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Agenda Item 4: Aviation Safety Matters
4.5 Other aviation safety matters

AERODROME SAFETY PROGRAMS UPDATE

(Presented by United States)

SUMMARY

Airports throughout the world routinely face a number of safety challenges. Improvements in procedures, programs and the introduction of new technology can help to improve safety. This paper discusses how the United States Federal Aviation Administration (FAA) places a high priority on improving airfield safety. The initiatives discussed here have helped the FAA maintain its commitment to safety. The programs and initiatives offered here include runway safety, mitigation of wildlife hazards, research and development, pavement management programs, Aircraft Rescue Firefighting (ARFF), implementation of Safety Management Systems, and other important initiatives and programs.

References:

- U.S. FAA Advisory Circular AC150/5200-37, *Introduction to Safety Management Systems for Airport Operators*
- U.S. FAA Advisory Circular 150/5220-22, *Engineered Materials Arresting Systems for Aircraft Overruns*

  Airport Cooperative Research Program (ACRP) Report 73, *Airport-to-Airport Mutual Aid Programs*

STRATEGIC OBJECTIVE	*This information paper is related to Strategic Objective:* *Safety – Enhance global civil aviation safety*

1. Introduction

1.1 The FAA regards safety as its number one priority and recognizes that there are many safety challenges faced by airport operators. To assist in addressing these challenges, the FAA is pursuing a number of programs and research activities to improve airport safety. This paper provides an update of a number of airport safety programs and initiatives currently in process.

2. **Discussion**

2.1 *Runway Safety Initiatives*: Runway Safety continues to be an important emphasis of the FAA. Although Vehicle Pedestrian Deviations (VPDs) were up slightly from Fiscal Year (FY) 2012 to FY2013, the number of the most serious (Category A) runway incursions dropped to just 2 in FY2013 from 6 in FY2012. Overall, in the two most serious categories (Category A and B) there were 10 runway incursions in 2013. It is also important to note that there were no Category A or B incursions in 2013 related to VPD events.

2.2 For many years, the FAA has actively invested in programs and technology to address airfield safety. We continue to deploy various technologies, such as Airport Surface Detection Equipment and Runway Status Lights (RWSL) and other new technologies to reduce risk on the surface. Changes to airport infrastructure and procedures have also been implemented throughout the United States, such as enhanced taxiway markings, improvements to runway safety areas (RSA) and increased driver training for all those with access to the movement area. In the human factors arena, changes have been made to policies for issuing taxi instructions and take-off clearances. In addition, a voluntary reporting system for air traffic controllers has been developed and implemented to aid in safety data collection and to incorporate safety management principles.

2.3 The FAA has also developed the Runway Safety Action Team Toolkit (RSAT). The RSAT toolkit was designed to assist regional and local runway safety teams in standardizing their efforts, and to provide them with the necessary tools and templates to make their work more efficient and effective. The RSAT toolkit is available at http://www.faa.gov/airports/runway_safety/resources/lrsat /.

2.4 Finally, as a result of the 2010 ICAO Global Runway Safety Seminar, the FAA hosted the first ICAO Regional Runway Safety Seminar (RRSS) in Miami. A primary goal of the regional seminars is to help states to establish Runway Safety Teams. The Miami event was a huge success and was attended by nearly 150 industry and government representatives from over 20 states throughout the region. Since the regional Miami seminar many states in the Caribbean and Latin America have worked actively to establish runway safety teams. The FAA also supported the RRSS in Antigua and plans to support the RRSS in Malaysia in November.

2.5 *Addressing Wildlife Hazards*: The risk of wildlife strikes is increasing. Many populations of birds commonly involved in strikes are growing at the same time that the rates of worldwide air traffic and passenger enplanements are increasing. The U.S. and states in the region are reporting significant increases in bird strikes.

2.6 The FAA requires that airports certificated in the United States that have a record of bird-strikes, or that experience one of several specific triggers, to conduct a wildlife hazard assessment (WHA). The FAA assists airport authorities by providing grant funding to help pay for WHAs and Wildlife Hazard Management Plans (WHMP). The FAA also provides guidance in the form of Advisory Circulars that describe the methodology for conducting a WHA and developing a WHMP. To date, all Part 139 airports have either conducted WHAs or have received funding from FAA to initiate WHAs as soon as possible.

2.7 Conducting a WHA is essential for an airport authority to know the wildlife situation on and around the airport. It is consistent with the tenets of Safety Management Systems (SMS), which require airport authorities to be proactive, to identify risks to airport safety, and to mitigate those risks to acceptable levels. The WHA is done over a one year period so that it adequately considers the wildlife threats in all seasons. The WHA is then submitted to the FAA for evaluation and determination whether a

WHMP is necessary. The assessment, which is required to be conducted by a qualified airport wildlife biologist, is the basis for the development of a WHMP. The WHMP documents the procedures the airport authority will implement to control wildlife, at or near the airport. It also describes the actions the airport authority will take to mitigate the wildlife hazards, the resources required, and the responsible personnel. Actions recommended in the WHMP may take many forms. In the WHMP airports will address: necessary management procedures related to wildlife hazards including, acquiring permits, developing and executing training, establishing communications with airport users, and defining and delegating responsibility for WHMP execution; establishing procedures for strike reporting and data collection; establishing procedures for wildlife control in and around the airport to include harassment, lethal control, and/or removal; establishing procedures for management of habitat and food sources around the airport including, controlling agriculture, waste management, managing water sources and minimizing attractants; working with authorities to secure adequate land-use controls for off-airport areas; and establishing the requirement to periodically reevaluate the WHMP and take the actions necessary to ensure its continued effectiveness.

2.8 The FAA has sponsored extensive research in methods and techniques for mitigating the risk of bird strikes. Research is underway in habitat modification, harassment techniques, and in the use of bird detecting radar.

2.9 The FAA sponsored Airport Cooperative Research Program has produced research studies in wildlife mitigation including: ACRP Synthesis Report Number 23: *Bird Harassment, Repellent, and Deterrent Techniques for Use on and Near Airport,* ACRP Synthesis Report Number 32: *Guidebook for Addressing Aircraft/Wildlife Hazards at General Aviation Airports,* and ACRP Synthesis Report Number 39: *Airport Wildlife Population Management*. Links to these reports can be found at: http://www.faa.gov/airports/airport_safety/wildlife/resources/.

2.10 Much of that research, wildlife management techniques and guidance, and specific recommendations, can be obtained at the FAA wildlife mitigation website (http://www.faa.gov/airports/airport_safety/wildlife/guidance/) and in the *Wildlife Hazard Management at Airports* document available at that website.

2.11 *Industry-Government Wildlife Collaboration Initiative*: Civil aviation authorities (CAAs) and industry must work together to address hazardous wildlife issues in a regional, cooperative, and prioritized manner. The Industry-Government Wildlife Collaboration Initiative is such an effort between the FAA, the United States Department of Agriculture (USDA), the International Air Transport Association (IATA), the Latin American and Caribbean Air Transport Association (ALTA), their partner air carriers, and the Airports Council International (ACI). These organizations have teamed up to work collaboratively with airports authorities, CAAs and ICAO to address hazardous wildlife issues in the Caribbean and Pan-American regions. The concept of this initiative is that each partner possesses unique resources and abilities that when shared through this partnership will benefit the member organizations and the region as a whole. Each partner brings its unique resources to assist CAAs and airports authorities that desire assistance in mitigating wildlife hazards.

2.12 The partners developed a steering committee made up of members from each of the team's organizations. The steering committee worked with regional air carriers and regional airports authorities to identify priority locations for initial participation in specific pilot projects. Panama and Ecuador were selected as locations for the pilot projects. Following the selection of these pilot projects and identification of in-country project champion teams (made up of air carrier, CAA, and airport authority staff from the local area) the USDA selected two highly qualified biologists who assisted with the assessments and the development of mitigation plans. In addition, an FAA Wildlife Biologist accompanied the USDA team to provide additional technical and program guidance. The first

assessment (initial pilot project) began the week of June 25th, 2012, in Panama and the final site visit took place July 2013. The steering committee has been working with the ICAO Regional Aviation Safety Group-Pan-America (RASG-PA) Executive Steering Committee, and the regional wildlife group (CARSAMPAF) throughout the program to gather additional data and recommend mitigation actions. Now that the pilot project is being wrapped up, the steering committee has begun working on implementing the program model in Brazil and Colombia in 2014.

2.13 *Engineered Materials Arresting System*: The development and use of Engineered Materials Arresting Systems (EMAS) to arrest aircraft in the event of an aircraft overrun has been a huge success in the United States. To date, EMAS has been deployed at 70 runway ends at 46 airfield locations throughout the United States, and has successfully stopped 8 overrunning aircraft. It has been deployed at several international locations as well. The latest successful aircraft overrun arrest in the United States happened at Palm Beach Airport in October 2013 when a Cessna Citation was successfully arrested after having overrun the runway.

2.14 As evidence of its continued commitment to the value of this system, the FAA has recently supported installation of EMAS systems in Tennessee, Massachusetts, New York and New Jersey, and currently has plans to install additional systems in New York, New Jersey, California and Ohio.

2.15 *Runway Safety Area Improvements*: The FAA has continued to make progress in improving Runway Safety Areas (RSAs). These areas enhance safety in the event an aircraft undershoots, overshoots, or veers off of the side of a runway. Several FAA internal orders are used to determine the best practicable and financially feasible alternative for RSA improvement (which may include the deployment of EMAS). The FAA started a program in fiscal year 2000 to accelerate RSA improvements for commercial service runways in the United States. FAA analysis shows that a standard EMAS installation can provide the equivalent protection as a standard 1,000 foot RSA. As of the end of FY 2013, a total of 578 RSAs have been improved since 2000. A total of 24 RSAs are scheduled for improvement in 2014. The FAA expects to make all practicable RSA improvements at commercial service airports by the end of 2015.

2.16 *Aerodrome Certification Training*: The FAA encourages states that have not yet certified their international airports to complete this important ICAO requirement. To help with this effort, the FAA has supported many training initiatives for aerodrome inspectors throughout the world, to include the offer of resident training for airport inspectors at the FAA Academy in Oklahoma City, Oklahoma. Most recently, the FAA supported the ICAO Mexico City regional office and the Sint Maarten CAA in conducting a regional aerodrome certification inspector training seminar held in Sint Maarten, June 11-15, 2012. Two highly qualified FAA inspectors assisted the Sint Maarten CAA and ICAO in week-long training of certification procedures, wildlife control, rescue fire-fighting, emergency management, compliance and enforcement, and other program elements and aspects of successful aerodrome certification programs. The seminar was open to all of the CAAs of the Caribbean and Pan-American regions.

2.17 *Safety Management Systems*: The FAA is working to implement SMS at aerodromes in the United States. To provide initial SMS guidance to airport authorities, the FAA published Advisory Circular 5200-37, *Introduction to Safety Management Systems at Airports*. That Advisory Circular is available at the FAA website and has been recently updated in draft form as AC150/5200-37A. Following the publication of AC150/5200-37 several SMS pilot studies were undertaken to gain experience with SMS and provide information that will help the FAA develop an amendment to our aerodrome certification regulation (Part 139) to require aerodromes to implement SMS. We issued a Notice of proposed rulemaking for airport SMS and are currently reviewing the large number of comments

received. Rulemaking in the United States is a lengthy process and we anticipate issuing a final airport SMS rule in fall of 2015. Finally, in order to introduce SMS principles, including the provision of Safety Risk Management (SRM) at certain commercial service airports, the FAA conducted several studies and efforts which resulted in promulgation of an internal order that requires the provision of SRM during planning and construction projects at our 29 large hub airports. The FAA is fully committed to implementing airport SMS.

2.18 *Airport Foreign Object Debris (FOD) Programs*: The presence of foreign objects in the airport environment introduces a major hazard to aircraft safety. FOD is any substance, debris, or article alien to the vehicle or system that could potentially cause damage. Identification of FOD at airports requires observation of airport surfaces or chance recognition by aircraft operating on the airport.

2.19 The FAA conducted an evaluation of an automated FOD detection system at John F. Kennedy International Airport to determine the capability of detecting objects as small as a two-inch long bolt on the pavement surface. We concluded from the research effort that under many operational and environmental conditions, the FOD detection system can identify even small objects. The FAA installed four types of automated FOD detection systems at three large U. S. airports: one each at the Theodore Francis Green Airport in Providence, Rhode Island, and Boston Logan International Airport; and two at Chicago O'Hare. We evaluated, documented, and summarized key operational characteristics of each FOD detection system and then published an FAA performance specification that airports can use to procure these FOD detection systems.

2.20 The FAA will be conducting further evaluation of FOD detection systems at Boston and Miami airports in 2014.

2.21 The FAA also recognizes that besides technology, FOD management programs are also critical to controlling dangerous FOD at airports. To that end the FAA published AC150/5210-24, *Airport Foreign Object Debris Management*. This document addresses prevention, detection and removal, and offers simple but effective strategies and practices that can reduce FOD at airports.

2.22 In a further effort to enhance safety the FAA has developed a prototype FOD reporting page. The purpose of the page is not to quantify the amount of FOD at a single airport, but rather to provide an overall awareness of FOD events, identify recurring issues, and single out problem areas at airports across the country. Airport operators are encouraged to report FOD using this page.

2.23 *Aircraft Fire Research.* The FAA has also expanded its ARFF research program to include firefighting strategies and technologies for cargo aircraft. Researchers have completed over a year's worth of full-scale live fire testing involving a retired Airbus A-310 cargo aircraft. Research reports from this program were recently published detailing the findings in areas of firefighting strategies and tactics, development of a prototype firefighting nozzle, weight and balance behavior of freighter aircraft and aircraft skin-penetrating nozzle testing of cargo liner materials. The results of this research will be of great value to airport fire departments that may respond to fires involving cargo aircraft.

2.24 The FAA is also researching the effects that advanced composite materials used in aircraft construction might have on the ARFF response to post-crash fires. One of the projects in this program is to develop a live fire test protocol that would determine if fires involving aircraft built with advanced composite material fuselages have any additional challenges or agent requirements than older aluminum built aircraft. Currently two advanced composite materials are used in construction of commercial aircraft fuselages; GLAss-REinforced Fiber Metal Laminate, commonly called GLARE, and carbon fiber composite. The objective of this series of tests is to assess the specific fire behavior of these materials such as if the materials support self-sustained burning or smoldering after fire exposure. These

tests comprise phase one to assess the fire behavior of fuselage composite materials. The second phase will be to determine the amount of firefighting agent needed to extinguish and cool the composite**.**

2.25 *U. S. National Airport Pavement Test Facility*: The FAA continues to conduct pavement research at the U. S. National Airport Pavement Test Facility at the William J. Hughes Technical Center in Atlantic City, New Jersey. The facility includes:

- A 900-foot-long by 60-foot-wide in-door test pavement,
- Embedded pavement instrumentation and a dynamic data acquisition system,
- Environmental instrumentation and a static data acquisition system (4 samples per hour)
- A test vehicle for loading the pavement with up to 20 aircraft tires at wheel loads of up to 75,000 pounds.
- The test vehicle is capable of simulating aircraft weighing up to 1.3 million pounds.

2.26 The results from research conducted at the facility by the Airport Technology R&D Branch have led to the development of software and advisory circulars for airport pavement thickness design, ACN/PCN (aircraft classification number – pavement classification number) computation, airport pavement roughness indices, and an airport pavement management system.

2.27 *Airport Pavement Management System*: FAA PAVEAIR, released in 2011, is a web-based airport pavement management system that provides users with historic and current information about airport pavement construction, maintenance, and management. PAVEAIR 2.0 was released June of 2012. Overall the program has been a huge success. It offers users a planning tool for modeling airport pavement surface degradation due to external effects such as traffic and environment. The program can be used with other FAA pavement applications to help users determine optimum repair scheduling and maintenance strategies. We developed it for installation and use on a stand-alone personal computer, an intranet, and the internet. An implementation of the internet version of FAA PAVEAIR is made available by the William J. Hughes Technical Center on the FAA PAVEAIR web site at http://faapaveair.faa.gov.

2.28 *Airport Cooperative Research Program (ACRP):* The FAA also sponsors a unique cooperative research program, providing US$15 million per year to fund ACRP research studies. ACRP was established by the U. S. Congress to provide research on problems shared by airports that are not being address by other Federal research programs. The FAA entered into an agreement with the National Academy of Sciences and its Transportation Research Board (TRB) to administer the program. Each year, TRB solicits research topics from airports and the aviation community in the areas of airport safety, airport environmental issues, airport administration, and airport capacity. Typically, TRB receives about 150 research topic proposals. Oversight comes from the ACRP Oversight Committee (AOC), consisting of airport executives, consultants, members of academia, the FAA, and airport associations. The AOC meets in July each year to select the most promising topics for funding. Typical studies are funded at between $300,000 and $500,000 and take one to two years to complete. TRB forms a volunteer technical panel of experts to turn the topic into a request for proposal to solicit contractors wanting to do the research. The technical panel selects the best proposal, and TRB awards the study contract.

2.29 ACRP studies are available online at no charge on the TRB and FAA web sites. These studies are of value to all airports. They are generally reports of best practices or guidebooks on important issues such as airport sustainability, deicing, maximizing airport revenue, mitigating wildlife hazards, irregular operations, emergency planning, and many other useful topics. The ACRP publishes the following type reports:

- Project reports (Original research projects that are often written as guidebooks or manuals)

- Synthesis reports (State of the practice based on literature reviews and surveys)
- Research results digest (Promote awareness of project results to facilitate implementation)
- Legal research digests (Reports on legal issues, case law, or specific legal solutions)

2.30 Currently there are 249 ACRP publications available, which include 100 Reports, 18 Research Digests, 21 Legal Digests, 49 Synthesis studies, 16 Web only documents, 39 CDs, 2 Conference Proceedings, and 4 Brochures. For fiscal year 2014, 28 projects have been selected to be studied, ranging in topics from assessing specific airport noise impacts, to conducting risk assessments of runway protection zones. Nine Synthesis studies and two Legal research studies will also begin in 2014.

2.31 The ACRP accepts research topics from the international community. The TRB web site (http://www.trb.org/ACRP/ACRP.aspx) contains more information about ACRP and how to submit a research topic. It is easy to do and they are usually only two-to-three pages. Normally, submissions for project efforts are received in July for the following fiscal year (FY), and in September for synthesis research projects. The individual or organization submitting a topic cannot also be awarded the final contract to do the research.

2.32 *Latin-American/Caribbean Disaster Operations Group Project*: In the United States the Disaster Operations Group (DOG) concept has been adopted by airports to establish procedures and protocols for airport-to-airport assistance following times of disaster. This concept was documented thoroughly in a Transportation Research Board, Airport Cooperative Research Program report in July of 2012 (ACRP report #73). The DOG concept in the U.S. is physically executed primarily by two organizations, the Southeast Airports Disaster Operations Group (SEADOG) and the Western Airports Disaster Operations Group (WESTDOG).

2.33 At the 2013 Central Caribbean Directors of Civil Aviation (C/CAR/DCA) meeting in Havana, Cuba, the U.S. presented a Working Paper discussing the idea of developing a similar Disaster Operations Group for Latin America and the Caribbean (Latin American/Caribbean Disaster Operations Group – LACDOG). The idea was endorsed and a committee was formed, with the U.S., Jamaica, Cuba, Honduras, Dominican Republic, Mexico and the International Civil Aviation Organization North American Central American Caribbean (ICAO-NACC) office, as members.

2.34 The work of the committee is in the preparatory stages and a face-to-face meeting is scheduled for early 2014 in Mexico City. To prepare for that meeting, the U.S. has developed goals and objectives documents, has developed an introductory concept document, and has coordinated with industry and airports to secure their assistance with development of this concept in the region.

2.35 So far, the idea of expanding the DOG concept in the region has been briefed to and endorsed by both SEADOG and WESTDOG. There are also several U.S. airports and industry groups that are interested in becoming involved. This would not only serve to provide important real-world experience, but also might open up direct physical assistance to the LACDOG group.

2.36 Finally, the FAA has worked directly with the non-governmental organization, Americas Relief Team and their project staff for the Port Resiliency Program (PReP). This program, sponsored by FedEx, was designed to improve the disaster resiliency of air and sea ports throughout the Latin American and Caribbean region. As it shares many concept elements with the LACDOG idea, it was a natural fit to establish cooperation between the two programs to share ideas, technical experience, and contacts.

3. Conclusion

3.1 There are many safety challenges faced by airports throughout the world. There are also many creative solutions to address those challenges. This paper offers a glimpse at several such safety initiatives and alternatives.

4. Recommendation:

4.1 This group is invited to:

a) note the contents and conclusions of this paper; and

b) consider adoption or implementation of the technologies and/or processes discussed to address the on-going safety challenges faced by airports.

— END —