airport, entered a runway where an American Airlines MD-80 had just landed, and the two aircraft missed each other by about 25 feet.[9] As of September 16, 2008, there have been 7 serious incursions involving commercial aircraft in fiscal year 2008, compared with 8 in fiscal year 2007. (See table 3 in app. I for additional information about serious incursions involving commercial aircraft during fiscal years 2007 and 2008.) Figure 4 shows the number of serious incursions involving commercial aircraft from fiscal year 2001 through fiscal year 2008.

[9] A Dallas-Fort Worth International Airport official said that since the incident, tug operations crossing active runways have been suspended indefinitely pending a review by the airport and the airline.

Figure 4: Total Number of Serious Incursions and Number of Serious Incursions Involving at Least One Commercial Aircraft, Fiscal Year 2001 through Fiscal Year 2008 to Date

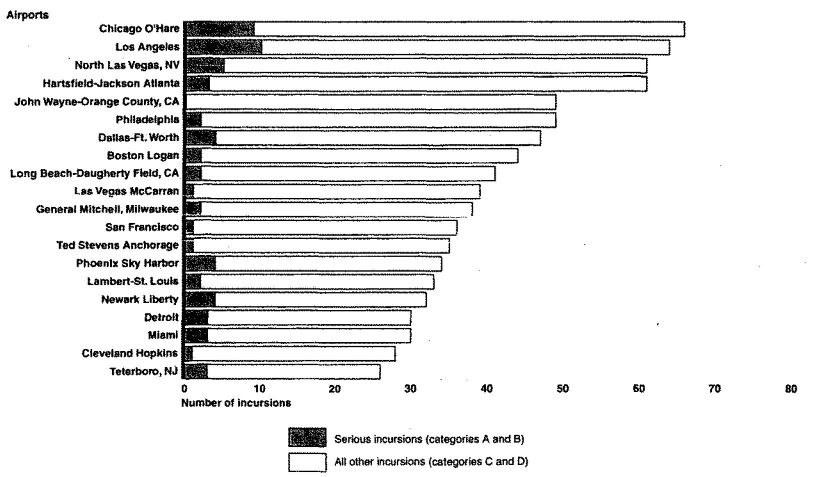


Source: FAA.

Note: Table 4 in app. I provides the data for fig. 4. Fiscal year 2008 data on serious incursions are through September 16, 2008.

In the United States, most incursions have occurred at major commercial airports, where the volume of air traffic is greater. Chicago O'Hare International and Los Angeles International Airports had the most runway incursions from fiscal year 2001 through August 18, 2008, as shown in figure 5.

Figure 5: U.S. Airports that Experienced the Most Runway Incursions from Fiscal Year 2001 through August 2008



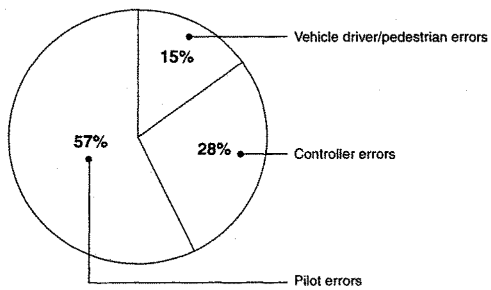
Source: GAO analysis of FAA data.

Notes: Table 5 in app. I provides the data for fig. 5. The above numbers combine data using FAA's previous definition of incursions from fiscal year 2001 through fiscal year 2007 and the ICAO definition of incursions during fiscal year 2008.

The primary causes of incursions, according to experts we surveyed and some airport officials, are human factors issues, which can include miscommunication between air traffic controllers and pilots, a lack of situational awareness on the airfield by pilots, and performance and judgment errors by air traffic controllers and pilots. According to FAA, in fiscal year 2007, 57 percent of incursions were caused by pilot errors, 28 percent by air traffic controller errors, and 15 percent by vehicle operator or pedestrian errors (see fig.6). Air traffic controller errors are a particular concern because, as we noted in our June 2008 testimony before this

Subcommittee,[10] FAA is hiring large numbers of new air traffic controllers to replace those who are retiring and the proportion of new hires is increasing over time. Our analysis of FAA's hiring and retirement projections indicates that by 2011, up to 59 percent of the controller workforce will have less than 5 years of experience. Newly certified controllers may be less efficient than experienced controllers in handling the high volumes of traffic that occur at large and congested airports, and any loss in efficiency could affect runway safety.

Figure 6: Causes of Incursions during Fiscal Year 2007



Source: FAA.

[10]GAO, *Federal Aviation Administration: Efforts to Hire, Staff, and Train Air Traffic Controllers Are Generally on Track, but Challenges Remain,* GAO-08-908T (Washington, D.C.: June 11, 2008).

FAA Has Increased Efforts to Oversee Runway Safety, but Collision Risk Remains

During fiscal year 2008, FAA has given higher priority to improving runway safety than it did during the previous 2 years, when the agency did not have a permanent director for its Office of Runway Safety. FAA's recent actions to improve runway safety include continuing to deploy and test new technology designed to prevent runway collisions; promoting changes in airport layout, markings, signage, and lighting; and issuing new air traffic procedures. However, NTSB officials and some aviation safety experts said that the risk of a runway collision is still high.

Efforts to develop and deploy technology have been among FAA's major actions to improve runway safety. To provide ground surveillance on the airfield, FAA has deployed the Airport Movement Area Safety System (AMASS), which uses the Airport Surface Detection Equipment (ASDE-3) radar,[11] at 34 of the nation's busiest airports and is deploying an updated system, the Airport Surface Detection Equipment, Model X (ASDE-X), at 35 major airports. According to its current plans, FAA will complete the deployment of ASDE-X by 2010, and a total of 44 airports will then have AMASS, ASDE-X, or both (see table 6 in app. I). FAA is also testing low-cost surface surveillance systems in Spokane, Washington, and has solicited industry proposals to acquire and install low-cost ground surveillance systems at 6 additional airports that are not scheduled to receive ASDE-3 or ASDE-X. Both ASDE-3 and ASDE-X are designed to alert controllers when they detect a potential collision on the ground. As of August 29, 2008, FAA had commissioned ASDE-X at 13 airports, up from 11 in August 2007. According to FAA, all ASDE-X-commissioned airports now have safety logic, which generates visible and audible signals to air traffic controllers of potential runway collisions. In our February 2008 testimony, we indicated that 2 ASDE-X-commissioned airports did not yet have safety logic. According to FAA, for all future systems, safety logic will be implemented when ASDE-X system is installed.

Despite ongoing efforts, FAA risks not meeting its current plans to complete the deployment of ASDE-X by 2010. FAA plans to finish installing ASDE-X at New York LaGuardia, Memphis International, and Las Vegas McCarran International Airports, where the agency is coordinating the implementation of ASDE-X with the completion of new air traffic control towers, after the fall of 2010. In addition, although it took about 4 years for ASDE-X to be installed at the first 11 airports and ASDE-X was

[11]AMASS is essentially safety logic, which is designed to detect potential collisions, using ASDE-3 data. This combined technology is usually referred to as ASDE-3/AMASS.

commissioned at 2 airports during the first 11 months of fiscal year 2008, FAA plans to install the system at 19 additional airports by the end of fiscal year 2010. In commenting on whether the 19 remaining installations can be completed on schedule, FAA's ASDE-X program manager said that the installations at all 19 airports have already begun, that the system installations are not done one airport at a time, and that the agency is working hard to push local governments and airports to obtain the needed approvals and leases.

In November 2007, we reported operational difficulties with ASDE-X's alerting functions. For example, some ASDE-X-commissioned airports were experiencing false alerts, which occur when the system incorrectly predicts an impending collision, and false targets, which occur when the system incorrectly identifies something on the airfield, such as an aircraft or vehicle, that could generate a false alert. We reported that the control tower at Hartsfield-Jackson Atlanta International Airport reported the most problems with false alerts and that the control tower at Seattle-Tacoma International Airport reported the most problems with false targets. However, FAA recently provided documentation indicating that the number of false alerts at Hartsfield-Jackson Atlanta International Airport had declined by 84 percent during 2008 and that the number of false alerts at Seattle-Tacoma International Airport had declined by 90 percent after the airport received a software upgrade in March 2008.

Another technology for improving runway safety that FAA recently decided to install at 22 airports is a runway status lights system. This technology, which gives pilots a visible warning when runways are not safe to enter, cross, or depart on, has already been tested and has received positive evaluations at Dallas-Fort Worth International and San Diego International Airports (see table 7 in app. I for a list of airports to receive runway status lights). Proposed legislation[12] to reauthorize FAA would authorize $74 million to acquire and install runway status lights. In November 2007, we reported that 10 of 17 experts we surveyed indicated that FAA's testing of runway status lights was very or extremely effective in addressing runway incursions. In addition, the Department of Transportation's Inspector General reported in January 2008 that runway incursions on the test runway at Dallas-Fort Worth International Airport decreased by 70 percent during the 29 months of testing, compared with

[12] *FAA Reauthorization Act of 2007*, H.R. 2881, 110th Congress (2007).

the 29 months before testing.[13] In addition, FAA and NTSB officials said that runway status lights prevented a serious incursion from occurring at Dallas-Fort Worth International Airport on May 15, 2008, involving an MD-80 aircraft and a regional jet. According to FAA, the MD-80 aborted its takeoff after seeing the status lights turn red when the regional jet was crossing that runway farther ahead. However, runway status lights need a surface surveillance system such as ASDE-3/AMASS or ASDE-X to operate, making the timely deployment of ASDE-X at the remaining 19 airports even more important.

Still another runway safety technology that FAA is testing is the Final Approach Occupancy Signal (FAROS) at Long Beach-Daugherty Field airport in California. FAROS activates a flashing light visible to aircraft on approach as a warning to pilots when a runway is occupied and hazardous for landing. FAA is also planning to install and evaluate an enhanced version of FAROS at Dallas-Fort Worth International Airport. According to FAA, the additional information on runway traffic provided by FAROS can improve the pilot's situational awareness and help reduce the severity of an incursion. However, nationwide deployment of FAROS is years away. Furthermore, FAA is still testing a low-cost surface surveillance system that already is being used at 44 airports outside the United States. FAA has also offered to provide up to $5 million to test in-cockpit displays that inform pilots where they are located on runways or electronic flight bags, which are electronic display systems that provide pilots with a variety of aviation data. In addition, in the longer term, deployment of the Automatic Dependent Surveillance-Broadcast (ADS-B) system, a satellite-based technology that broadcasts aircraft identification, position, and speed with once-per-second updates, will provide pilots with greater situational awareness and help to keep aircraft at safe distances from each other on the runways.

Besides deploying and testing technology, FAA has taken other actions to improve runway safety, including

[13]Department of Transportation Office of Inspector General, *FAA's Implementation of Runway Status Lights,* AV-2008-021 (Washington, D.C.: Jan. 14, 2008).

- issuing new air traffic procedures requiring controllers to give explicit instructions to pilots on precise routes to take from the gate to the runway;
- conducting safety reviews at 42 airports based on incursion and wrong-runway-departure data, the findings from which were used to improve signage and markings, as well as implement training programs for airport personnel (see table 8 in app. I for a list of the airports reviewed);
- establishing the Runway Safety Council, consisting of FAA and aviation industry representatives, to analyze the root causes of serious incursions and recommend runway safety improvements; and
- testing a voluntary safety reporting program for air traffic controllers at facilities in the Chicago area—a program we had recommended in our November 2007 report that FAA implement.

In June 2008, FAA also completed an internal review of runway incursions at Boston Logan International Airport with a team of experts from FAA, the airport, and a major airline to identify best practices to prevent incursions. FAA is currently reviewing runway incursions at Hartsfield-Jackson Atlanta International Airport and is planning reviews at 8 additional airports based on the frequency of runway incursions. In addition, FAA plans to work with a contractor to validate the alerting perimeters of AMASS and ASDE-X to ensure that controllers receive warnings in time to act on them and relay the warnings to pilots. Furthermore, according to an FAA official, the agency is drafting a new national runway safety plan, which we recommended in our November 2007 report. In addition, in July 2008, FAA submitted, as requested by this Subcommittee, its first quarterly progress report on how it was handling serious incursions.

Several aviation safety stakeholders, including officials from associations representing airlines and pilots, said that FAA has increased its attention to runway safety during the past year. For example, an official from the Air Transport Association (ATA), which represents the airline industry, said that FAA's level of attention to runway safety is noticeably better than last year, there is more communication, and FAA leadership at the highest levels is focused on the issue. In addition, an official from the Air Line Pilots Association (ALPA) said that the new air traffic procedures requiring controllers to give explicit instructions to pilots on precise routes to take from the gate to the runway were a substantial improvement, resulting in less confusion. However, an official from the

National Air Traffic Controllers Association (NATCA) said that FAA had not made progress in addressing air traffic controller overtime and fatigue issues over the last year. In November 2007, we reported that, as of May 2007, at least 20 percent of the controllers at 25 air traffic control facilities, including towers at several major airports, were regularly working 6-day weeks, which could cause fatigue. We also recommended that FAA develop a mitigation plan for addressing controller overtime. FAA officials said that this year, the agency had offered relocation and retention incentives for controllers, targeting major facilities experiencing high rates of overtime. The officials said that 80 controllers had been selected to receive the relocation bonuses and that 100 controllers had accepted retention bonuses in exchange for 2 more years of service. An FAA official said that it was too early to tell what impact those actions would have on the frequency of overtime. To address controller fatigue issues, FAA officials said that the agency held a summit on the subject in June 2008 and is considering shift scheduling changes for controllers.

In commenting on the voluntary safety reporting program for air traffic controllers being tested in the Chicago area, FAA officials said that since the test program began last month, controllers have submitted about 40 reports, 4 of which involved runway incidents. Senior NATCA officials said that although controllers are participating, some are concerned that FAA will take disciplinary actions against them for reporting safety incidents. However, FAA officials said that it is not agency policy to discipline controllers for reporting incidents through the program except under the circumstances specified in the memorandum of understanding with NATCA involving criminal activity, substance abuse, controlled substances, alcohol, or intentional falsification.

According to FAA, airlines have also taken actions to improve runway safety. For example, FAA indicated that all 112 active air carriers have reported that they (1) provide pilots with simulator or other training that incorporates scenarios from aircraft pushback through taxi and (2) have reviewed cockpit procedures to identify and develop a plan to address elements that contribute to pilot distraction while taxiing. Verification of these actions during FAA's inspections will ensure that these activities are fully implemented.

With the help of FAA funding, several airports have made recent changes to their runways and taxiways to reduce the risk of collisions. In June 2008, Los Angeles International Airport opened a new center taxiway that requires aircraft to reduce speed before exiting. Previously, aircraft used high-speed taxiways in that area of the airfield, resulting in runway incursions when aircraft did not stop in time before approaching active runways. In our February 2008 testimony, we reported that Los Angeles International Airport had experienced the most runway incursions in fiscal years 2001 through 2007. However, the new taxiway may have been a contributing factor in reducing the number of incursions at Los Angeles International Airport this fiscal year, compared with last year. Using FAA's previous definition of incursions to compare both years, the Los Angeles International Airport had 3 incursions during fiscal year 2008 through September 16, 2008, and none were serious, compared with 8 during fiscal year 2007, including 2 serious ones. When data through August 2008 are included, Chicago O'Hare International Airport has experienced the most runway incursions since fiscal year 2001. In October 2008, Dallas-Fort Worth International Airport plans to open a perimeter taxiway (also called an end-around taxiway) that gives aircraft access to gates without crossing active runways. Crossing active runways is one of the many causes of incursions. In April 2007, Hartsfield-Jackson Atlanta International Airport also opened a perimeter taxiway. According to an airport official, the perimeter taxiway eliminates about 560 runway crossings per day, or about one-third of the airport's total daily runway crossings.

In November 2007, we reported that FAA's Office of Runway Safety had not carried out its leadership role to coordinate and monitor the agency's runway safety efforts. Until FAA hired a permanent director at the senior executive service (SES) level for the Office of Runway Safety in August 2007, that office had been without a permanent director for the previous 2 years. Since a permanent director was hired, the number of full-time staff in the Office of Runway Safety has increased, up to 41[14] as of August 2008 from about 37, including contractors, led by a non-SES-level acting director in May 2007. Although we did not determine what the appropriate level of staffing for the Office of Runway Safety would be, we note that before 2004, when FAA provided a high level of attention to runway safety, the office had 66 full-time staff, including contractors.

NTSB officials and some aviation safety experts said that, despite the numerous actions taken by FAA to improve runway safety, the risk of a runway collision is still high. NTSB officials, for example, cited two nonfatal runway collisions that occurred this year—one at an untowered airport in Pawtucket, Rhode Island, where two general aviation aircraft

[14]This includes 17 full-time staff, 21 contractors, and the equivalent of 3 staff years that are assigned to other offices, but provide assistance to the Office of Runway Safety.

collided on a runway, substantially damaging both aircraft, and another accident at the airport in Reading, Pennsylvania, where a landing general aviation aircraft collided with a tractor that was at the intersection of a runway and a taxiway, breaking off part of the aircraft's left wing. In addition, an official from the Flight Safety Foundation said that although the probability of a runway collision is very low, the severity of such an accident means that the risk is high. The low probability of a runway collision is supported by the fact that FAA controls the takeoff, landing, and flights of about 50,000 aircraft every day, but the most recent fatal runway collision at a towered airport involving commercial aircraft occurred 14 years ago, in 1994, when a Trans World Airlines MD-82 collided with a general aviation aircraft on a runway at Lambert-St. Louis International Airport, killing 2 people. However, the worst accident in aviation history involved a runway collision, in 1977, when two Boeing 747s collided on a runway in Tenerife, the Canary Islands, killing 583 passengers and crew. Moreover, despite recent reductions in air traffic, by 2025, air traffic is projected to increase two- to threefold, equating to about 100,000 to 150,000 flights a day, making airports even more congested than they are today.

To address runway overruns, FAA and airports have increased the percentage of runways that are in compliance with FAA standards for runway safety areas—unobstructed areas that surround runways to enhance safety in the event that an aircraft overruns, overshoots, or veers off a runway. As of August 2008, 76 percent of 1,015 runways at 561 commercial service airports were in substantial compliance with runway safety area standards, up from 70 percent in May 2007. FAA considers runway safety areas that meet 90 percent of the standards to be in substantial compliance. Increased compliance with runway safety area standards reduces the chances of aviation accidents resulting from overruns. In addition, as of August 2008, the Engineered Materials Arresting System (EMAS), a bed of crushable concrete designed to stop overrunning aircraft, was installed at 35 runway ends at 24 U.S. airports, up from 24 runway ends at 19 U.S. airports during June 2007. Furthermore, as of August 2008, there were plans to install 15 additional EMAS systems at 11 additional airports. (Table 9 in app. I lists the airports with EMAS installations.) In our November 2007 report, we recommended that FAA develop and implement a plan to collect data on runway overruns that do not result in damage or injury for analyses of trends and causes of overruns. In response, FAA indicated that a working group will be established to assess what additional runway overrun data could be collected and to make recommendations by the end of this year.

Addressing Human Factors Issues Could Help Improve Runway Safety

FAA could further improve runway safety by addressing human factors issues, which aviation safety experts identified as the primary cause of incursions. To address these issues, FAA could encourage the development of new technology, revise additional procedures, and adopt best practices. Proposed legislation[15] to reauthorize FAA would support additional efforts to improve runway safety by authorizing $114 million to develop runway incursion reduction programs and to deploy technology.

In November 2007, we reported that, according to experts we surveyed, encouraging the development of a runway incursion warning system in the cockpit would be among the most effective actions that FAA could take to improve runway safety. In addition, in 2000, NTSB recommended, among other things, that FAA require airports to deploy a ground movement safety system to prevent runway incursions and develop a direct incursion warning capability for flight crews. A system that provides a direct warning to the cockpit being developed by Honeywell and the Sensis Corporation, called the Runway Incursion Cockpit Alerting System, is designed to work at airports equipped with ASDE-X and functioning safety logic. A demonstration of the system was conducted with FAA and NTSB officials at Syracuse Hancock International Airport in August 2007. NTSB officials said that FAA could move faster to approve technology that provides runway incursion warnings directly to the cockpit. However, FAA officials said the cockpit warning system would need to be thoroughly reviewed before being approved for use, a process they said could take at least 2 years.

Also to improve runway safety, ATA and ALPA officials suggested FAA could standardize air traffic control phraseology. Future FAA air traffic procedures will cover clearances for runway crossings, takeoffs, and multiple landings and will include the adoption of international phraseology such as "line up and wait" instead of "position and hold." A senior ALPA official said that adopting international standards for air traffic control phraseology could be particularly useful at airports that handle a large volume of foreign airline traffic, such as Los Angeles International Airport. However, senior NATCA officials said they are concerned about FAA's adoption of international taxiing phraseology because of the complexity of handling the high volume of air traffic in the United States. These officials also said that FAA could do more to reduce air traffic controller overtime and take additional actions to address

[15] *FAA Reauthorization Act of 2007*, H.R. 2881, 110th Congress (2007).

controller fatigue. In the meantime, NATCA plans to start its own fatigue management initiative, according to senior NATCA officials. In addition, a NATCA official said that FAA's focus on reporting the number of serious incursions should not distract attention from less serious incursions, which the official said are also important. A human factors expert we contacted agreed, saying that serious incursions are only the "tip of the iceberg," that less serious incursions can lead to more serious ones, and that the entire scope of incidents should be examined.

Adopting best practices for runway safety, such as ones that FAA has compiled, also could help address human factors issues. These include practices such as conducting runway safety training for controllers, pilots, and airport personnel; checking the accuracy of airport diagrams and updating them as needed; encouraging pilots to turn aircraft lights on during landing and departure; and eliminating distractions in the control tower.

In closing, although FAA has increased its efforts to improve runway safety through a multilayered approach, the current high level of attention must be sustained to reduce the risk of potentially catastrophic runway accidents. Although the number of serious incursions has declined since 2001, the continuing incidence of near collisions involving commercial aircraft and the continuing increase in the overall number and rate of incursions suggest that a significant risk of catastrophic runway collisions still exists. A significant reduction in the number and rate of incursions may not be realized until the development and installation of runway safety technology is complete. Therefore, FAA must continue to provide a high level of attention to further reduce the number of serious incursions and reverse the upward trend in the overall number of runway incursions through the timely deployment of technology, sustained leadership, and other means.

Mr. Chairman, this concludes my prepared statement. I would be pleased to respond to any questions from you or other Members of the Subcommittee.

GAO Contact and Staff Acknowledgments

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Appendix I: Data on Runway Incursions and Deployment of Related Safety Technology

Table 1: Number and Rate of Runway Incursions from Fiscal Year 1998 through the Third Quarter of Fiscal Year 2008

Fiscal year	Number of incursions	Rate per 1 million tower operations
1998	304	4.66
1999	329	4.83
2000	405	5.9
2001	407	6.1
2002	339	5.2
2003	323	5.1
2004	326	5.2
2005	327	5.2
2006	330	5.4
2007	370	6.05
2008 (first 3 quarters) using the Federal Aviation Administration's (FAA) previous definition of incursions	293	6.72
2008 (first 3 quarters) using the International Civil Aviation Organization's (ICAO) definition of incursions	712	16.33

Source: FAA.

Table 2: Number and Rate of Incursions, by Quarter, during Fiscal Year 2007 and Fiscal Year 2008

Quarter and fiscal year	Number of incursions	Incursion rate per 1 million tower operations	Number of serious incursions	Rate of serious incursions per 1 million tower operations
First quarter 2007	90	6.03	2	0.134
Second quarter 2007	79	5.533	5	0.3502
Third quarter 2007	106	6.709	10	0.6329
Fourth quarter 2007	95	5.891	7	0.4341
First quarter 2008, using previous FAA incursion definition	94	6.434	10	0.685
First quarter 2008, using ICAO incursion definition	226	15.744	10	0.685
Second quarter 2008, using previous FAA incursion definition	93	6.62	5	0.36
Second quarter 2008, using ICAO incursion definition	217	15.62	5	0.36
Third quarter 2008, using previous FAA incursion definition	108	7.149	4	0.265
Third quarter 2008, using ICAO incursion definition	269	17.807	4	0.265
Fourth quarter 2008, using previous FAA incursion definition	a	a	4	a
Fourth quarter 2008, using ICAO incursion definition	a	a	4	a

Source: FAA.

Note: Fourth quarter fiscal year 2008 data on serious incursions are through September 16, 2008.

[a]Not yet available.

Table 3: Serious Incursions Involving at Least One Commercial Aircraft from Fiscal Year 2007 through September 16, 2008

Date	Location	Airline(s) and aircraft involved	Number of air passengers
January 5, 2007	Denver International	Key Lime Air Swearingen SW4 and Frontier Airbus A319	50
February 2, 2007	Denver International	United Boeing 737 and snowplow	101
May 4, 2007	Cyril E. King Airport, Charlotte Amalie, VI	American Airlines Boeing 757 and Cessna C208	[a]
May 6, 2007	Los Angeles International	Skywest Embraer 120 and Virgin Air Airbus A340	[a]
May 26, 2007	San Francisco International	Republic Airlines Embraer 170 and Skywest Airlines Embraer 120	27
July 11, 2007	Fort Lauderdale-Hollywood International, FL	Delta Air Lines Boeing 757 and United Airlines Airbus A320	172
July 19, 2007	Chicago O'Hare International	United Airlines Boeing 737 and US Airways Boeing 737	[a]
August 16, 2007	Los Angeles International	WestJet Boeing 737 and Northwest Airlines Airbus A320	296
December 2, 2007	Baltimore-Washington International	US Airways/America West Airbus A320 and Comair Canadair CRJ-100	[a]
December 6, 2007	Newark Liberty International	Continental Airlines Boeing 737 and Continental Express Embraer E145	[a]
January 16, 2008	San Diego International	Southwest Airlines Boeing 737 and Hawker H25B	[a]
April 6, 2008	Dallas-Fort Worth International	American Airlines MD-80 and Boeing 777	[a]
July 21, 2008	Chicago O'Hare International	American Eagle Embraer E145 and Learjet LJ25	4
July 28, 2008	Cleveland Hopkins International	SkyWest Canadair CRJ-200 and Air Canada Jazz DeHavilland Dash 8	[a]
August 28, 2008	Fresno Yosemite International	SkyWest Canadair CRJ-200 and Piper Malibu	[a]

Source: GAO analysis of FAA and National Transportation Safety Board (NTSB) data.

Note: Fiscal year 2008 data through September 16, 2008.

[a]Information not contained in the NTSB incident reports.

Table 4: Total Number of Incursions and Number of Serious Incursions Involving at Least One Commercial Aircraft, Fiscal Year 2001 through September 16, 2008

Fiscal year	Number of serious incursions	Serious incursions involving at least one commercial aircraft
2001	53	26
2002	37	11
2003	32	9
2004	28	9
2005	29	9
2006	31	10
2007	24	8
2008 (through Sept. 16, 2008)	23	7

Source: FAA.

Table 5: U.S. Airports that Experienced the Most Runway Incursions from Fiscal Year 2001 through August 2008

Airport	Number of serious incursions	Number of total incursions[a]
Chicago O'Hare International	9	66
Los Angeles International	10	64
North Las Vegas	5	61
Hartsfield-Jackson Atlanta International	3	61
Philadelphia International	2	49
John Wayne-Orange County, Santa Ana, CA	0	49
Dallas-Fort Worth International	4	47
Boston Logan International	2	44
Long Beach-Daugherty Field, CA	2	41
Las Vegas McCarran International	1	39
General Mitchell International, Milwaukee, WI	2	38
San Francisco International	1	36
Ted Stevens Anchorage International	1	35
Phoenix Sky Harbor International	4	34
Newark Liberty International	4	32
Lambert-St. Louis International	2	33
Detroit Wayne County International	3	30
Miami International	3	30
Cleveland Hopkins International	1	28
Teterboro, NJ	3	26

Source: FAA.

[a]Excludes 30 incursions that FAA had not yet classified as of August 18, 2008. The above numbers combine data using FAA's previous definition of incursions from fiscal year 2001 through fiscal year 2007 and the ICAO definition of incursions during fiscal year 2008. The number of serious incursions is not affected by FAA's adoption of the ICAO definition.

Table 6: Airports with Airport Surface Detection Equipment Model 3 (ASDE-3)/Airport Movement Area Safety Systems (AMASS) or Airport Surface Detection Equipment Model X (ASDE-X) or Scheduled to Receive ASDE-X

Airport	ASDE-3/AMASS	ASDE-X commissioned	Scheduled ASDE-X deployment[a]
Baltimore-Washington International	x		April 2010
Boston Logan International	x		July 2009
Bradley International, Windsor Locks, CT		x	
Camp Springs Andrews Air Force Base	x		
Charlotte Douglas International		x	
Chicago Midway			June 2010
Chicago O'Hare International		x	
Cleveland Hopkins International	x		
Covington/Cincinnati Northern Kentucky International	x		
Dallas-Fort Worth International	x		April 2010
Denver International	x		November 2009
Detroit Metro Wayne County		x	
Fort Lauderdale-Hollywood International, FL			April 2009
General Mitchell International, Milwaukee, WI		x	
George Bush Intercontinental, Houston, TX	x		November 2009
Hartsfield-Jackson Atlanta International		x	
Honolulu International-Hickam Air Force Base			May 2010
John F. Kennedy International, New York, NY	x		August 2008[b]

Airport	ASDE-3/AMASS	ASDE-X commissioned	Scheduled ASDE-X deployment[a]
John Wayne-Orange County, Santa Ana, CA			February 2010
Kansas City International	x		
Lambert-St. Louis International		x	
Las Vegas McCarran International	x		April 2011
Los Angeles International	x		September 2008
Louis Armstrong New Orleans International	x		
Louisville International-Standiford Field		x	
Memphis International	x		April 2011
Miami International	x		March 2010
Minneapolis-St. Paul International	x		March 2010
New York LaGuardia	x		October 2010
Newark Liberty International	x		July 2009
Orlando International		x	
Philadelphia International	x		December 2009
Phoenix Sky Harbor International			September 2008
Pittsburgh International	x		
Portland International	x		
Ronald Reagan Washington National	x		June 2010
Salt Lake City International	x		May 2010
San Diego International	x		August 2010
San Francisco International	x		
Seattle-Tacoma International		x	
Ted Stevens Anchorage International	x		
Theodore Francis Green State, Providence, RI		x	

Airport	ASDE-3/AMASS	ASDE-X commissioned	Scheduled ASDE-X deployment[a]
Washington Dulles International		x	
William P. Hobby, Houston, TX		x	

Source: FAA.

Note: Schedule as of August 25, 2008.

[a]Scheduled deployment dates are as of Aug. 25, 2008, and represent when the facility first declares the system ready for conditional use. Once the system is formally accepted by the facility, the system is commissioned. FAA's draft accelerated schedule, shown in this table, targets completing ASDE-X deployment by the fall of 2010, except at New York LaGuardia, Memphis International, and Las Vegas McCarran International Airports, where the agency is coordinating ASDE-X implementation with the completion of new air traffic control towers.

[b]Expected to be commissioned by late September 2008.

Note: As indicated above, 26 airports currently have ASDE-3/AMASS. Eight additional airports (Charlotte Douglas International, Chicago O'Hare International, Detroit Metro Wayne County, Hartsfield-Jackson Atlanta International, Lambert St.-Louis International, Louisville International-Standiford Field, Seattle-Tacoma International, and Washington Dulles International) originally had ASDE-3/AMASS, but the equipment has since been upgraded to ASDE-X.

Table 7: Airports to Receive Runway Status Lights

Airport
Baltimore-Washington International
Boston Logan International
Charlotte Douglas International
Chicago O'Hare International
Dallas-Fort Worth International[a]
Denver International
Detroit Metro Wayne County
Fort Lauderdale-Hollywood International, FL
Hartsfield-Jackson Atlanta International
George Bush Intercontinental, Houston, TX
John F. Kennedy International
Las Vegas McCarran International
Los Angeles International
Minneapolis-St. Paul International
New York LaGuardia
Newark Liberty International
Orlando International
Philadelphia International
Phoenix Sky Harbor International
San Diego International[a]
Seattle-Tacoma International
Washington Dulles International

Source: FAA.

Note: The runway status lights deployment schedule was not yet available as of August 2008.

[a]Currently being tested at these locations.

Table 8: Airports that Received Safety Reviews in 2008

Airport
Adams Field, Little Rock, AR
Albuquerque International Sunport, NM
Boston Logan International
Charlotte Douglas International
Chicago Midway
Chicago O'Hare International
Cleveland Hopkins International
Dallas-Fort Worth International
Daytona Beach International
Dekalb Peachtree, Atlanta, GA
Denver International
Falcon Field, Mesa, AZ
Fort Lauderdale Executive
Fort Lauderdale-Hollywood International
General Mitchell International, Milwaukee, WI
Hartsfield-Jackson Atlanta International
John F. Kennedy International, New York, NY
John Wayne-Orange County, Santa Ana, CA
Kendall-Tamiami Executive, Miami, FL
Lambert-St. Louis International
Las Vegas McCarran International
Long Beach-Daugherty Field, CA
Los Angeles International
Lubbock Preston Smith International
Miami International
Midland International, TX
Nashville International
New York LaGuardia
Norman Y. Mineta San Jose International
North Las Vegas, NV
Orlando International
Philadelphia International
Reno-Tahoe International, NV
Rocky Mountain Metropolitan, Denver, CO
San Antonio International

Airport
San Francisco International
Santa Barbara Municipal, CA
Seattle-Tacoma International Airport
Ted Stevens Anchorage International
Teterboro, NJ
Washington Dulles International
William P. Hobby, Houston, TX

Source: FAA.

Table 9: Airports with the Engineered Materials Arresting System

Airport	Number of systems	Installation date
John F. Kennedy International Airport, New York	2	1996, 2007
Minneapolis-St. Paul International	1	1999
Adams Field, Little Rock	2	2000, 2003
Greater Rochester International, NY	1	2001
Bob Hope, Burbank, CA	1	2002
Baton Rouge Metropolitan	1	2002
Greater Binghamton, NY	2	2002
Greenville Downtown, SC[a]	1	2003
Barnstable Municipal, Hyannis, MA	1	2003
Roanoke Regional, VA	1	2004
Fort Lauderdale-Hollywood International	2	2004
Dutchess County, Poughkeepsie, NY	1	2004
New York LaGuardia	2	2005
Boston Logan International	2	2005, 2006
Laredo International, TX	1	2006
San Diego International	1	2006
Teterboro, NJ	1	2006
Chicago Midway	4	2006, 2007
Merle K. (Mudhole) Smith, Cordova, AK	1	2007
Charleston Yeager, WV	1	2007
Manchester, NH	1	2007
Wilkes-Barre/Scranton International, PA	1	2008
San Luis Obispo, CA	2	2008
Chicago O'Hare International	2	2008

[a]General aviation airport.

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Testimony of

Patrick Forrey, President,
National Air Traffic Controllers Association

Before the House Transportation and Infrastructure Committee
Subcommittee on Aviation
Thursday, September 25, 2008

Runway Safety: An Update

Background

In November of 2007, the Government Accountability Office (GAO) issued a report that warned of "a high risk of a catastrophic runway collision occurring in the United States."[1] The GAO's study found that, in 2007, runway incursions had reached an alarming rate - nearly as high as the previous peak in 2001. Shortly thereafter, the Aviation Subcommittee of the House Transportation and Infrastructure Committee held an investigative hearing on how best to address this serious and growing threat to runway safety. NATCA presented a number of recommendations for improving runway safety at that February 2008 hearing[2].

These recommendations included:

- Establishing local committees for runway incursion prevention. These committees, structured on the level of the individual airport, would be composed of representatives of local stakeholders, including pilots, air traffic controllers, airport management and airport vehicle drivers, as well as a national representative from the FAA. Through their first hand experience these local professionals would be able to identify runway incursion "hot spots" where they have witnessed breakdowns of communication, inadequate procedures, failures of airport markings, or terrain-related difficulties in order to develop strategies for addressing these facility-specific safety issues.
- Ensuring that air traffic control towers are properly staffed. The first step towards proper staffing requires the FAA to return to the bargaining table to reach a mutually agreeable contract with NATCA. This would stem the flow of qualified controllers from the workforce by making the job more attractive for individuals at all stages of their careers, including newly-hired controllers as well as those eligible for retirement.
- Re-establishing a collaborative working relationship between the FAA and NATCA to identify the technological needs of the air traffic system and effectively develop and employ technology to meet those needs. There currently exists technology that, if properly implemented, could help to improve runway safety. These technologies include Surface Radar (both ASDE-X or lower cost surveillance systems), runway status lights, data link systems, and taxiway monitoring systems.
- Constructing and fully utilizing End Around Taxiways to avoid runway crossings.

Deteriorating Runway Safety

Runway safety has not improved in the months since this subcommittee last convened to address this issue. According to internal FAA documents, as of September 4, 2008 there were 921 runway incursions in FY 2008, 106 more than during the same period in FY 2007. Runway incursions have also exceeded the limit placed by FAA performance standards, which allows no more than 769 runway incursions during the entire fiscal year.

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[1] November 2007 GAO report number GAO-08-29 "Aviation Runway And Ramp Safety: Sustained Efforts to Address Leadership, Technology, and Other Challenges Needed to Reduce Accidents and Incidents"
[2] Forrey, Patrick "Runway Safety: Testimony of Patrick Forrey, President National Air Traffic Controllers Association, AFL-CIO Before the House Transportation and Infrastructure Subcommittee on Aviation" February 13, 2008

Figure 1

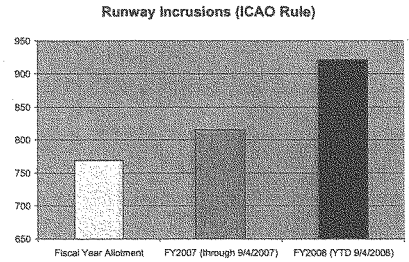
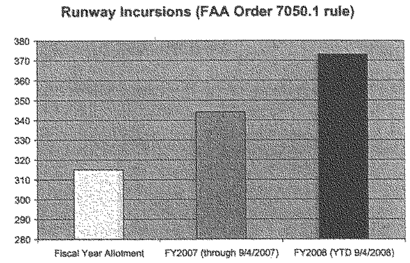


Figure 2



It must be noted that on October 1, 2007 the FAA adopted the International Civil Aviation Organization (ICAO) definition of runway incursion, abandoning the standard that had been laid out in FAA Order 7050. Most significantly, this new standard changed the definition of a runway incursion. A runway incursion is now defined as "any unauthorized intrusion onto a runway,"[3] regardless of the likelihood of conflict. In the past, for example, if an aircraft crossed an empty runway without authorization, the incident was classified by the FAA as a "surface incident" rather than runway incursion. Under the new terms, the same incident would be considered a Category C or D runway incursion. The FAA maintained records of "surface incidents," allowing us to make meaningful comparisons. Using either the old FAA rule or the new ICAO rule, there has been an undeniable and significant increase in runway incursions in FY 2008 as demonstrated figures one and two.

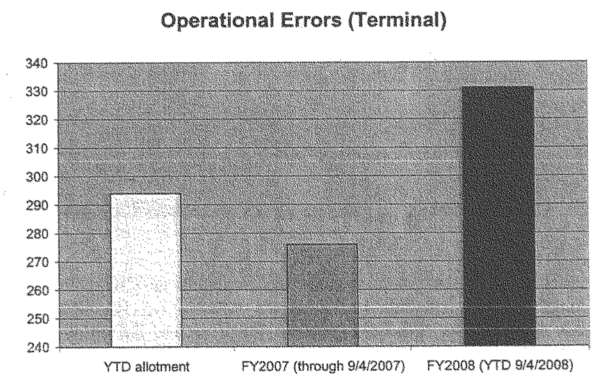
The number of severe (Category A and B) runway incursions thus far this fiscal year is similar to that at the same time last year. As of September 16, 2008 there were 23 Category A and B runway incursions[4], while last year at this time there had been 24[5]. However, the number of airport operations has decreased during that same time period. Therefore the rate of serious incursions has actually increased. As of July 31, 2008[6] the rate of Category A and B runway incursions in FY 2008 is 0.39 per one million airport operations, an increase of nine percent from the 0.35 last year.[7]

Particularly alarming to NATCA is the 2008 increase in operational errors in the terminal environment. According to internal FAA sources, terminal operational errors have increased by 20 percent thus far in FY 2008 over the same period in 2007. This year number of errors allotted by FAA performance standards has also been exceeded. This increase suggests that human

[3] Takemoto, Paul. FAA Press Release, "FAA Adopts ICAO definition for Runway Incursions," October 1, 2007
[4] From "FAA Today" September 16, 2008
[5] From "FAA Today" September 14, 2007 and September 17, 2007
[6] July 31 is the last date for which the FAA has posted traffic counts on the Air Traffic Activity Systems Database.
[7] Rates are calculated based on the number of runway incursions (as published in FAA today) and the number of airport operations (as published in the FAA's Air Traffic Activity Systems Database (ATADS)) for the same time period.

factors affecting air traffic controllers – understaffing, training, fatigue, stress and workload – are having an increasingly harmful effect on safety in the terminal environment.

Figure 3



Limited Progress on NATCA's Recommendations

NATCA has been very disappointed by the lack of meaningful attention the FAA has given to addressing the issue of runway safety. Although the Agency has have made some nominal gestures, it has done little of value to address NATCA's concerns or implement our recommendations.

Proper Staffing of Air Traffic Control Facilities

The FAA has taken no meaningful steps toward returning to the bargaining table to bargain with air traffic controllers. As a result, job dissatisfaction remains high and controllers continue to flee the profession at alarming rates through retirement (less than two percent of those that left reached their mandatory retirement age)[8], resignations, and promotions to management. Although the FAA has put into place several incentive programs, these stop-gap measures have proven very limited in their efficacy and do not address the problem at its root.

As NATCA has testified before this subcommittee,[9] understaffing forces many controllers to work frequent overtime shifts contributing to fatigue in the workforce. Even with many controllers working extra hours, shifts remain short-staffed – forcing controllers to work combined positions and affording them fewer opportunities for rest and recovery during the shift itself, exacerbating problems with workload and fatigue. Furthermore, the outflow of

[8] Based on payroll data provided by the FAA to NATCA

[9] Testimony of Patrick Forrey, President, National Air Traffic Controllers Association before the House Transportation and Infrastructure Committee Subcommittee on Aviation Wednesday, "Air Traffic Control Facility Staffing" June 11, 2008

experienced personnel from the air traffic controller ranks has created an unmanageable ratio of trainees, forced trainees into busy facilities, and contributed to an unacceptable lack of experience in the workforce at large.

In March 2008, the FAA released the annual "Controller Workforce Plan" which updated the FAA's staffing ranges for each air traffic control facility. These staffing ranges are designed to give the misleading appearance that facilities are adequately staffed by designing ranges that are deliberately skewed low. In its 2007 workforce plan, the FAA justifies these ranges by averaging the following numbers. [10]

1. The results of a scientific assessment of acceptable staffing levels, details of which they have not provided.
2. Current staffing at peer facilities: As the entire system is suffering the same staffing shortage, peer facilities will be equally understaffed.
3. Past staffing lows: The FAA misleadingly refers to this comparison as the past year of "highest productivity." However, they define productivity as the highest number of operations per controller – the year when the fewest controllers were relied upon to control the largest amount of traffic – without taking into account error rates, delays, or the effect on the workforce.
4. Managers' advice: The FAA misleadingly refers to this as "service unit input" however, this did not include input from NATCA representatives.

In order to best ensure the safety of the flying public, the FAA must work with NATCA and the National Academy of Sciences, or other independent third party, to re-establish scientifically-based staffing ranges for each facility.

Local Runway Committees

NATCA is not aware of any FAA initiative to create local runway safety committees that address the unique runway safety issues of each airport, has the union been asked to participate in such a program.

NATCA is aware of runway incursion workgroups that are being held at the regional level, and we are involved in some, but not all, of these work groups. NATCA should be afforded a position on all agency workgroups dealing with runway safety throughout the country, and our representatives should be granted official duty time to attend these meetings.

Technology and Modernization

Progress has been slow on our recommendations for effective use of technology and modernization. Of particular concern is the FAA's indication that it is not interested in re-establishing the liaison program. NATCA's Safety Director has met with the FAA's Rick Ducharme, Director of Terminal Mission Support for the Air Traffic Organization, who has made it clear that the FAA had no desire to work with NATCA representatives for this purpose. As indicated in the February 13 testimony, some of the most effective technological changes to

[10] Federal Aviation Administration, "A Plan For the Future: 2007-2016" March 2007

air traffic control grew out of the liaison program, because the FAA was able to draw upon the expertise of front-line air traffic controllers to determine useful features and strategies for successful integration of new technology. NATCA reaffirms its position that our inclusion is critical to the success of new technologies in the air traffic control environment. With the aviation community justifiably focused on NextGen, we must be more vigilant than ever to ensure that users are included early on so that cost overruns and delays can be avoided.

The FAA has begun to take steps toward implementing the Low Cost Ground Surveillance System (LCGS) program referenced in our testimony; it has begun testing the system at Spokane International Airport (GEG). This system provides information on vehicles on the runway and at low altitudes around the airport, providing an additional tool for controllers, particularly during periods of low visibility. Because LCGS does not have the built-in safety logic of the ASDE surveillance programs, it is an inferior tool. However, NATCA supports the implementation of LCGS at medium to small sized airports, where implementation of ASDE-X is not feasible. Again, collaboration with NATCA during the implementation process is crucial for the success of this program.

The FAA also continues to move forward – without NATCA involvement – on the runway status lights program, a program that began as a NATCA initiative at Dallas Fort Worth. Details regarding the status of this program or intentions to expand the program to other airports have not been provided to NATCA. Most of the work on Data Link Systems recommended in our February testimony is being done by the industry groups associated with NextGen. There is no viable Data Link program at this time that could be implemented prior to 2016. Taxiway monitoring systems are already available through the Sensis Corporation with their upgraded ASDE program. This technology would allow a controller to input a coded taxi route into the monitoring system and would alert the controller if the pilot deviated from the assigned route. However, the FAA is not purchasing this software upgrade and the technology will not be available on the LCGS.

Minimizing Runway Crossings

The FAA has not designated any additional airports for the construction of end-around taxiways. Even at airports that have such taxiways, many pilots avoid these routes because the companies they work for are reluctant to burn the extra fuel required to use them.

For airports where end-around taxiways simply are not feasible, there needs to be a genuine effort to develop taxi procedures to reduce runway crossings. Coded taxi routes should be seriously considered at any airport which has more than two taxiways required from the terminal or parking to the runway.

Perpendicular Runways

For many years, Air Traffic Controllers at John F Kennedy Airport (JFK) in New York have warned the FAA of the safety risk posed by simultaneous utilization of the airport's perpendicular runways without staggering flights. The FAA refused to heed this warning and continued to require controllers to utilize the runways in this way. In a memo dated September

25, 2000 the Air Traffic Division Manager informed the managers of New York TRACON and JFK Tower that there was "No wake turbulence separation requirements for the following operations: 1. An aircraft arriving behind a heavy aircraft arriving on an intersecting runway [and] 2. An arriving aircraft that is not expected to cross the flight path of a departing heavy aircraft from an intersecting runway."[11] In other words, prior to these incidents there was no procedure to ensure safe separation in the event that an aircraft aborts a landing and crosses the flight path of an aircraft departing or aborting a landing on an intersecting runway.

In April the Air Traffic Organization's Office of Aviation Oversight found that similar operations at Detroit Metropolitan Wayne County Airport (DTW) were unsafe because of "procedural and wake turbulence issues." In a memo dated April 4, 2008 the Operations Manager at DTW ordered a suspension of the "Southwest Flow Configuration (Land Runways 27L/22R; Depart Runways 21R/27L)...pending corrective action."[12] Despite clear indication that the FAA was aware that such a configuration was unsafe, no action was taken on a national level.

This July, there were two near collisions in the span of a week at JFK airport both caused by unsafe usage of perpendicular runways.

On July 5, 2008 a Cayman Airways pilot aborted a landing and executed a go-around causing it to intersect with the flight path of an LAN Chile jet that was taking off from a perpendicular runway. The aircraft came within 200 feet and a half-mile horizontally of one another. On July 12th, Delta Flight 123 aborted its landing and executed a go-around, causing it to intersect with the flight path of Comair Flight 1520, taking off from a perpendicular runway. The two flights, and a third, Bombardier CRJ9, all came within 600 feet of one another.[13]

The FAA continues to claim that these were non-incidents as they did not violate existing FAA rules. FAA reacted to negative press attention however, by temporarily changing certain flight procedures. According to the memo announcing the new rule, JFK tower personnel are authorized to conduct operations "that will allow an aircraft to begin departure roll on Runway 13 R once the preceding arriving aircraft on Runway 22L has crossed the landing threshold of 22L."[14] This new procedure calls for the staggering of departures and arrivals on intersecting runways, protecting an aircraft that aborts a landing from conflict with a departing aircraft on an intersecting runway. The new procedure, however, fails to protect two aircraft arriving on intersecting runways from conflict with one another if both decide to abort their landings, in addition to the fact that it does not address the reciprocal operation (arrivals on 4R and 13R, departures on 13L).

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[11] Memorandum dated September 25, 2000 signed by F.D. Hatfield from Manager Air Traffic Division AEA-500 to Manager, New York TRACON with the subject line "Information: Wake Turbulence Separation"

[12] Memorandum dated April 4, 2008 by John Guth Manager, System Operations DTW/D21 with subject line "Impact Statement and Brief: Suspension of the Southwest Flow Configuration"

[13] Lowy, Joan, *Associated Press* "2nd near collision occurs at JFK airport in week" July 12, 2008

[14] Memorandum dated August 8, 2008 To Director, Easter Terminal Operations, From Raul C. Trevino, Director, Terminal Safety and Operations Support with the subject "Request to Waiver FAA Order 7110.65S, Paragraph 3-9-8 b2, Intersecting Runway Operations: your Memo Dated July 22, 2008."

This procedural change also applies only to operations at JFK airport despite similar runway configurations causing similar problems at several other airports. On June 11th, there was a similar incident at Memphis International Airport, where, in order to avoid conflict with a SF34 which had not yet exited the runway, a controller issued go-around instructions to a Flagship CRJ approaching in sequence behind the SF34 on Runway 27. This go-Around route put the CRJ in the flight path of an aircraft arriving on perpendicular runway 18R, resulting in a near collision. Other airports with similar problematic configurations include, among others (see appendix for airport maps): DTW, Boston Logan International Airport (BOS), Newark International Airport (EWR), Washington Dulles International Airport (IAD), Las Vegas McCarron Airport (LAS), and Houston International Airport (IAH)

NATCA believes that the new rule at JFK should be made permanent. An additional rule should also be made requiring staggered arrivals into intersecting runways, in order to protect both aircraft in the event that both pilots abort the landing. These rules should also be put in place for other airports with similar configurations including those previously listed.

Conclusion and Recommendations

NATCA is disappointed by the lack of attention the FAA has given to meaningfully improving runway safety. Therefore the Union reiterates the recommendations from our earlier testimony.

1. Local Airport Committees for Runway Incursion Prevention
It is imperative that each airport has the opportunity to employ a set of solutions that address specific local issues. NATCA recommends that Runway Incursion Prevention Committees be established for each airport throughout the country that would be run and structured on the level of the individual airport. These groups would be composed of representatives of the local stakeholders, including pilots, air traffic controllers, airport management, and airport vehicle drivers as well as a national representative from the FAA.

2. Proper Staffing of Air Traffic Control Towers
The first step to relieving the staffing shortage and alleviating controller fatigue is to stem the flow of Air Traffic Controllers leaving the FAA workforce. Therefore, NATCA recommends to this committee that the FAA be instructed to return to the bargaining and bargain in good faith with NATCA to produce a ratifiable agreement for the Air Traffic Controllers. This gesture of good faith will slow the rate of attrition by making staying in the FAA workforce more attractive to both newly hired Controllers and those eligible for retirement,. Additionally, The FAA must work with NATCA and the National Academy of Sciences, or other independent third party, to re-establish scientifically-based staffing ranges for each facility.

3. Technology and Modernization
- *Collaboration:*

When NATCA and the FAA worked collaboratively on modernization projects through the Liaison Program, they were able to successfully identify the technological needs of the air traffic system and develop and deploy the technology to meet those needs. Unfortunately this collaborative program was dissolved in 2003 by the FAA.
- *Surface Radar:*

NATCA recommends that ASDE-X be installed throughout the country at all airports with middle to high traffic density. For airports where implementation of ASDE technology is not feasible, the Low Cost Ground Surveillance program should be utilized. Air Traffic Controllers should be given the opportunity to provide feedback and guidance on the local level during the implementation and deployment of the technology.

- *Additional Technologies:*

NATCA recommends that Runway Status Lights, Data Link Systems, and Taxiway Monitoring Systems be tested and adapted for use in the U.S. airport environment. Testing should be done swiftly, efficiently and cooperatively, and, once completed, the technologies should be implemented at all major airports.

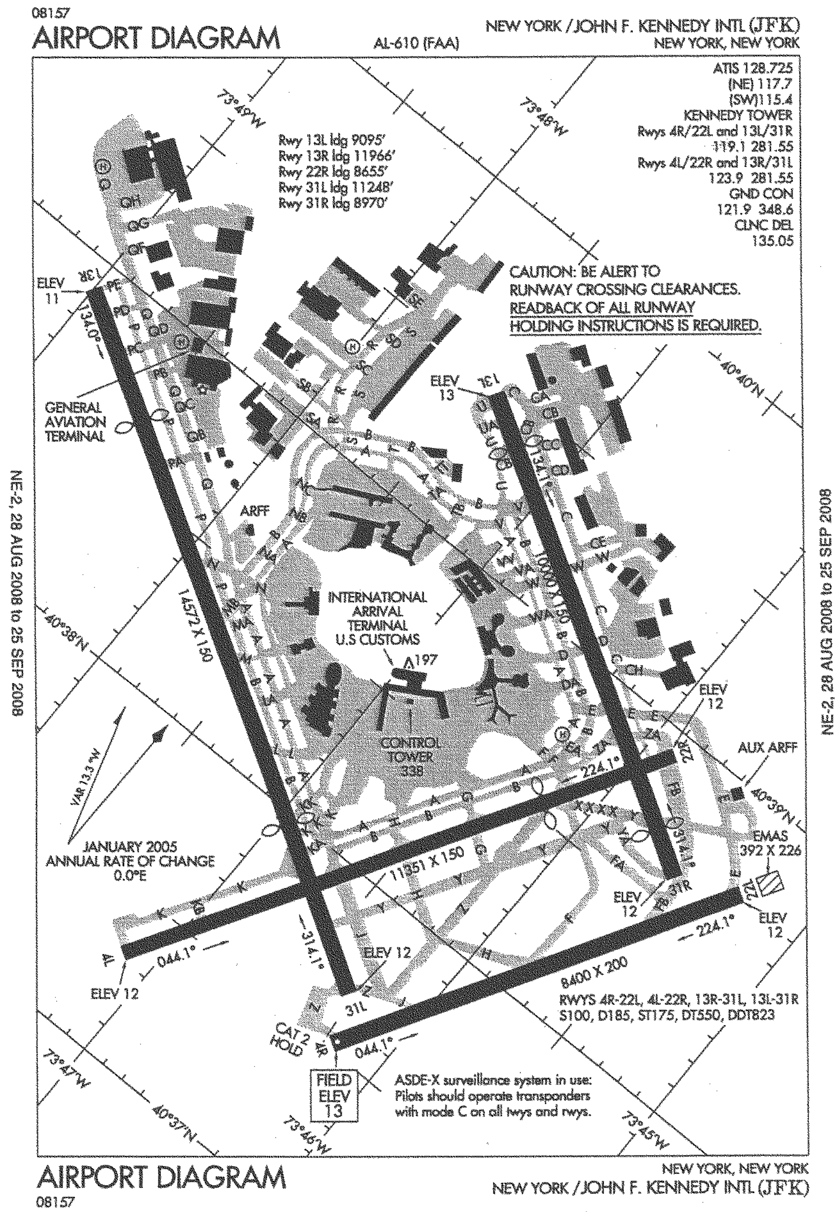
4. Runway Crossing

Runway incursions commonly occur when the layout of taxiways force aircraft to cross a runway in route to a second runway or the gate. NATCA recommends to this subcommittee that end-around taxiways be constructed and utilized at all airports where such construction is possible.

In light of the recent incidents at JFK and at other facilities with intersecting runways, we would like to add an additional recommendation:

5. Intersecting Runways

The new rule at JFK, which staggers departures from arrivals on intersecting runways, should be made permanent. An additional rule should be made requiring staggered arrivals in to intersecting runways, in order to protect both aircraft in the event that both pilots abort the landing. These rules should also be put in place for other airports with intersecting runway configurations.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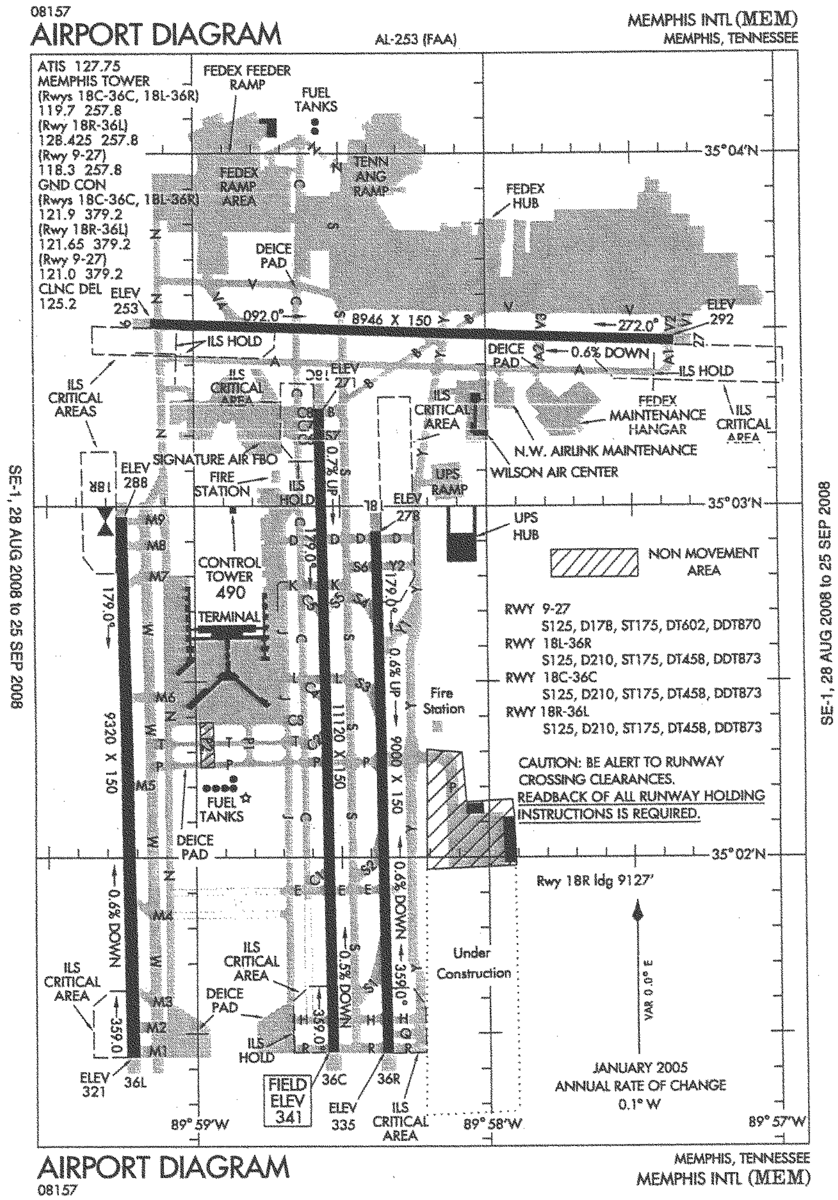
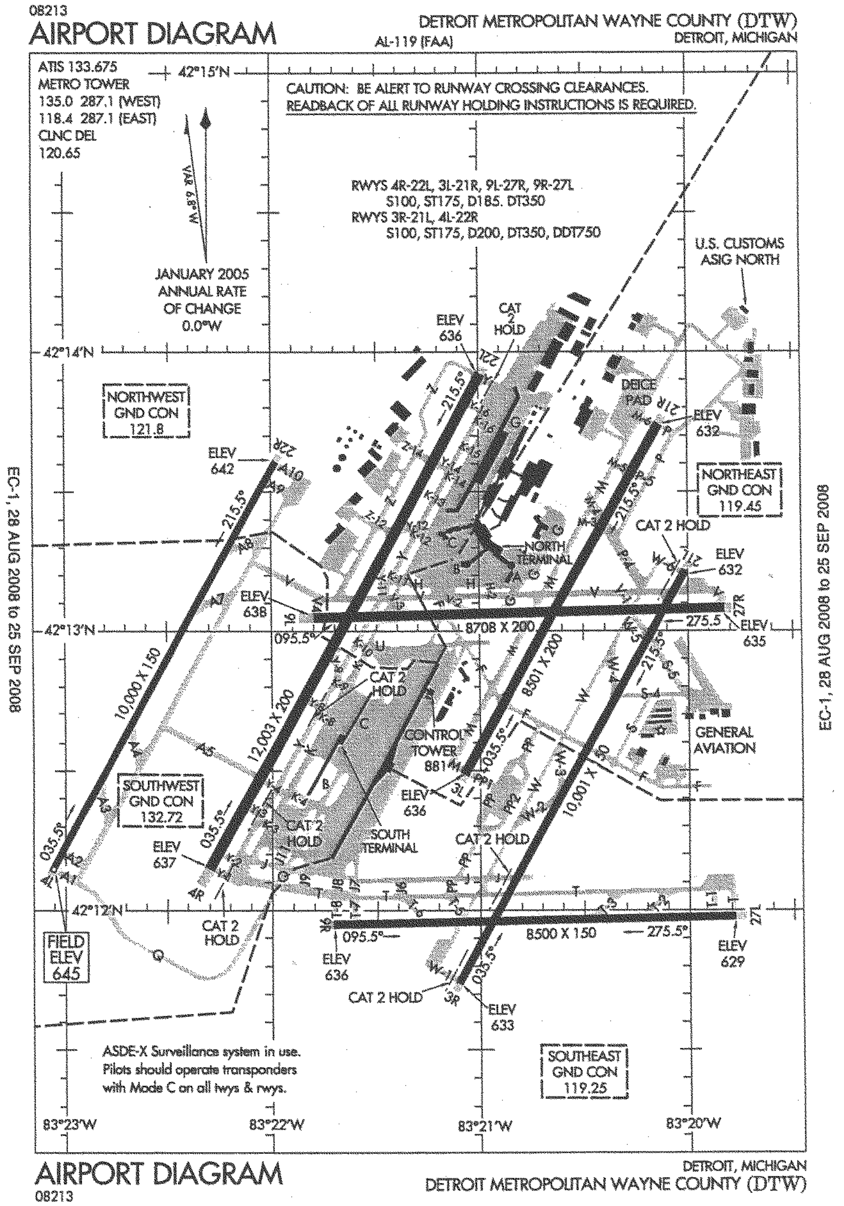
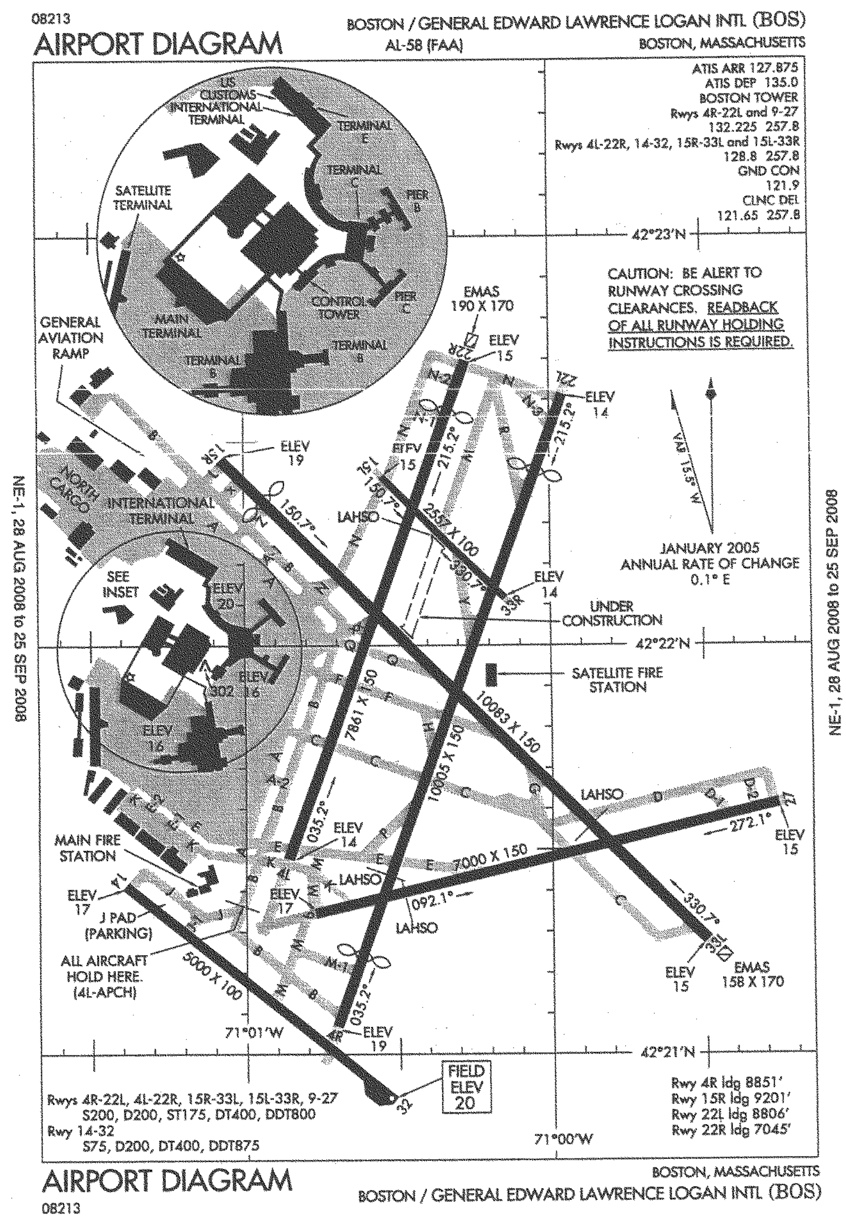
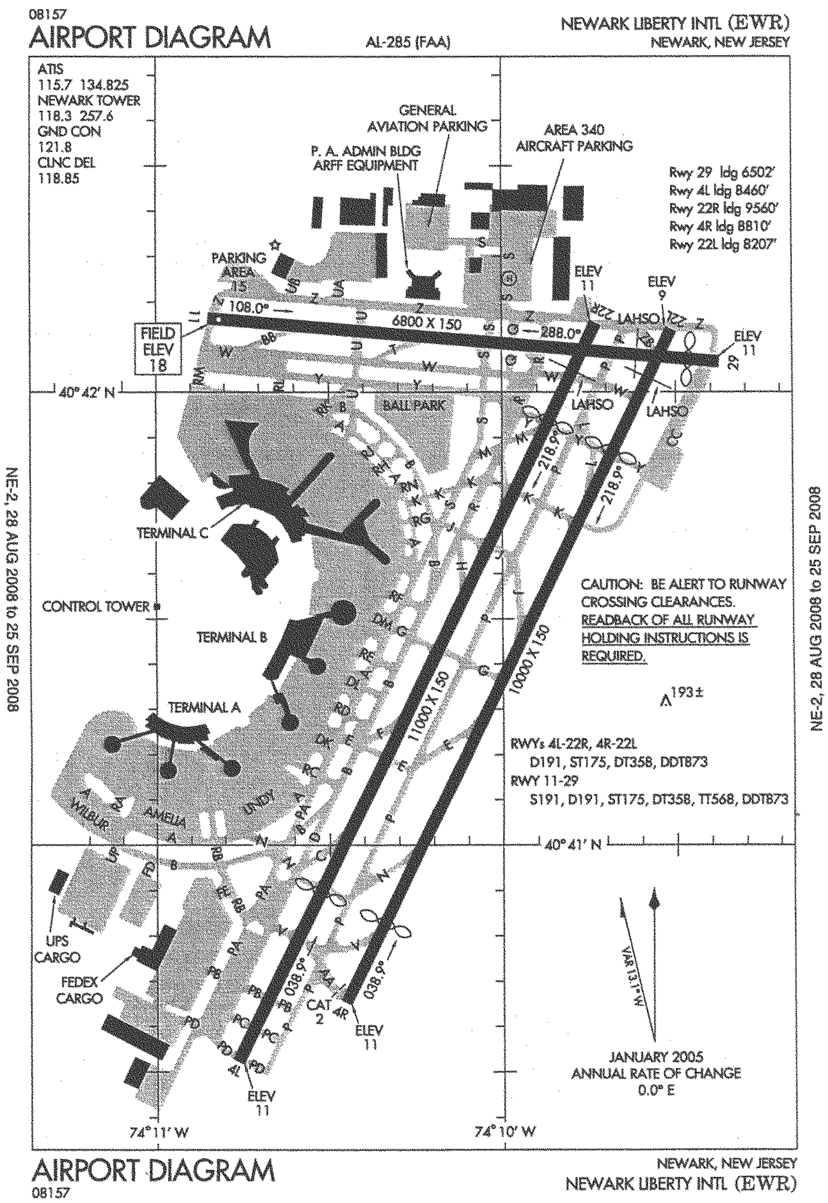
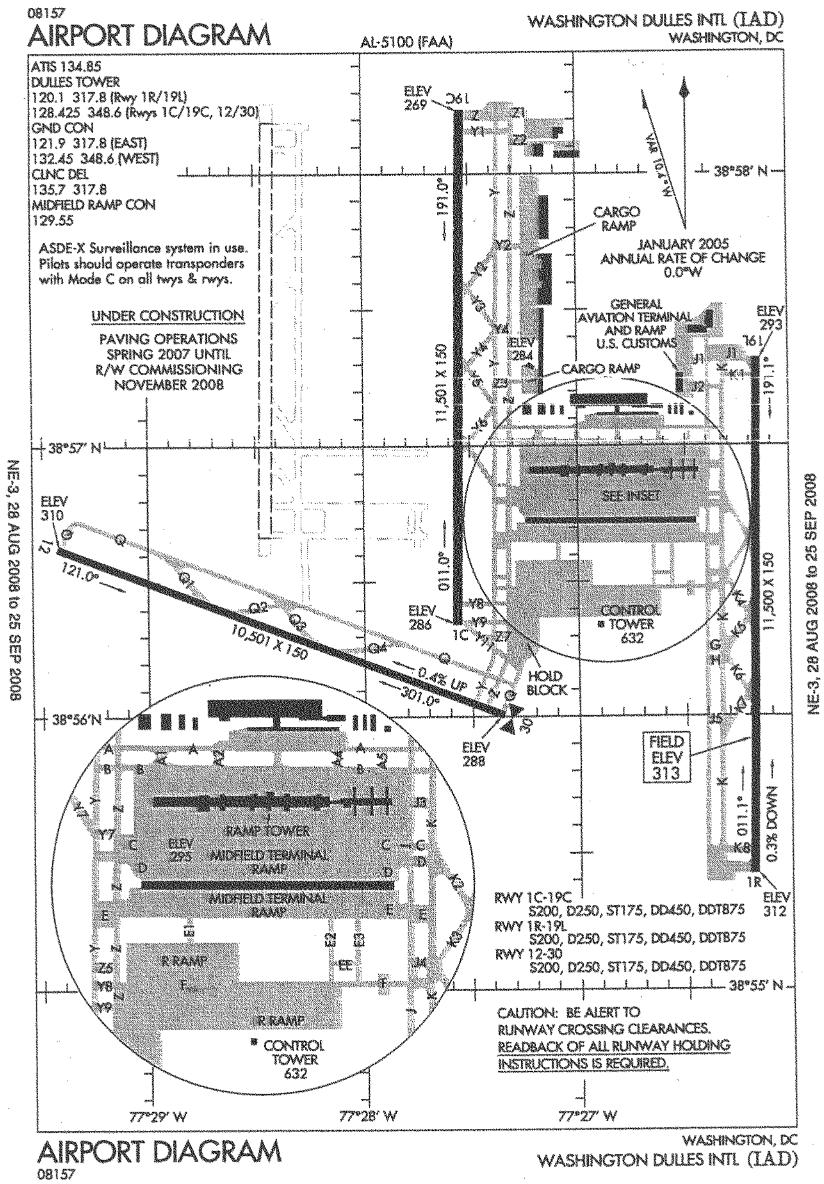
Rwy 13R ldg 11966'
Rwy 22R ldg 8655'
Rwy 31L ldg 11248'
Rwy 31R ldg 8970'
CAUTION: BE ALERT TO RUNWAY CROSSING CLEARANCES. READBACK OF ALL RUNWAY HOLDING INSTRUCTIONS IS REQUIRED.
GENERAL AVIATION TERMINAL
ARFF
INTERNATIONAL ARRIVAL TERMINAL U.S CUSTOMS
197
CONTROL TOWER 338
14572 X 150
10000 X 150
11351 X 150
8400 X 200
JANUARY 2005 ANNUAL RATE OF CHANGE 0.0°E
VAR 13.3°W
AUX ARFF
EMAS 392 X 226
RWYS 4R-22L, 4L-22R, 13R-31L, 13L-31R
S100, D185, ST175, DT550, DDT823
CAT 2 HOLD
FIELD ELEV 13
ASDE-X surveillance system in use: Pilots should operate transponders with mode C on all twys and rwys.
NE-2, 28 AUG 2008 to 25 SEP 2008
AIRPORT DIAGRAM
NEW YORK, NEW YORK
NEW YORK / JOHN F. KENNEDY INTL (JFK)
08157

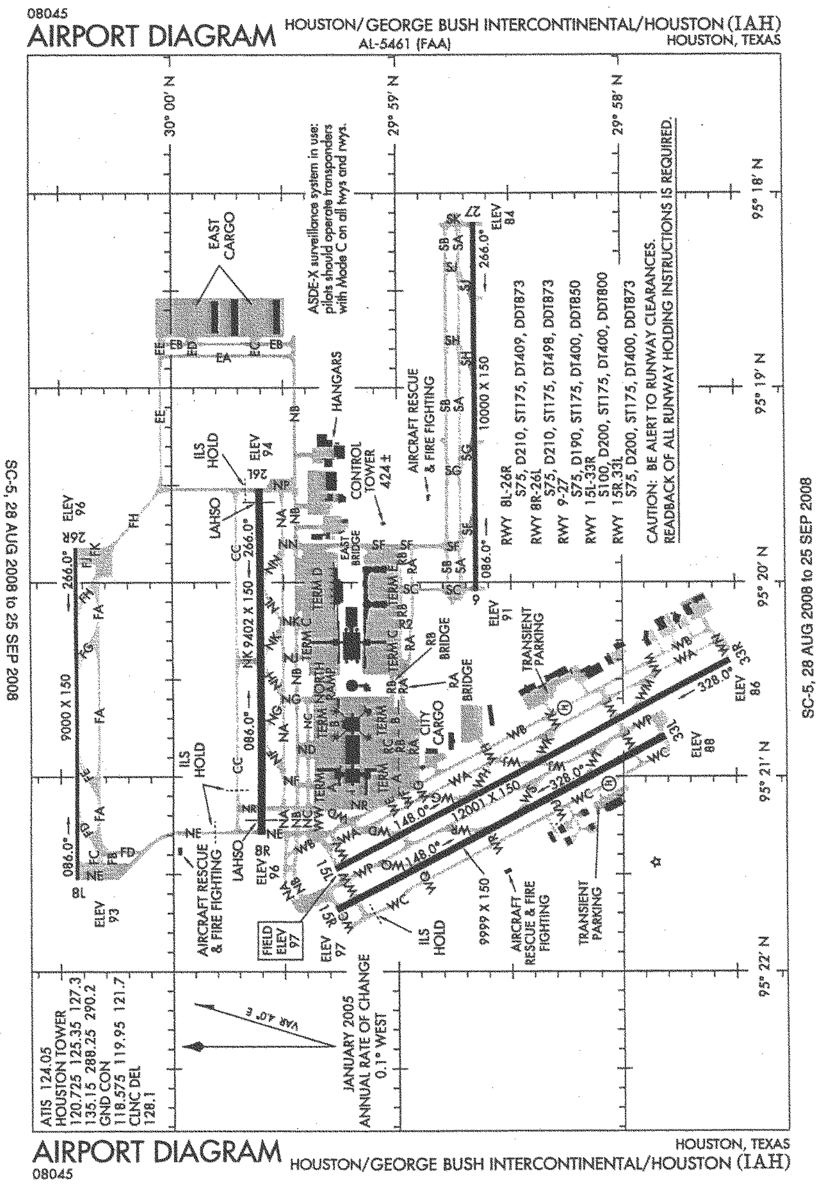

08157
AIRPORT DIAGRAM
AL-253 (FAA)
MEMPHIS INTL (MEM)
MEMPHIS, TENNESSEE
ATIS 127.75
MEMPHIS TOWER
(Rwys 18C-36C, 18L-36R)
119.7 257.8
(Rwy 18R-36L)
128.425 257.8
(Rwy 9-27)
118.3 257.8
GND CON
(Rwys 18C-36C, 18L-36R)
121.9 379.2
(Rwy 18R-36L)
121.65 379.2
(Rwy 9-27)
121.0 379.2
CLNC DEL
125.2
FEDEX FEEDER RAMP
FUEL TANKS
FEDEX RAMP AREA
TENN ANG RAMP
FEDEX HUB
DEICE PAD
ELEV 253
092.0°
8946 X 150
272.0°
ELEV 292
ILS HOLD
DEICE PAD
0.6% DOWN
ILS HOLD
ILS CRITICAL AREAS
ILS CRITICAL AREA
ELEV 271
ILS CRITICAL AREA
FEDEX MAINTENANCE HANGAR
ILS CRITICAL AREA
N.W. AIRLINK MAINTENANCE
SIGNATURE AIR FBO
WILSON AIR CENTER
FIRE STATION
ILS HOLD
UPS RAMP
ELEV 288
ELEV 278
35°04'N
35°03'N
35°02'N
UPS HUB
NON MOVEMENT AREA
CONTROL TOWER
490
TERMINAL
0.7% UP
179.0°
RWY 9-27
S125, D178, ST175, DT602, DDT870
RWY 18L-36R
S125, D210, ST175, DT458, DDT873
RWY 18C-36C
S125, D210, ST175, DT458, DDT873
RWY 18R-36L
S125, D210, ST175, DT458, DDT873
Fire Station
9320 X 150
11120 X 150
9000 X 150
0.6% UP
CAUTION: BE ALERT TO RUNWAY CROSSING CLEARANCES.
READBACK OF ALL RUNWAY HOLDING INSTRUCTIONS IS REQUIRED.
FUEL TANKS
DEICE PAD
Rwy 18R ldg 9127'
0.6% DOWN
0.5% DOWN
Under Construction
VAR 0.0° E
ILS CRITICAL AREA
ILS CRITICAL AREA
DEICE PAD
359.0°
ILS HOLD
JANUARY 2005
ANNUAL RATE OF CHANGE
0.1° W
ELEV 321
36L
FIELD ELEV 341
36C
36R
ELEV 335
ILS CRITICAL AREA
89°59'W
89°58'W
89°57'W
SE-1, 28 AUG 2008 to 25 SEP 2008
AIRPORT DIAGRAM
08157
MEMPHIS, TENNESSEE
MEMPHIS INTL (MEM)

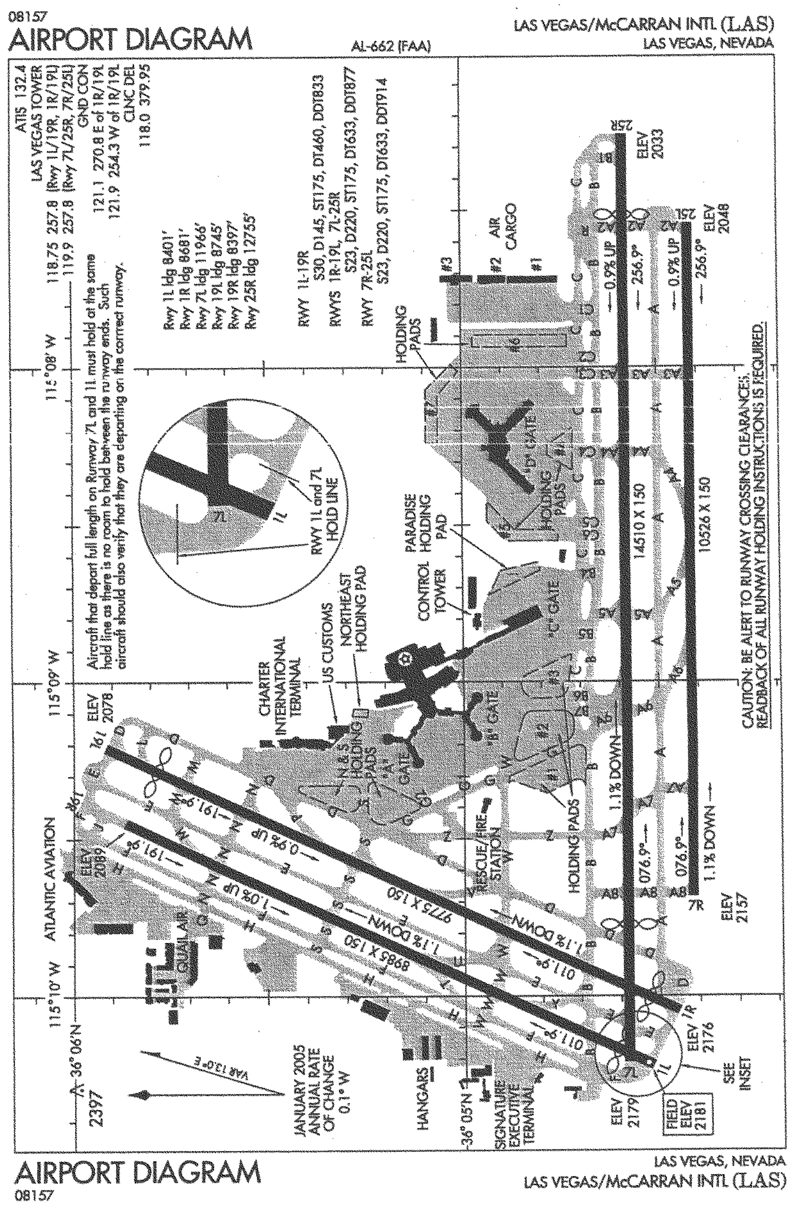

08213
AIRPORT DIAGRAM
AL-119 (FAA)
DETROIT METROPOLITAN WAYNE COUNTY (DTW)
DETROIT, MICHIGAN
ATIS 133.675
METRO TOWER
135.0 287.1 (WEST)
118.4 287.1 (EAST)
CLNC DEL
120.65
CAUTION: BE ALERT TO RUNWAY CROSSING CLEARANCES.
READBACK OF ALL RUNWAY HOLDING INSTRUCTIONS IS REQUIRED.
RWYS 4R-22L, 3L-21R, 9L-27R, 9R-27L
S100, ST175, D185, DT350
RWYS 3R-21L, 4L-22R
S100, ST175, D200, DT350, DDT750
VAR 6.8°W
JANUARY 2005
ANNUAL RATE
OF CHANGE
0.0°W
U.S. CUSTOMS
ASIG NORTH
NORTHWEST
GND CON
121.8
NORTHEAST
GND CON
119.45
SOUTHWEST
GND CON
132.72
SOUTHEAST
GND CON
119.25
DEICE PAD
NORTH TERMINAL
SOUTH TERMINAL
CONTROL TOWER
881
GENERAL AVIATION
CAT 2 HOLD
10,000 X 150
12,003 X 200
8708 X 200
8501 X 200
10,001 X 150
8500 X 150
FIELD
ELEV
645
ASDE-X Surveillance system in use.
Pilots should operate transponders
with Mode C on all twys & rwys.
42°15'N
42°14'N
42°13'N
42°12'N
83°23'W
83°22'W
83°21'W
83°20'W
EC-1, 28 AUG 2008 to 25 SEP 2008
AIRPORT DIAGRAM
08213
DETROIT, MICHIGAN
DETROIT METROPOLITAN WAYNE COUNTY (DTW)


08213
AIRPORT DIAGRAM
AL-58 (FAA)
BOSTON / GENERAL EDWARD LAWRENCE LOGAN INTL (BOS)
BOSTON, MASSACHUSETTS
ATIS ARR 127.875
ATIS DEP 135.0
BOSTON TOWER
Rwys 4R-22L and 9-27
132.225 257.8
Rwys 4L-22R, 14-32, 15R-33L and 15L-33R
128.8 257.8
GND CON
121.9
CLNC DEL
121.65 257.8
US CUSTOMS
INTERNATIONAL TERMINAL
TERMINAL E
TERMINAL C
PIER B
PIER C
SATELLITE TERMINAL
CONTROL TOWER
MAIN TERMINAL
TERMINAL B
GENERAL AVIATION RAMP
42°23'N
CAUTION: BE ALERT TO RUNWAY CROSSING CLEARANCES. READBACK OF ALL RUNWAY HOLDING INSTRUCTIONS IS REQUIRED.
EMAS 190 X 170
ELEV 15
ELEV 14
ELEV 19
NORTH CARGO
INTERNATIONAL TERMINAL
SEE INSET
ELEV 20
LAHSO
2557 X 100
UNDER CONSTRUCTION
VAR 15.5° W
JANUARY 2005 ANNUAL RATE OF CHANGE 0.1° E
42°22'N
SATELLITE FIRE STATION
ELEV 16
10083 X 150
7861 X 150
10005 X 150
7000 X 150
5000 X 100
MAIN FIRE STATION
J PAD (PARKING)
ALL AIRCRAFT HOLD HERE. (4L-APCH)
ELEV 17
EMAS 158 X 170
71°01'W
42°21'N
FIELD ELEV 20
Rwys 4R-22L, 4L-22R, 15R-33L, 15L-33R, 9-27
S200, D200, ST175, DT400, DDT800
Rwy 14-32
S75, D200, DT400, DDT875
71°00'W
Rwy 4R ldg 8851'
Rwy 15R ldg 9201'
Rwy 22L ldg 8806'
Rwy 22R ldg 7045'
NE-1, 28 AUG 2008 to 25 SEP 2008
AIRPORT DIAGRAM
08213
BOSTON, MASSACHUSETTS
BOSTON / GENERAL EDWARD LAWRENCE LOGAN INTL (BOS)


08157
AIRPORT DIAGRAM
AL-285 (FAA)
NEWARK LIBERTY INTL (EWR)
NEWARK, NEW JERSEY
ATIS
115.7 134.825
NEWARK TOWER
118.3 257.6
GND CON
121.8
CLNC DEL
118.85
GENERAL AVIATION PARKING
P. A. ADMIN BLDG ARFF EQUIPMENT
AREA 340 AIRCRAFT PARKING
Rwy 29 ldg 6502'
Rwy 4L ldg 8460'
Rwy 22R ldg 9560'
Rwy 4R ldg 8810'
Rwy 22L ldg 8207'
PARKING AREA 15
FIELD ELEV 18
6800 X 150
108.0°
288.0°
LAHSO
BALL PARK
TERMINAL C
CONTROL TOWER
TERMINAL B
TERMINAL A
CAUTION: BE ALERT TO RUNWAY CROSSING CLEARANCES.
READBACK OF ALL RUNWAY HOLDING INSTRUCTIONS IS REQUIRED.
11000 X 150
10000 X 150
218.9°
038.9°
RWYs 4L-22R, 4R-22L
D191, ST175, DT358, DDT873
RWY 11-29
S191, D191, ST175, DT358, TT568, DDT873
40° 42' N
40° 41' N
74° 11' W
74° 10' W
UPS CARGO
FEDEX CARGO
CAT 2
VAR 13.1° W
JANUARY 2005
ANNUAL RATE OF CHANGE
0.0° E
NE-2, 28 AUG 2008 to 25 SEP 2008
AIRPORT DIAGRAM
08157
NEWARK, NEW JERSEY
NEWARK LIBERTY INTL (EWR)


08157
AIRPORT DIAGRAM
AL-5100 (FAA)
WASHINGTON DULLES INTL (IAD)
WASHINGTON, DC
ATIS 134.85
DULLES TOWER
120.1 317.8 (Rwy 1R/19L)
128.425 348.6 (Rwys 1C/19C, 12/30)
GND CON
121.9 317.8 (EAST)
132.45 348.6 (WEST)
CLNC DEL
135.7 317.8
MIDFIELD RAMP CON
129.55
ASDE-X Surveillance system in use. Pilots should operate transponders with Mode C on all twys & rwys.
UNDER CONSTRUCTION
PAVING OPERATIONS SPRING 2007 UNTIL R/W COMMISSIONING NOVEMBER 2008
CARGO RAMP
JANUARY 2005 ANNUAL RATE OF CHANGE 0.0°W
VAR 10.4°W
38°58′ N
38°57′ N
38°56′ N
38°55′ N
GENERAL AVIATION TERMINAL AND RAMP U.S. CUSTOMS
CARGO RAMP
ELEV 269
ELEV 293
ELEV 284
ELEV 310
ELEV 286
ELEV 288
ELEV 312
ELEV 295
191.0°
011.0°
11,501 X 150
191.1°
011.1°
11,500 X 150
0.3% DOWN
121.0°
301.0°
10,501 X 150
0.4% UP
SEE INSET
CONTROL TOWER 632
HOLD BLOCK
FIELD ELEV 313
RAMP TOWER
MIDFIELD TERMINAL RAMP
R RAMP
RWY 1C-19C
S200, D250, ST175, DD450, DDT875
RWY 1R-19L
S200, D250, ST175, DD450, DDT875
RWY 12-30
S200, D250, ST175, DD450, DDT875
CAUTION: BE ALERT TO RUNWAY CROSSING CLEARANCES. READBACK OF ALL RUNWAY HOLDING INSTRUCTIONS IS REQUIRED.
77°29′ W
77°28′ W
77°27′ W
NE-3, 28 AUG 2008 to 25 SEP 2008
NE-3, 28 AUG 2008 to 25 SEP 2008
AIRPORT DIAGRAM
08157
WASHINGTON, DC
WASHINGTON DULLES INTL (IAD)


08045
AIRPORT DIAGRAM
HOUSTON/GEORGE BUSH INTERCONTINENTAL/HOUSTON (IAH)
AL-5461 (FAA)
HOUSTON, TEXAS
SC-5, 28 AUG 2008 to 25 SEP 2008
ASDE-X surveillance system in use: pilots should operate transponders with Mode C on all twys and rwys.
RWY 8L-26R S75, D210, ST175, DT409, DDT873
RWY 8R-26L S75, D210, ST175, DT498, DDT873
RWY 9-27 S75, D190, ST175, DT400, DDT850
RWY 15L-33R S100, D200, ST175, DT400, DDT800
RWY 15R-33L S75, D200, ST175, DT400, DDT873
CAUTION: BE ALERT TO RUNWAY CLEARANCES.
READBACK OF ALL RUNWAY HOLDING INSTRUCTIONS IS REQUIRED.
ATIS 124.05
HOUSTON TOWER 120.725 125.35 127.3 135.15 288.25 290.2
GND CON 118.575 119.95 121.7
CLNC DEL 128.1
JANUARY 2005 ANNUAL RATE OF CHANGE 0.1° WEST
VAR 4.0° E
FIELD ELEV 97
EAST CARGO
HANGARS
CONTROL TOWER 424±
CITY CARGO
TRANSIENT PARKING
AIRCRAFT RESCUE & FIRE FIGHTING
ILS HOLD
LAHSO
9000 X 150
9402 X 150
10000 X 150
12001 X 150
9999 X 150
AIRPORT DIAGRAM
HOUSTON/GEORGE BUSH INTERCONTINENTAL/HOUSTON (IAH)
HOUSTON, TEXAS
08045


08157
AIRPORT DIAGRAM
AL-662 (FAA)
LAS VEGAS/McCARRAN INTL (LAS)
LAS VEGAS, NEVADA
ATIS 132.4
LAS VEGAS TOWER
118.75 257.8 (Rwy 1L/19R, 1R/19L)
119.9 257.8 (Rwy 7L/25R, 7R/25L)
GND CON
121.1 270.8 E of 1R/19L
121.9 254.3 W of 1R/19L
CLNC DEL
118.0 379.95
Aircraft that depart full length on Runway 7L and 1L must hold at the same hold line as there is no room to hold between the runway ends. Such aircraft should also verify that they are departing on the correct runway.
Rwy 1L ldg 8401'
Rwy 1R ldg 8681'
Rwy 7L ldg 11966'
Rwy 19L ldg 8745'
Rwy 19R ldg 8397'
Rwy 25R ldg 12755'
RWY 1L-19R
S30, D145, ST175, D1460, DDT833
RWYS 1R-19L, 7L-25R
S23, D220, ST175, DT633, DDT877
RWY 7R-25L
S23, D220, ST175, DT633, DDT914
RWY 1L and 7L HOLD LINE
CHARTER INTERNATIONAL TERMINAL
US CUSTOMS
NORTHEAST HOLDING PAD
CONTROL TOWER
PARADISE HOLDING PAD
HOLDING PADS
AIR CARGO
"D" GATE
"C" GATE
"B" GATE
"A" GATE
N & S HOLDING PADS
RESCUE/FIRE STATION
ATLANTIC AVIATION
QUAIL AIR
HANGARS
SIGNATURE EXECUTIVE TERMINAL
JANUARY 2005 ANNUAL RATE OF CHANGE 0.1° W
VAR 13.0° E
14510 X 150
10526 X 150
9775 X 150
8985 X 150
ELEV 2033
ELEV 2048
ELEV 2078
ELEV 2089
ELEV 2157
ELEV 2176
ELEV 2179
FIELD ELEV 2181
SEE INSET
115°10' W
115°09' W
115°08' W
36°06'N
36°05'N
CAUTION: BE ALERT TO RUNWAY CROSSING CLEARANCES. READBACK OF ALL RUNWAY HOLDING INSTRUCTIONS IS REQUIRED.
SW-4, 28 AUG 2008 to 25 SEP 2008

STATEMENT OF HANK KRAKOWSKI, CHIEF OPERATING OFFICER, AIR TRAFFIC ORGANIZATION, FEDERAL AVIATION ADMINISTRATION, ON RUNWAY SAFETY: AN UPDATE, BEFORE THE HOUSE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION, SEPTEMBER 25, 2008.

Chairman Costello, Congressman Petri, and Members of the Subcommittee:

Thank you for inviting me here today to update you on the Federal Aviation Administration's (FAA's) efforts to improve runway safety. Since I was last here in February of this year, I am happy to report that we have made some excellent progress in this arena, and I am confident that we will continue on this path.

Current Status of Runway Incursions

At the FAA, safety is our first priority, and as I have mentioned to this Committee before, a commitment to safety is part of my DNA. While 2007 was the safest year yet for aviation in our Nation's history, when we last testified in February 2008, we had experienced one of the worst quarters for serious runway incursions – 10 between October 2007 and December 2007, and two more in January 2008. Based on our response to this unacceptable situation, as of September 15, 2008, we are on track to equal or slightly improve on the safest year on record.

The National Transportation Safety Board (NTSB) and the Government Accountability Office (GAO) have issued recommendations on areas where the FAA could make improvements in runway safety. In November, the NTSB announced that improving runway safety will remain on the Board's "Most Wanted" list of improvements for 2008. FAA believes that the technologies we are now testing and deploying will be responsive to address the problem of runway incursions. Also, the GAO reported on how the FAA has taken steps to address runway and ramp safety. We appreciate the work that the GAO and NTSB have done, and we welcome their analysis and feedback. While runway safety has received more public attention in recent months, it is important to remember that for many years, the FAA has actively invested in programs and technology development to address this serious aviation safety issue.

As a reminder to the Members, let me explain the categories of runway incursions. Category A incursions are the most serious incidents, in which a collision was narrowly avoided. Category B incursions are incidents in which separation decreases, and there is a significant potential for a collision, which may result in a time critical corrective or evasive response to avoid a collision. Category C incidents are characterized by ample time and/or distance to avoid a collision, and Category D is an incident which meets the definition of runway incursion, such as the incorrect presence of single vehicle/person/aircraft on the protected area of a surface designated for the take-off or landing of an aircraft, but with no immediate safety consequences.

Beginning with Fiscal Year (FY) 2008, the FAA adopted the definition of runway incursion as used by the International Civil Aviation Organization (ICAO), the United Nations organization charged with promoting safety and security in international aviation. This new definition, which FAA helped develop for ICAO, is much more inclusive and counts every single mistake made on the airport operational surface, even if another vehicle, pedestrian or aircraft is not involved. As a result, we will have more data to analyze trends and improve safety.

By redefining what a runway incursion is, the total number of what we now report as a runway incursion is expected to triple. This explains the spike in Category C incidents beginning in October 2007. Category C now includes data that we used to classify as Category C and D incursions. The new Category D accounts for incursions which we previously tracked as surface incidents. However, Category A and B incidents, the most serious incursions, continue to be defined and tracked as before.

An aggressive and effective FAA runway safety program has reduced the number of serious runway incursions by 55 percent since 2001. In FY 2007, we saw a 25 percent reduction in serious runway incursions from 2006. There were 24 serious runway incursions (Category A and B incursions) during 61 million aircraft operations, a significant reduction from the 31 incursions in FY 2006, and the 53 incursions in FY 2001. We have only had 23 serious runway incursions as of September 15th of FY 2008, as compared to 24 last year.

What is significant about this number, however, is the quarterly comparison. During the first quarter of FY 2008, there were 10 Category A and B runway incursions, as compared to two in first quarter FY 2007. During the second quarter of FY 2008, there were five Category A and B runway incursions, as compared to five in second quarter FY 2007. In third quarter FY 2008, there have been four Category A and B runway incursions, while third quarter FY 2007 saw 10 of these. And, as we approach the end of the fiscal year, there have been four (with a possible fifth pending) Category A and B runway incursions, in comparison to the seven in final quarter of FY 2007. As you can see, the trend is towards continued improvement every quarter.

But while we have made improvements with the most serious of the runway incursions, overall runway incursions increased in FY 2007 to 370, up from 330 in FY 2006, and they continued to increase in 2008. If we use the prior definition for comparison purposes only, we have already had 388 runway incursions so far this year. To understand the impact of the new runway incursion definition, last year there would have been 891 runway incursions and so far this year we have had 953. So far, seven of the

23 serious incursions involved a commercial airline and there was one collision involving a general aviation airplane and a grass mowing tractor.

As you know, the FAA investigates every reported runway incursion and assigns a reason for the incursion. We send a team to the facility to review the airport information; radar data and voice tapes, if they are available; and interview the individuals involved, often controllers, pilots and/or vehicle operators. In 2008 we are seeing about 65 percent pilot error, 25 percent vehicle/pedestrian errors, and 10 percent controller errors. The shift between Operational Errors (OEs) and Vehicle or Pedestrian Deviations (VPDs) is a result of the new definition. Previously, Pilot Deviations (PDs) or VPDs that did not involve a loss of separation were not counted as runway incursions. Under the new definition, they are, which is causing the increase in our count. By contrast, this decreases the percentage of OEs in our database.

Update on Technology Installations

As I reported to you in February, we are working to install runway surveillance technology that improves controller situational awareness on the airport movement area at our nation's busiest airports. The FAA has spent over $404 million to date to acquire and deploy the next generation of ground surveillance technology, known as Airport Surface Detection Equipment – Model X or ASDE-X for short. The FAA will commit more than $806 million over a 30-year period on equipment, installation, operations and maintenance of the 35 operational and three support ASDE-X systems. I am pleased to report that we are rolling out ASDE-X even faster than we had originally anticipated. Seventeen towers are now using ASDE-X operationally and 16 additional towers are scheduled to be operational by the end of October 2010, with the remaining two scheduled to be operational by Spring 2011.

Runway Status Lights, which were developed as a result of the NTSB's "Most Wanted" list of safety improvements, are a fully-automated system that integrates airport lighting equipment with surveillance systems to provide a visual signal to pilots and vehicle operators when it is unsafe to enter/cross/or begin takeoff roll on a runway. Airport surveillance sensor inputs are processed through light control logic that command in-pavement lights to illuminate red when there is traffic on or approaching the runway. The contract is scheduled to be awarded this fall.

There are two types of Runway Status Lights currently being tested: Runway Entrance Lights and Takeoff Hold Lights. Runway Entrance Lights provide signals to aircraft crossing or entering a runway from an intersecting taxiway. Takeoff Hold Lights provide a signal to aircraft in position for takeoff that another aircraft is crossing or entering the runway. These systems are scheduled to be installed at 22 of the nation's busiest airports by FY 2011. We recently announced accelerated installation and testing at Los Angeles International Airport (LAX) and Boston Logan International Airport (BOS). BOS will be testing a third type of light system designed to warn pilots of potential conflicts on intersecting runways. We have also initiated Memoranda of Understanding at 18 airports, which contain the agreements for the light configuration and construction and installation timetables.

We are also testing a system at the Long Beach Airport, known as the Final Approach Runway Occupancy Signal (FAROS), which will further enhance runway safety. This system is similar to Runway Status Lights in that it provides immediate information to pilots on approach to land that the runway is occupied or otherwise unsafe for landing. The FAROS system determines the occupancy of the runway by detecting aircraft or vehicles on the runway surface. If a monitored area on the runway is occupied, FAROS activates a signal to alert the pilot that it is potentially unsafe to land. We are developing a plan for implementing FAROS at larger airports, and expect to begin operational trials at Dallas-Fort Worth later this fall.

The FAA is also evaluating low-cost ground surveillance systems for potential application at airports that are currently not programmed to receive ASDE-X technology. At present, we are evaluating two such systems at Spokane, Washington and we believe that basic ground surveillance capability, increasing controller situational awareness, can be provided at a cost less than the more sophisticated ASDE-X technology that is needed at larger, more complex airports.

Since I last appeared before you in February, we have taken the process a step further. Based on what we have learned at Spokane, we have issued a request for proposal inviting industry offers of candidate low-cost ground surveillance products for FAA consideration. Our intent is to install these selected low-cost products at various airports as part of a pilot project to determine which products satisfy minimum operational and safety requirements. We will use the results of the pilot project to determine the feasibility and cost-effectiveness of implementing a low-cost surveillance product, and if deemed feasible, develop a plan for acquisition and deployment. Several industry offers are currently under review and we expect to complete our evaluations in the near future.

The FAA recognizes that technologies that increase situational awareness and provide direct alerting to aircrews offer great potential to address some of the human factors that contribute to runway incursions. Our decision to deploy runway status lights is just one example of our increased emphasis on direct aircrew alerting. We are also aware that industry has stepped up to the plate to offer avionic product solutions that may further enhance aircrew situational awareness and thus increased runway safety. To facilitate operational assessment of these solutions, the FAA recently announced a "Cooperative Agreement for Improving Runway Safety." Under this program, the FAA intends to enter into Funded Cooperative Agreements with users who agree to equip their aircraft with equipment which can display approved Airport Moving Maps or with equipment approved to provide aural situational awareness runway information to pilots. The FAA will offer participants federal funds in an amount commensurate with the type of equipment proposed and the extent of the user's installation and participation in the FAA's operational evaluation program. In exchange for the federal contribution, the users must agree to equip their airplanes within a specified period and participate in FAA tests detailed in a Test and Evaluation Master Plan. The FAA is initially committing $2 million to this initiative.

Twenty of the busiest airports in America were identified for targeted Runway Safety Action Team visits based on a combination of a history of runway incursions, wrong runway events and wrong runway risk factors. Last year, these 20 airports accounted for 33 percent (8 of 24) of the serious runway incursions. So far this year that number is 17 percent (4 of 23).

The Runway Safety Action Team visits involved surface analysis meetings with air traffic control, both management and controllers, safety inspectors from FAA and the airports, and airport managers and operators. Just through the interaction and discussion among these groups, action plans to mitigate identified risks were finalized. These meetings identified over 100 short term fixes that could be accomplished within 60 days, including new or improved signage, improved marking, driver training, and other actions. This proves that "common sense" opportunities for curbing runway incursions exist.

Not all measures to improve runway safety will involve fielding expensive equipment and new systems. Quick and relatively inexpensive solutions include improving airfield markings, adding targeted training for controllers and aircrews, and fine-tuning air traffic procedures. Incorporating the lessons learned through the meetings with the initial 20 airports, FAA identified a second tier of 22 airports and we completed the focused surface analysis at these 22 airports in July 2008.

FAA has also continued to make progress in improving Runway Safety Areas (RSAs). RSAs enhance safety in the event of an undershoot, overrun, or excursion from the side of the runway. In FY 2000, FAA started an ambitious program to accelerate RSA improvements for commercial service runways that do not meet standards. The FAA developed a long-term completion plan that will ensure that all practicable improvements are completed by 2015.

When the RSA improvement initiative began in FY 2000 there were a total of 454 RSAs requiring improvement. Since then, significant progress has been made and 68 percent of the RSA improvements have been completed. By the end of 2010, 86 percent of RSA improvements will be completed, leaving only 59 to meet the 2015 goal. Twenty-four airports have improved safety areas using Engineered Materials Arresting Systems (EMAS), a relatively recent technology of crushable material placed at the end of a runway, and designed to absorb the forward momentum of an aircraft. EMAS offers a significant RSA improvement where the land off the ends of the runway is constrained and a conventional RSA is not practicable. To date, four aircraft overruns have been caught by EMAS applications with a 100 percent success rate.

As part of the Administrator's "Call to Action" last year, the FAA required all airports with enplanements of 1.5 million or more (75 airports) to enhance airport markings by June 30, 2008, and urged airports to provide recurrent training to contractors and service providers that drive on aircraft movement areas. All 75 airports completed the marking upgrades by June 2008 and most did so well in advance of the deadline. More than half of the commercial service airports not currently required to upgrade their markings have voluntarily agreed to do so. In addition, roughly 85 percent of all commercial service airports currently have or plan to provide recurrent training for all who have access to the aircraft movement area. Our Airports office at the FAA has completed rulemaking requiring the enhanced markings at all Part 139 certificated airports by 2009 for medium and 2010 for small airports.

Human Factors

While the FAA has made great strides in advancing and implementing technologies to reduce runway incursions, technology is only as good as the people who use it. To this end, we are concentrating a great deal of effort into the human factors elements of runway incursions. As I reported to you in February, the FAA is seeking input from NATCA on revamping policies for issuing taxi clearances. The requirement to issue explicit taxi instructions was implemented in May 2008 and the requirement for an aircraft to cross all intervening runways prior to receiving a takeoff clearance was implemented in August 2008. Both of these requirements address NTSB recommendations on runway safety.

We are also working with NATCA to implement a voluntary reporting system for air traffic controllers similar to the Aviation Safety Action Program (ASAP) with airlines, pilots, airport operators and the FAA. This program is know as the Air Traffic Safety Action Program (ATSAP) and marks the beginning of a demonstration program to encourage voluntary safety reports from the ATO controllers. The program offers individual controllers an opportunity to provide valuable inputs to improve safety.

Voluntary safety reporting has proven very successful as sources of additional information that can be used to target safety risks that may not have been identified through existing audits, inspections, and automated tools. In my role at United, I was responsible for four ASAP programs for pilots, dispatchers, mechanics and flight attendants. Because of this work, I am convinced that information from a voluntary reporting system will help us to spot trends and prevent future runway incursions. We have implemented voluntary reporting in our Chicago area facilities and receive valuable safety information daily regarding events and incidents that previously might have gone unreported. We will continue to expand this program without delay to additional facilities.

Recently the FAA conducted our first-ever Fatigue Symposium. This symposium brought together leading fatigue scientists; representatives of the airline industry and its employee groups, representatives of the NTSB, and representatives of the FAA and its employee groups. At the symposium, fatigue scientists and industry experts presented the most current scientific and industry-relevant fatigue information to a broad audience representing both flight operations and shift-work operations, including air traffic control, maintenance, ramp operations, and aircraft dispatch. The intent of the conference was to present information that would lead to improved understanding of fatigue in aviation and increased awareness of fatigue mitigation strategies, which the aviation industry can voluntarily adopt. By all accounts that conference was extremely successful and resulted in a great deal of information, ideas, and strategies.

Following up on that, we are preparing the proceedings of the Fatigue Symposium for posting on the FAA homepage, so that all operators, not just those in attendance, may access the wealth of information the conference produced. We have already applied some of the information, ideas and strategies in its evaluation of air carrier-specific proposals for ultra long range (ULR) operations (operations with a flight or flights in excess of 16 hours). The FAA is observing the effectiveness of the fatigue mitigation strategies employed in ULR operations, for any "lessons learned" that may be applied to other, non-ULR operations. We continue to examine the information from the Fatigue Symposium to determine what next steps we may be able to take.

The FAA is committed to designing an end-to-end system that seeks to eliminate runway incursions while accommodating human error. In February, I mentioned to you that the FAA plans on creating a standing Runway Council Working Group to look at the data and address root causes, and continue to involve all who play a part in runway safety. The Runway Council is scheduled to begin this fall, and will have dedicated human factors expertise to address this aspect of runway incursions.

Conclusion

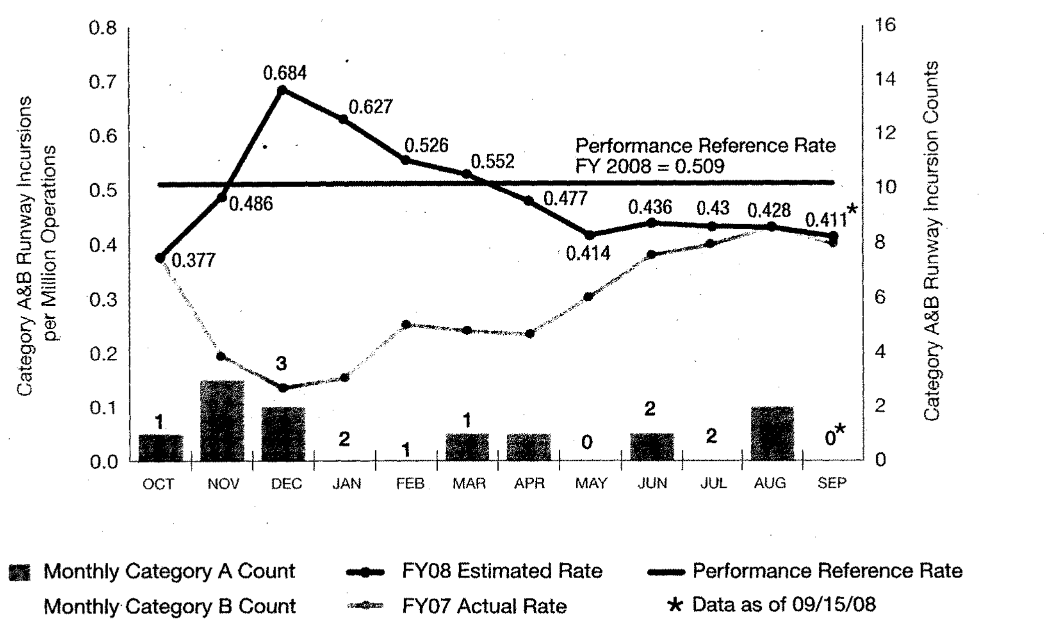
The FAA continues to seek ways to improve awareness, training, and technologies and we look forward to our collaboration with airlines, airports, air traffic control and pilot unions, and aerospace manufacturers to curb runway incursions. I want to thank personally all of the stakeholders that have been working with the FAA on our efforts, including the Office of the Inspector General, the GAO, NATCA, the National Business Aviation Association, the Airline Pilots Association, the airlines, the Aircraft Owners and Pilots Association, and many others. We could not do what we do without their incredibly valuable input.

We also value the Committee's interest in this arena, and welcome your counsel and assistance in our efforts to reduce runway incursions and improve safety in our nation's aviation system. Your oversight has kept us on track to continue to improve safety, on the ground and in the air, and I appreciate that.

This concludes my remarks, and I would be happy to answer any questions the Committee may have.

FY 2008 Category A&B Rates and Counts

Rates are as of the report date and reflect performance since the beginning of the fiscal year.



Total Category A&B Runway Incursions YTD FY 2008: 23
Total Category A&B Runway Incursions YTD FY 2007: 24

FAA
Air Traffic Organization

September 25, 2008
Subcommittee on Aviation
Hearing on
"Runway Safety: An Update"

Questions for the Record
From Chairman Jerry F. Costello

To

Mr. Hank Krakowski
Chief Operating Officer
Air Traffic Organization
Federal Aviation Administration

Question 1: Would you comment on the FAA's current plans to meet the deployment of ASDE-X by 2010 and if you feel that you are going to meet the schedule by 2010?

Response: In September 2007, the FAA Acting Administrator committed to accelerating the overall ASDE-X deployment schedule from 2011 to 2010. The FAA is pleased to report that there has been significant progress in the ASDE-X system deployment, even more than originally anticipated. Seventeen ASDE-X systems, nearly half of the 35 planned systems, are operational.

Sixteen additional systems are scheduled to be operational by the end of October 2010, and the remaining two systems are scheduled to be operational by Spring 2011. These last two systems are dependent on and aligned with their respective new airport traffic control tower (ATCT) schedules. The ASDE-X surface movement radar will be installed on top of the new ATCT.

The FAA is aggressively working towards meeting the accelerated schedule. We are confident that we will meet the schedule. Work has begun on all of the remaining sites; the 18 remaining sites are in various stages of the implementation process. This process includes site survey, site design, lease approval, completion of environmental requirements, site preparation and construction, installation, system optimization, training, and acceptance and commissioning activities.

Question 2: How many ASDE-X systems do you anticipate will be installed in either the next fiscal year or calendar year?

Response: In the next fiscal year, two additional ASDE-X systems are scheduled to be operational.

Question 3: How many ASDE-X systems do you intend to have installed by this time next year?

Response: By this time next year (November 30, 2009), the FAA plans to have four additional systems operational for a total of 21 operational systems.

September 25, 2008
Subcommittee on Aviation
Hearing on
"Runway Safety: An Update"

Questions for the Record
From Congressman Charles W. Dent

To

Mr. Hank Krakowski
Chief Operating Officer
Air Traffic Organization
Federal Aviation Administration

Question: I happen to represent Lehigh Valley International Airport. There was a very serious runway collision or incursion that occurred there recently. The GAO did a runway safety project report in November 2007 and concluded that the FAA National Runway Safety Plan was out-of-date and uncoordinated. I have noticed that the FAA has deployed technology and has tested new technology, including technology deployed at, I think, 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. Did Lehigh Valley International Airport receive any of this technology that was referred to?"

Response: The FAA plans to deploy Airport Surface Detection Equipment, Model X (ASDE-X) systems to 35 airports. Lehigh Valley International Airport is not scheduled to receive an ASDE-X system. The airports scheduled to receive ASDE-X systems were finalized in September 2005. At that time a business case was completed, including an "alternatives analysis" of the sites scheduled to receive ASDE-X equipment. The analysis showed that the sites providing the greatest return on the agency's investment were the airports with larger traffic counts and/or more complex operations, e.g., airports that use the same runway(s) for arrivals and departures.

The Runway Status Lights (RWSL) program depends on prior implementation of the ASDE-X, a surface surveillance system, to command the field lighting system. Since Lehigh Valley International Airport is not scheduled to receive an ASDE-X system, it was not considered for a RWSL system during the cost benefit analysis.

September 25, 2008
Subcommittee on Aviation
Hearing on
"Runway Safety: An Update"

Questions for the Record
From Congressman John J. Hall

To

Mr. Hank Krakowski
Chief Operating Officer
Air Traffic Organization
Federal Aviation Administration

Question: There was just announced a two-hour a day reduction in staffing at the Dutchess County, New York Airport, which is in a county that is attempting to do economic development and to attract more businesses and people who would fly in and out from their residences to do business around the country, this is a problem for us that we have heard from our community leaders and business leaders, as well as from the airport management and pilots and controllers about it, and I think it is unfortunately going to have a detrimental effect on our ability to use that airport as an attraction for economic development in the Hudson Valley. Are you familiar with this? Would you please research this and get back to me. Thank you.

Response: Staffing has not been reduced at Dutchess County Airport, but operating hours were reduced as of September 15, 2008. The reduction in operating hours was based on a study that the FAA conducted to assess air traffic operations at the facility. The study found that Dutchess Airport runs approximately one operation per hour between 9 p.m. and 10 p.m., and runs less than one operation per hour between 10 p.m. and 11 p.m. Since this was based on primarily seasonal traffic, the study was expanded to include the entire year. Even with the expanded coverage of the assessment, the results indicated the facility was well within the range for a reduction in hours.

In March 2007, the FAA advised members of the Airport Rules and Regulations Committee about the potential change. They raised concerns about the economic impact this would have in attracting new tenants. As a compromise, the FAA opted to institute seasonal hours, rather than close the facility year around at 9 p.m. We also offered to reconsider the operating hours if a prospective tenant intended to conduct late evening operations.

STATEMENT OF

CAPTAIN JOHN PRATER

PRESIDENT

AIR LINE PILOTS ASSOCIATION, INTERNATIONAL

BEFORE THE

SUBCOMMITTEE ON AVIATION

COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

UNITED STATES HOUSE OF REPRESENTATIVES

WASHINGTON, DC
September 25, 2008

RUNWAY SAFETY: AN UPDATE

Air Line Pilots Association, International
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STATEMENT OF
CAPTAIN JOHN PRATER
PRESIDENT
AIR LINE PILOTS ASSOCIATION, INTERNATIONAL

BEFORE THE
SUBCOMMITTEE ON AVIATION
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
UNITED STATES HOUSE OF REPRESENTATIVES
ON
RUNWAY SAFETY: AN UPDATE

September 25, 2008

Good morning, Mr. Chairman and members of the Subcommittee. I am Captain John Prater, President of the Air Line Pilots Association, International (ALPA). ALPA represents 53,000 pilots who fly for 37 passenger and all-cargo airlines in the United States and Canada. On behalf of our members, I want to thank you for the opportunity to provide an update on the efforts of government and industry to enhance runway safety. While significant progress has been made, much work remains to be done. Today, I will address three runway safety topics: runway incursions; runway excursions; and runway confusion.

We are pleased that FAA has placed a greater emphasis on runway safety, which is evidenced by its "Call to Action" in August 2007 and follow-up thereafter. Pilots, controllers, airlines, and airport operators and international non-profit aviation safety organizations, such as the Flight Safety Foundation, have all contributed to improving safety through better signs, markings, training, and procedures. ALPA has done its part by publishing six runway safety newsletters for our members since January 2008 with four more to be published in the next few months. We have also created a special runway safety website which we use to educate and inform our members on best practices and ways to increase their vigilance during surface movements. These ALPA activities have contributed to a heightened awareness of runway and airport safety. We will continue to stress the need for awareness amongst flight deck crewmembers to ward off the potential for complacency.

Runway Incursions

The problem of runway incursions has been exhaustively studied by dozens of aviation experts and numerous, effective, mitigation solutions have been devised that can greatly lessen the inherent risk associated with airport ground operations. U.S. airlines safely completed 19.4 million flights in 2007. Of these, a few hundred experienced a runway incursion and most of those were not "close calls." FAA issued a report on runway safety in June 2008 which stated that the number of serious runway incursions has dropped by 55 percent since FY 2001. In 2007, there were 24 serious runway incursions

(Category A and B) during 61 million aircraft operations, down from 31 such incursions in FY 2006, and 53 serious incursions in FY 2001. Of the 24 serious incursions, only eight involved commercial flights. While these numbers are encouraging and trending in the right direction, the fact remains that the consequences of a high-speed collision on the ground are potentially catastrophic.

Demanding schedules, inadequate rest periods and insufficient or inaccurate information related to weather or airport conditions can degrade the performance of even the most seasoned and dedicated pilot. Recognizing these facts, the Federal Aviation Administration (FAA) has made efforts to address a number of these issues by emphasizing improvements to crew operating procedures and training. Clearly, the focus on human factors should continue, but the need to invest in available technological improvements, system design enhancements and procedural changes to reduce pilot and air traffic controller errors, all of which contribute to the problem of runway incursions, remains.

The pressure on the National Airspace System (NAS) is, as you know, growing daily. The aging infrastructure we rely on is in dire need of modernization. The need for a long-term modernization effort in communications, navigation, and surveillance systems is reflected in many programs with a direct impact on runway safety.

Ingenious technology, combined with political will and monetary resources, has virtually thwarted two of the deadliest types of aircraft accidents: midair collisions and controlled flight into terrain (CFIT). The traffic alert and collision avoidance system (TCAS) warns pilots of an impending collision and gives instructions on how to avoid it. Since the introduction of TCAS, many midair collisions have been averted, and numerous lives have been saved.

The invention, development, and implementation of the ground proximity warning system (GPWS), and its newer supplement, the enhanced GPWS, or EGPWS/TAWS, has had the same powerful effect on reducing the number of CFIT accidents that TCAS has had on reducing the number of midair collisions. Prior to the development of these systems, existing technologies, training, and procedures were insufficient to satisfactorily meet the challenge of preventing incidents and accidents. Following their deployment, enhanced situational awareness and conflict alerting capability were combined for a powerful one-two punch directed at the heart of the problem. However, in both instances, recommendations for effective risk mitigations were ignored until several high-profile accidents occurred.

A similar situation exists for mitigating runway incursions. According to the U.S. Commercial Aviation Safety Team (CAST), the risk posed by runway incursions can be reduced as much as 95 percent by using a combination of technologies which greatly improve the flight crew's situational awareness and provide conflict-alerting capability during ground operations. Unfortunately, however, the technologies and processes we are discussing today require more than just buying an electronic box for an airplane.

They involve long-range programmatic infrastructure projects that will not succeed without a similarly long-term national commitment for sustained funding.

We cannot afford to wait for another catastrophic event before we get serious about solving the problem of runway incursions. Aviation stakeholders must renew their commitment as an industry to field effective mitigations, whether they are low-tech solutions, such as painting runways and taxiways with enhanced markings, improving airport signage and lighting, or more sophisticated answers, such as providing electronic flight bag with moving map display and Automatic Dependent Surveillance Broadcast (ADS-B) technology on the flight deck. We need to provide the best equipment in control towers and cockpits that will improve situational awareness at both ends of the radio. More rapid and wide-spread installation of systems like runway status lights (RWSL) that have already been proven effective in reducing the risk of runway incursions at airports such as Dallas-Ft. Worth (DFW), San Diego (SAN) and Boston-Logan (BOS), will have a great effect on improving safety.

Mitigating the risk of runway incursions has proven to be a very difficult undertaking and we are undoubtedly years away from reaching what anyone would term a successful conclusion. We challenge both government and industry to mutually establish a goal of zero serious runway incursions involving commercial airliners and focus our resources and attention on that goal until it is achieved, no matter how long it takes us.

Implement CAST Recommendations

Since we testified before the Subcommittee in February, FAA and the aviation industry have worked hard to bring greater safety to the runway environment. I would like to update you on the action items that we discussed earlier this year.

ALPA's white paper on Runway Incursions, published in March 2007, proposed that the U.S. government and aviation industry fulfill the commitments that were made to implement the recommendations of the CAST Runway Incursion Joint Safety Implementation Team (R-I JSIT).

CAST determined that 95 percent of all runway incursions could be prevented by having:

(1) cockpit moving map display with own-ship position for improved situational awareness
(2) integration of ADS-B to enable pilots and controllers to see all aircraft and vehicles on the surface and aircraft up to 1,000 feet above ground level
(3) automatic runway occupancy alerting, and
(4) digital data-linked clearances that are displayed on the moving map.

Cockpit Moving Map Display with Own-Ship Position

Electronic flight bags (EFBs), which provide computer-generated displays of aircraft and flight information, can be used to display moving maps and own-ship position. Although the FAA has announced its intention to amend its policies on the use of EFBs in order to provide airline pilots with additional safety tools, only a very few airliners have been equipped with EFBs which display moving maps and own-ship position. Installation of this vital equipment on airliners should become a national aviation safety priority.

The FAA is now working on two initiatives aimed at putting EFB's into airliners. The first is a $5 million project to test these in-cockpit displays. This funding will assist operators in equipping their aircraft with EFBs and an aural warning system. Secondly, the FAA has allocated $9.3 million to accelerate air-to-air applications, with specific emphasis on runway safety. This funding will allow the FAA to accelerate the ADS-B surface conflict detection/cockpit alerting application, and provide industry participation and perspective on the application development, which should enable manufacturers to produce production-ready avionics at a lower cost.

<u>Automatic Dependent Surveillance – Broadcast (ADS-B)</u>
ADS-B does not rely on a ground-based infrastructure. Three-dimensional, Global Positioning Satellite (GPS)-derived aircraft positioning reports will provide air traffic controllers with greatly enhanced air traffic surveillance capabilities. Additionally, the use of ADS-B in a surface-alerting system will enable pilots and controllers to see all aircraft and properly equipped vehicles on the airport surface and aircraft up to 1,000 feet above ground level.

A recently issued FAA Notice of Proposed Rulemaking (NPRM) would require mandatory ADS-B OUT equipage for National Airspace (NAS) operations after the year 2020. ALPA believes that this mandate should be accelerated and that it is imperative that increased emphasis be placed on the development of technology and procedures for display of traffic information on the flight deck via ADS-B IN. ADS-B OUT capability is a necessary enabler to follow-on applications and improves controller surveillance, but provides pilots with no additional situational awareness information. Operational safety enhancement will only be gained with equipage of aircraft with ADS-B IN and Cockpit Display of Traffic Information (CDTI). Once the safety and efficiency gains for this technology are analyzed, it is our expectation that there will be compelling data to suggest a mandate for ADS-B technology in an accelerated timeframe.

<u>Automatic Runway Occupancy Alerting</u>
RWSL's work in conjunction with an airport's surface movement radar system and provide pilots with a direct indication of runway status, a recommendation endorsed by the NTSB. In a recent operational evaluation conducted by MIT's Lincoln Laboratory at Dallas-Fort Worth International Airport (DFW), runway incursions on the test runway decreased by 70 percent. FAA announced this summer that a total of 22 airports will received RWSL's by 2011.

ALPA recommends that the RWSL system become a standard technology upgrade for all large air carrier hub airports. Airport Improvement Plan (AIP) funds should be allocated to expedite implementation for all candidate airports.

At least one major air carrier has installed an automatic runway warning system in some of its aircraft for aural alerts to the flight crew. Although the system does not alert to the presence of other aircraft, it is useful for enhancing situational awareness. Some crews have found that this particular system's automated alerts can, however, conflict with receiving ATC clearances and other radio transmissions.

FAA is currently testing the Final Approach Runway Occupancy Signal (FAROS) at Long Beach/Daugherty Field in California and at Dallas-Ft. Worth (DFW). FAROS, which was initially conceived and promoted by a former ALPA Airport Standards Committee chairman, is intended to warn flight crews on final approach that their runway is occupied. FAROS flashes visual glide slope indicator lights when it is not safe to land and may ultimately be useful in preventing land-over and other types of occupied-runway events.

Digital Data-linked Clearances

Government and industry are still developing standards for digital data-linked clearances. While the long-term goal remains to transition from voice-only to data with voice, there are still many safety hurdles to be cleared before such data can be used for anything other than advisory messages.

Improve Air Traffic Controller Training

In 2000, CAST made recommendations intended to improve air traffic controller training. Subsequently, the FAA issued guidance for the development of a Controller Resource Management (CRM) curriculum which has been incorporated into initial and recurrent controller training programs. ALPA applauds the FAA for having begun the CRM program at all ATC facilities across the US. Industry experience has proven that CRM training must be a continuing process that builds and reinforces CRM concepts.

The FAA has also installed Tower Simulation Systems (TSS's) at 22 airports in the US. As with any start-up programs, the TSS will need buy-in from line controllers and supervisors, on-going review and feedback, and close monitoring for effective results. ALPA expects that the TSS will provide more realistic depictions of an airfield and its surrounding areas as it is programmable to replicate varying traffic, weather, lighting and visibility conditions. The combination of CRM and TSS is clearly a positive step in the effort to prevent runway incursions.

Airport Design and Enhanced Airport Signage and Markings

The FAA's action to require all commercial airports to implement enhanced taxiway markings is another positive step toward assisting pilots in maintaining situational awareness on the surface. Of those airports having more than 1.5 million annual passenger enplanements, 71 have accomplished this goal, 62 other airports have voluntarily made the improvements, with 121 more airports planning to finish the task by the end of the calendar year. ALPA recommends that all FAR Part 139 airports install enhanced taxiway markings, to include a red runway identifier marking at runway entrances.

Implementing enhanced surface markings will clearly assist pilots in identifying approaching runway intersections, but their usefulness is limited when an airport surface is obscured by snow or other forms of precipitation or contaminants. Because surface markings have limited application, a number of other technologies have been developed which are intended to improve the situational awareness of pilots traversing an airport's surface. Use of these directional aids takes on added meaning when pilots are navigating airfields with which they have little familiarity, or are operating in adverse meteorological or high traffic conditions.

The following recommendations on available technologies are contained in the CAST 2002 RI-JSIT report wherein it is noted that substantially improved ground movement navigation guidance is needed to prevent runway incursion accidents and incidents:

- Variable electronic message boards which display critical clearance related instructions such as "hold," "cross," or "takeoff."
- Provision of runway occupancy information to pilots on final approach to prevent "land over" accidents and incidents in which an arriving aircraft jeopardizes, or collides with, an aircraft positioned on a runway awaiting takeoff clearance.
- "Smart" ground movement lighting that indicates the cleared taxi route, substantially reducing runway incursions which result from pilots proceeding onto a runway or taxiway without a clearance.

End-Around and Center Taxiways

ALPA supports the installation of perimeter (i.e., end-around) taxiways as they enhance both safety and capacity by drastically reducing opportunities for runway incursions. Atlanta Hartsfield International Airport (ATL) has completed construction of an end-around taxiway that allows traffic to proceed from arrival runways to terminal gates without crossing other arrival or departure runways. Because Atlanta's airport experiences 500–600 fewer runway crossings daily due to its end-around taxiway, there are that many fewer opportunities for a runway incursion. Additionally, operational data has demonstrated that perimeter taxiways can actually increase airport efficiency. Dallas-Ft. Worth (DFW) is in the process of constructing several of these taxiways.

The history of runway incursions includes numerous cases involving parallel runways, where a landing aircraft exited the runway via a high-speed taxiway onto an occupied parallel runway causing a runway incursion in the process. This high-risk scenario can be mitigated by implementing a center taxiway between parallel runways. ALPA supports the Los Angeles World Airport authority's intent to include a center taxiway between parallel runways in their north airfield modernization program for this reason.

Airport Surface Detection Equipment Model X (ASDE-X)

ASDE-X, which operates on the principle of multi-lateration, provides tower controllers with increased situational awareness of the airport surface by displaying a wide variety of targets, including aircraft and ground vehicles. Currently, only 11 airports in the U.S. have ASDE-X installed. ALPA supports an accelerated plan to implement ASDE-X at all OEP airports. While issues remain with its operational use, we believe that this technology offers controllers a high fidelity presentation of the airport surface movement area so as to provide reliable data and better decision-making.

This summer, FAA announced that it was soliciting industry proposals to purchase and install low-cost ground surveillance systems for airports that are not scheduled to receive ASDE-3 or ASDE-X. The agency has evaluated two such systems in Spokane, Washington and intends to deploy them to six more airports in 2009.

Non-Standard Air Traffic Phraseology

We testified in February of our concerns stemming from the fact that the U.S. has not fully aligned itself with ICAO guidance for aviation phraseology used in radio transmissions. We are pleased that the FAA recently accepted the ICAO phraseology for instructing a flight to enter the runway and hold its position until a takeoff clearance can be issued. This is a step in the right direction. However, ALPA encourages the FAA to adopt taxi phraseology for airport surface operations. The ICAO guidance is more succinct than the FAA's phraseology and requires a specific affirmation of a clearance to cross all active runways on their assigned taxi route. Adoption of the ICAO phraseology would reduce the possibility of inadvertently crossing a runway without a clearance.

On any given day there are hundreds of internationally based flight crews operating at our nation's busiest airports. With multiple accents on busy radio frequencies and the lack of a common understanding as to what is expected of everyone, we fear that safety is being compromised.

Standard Operating Procedures (SOPs)

ALPA recommends improved standard operating procedures (SOPs) and improved training for aircraft ground operations throughout the aviation industry. One prudent SOP is to complete as much "heads down" activity as possible prior to departing the gate. To accomplish this goal, ALPA recommends that all airlines standardize their procedures and implement the guidance contained in FAA Advisory Circular (AC) 120-74A, *SOPs for Ground Operations*. Completing all pre-departure checklists and briefings before leaving the gate will significantly reduce crew distractions during the taxi phase. Similarly, executing post-landing checklists after safely clearing the active runway, but before initiating taxi to the gate, will ensure that both crewmembers are focused on taxi clearance instructions and the safe transiting of the prescribed route.

One major airline has noted that complex taxi routes and pilots' misunderstanding of taxi instructions account for over 90% of their runway incursions. This miscommunication is due in part to the necessity for flight crews to complete complicated checklists as they taxi. Frequently, flight crews must process changes to navigation routings given by air traffic controllers (ATC), or prepare the aircraft for flight as they determine correct aircraft trim settings based on actual weight and balance factors of the plane. Such information is often known only minutes before leaving the gate.

We know of at least two airlines that have changed their taxi procedures to facilitate the completion of all checklists items that can be accomplished prior to departing the gate area. Particularly in the event of a short taxi route, this practice will prevent crews from rushing completion of their checklist items while navigating their aircraft on the airport surface.

Runway Excursions

Rejected takeoffs and less-than-optimum landings continue to be high-risk maneuvers that may lead to a runway excursion. Ground operations in adverse weather with degraded runway and taxiway conditions play a significant part in runway and taxiway excursions. In fact, the industry continues to experience several runway excursions annually in spite of continued research and industry attention.

In response to continued runway excursions on other-than-dry runways, and precipitated by the fatal runway excursion that occurred in 2005 in Chicago, the FAA formed the Takeoff / Landing Performance Assessment Aviation Rulemaking Committee (TALPA ARC). The TALPA ARC is intended to provide a forum for the U.S. aviation community to discuss the recommended actions identified in Safety Alert for Operators (SAFO) #06012 issued in August of 2006. The goal of the TALPA ARC is to provide advice and recommendations on the following aspects of contaminated runway operations: airplane certification and operational requirements – including training – for takeoff and landing operations on contaminated runways; landing distance assessment requirements, including minimum landing distance safety margins, to be performed at the time of arrival; and standards for runway surface condition reporting and minimum surface conditions for continued operations.

While ALPA is actively involved in the TALPA ARC and initial deliverables are due to the FAA in the 3rd quarter of 2008, until the ARC completes its work, there are still some deficiencies in the guidance material provided to flight crews and airport operators for operating under adverse meteorological conditions. For instance, aircraft flight manuals do not contain actual flight-test-determined data for takeoff or landing performance under wet or slippery runway conditions. Flight crews are also not provided the necessary data to determine the effect of a contaminated runway on aircraft braking, and stopping information is vague and subjective.

Pilot braking action reports are highly subjective and based upon the crew's previous experience and operating environment. The FAA and industry must work to provide standardized guidance to flight crews on the criteria to be used in determining pilot braking action reports. The goal is to make any pilot braking action report useful to any pilot operating to the same runway.

In the event that an aircraft is unable to stop before reaching the end of the runway due to mechanical, weather, or other operational problems, a runway safety area (RSA) is intended to ensure that an incident does not become an accident. ICAO recommends that runways have a defined RSA that is free of obstacles and extends well past the end of the actual runway. In the U.S., FAA Advisory Circular 150/5300-13, *Airport Design*, provides the criteria for an acceptable RSA.

Unfortunately, hundreds of airports in the U.S. that serve both domestic and international air carrier operations do not meet U.S. or international standards in this regard. According to recent FAA statistics, 45% or 460 of the 1,024 certificated airport runway ends in the U.S. must be improved.

Three solution methodologies exist for those airports that do not meet current RSA standards:

1. Airport authorities may remove obstacles, fill ravines, or level ground to create adequate RSAs. This option may not be possible for airports in confined geographic areas.
2. If the physical space does not exist to create the recommended runway safety area, an Engineered Materials Arresting System (EMAS) could be installed. This system uses aerated, frangible concrete to bring an aircraft to a quick but controlled stop, much like runaway truck ramps on steep mountain highways. EMAS is a solution that has proven successful in actual operation. It is generally unaffected by snow and/or ice contamination and functions to the same level of arresting ability regardless of meteorological conditions.
3. Airports can decrease the effective runway length to create adequate runway safety areas. This option may not be attractive because it could potentially result in reducing the size and weight of aircraft that use the airport.

Runway Confusion

The Comair Airlines accident in Lexington, Kentucky in 2006 and the Singapore Airlines 747-400 takeoff accident in Taiwan in 2000 represent the real risks of runway confusion. Other runway confusion-related incidents have occurred, but in those cases, safety was not compromised to the point of causing an accident.

Known causes of runway confusion usually include one or more of the following factors: degraded/inadequate situational awareness; crew in "heads down" operations; lack of advisory information on airfield configuration changes; obscuration of markings and signs; insufficient charting while construction is in progress; and, poor quality automated terminal information service (ATIS) broadcasts.

Unfortunately, this hazardous safety issue has not yet generated sufficient interest within the industry. It is clearly being handled as a "one-off" phenomena caused by a single flight crew. In our opinion, however, one event such as either the Lexington or Taiwan event is too many.

In April 2007, the CAST issued an interim report on its review of wrong-runway events. The study looked at wrong-runway events covering 25 years of accident and incident data and identified over 600 events during that period. Mitigating factors identified in the study include: the need for better inter- and intra-cockpit communications between the flight crew and between the cockpit and the air traffic control facility; airports must develop threat-and-error management techniques to assess and address hazards before they become an issue; the incorporation of devices such as runway alerting awareness system, electronic flight bag and aircraft moving map display technologies to provide improved airport situational awareness to the flight crew. While these technologies offer great potential in terms of runway and airport safety, some are expensive and may be economically burdensome to smaller airlines. One additional area of needed improvement is an enhanced Notice to Airmen (NOTAM) system which would provide timelier airport construction information to flight crews.

Summary of Recommendations

We urge Congress to assist the industry in its efforts to mitigate the risks of runway incursions, runway excursions, and runway confusion. Congress can greatly facilitate this undertaking by helping to ensure that funding is available for a long-term modernization effort in those communications, navigation, and surveillance systems which directly impact runway safety.

Following are our other recommendations.

Runway Incursions

- Provide improved ground movement training for air traffic controllers, particularly with the use of high-fidelity visual tower simulators, which are similar in quality to aircraft flight simulators routinely used for pilot training.
- Require that all airports with commercial air carrier operations implement enhanced taxiway markings including the red runway identifier marking that is not yet part of FAA's required improvements.
- Support the expenditure of funds to install perimeter taxiways, which enhance both safety and capacity.
- Airlines should work with equipment manufacturers to install Electronic Flight Bags (EFBs) with Aircraft Moving Map Displays in our cockpits. The FAA has lowered the certification requirements for them thereby reducing the cost to implement EFBs.
- FAA is scheduled to implement ASDE-X at 7 airports in 2008. Surface movement radar should be provided at all commercial airports.

- Include Runway Status Lights (RWSLs) as a standard technological upgrade for large hub airports and support Airport Improvement Plan (AIP) funding to quickly implement RWSLs at the nation's busiest airports.
- Aircraft must be adequately equipped, and regulators must develop and implement procedures, for ADS-B technology. The government and industry should push for the development of air-to-air ADS-B applications that benefit the users.
- All airlines should standardize their procedures and implement the guidance contained in the FAA Advisory Circular (AC) 120-74A, SOPs for Ground Operations.
- Change procedures to require crews to complete all pre-departure checklists and briefings before leaving the gate to significantly reduce distractions to the crew during the taxi process.
- In the short term, change procedures to require crews to complete after-landing checklists and briefings before taxiing. Longer term, airport layouts should be improved to eliminate the potential for pilots to face a runway incursion hazard when clearing a runway.
- Airlines should conduct thorough root cause analysis of all runway incursion events that involve their flight crews to ensure a complete understanding of why the event took place and implement strategies to eliminate them.

Runway Excursions

- Manufacturers must be required to provide flight crew with performance data for takeoff and landing for all runway conditions expected in service. Pilots should be provided data in the form of required landing distances, rather than in terms of weight limits. Pilot landing assessments at the time of arrival must give the flight crew the best tools available (e.g. stopping performance data using standard operational techniques, runway friction readings, pilot braking action reports, etc.) to accurately determine whether they can safely land and stop their aircraft on the runway available.
- The industry must develop a standardized set of guidelines that will allow flight crews to accurately assess their aircraft's performance and provide uniform pilot braking action reports that are compatible across the fleets being operated into that airport.
- Runways with RSA's less than 1,000 feet in length should be improved to provide at least this degree of protection. If the physical space does not exist to create the recommended RSA, an Engineered Materials Arresting System (EMAS) should be installed.

Runway Confusion

- All airlines should standardize their procedures and implement the guidance contained in the FAA Advisory Circular (AC) 120-74A, SOPs for Ground Operations.

- Change procedures to require crews to complete all pre-departure checklists and briefings before leaving the gate. The intent is to significantly reduce distractions to the crew during the taxi process.
- Provide improved ground movement training for air traffic controllers, particularly with the use of high-fidelity visual tower simulators, which are similar in quality to aircraft flight simulators routinely used for pilot training.
- Require that all airports with commercial air carrier operations have the enhanced taxiway markings including the red runway identifier marking that is not part of FAA's required improvements.
- Airports must develop some sort of threat-and-error management tool to better identify potential airport issues and enumerate those issues to the operators and flight crews in a timely manner.
- Airlines should install Electronic Flight Bags (EFBs) with Aircraft Moving Map Displays (AMMD) in cockpits.
- Improve the Notice to Airmen (NOTAM) system to provide more timely and accurate information to the aircraft as it relates to runway construction and its impact on taxi routings and runway configurations.

Thank you for the opportunity to testify today. I would be pleased to address any questions that you may have.

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