INTERNATIONAL CIVIL AVIATION ORGANIZATION

FIRST MEETING OF THE REGIONAL AVIATION SAFETY GROUP - ASIA AND PACIFIC REGIONS (RASG-APAC/1)

Noumea, New Caledonia, 10 - 11 October 2011

Agenda Item 4: Member State Presentations

AIRFIELD SAFETY IN THE UNITED STATES

(Presented by the United States of America)

SUMMARY

One of the biggest safety challenges to aviation is not in the air but on the ground. Improvements in procedures and the introduction of new technology can improve runway safety. This paper discusses how the United States Federal Aviation Administration (FAA) places a high priority on improving airfield safety and how, in partnership with industry, airport operators, and air traffic controllers, it has implemented many changes to reduce the risk of runway incursions and excursions.

1. INTRODUCTION

1.1 The FAA regards safety as its first priority. The biggest safety challenge is not in the air, but on the ground at hundreds of commercial service airports. Both runway incursions and runway excursions pose a threat to passengers, crews, and airport workers that can cause significant damage to aircraft and infrastructure.

1.2 An aggressive and effective runway safety program reduced the number of serious category A and B runway incursions in the United States by 50 percent from 24 in 2008 to 12 in 2009. A further 50 percent reduction was obtained in 2010 when serious category A and B incursions were reduced to 6. Aalthough these are encouraging numbers, there is still much work to be done.

1.3 For many years, the United States has actively invested in programs and technology to address airfield safety. We continue to deploy the Airport Surface Detection Equipment, Model X (ASDE-X) while pursuing newer technologies such as Runway Status Lights, Final Approach Runway Occupancy Signal (FAROS), low-cost ground surveillance systems, and Airport Moving Maps. Changes to airport infrastructure and procedures have also been implemented, such as enhanced taxiway markings, improvements to runway safety areas (RSA), and increased training. In the human factors arena, changes have been made in policies for issuing taxi instructions and takeoff clearances; a voluntary reporting system for air traffic controllers has been implemented. In March 2011 a voluntary, not for retribution reporting system for airport safety inspectors was implemented.

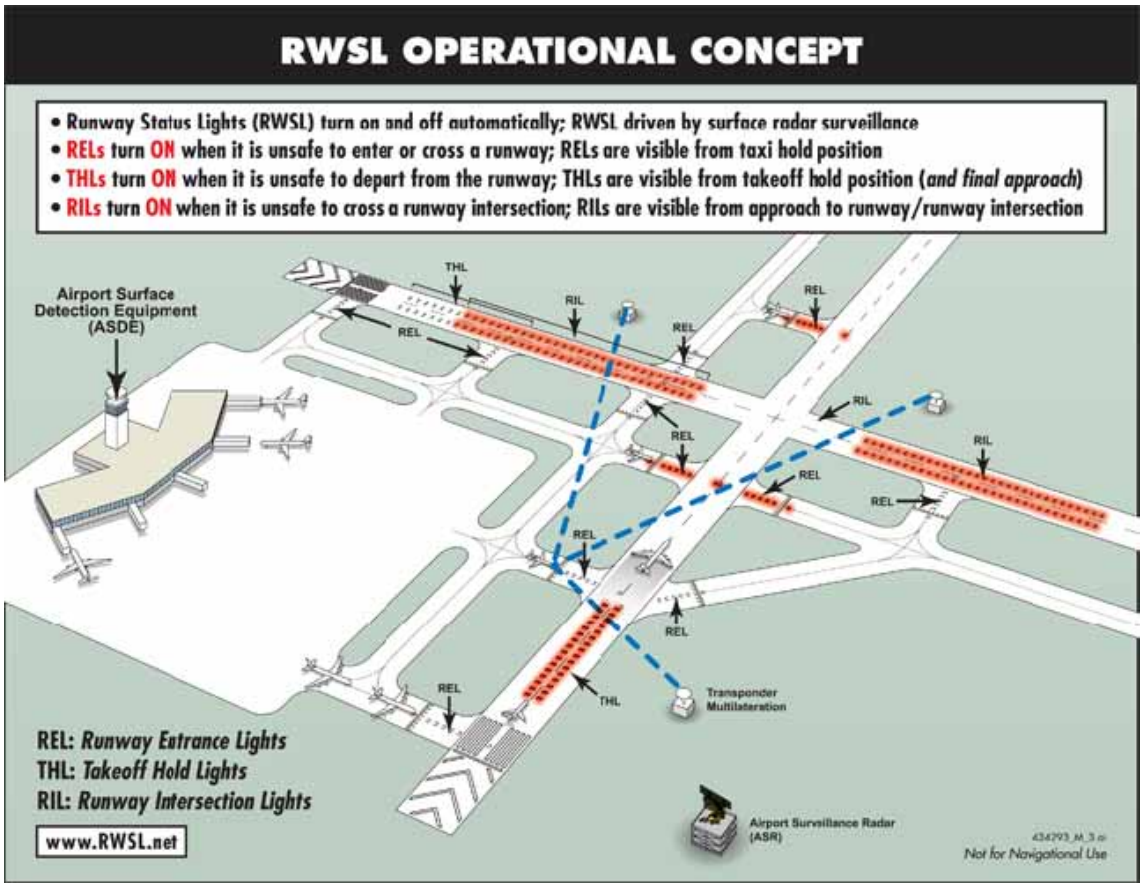
2. DISCUSSION

2.1 To improve controller situational awareness on the airport movement area at the busiest U.S. airports, the FAA has installed ASDE-X ground surveillance systems at 35 towers. ASDE-X screens

show controllers aircraft on a continuously updated color display map. Controllers can zoom in to the specific areas of the airport they need to focus on. The display also shows the edges of a runway where a plane is landing or departing. If another plane or vehicle crosses those lines or moves toward them at a certain speed, visual and aural alarms go off, and allow the controller to diffuse the situation

2.2 Runway Status Lights 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 or cross a runway (Runway Entrance Lights) or begin takeoff roll on a runway (Takeoff Hold Lights). 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. Runway status lights have been successfully demonstrated at Dallas-Fort Worth, San Diego, Boston Logan, and Los Angeles World Airport as a cooperative effort between the airport and the FAA. The developmental systems have proven successful and the FAA is moving ahead with installing FAA operated runway Status Lights production systems at 23 of the busiest airports. Additionally a new application for Runway Intersection Lights (RILs), is currently being evaluated at Boston Logan Airport. The Operational Evaluation is ongoing.

The following 23 airports will have Runway Status Lights by the end of 2015: Atlanta; Baltimore Washington International; Boston; Charlotte, NC; Chicago O'Hare; Dallas-Fort Worth; Denver; Detroit; Washington Dulles; Fort Lauderdale; Houston Intercontinental; John F. Kennedy; LaGuardia; Las Vegas; Los Angeles; Minneapolis; Newark, N.J.; Orlando, Fla.; Philadelphia; Phoenix; San Diego; San Francisco and Seattle. Installation is currently underway and in various states of completion at many of the airports. Orlando International Airport, FL (MCO) is the first slated for commissioning during summer 2011. The 23 sites are planned to be operational by the end of 2016.



2.3 The FAA also tested the FAROS system, which provides immediate information to pilots on approach that the runway is occupied or otherwise unsafe for landing. The FAROS system determines occupancy of the runway by detecting aircraft or vehicles on the runway surface. If a monitored area on the runway is occupied, FAROS flashes the Precision Approach Path Indicator Lights (an existing system)

to alert the pilot that it is potentially unsafe to land. The system is being tested at both Dallas-Fort Worth Airport and Long Beach/Daugherty Field Airport. An enhanced version of the system, eFAROS will be installed at Dallas-Fort Worth, Los Angeles, San Diego, and Boston in 2012.

2.4 The FAA is also evaluating the use of low-cost, commercially available radar surveillance systems that would reduce the risk of runway incursions at certain small and medium-sized airports that are currently not programmed to receive ASDE-X. Four vendors were selected to provide one system for each for evaluation. The Operational Evaluation is under way at Spokane. Installations are in process at San Jose, Manchester, Long Beach, and Reno. System test and evaluation is planned to complete by the end of December 2012. The FAA is also testing the possibility of fusing ADS-B surveillance data with primary radar data from the low cost ground surveillance system (LCGS) to provide a more accurate position of ground traffic. This evaluation will measure the feasibility of each vendor system's capability to ingest ADS-B data and display properly. A prototype demonstration is being conducted at Boston Logan International Airport.

2.5 The Runway Occupancy Warning System (ROWS) is testing the capability of a suite of Commercial Off the Shelf (COTS) sensors to detect and track aircraft and vehicles in an airport movement area. ROWS aims to prove the technological capability of a very low cost solution set that may be deployable to sites that cannot justify the expense of a LCGS. The ROWS program will evaluate the viability of using COTS sensors in a combined platform to detect and track aircraft or vehicles as well as to provide audible and/or visual warnings to pilots or controllers.

2.6 Industry has developed avionic products that may further enhance aircrew situational awareness. To facilitate operational assessment of these options, the FAA reached agreement with four US airlines to fund in-cockpit runway safety systems in exchange for critical operational data. The selected airlines will equip their aircraft with surface moving maps with own-ship position on an Electronic Flight Bag for flights to or from 21 test bed airports. The airlines started installing the technology in their aircraft in December 2010. The data gathered will help the FAA evaluate the safety impact of this technology and is expected to accelerate key safety capabilities necessary for the transition to our Next Generation Air Transportation System

2.7 The FAA requires air traffic control tower facilities to conduct a Runway Safety Action (RSAT) meeting on an annual basis. RSATs are chartered to identify surface safety risk areas and develop and track mitigations. RSAT participants typically include airport management, air traffic controllers and management, airport tenants, airlines, charter companies, general aviation pilots, fixed base operators, airport certification inspectors, and aviation safety inspectors. The FAA has developed the Local Runway Safety Action Team Toolkit to provide guidance and resources to support facilities in the planning and conduct of an RSAT and drafting of the resulting Runway Safety Action Plan. The toolkit is available on the FAA Office of Runway Safety web-site. The U.S. Government Accountability Office (GAO) reported that RSATs are one of the most effective actions to address runway incursions. The GAO reported that RSATs recommended 4,441 actions in a five year period, with approximately 75% completed. One of the outcomes of the May 2011 Global Runway Safety Seminar held in Montreal was a recommendation that airports world-wide form RSATs.

2.8 FAA has continued to make progress in improving Runway Safety Areas (RSAs) which enhance safety in the event an aircraft undershoots, overruns, or veers off the side of the runway. Since a program was started in FY 2000 to accelerate RSA improvements for commercial service runways, 79 percent of those improvements have been completed. Thirty five airports accomplished their improvements by installing Engineered Materials Arresting Systems (EMAS), a bed of crushable concrete placed at the end of a runway to absorb the forward momentum of an aircraft. The EMAS technology provides safety benefits in cases where land is not available or where it would be very expensive for the airport sponsor to buy the land off the end of the runway. This technology is now in place at 51 runway ends at 35 airports in the United States. Plans are in place to install an additional nine EMAS systems at six more airports. EMAS has also been installed internationally at Sichuan Province, People's Republic of China and Madrid, Spain. To date, there have been seven incidents where the technology has worked successfully to keep aircraft from overrunning the runway and in several cases has prevented injury to

passengers and damage to the aircraft. The latest successful arrestment was at Teterboro Airport in New Jersey. EMAS is proven technology that can significantly enhances safety at airports that do not have enough room for a standard runway safety area.

Saab 340 Overrun
JFK
May 1999

Falcon 900 Overrun
Greenville, SC
July 2006

Bombardier CRJ-200 Overrun
Yeager Airport, Charleston, SC
January 2010

2.9 All US certificated airports completed installation of the enhanced taxiway centerline on schedule by December 2010. The enhanced taxiway centerline is a low cost method to improve pilot situational awareness when approaching a hold line. It has been adopted by ICAO as a Recommended Practice in Annex 14. In addition, all commercial service airports require recurrent driver training for all who have access to the aircraft movement area.

Previous Taxiway Centerline Markings

Enhanced Taxiway Centerline Markings

2.10 The FAA is performing a number of activities in an effort to reduce the risks that Foreign Object Debris (FOD) poses on airports. In September of 2009, the FAA published performance standards for continuous FOD detection equipment in Advisory Circular (AC) 150/5220-24, *Airport FOD Detection Equipment*. The AC allows for four types of continuous FOD detection systems to be used on an airport: stationary radar; stationary electro-optical; stationary hybrid radar and electro-optical; and mobile radar. The FAA has published a companion AC, 150/5380-5, *Airport FOD Management*, that is intended to provide guidance for airports on the development and management of FOD programs.

2.11 Re-examining air traffic communications offers potential to improve surface safety. After conducting a risk analysis, the FAA implemented a requirement for controllers to issue explicit taxi instructions in May 2008. In August 2008, the requirement for an aircraft to cross all intervening runways prior to receiving a takeoff clearance was implemented. At the end of June, 2010, the requirement for a

pilot to receive a clearance to cross every runway went into effect. The adoption of the ICAO phraseology "line up and wait" instead of "position and hold" was implemented in 2010.

2.12 The FAA, working with our Air Traffic Controller's union, is using a phased approach to implement a voluntary reporting system for air traffic controllers. The program is currently implemented at 322 facilities, giving over 20,000 controllers access. This system offers individual controllers an opportunity to provide valuable information that can be used to target safety risks that may not have been identified through existing audits, inspections, and automated tools. The program posts monthly analysis of data, weekly overviews of Event Review Committee activity, and safety issues that were identified through the voluntary reporting program on their web page. The FAA Airport's organization has also implemented a voluntary, not for retribution system for airport safety inspectors.

2.13 The FAA has developed standards for end-around taxiways, which can keep aircraft from having to cross runways being used for takeoffs and landings at the busiest airports. An end-around taxiway at Atlanta has been operational since April 2007, and another that opened at Dallas-Fort Worth in December 2008 has eliminated more than 1,500 runway crossings each day. There is also an associated reduction in radio communications – fewer transmissions and shorter conversations. The FAA also encourages operators to build perimeter roads around the airfield so that vehicles do not have to be driven across taxiways and runways.

2.14 The FAA formed a joint FAA-industry Runway Safety Council in October 2008 to explore the root causes of runway incursions. The Council is comprised of representatives from various parts of the aviation industry. The Council's Root Cause Analysis Team investigates serious runway incursions, conducts an analysis, and then presents its findings to the Council. The working group also makes recommendations on ways to improve runway safety to the Council. If accepted, these recommendations are assigned to the part of the FAA and/or the industry that is best able to control the root cause and prevent further runway incursions. The Council tracks recommendations to make sure appropriate action is taken. To date, the RCAT has investigated 8 incursions and forwarded 21 recommendations to the Council.

2.15 For almost 50 years, the FAAs wildlife hazard management program has focused on mitigating wildlife hazards on or near airports through various methods including habitat modification, harassment technology, research, and partnerships with academia, military, government, and the aviation industry. The FAA has two wildlife staff biologists who manage the FAAs wildlife program through the airport regulations (Part 139); advisory circulars and manuals; education and outreach; data collection; and memorandums of agreements and understanding with other government agencies, and the military.

2.16 Wildlife strikes are increasing. This is a result of significant increases in bird populations along with increases in the number of aircraft operations. The FAA believes that airport operators must be proactive and understand if they have a wildlife issue at their airport. The FAA initiated rulemaking to require certificated airports to conduct wildlife hazard assessment. The assessment will identify the number and species of wildlife on or near the airport. It will also identify the wildlife attractants on or near the airport. If the wildlife hazard assessment indicates that the airport has a wildlife hazard issue, then the airport must do a wildlife hazard management plan that explains the steps the airport will implement to mitigate the wildlife hazard. That plan must be submitted to the FAA for review and approval.

2.17 The FAA has also started a major initiative to require over 2,500 general aviation airports to conduct wildlife hazard assessments or site visits. If needed, the airport must complete a wildlife hazard management plan. Because of the large number of general aviation airports, it will take a ten-year period to complete all the assessments. The FAA will help airports by providing grant funding that the airport can use to hire a qualified wildlife biologist to perform the assessment.

2.18 The FAA is also evaluating the capability of bird radars to help airports implement wildlife hazard management programs. The FAA tested a number of commercially available bird radars and developed a performance specification in the form of an advisory circular, which airports can use to

competitively purchase bird radar systems. The specification provides the operational guidelines for airport operators to competitively acquire avian radar systems to enhance wildlife hazard mitigation practices.

2.19 The FAA will continue to evaluate commercially available avian radars and emerging sensor technologies such as electronic scanning radars. These systems send beams out in all directions rather than using the standard revolving radar antenna. Electronically scanned radar systems eliminate the time delay for scanning that is incurred with standard revolving antenna radar. This new technology radar is currently being tested at Dallas Fort Worth Airport. A new research effort will begin at the end of 2011 and will examine the feasibility and practicality of having pilots and air traffic controllers use aviation radar data to further reduce the likelihood of collisions between birds and aircraft.

2.20 For the last 15 years, the FAA and the Unite States Department of Agriculture's Wildlife Services have conducted a research program to make airports safer by reducing the risks of aircraft-wildlife collisions. The research efforts designed to improve wildlife management techniques and practices on and near airports include. The research has evaluated harassment techniques and methods for making the airport less attractive to wildlife. FAA has published the results of our wildlife research in a comprehensive Wildlife Hazard Management Manual. The manual has been translated into French and Spanish and provides practical methods that airport operators can use to mitigate wildlife hazards at their airport. It is available at no cost on the FAA web site.

2.21 The FAA has made significant progress in implementing Safety Management Systems (SMS). SMS will allow us to move to the next level of safety by formalizing the use of risk based analysis to identify potential risks and mitigate the risks to an acceptable level before an airport implements changes to procedures or airport geometry that could impact aviation safety. The FAA has conducted a number of SMS pilot programs at airports to gain experience that can help us develop an SMS regulation to require certificated airports to implement SMS. The FAA published a technical report in June 2011 that summarized the experiences of the SMS pilot airports. The FAA has also issued a Notice of Proposed Rulemaking (NPRM) for an airport SMS regulation for public comment. The comment period closed on July 5. 2011 and the FAA is reviewing the comments as it develops the final rule. We anticipate issuing a final airport SMS regulation by the end of 2012.

2.22 Another outcome of the ICAO Global Runway Safety Seminar was a new initiative to conduct a series of twelve regional runway safety seminars over the next two years. The United States is hosting the first of these regional Runway Safety Seminars. It is actually taking place at the same time as this New Caledonia meeting from October 11 to 14, 2011 in Miami, Florida.

3. ACTION BY THE MEETING

3.1 The Meeting is invited to:

a) note the contents of this paper, and

b) consider implementing some or all of the technologies and processes discussed to improve airfield safety.

— END —