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BEFORE THE
UNITED STATES SENATE COMMITTEE ON APPROPRIATIONS,
SUBCOMMITTEE ON
TRANSPORTATION, HOUSING AND URBAN DEVELOPMENT,
AND RELATED AGENCIES:
OVERSIGHT OF THE FEDERAL AVIATION ADMINISTRATION,
JULY 31, 2019

Chairman Collins, Ranking Member Reed, Members of the Subcommittee:

Thank you for inviting me to speak with you today to update you on the Federal Aviation Administration's (FAA) work to fulfill its mission to provide the safest, most efficient airspace system in the world. The FAA is committed to advancing the Administration's and the Department of Transportation's priorities of creating stronger infrastructure that supports a growing economy and continuing American leadership in innovation while maintaining safety and access for all users of the National Airspace System (NAS). Our employees are working diligently to accomplish the directives Congress set forth in the *FAA Reauthorization Act of 2018* and the *Consolidated Appropriations Act, 2019*, which together provide a reliable foundation for the FAA to achieve these objectives. Accompanying me today are Ali Bahrami, Associate Administrator for Aviation Safety; Angela H. Stubblefield, Deputy Associate Administrator for Security and Hazardous Materials Safety; and Winsome Lenfert, Deputy Associate Administrator for Airports. With their help, I would like to highlight for you some of our activities in these specific areas: aviation safety, unmanned aircraft systems (UAS) integration, and airports and infrastructure.

Aviation Safety

Safety is the core of the Federal Aviation Administration's mission and our top priority. With the support of this Committee, we have worked tirelessly to take a more proactive, data-driven approach to oversight that prioritizes safety above all else inside the FAA and within the

aviation community that we regulate. The result of this approach is that the United States has the safest air transportation system in the world. Since 1997, the risk of a fatal commercial aviation accident in the United States has been cut by 94 percent. With respect to commercial space transportation, since 1995, there have been a total of 388 licensed or permitted launches and reentries (19 so far in 2019), all without any fatalities, serious injuries, or significant property damage to the general public. In the past ten years, there has been one passenger fatality on a U.S. commercial airline in over 90 million flights. But one fatality is one too many, and a healthy safety culture requires continuous attention and commitment to continuous improvement.

In order to maintain the safest air transportation system in the world, the FAA has evolved from a prescriptive and more reactive approach to its safety oversight responsibilities to one that is performance-based, proactive, centered on managing risk, and focused on continuous improvement. This approach to safety oversight relies on access to data and requires the open and transparent exchange of information. We know that it takes collaboration, communication, and common safety objectives to allow the FAA and the aviation community to identify system hazards and to implement safety solutions. This approach gives us knowledge that we would not otherwise have about safety events and risks. Sharing safety issues, trends, and lessons learned is critical to recognizing potential risks in the system. The more data we have, the more we can learn about the system, which in turn allows us to better manage and improve the system.

The FAA's grounding of the Boeing 737 MAX airplane placed a spotlight on safety and our approach to oversight of those we regulate. With respect to the certification of the 737 MAX, the facts are these: it took five years to certify the 737 MAX. Boeing applied for certification in January 2012. The certification was completed in March 2017. During those five years, FAA safety engineers and test pilots put in 110,000 hours of work, and they flew or

supported 297 test flights. After certification of an aircraft design, the FAA continues to oversee the aircraft's production and operation. As we obtain pertinent information, identify potential risk, or learn of a system failure, we analyze it, determine how best to mitigate the risk, and require operators to implement the mitigation.

This approach to safety and fact-based, data-driven decision making has been the FAA's guiding principle in our response to the Lion Air and Ethiopian Airlines accidents. Once the FAA had data showing similarities between the two accidents that warranted further investigation of the possibility of a shared cause, the FAA made the decision to ground all 737 MAX airplanes operated by U.S. airlines or in U.S. territory pending further investigation.

As part of the FAA's commitment to continuous improvement, we both welcome and invite review of our processes and procedures. A number of reviews and audits have been initiated to look at different aspects of the 737 MAX certification. After the FAA grounded the 737 MAX, Secretary Chao asked the Department of Transportation's Inspector General to conduct an audit of the certification for the 737 MAX, with the goal of compiling an objective and detailed factual history of the activities that resulted in the certification of the 737 MAX aircraft. Secretary Chao also announced the establishment of a Special Committee to review the FAA's procedures for the certification of new aircraft, including the 737 MAX. The Special Committee to Review FAA's Aircraft Certification Process is an independent body whose findings and recommendations will be presented directly to the Secretary and the FAA Administrator.

The FAA also established a Joint Authorities Technical Review (JATR) to conduct a comprehensive review of the certification of the automated flight control system on the Boeing 737 MAX. The JATR is chaired by former NTSB Chairman Christopher Hart and comprises a

team of experts from the FAA, National Aeronautics and Space Administration (NASA), and the aviation authorities of Australia, Brazil, Canada, China, the European Union, Indonesia, Japan, Singapore, and the United Arab Emirates. Completion of the JATR's work is not a prerequisite for returning the 737 MAX to service; however, the FAA will consider the findings and recommendations of each of the participants as we continually review our processes.

Additionally, the FAA met with safety representatives of the three U.S.-based commercial airlines that have the Boeing 737 MAX in their fleets, as well as the pilot unions for those airlines. This meeting was an opportunity for the FAA to hear individual views from operators and pilots of the 737 MAX as the agency evaluates what needs to be done before the FAA makes a decision to return the aircraft to service in the United States. In keeping with the FAA's longstanding cooperation with its international partners, the FAA also recently hosted a meeting of Directors General of civil aviation authorities from around the world to discuss the FAA's activities toward ensuring the safe return of the 737 MAX to service. We continue to be in frequent communication with the international aviation safety community and are working closely with our counterparts to address their concerns and keep them informed of progress.

The FAA also initiated a multi-agency Technical Advisory Board (TAB) review of Boeing's Maneuvering Characteristics Augmentation System (MCAS) software update and system safety assessment in order to determine sufficiency. The TAB consists of a team of experts from the U.S. Air Force, NASA, Volpe National Transportation Systems Center, and the FAA. None of the TAB experts have been involved in any aspect of the Boeing 737 MAX certification. The TAB is charged with evaluating Boeing and FAA efforts related to the software update and its integration into the flight control system. The TAB will identify issues where further investigation is required prior to approval of the design change. The JATR is

looking broadly at the original certification of the 737 MAX flight control system, while the TAB is evaluating Boeing's proposed technical solutions related to the two accidents. The TAB's recommendations will directly inform the FAA's decision concerning the 737 MAX fleet's return to service.

The FAA is following a thorough process, not a prescribed timeline, for returning the 737 MAX to passenger service. We continue to evaluate Boeing's software modification to the MCAS, and we are still developing necessary training requirements. The 737 MAX will not return to service for U.S. carriers and in U.S. airspace until the FAA's analysis of the facts and technical data indicate that it is safe to do so.

UAS Integration

The FAA's commitment to global leadership in aviation is equally evident in the area of UAS integration. The steady development and expansion of UAS has created a dynamic change in aviation that we have not seen since the dawn of the jet age. The FAA is committed to supporting this change and to working with the UAS community to ensure that this technology is integrated into the NAS safely and securely. UAS offer expanded capabilities in aviation with a fast pace of innovation and increasing volume of operations. For example, the progression of UAS innovation and the change in product cycles can generally be measured in months, not years. Similarly, the volume of UAS operations is outpacing manned aircraft. Currently, there are nearly four times as many UAS as registered manned aircraft.

The new dynamics that UAS bring to the NAS redouble our focus on the safety of all aircraft operations as the FAA's first priority. An ongoing challenge to UAS integration is the potential for conflict between manned and unmanned aircraft. We continue to engage in outreach to UAS operators and the public at large to educate current and prospective drone users

about their safety responsibilities. Efforts such as the "Know Before You Fly" information campaign have encouraged UAS operators to understand the rules and responsibilities for flying an aircraft in the NAS. This campaign and the FAA's related work on the "B4UFLY" mobile application are bearing fruit. The annual rate of increase of pilot reports about UAS operating in places where they should not be is dropping by 50 percent each year—while the number of UAS operating in the airspace is increasing.

The UAS Integration Pilot Program (IPP)[1] also has been a crucial step in accelerating the Department of Transportation's and FAA's UAS integration efforts. Through the IPP, nine different communities across the country are working to identify ways to balance local and national interests. The IPP is a case study in communications, security, privacy, and data collection. The experience gained and the data collected from the IPP will help ensure the United States remains the global leader in safe UAS integration and fully realizes the economic and societal benefits of this technology. In fact, the IPP is already paying dividends on the investment. Recently, the FAA granted the first air carrier certification to a commercial drone operator for package deliveries in rural Blacksburg, Virginia. Although the regulatory framework for broader drone operations is not complete, the IPP has helped to inform the FAA and drone operators of the extent to which operations can begin under existing rules.

UAS Rulemaking

The FAA currently is enabling safe UAS operations using existing rules, but we also understand the need to focus on enabling an ever-expanding universe of UAS operations and capabilities. In order to allow for such operations to be conducted safely and securely, the FAA has moved forward with a number of regulatory initiatives. Together with the Department of

[1] https://www.whitehouse.gov/presidential-actions/presidential-memorandum-secretary-transportation/

Transportation's Office of the Secretary, the FAA recently published a proposed new rule on the operation of small UAS over people.[2] The proposal seeks to mitigate safety risks without inhibiting technological and operational advances. The FAA also recently published an advanced notice of proposed rulemaking seeking public input to identify drone safety and security issues and explore ways to mitigate risks UAS may pose to other aircraft, people on the ground, or to national security.[3] The FAA's security partners have helped to highlight some of the important security and public safety questions that must be addressed.

Additionally, in February 2019, the FAA published an interim final rule on external marking requirements for small UAS.[4] The rule requires small unmanned aircraft owners to display their unique identifier (registration number) on an external surface of the aircraft. Identifiers are assigned by the FAA upon completion of the registration process. Small unmanned aircraft owners are no longer permitted to enclose the FAA-issued registration number in a compartment. The FAA took this action to address concerns expressed by the law enforcement community and the FAA's interagency security partners regarding the risk a concealed explosive device poses to first responders who must open a compartment to attempt to find the small unmanned aircraft's registration number.

UAS Remote Identification

Going forward, the ability to remotely identify UAS operators will be a crucial stepping stone for UAS traffic management and will facilitate what we envision as high volume, safe, and

[2] https://www.federalregister.gov/documents/2019/02/13/2019-00732/operation-of-small-unmanned-aircraft-systems-over-people

[3] https://www.federalregister.gov/documents/2019/02/13/2019-00758/safe-and-secure-operations-of-small-unmanned-aircraft-systems

[4] https://www.federalregister.gov/documents/2019/02/13/2019-00765/external-marking-requirement-for-small-unmanned-aircraft

secure low-altitude UAS operations. Congress recognized the importance of remote identification when it enacted the FAA Extension, Safety, and Security Act of 2016. That Act laid the foundation for FAA's work with operators and our security partners to realize the importance of remote identification and to reach a consensus on how to address it. More recently, the FAA Reauthorization Act of 2018 provided the FAA with additional authority to move ahead with work on universal registration and remote identification—both of which are critical to the success of commercial UAS operations and UAS integration more broadly.

Remote identification is fundamental to both safety and security of drone operations. Remote identification will be necessary for routine beyond visual line-of-sight operations and operations over people, package delivery, operations in congested areas, and the continued safe operation of all aircraft in shared airspace. It will also be foundational for the advancement of automated passenger or cargo-carrying air transportation—what is often referred to as Urban Air Mobility. From a security perspective, remote identification would enable us to connect a suspect UAS to its control station location and to identify the registered owner of a suspect UAS. With universal remote identification, the FAA, our national security partners, and state and local law enforcement will be better able to locate and identify a UAS operator, determine if a UAS is being operated in an unsafe, unauthorized, or criminal manner, and take appropriate action if necessary. The FAA is committed to establishing remote identification requirements as quickly as possible.

UAS and the Airport Environment

With the December 2018 protracted UAS disruption at Gatwick Airport, and other reported disruptions at airports around the world and in the United States, the FAA understands and shares the concerns of airlines, airport sponsors, and our security partners regarding the

potential safety hazards and security threats presented by errant or malicious UAS, particularly in and around the airport environment. A number of airport sponsors have acquired or are pursuing possible acquisition of UAS detection systems for their airports. In an effort to make sure such activity is conducted in a safe and coordinated manner, in early May, the FAA sent informational correspondence to airport sponsors, which included information to support informed airport decision-making regarding the demonstration or installation of UAS detection systems at airports (including the legal uncertainties posed by certain UAS detection systems), answers to some frequently asked questions, and technical considerations that the FAA has used to assess the readiness of UAS detection technologies.[5] The FAA wants to coordinate with airports that plan to use UAS detection systems to ensure deployment and use do not create interference or obstruction with other aviation safety and efficiency systems.

Given the events in Gatwick, there is no doubt about the significant operational and economic impacts a persistent UAS disruption can have in the airport environment and the need to be able not only to detect, identify, and track a disruptive UAS, but also to be able to take action to end the disruption. The FAA along with our federal security partners have formulated a concept of operations (CONOPS) for a National Federal Response plan through which current federal counter-UAS (C-UAS) authorities and existing federal C-UAS equipment can be rapidly projected into a major U.S. airport experiencing a persistent operational disruption due to an unauthorized UAS operation. This CONOPS has been socialized with airport and airline associations and should be finalized for implementation soon.

[5] https://www.faa.gov/airports/airport_safety/media/Updated-Information-UAS-Detection-Countermeasures-Technology-Airports-20190507.pdf

Airports and Infrastructure

Airport infrastructure in the United States, with 3,332 airports and 5,000 paved runways, supports our economic competitiveness and improves the safety and efficiency of our air transportation system. According to the FAA's most recent economic analysis, U.S. civil aviation accounts for $1.6 trillion in total economic activity and supports nearly 11 million jobs. The FAA's Office of Airports provides leadership in maintaining a safe, secure, efficient, environmentally sustainable, and fiscally responsible system of airports. Under Secretary Chao's leadership, the Department of Transportation and the FAA are delivering Airport Improvement Program (AIP) investments for the American people, who depend on reliable infrastructure. The FAA is also helping to streamline non-aeronautical development at airports and is increasing airport safety by addressing runway incursions and improving runway safety areas (RSA).

AIP Investments

Through the *Consolidated Appropriations Act, 2018*, Congress provided an additional $1 million in supplemental funding for infrastructure grants. The FAA published a Federal Register notice on July 9, 2018[6], explaining the evaluation criteria and submission process for supplemental discretionary funding requests. The requirements under the *Consolidated Appropriations Act, 2018* included: requiring the FAA to give "priority consideration" to specific types of airports (smaller and more rural airports); for non-primary airports, there is no local match required for the work covered by the grant; and requiring the FAA to obligate the supplemental funding by September 2020. After the FAA awarded an initial round of $205 million to 37 airports in 34 states in September 2018, airports in October 2018 submitted

[6] https://www.federalregister.gov/documents/2018/07/09/2018-14675/supplemental-guidance-on-the-airport-improvement-program-aip-for-fiscal-years-2018-2020

additional funding requests for grant awards in fiscal years (FY) 2019 or 2020. This project solicitation resulted in requests totaling $10.9 billion in funding.

On May 15, 2019, Secretary Chao announced the intent to award another $779 million in supplemental funding for infrastructure grants to 127 airports in all 50 states and Puerto Rico. This represented the final round of grants awarded under the supplemental funding provided in the *Consolidated Appropriations Act, 2018*. Overall, about 88% of the supplemental funds went to airports meeting the statutory criteria for "Priority Consideration" and more than $430 million went to non-primary airports. Recipients of the selected grants will still need to meet any remaining required approvals. Selected projects include runway reconstruction and rehabilitation, as well as new construction or rehabilitation of taxiways, aprons, and terminals. The construction and equipment supported by this funding increase airports' safety, emergency response capabilities, and capacity, and could support further potential growth and development within each airport's region. The FAA is currently working through the normal Airports Capital Improvement Plan (ACIP) process to identify and evaluate potential projects for the $500 million in supplemental funds appropriated in FY 2019.

With regard to the total $3.18 billion in regular FY 2019 AIP funding for airports across the United States, Secretary Chao has announced three allotments totaling almost $1.8 billion in grants awarded for over 900 airports. Some notable examples of the grant awards include: $11 million for reconstruction of Runway 5/23 and mitigation of factors contributing to runway incursions in Des Moines, Iowa; $10.4 million for construction of an aircraft rescue and firefighting building and acquisition of two aircraft rescue and firefighting vehicles to enhance airport safety in Birmingham, Alabama; $3.1 million for runway rehabilitation in Charleston, West Virginia; $2.7 million for mitigation of airport noise in New Haven and East Haven,

Connecticut; and $2 million for rehabilitation of a general aviation apron used for aircraft parking in Helena, Montana.

Streamlining Certain Types of Development

The Department of Transportation and the FAA are also working to streamline project reviews and remove unnecessary barriers to development. Section 163 of the *FAA Reauthorization Act of 2018* provided a framework for the FAA to determine that certain types of proposed development projects no longer trigger a need for formal FAA review and approval. To date, the FAA has received over 40 requests for determinations under section 163 and has issued 25 determinations. Some examples of projects receiving determinations under section 163 are the sale of 11.8 acres of airport land for development of a $37 million facility in the Purdue University-affiliated Discovery Park District in Lafayette, Indiana; and the long-term lease and construction of industrial warehouse flex facilities on 27 acres of land acquired with Airport Development Aid Program[7] funds in Pittsburgh, Pennsylvania. Because formal FAA review and approval is not required for these projects, they may be able to begin construction more quickly.

Airport Safety

The FAA also is engaged in several successful efforts to improve safety at our nation's airports. Runway incursions, which include wrong runway landings and takeoffs, are a top airport safety concern for the FAA. Research has shown that airport geometry can contribute to runway incursions. As a result, the FAA has provided airports with updated guidance on recommended taxiway layouts.[8]

[7] A forerunner to the current Airport Improvement Program.
[8] Advisory Circular 150/5300-13, "Airport Design" and Engineering Brief Number 75, "Incorporation of Runway Incursion Prevention into Taxiway and Apron Design" available at www.faa.gov/airports/resources/.

A research study conducted in FY 2012 identified 140 locations with nonstandard geometry and a high incidence of runway incursions using data from FY 2008 through FY 2012. As a result, the FAA launched the Runway Incursion Mitigation (RIM) program in FY 2015 to help mitigate the nonstandard geometry at these locations and ultimately reduce the number of runway incursions. The FAA maintains a RIM database, which is updated annually with new data.

Currently, there are 128 RIM locations at 77 airports. Airports can utilize a variety of mitigation strategies to eliminate nonstandard geometry configurations and reduce the likelihood of pilot confusion and ultimately, runway incursions. Airports often use a combination of mitigation strategies for RIM locations, which can include changes to airport geometry, lights, signs, markings, and/or operational procedures.

To date, 39 locations have been mitigated through the RIM program, including Santa Barbara Municipal Airport, Corpus Christi International Airport, and Albuquerque International Airport. Before mitigation, these 39 locations experienced 435 runway incursions, compared to 30 runway incursions after mitigation. The RIM locations will be monitored over time to determine if mitigation efforts were successful and whether or not additional mitigation is needed.

The FAA has also worked to mitigate the impacts of runway excursions—incidents where an aircraft overruns, undershoots, or veers off the side of a runway—by improving RSA at commercial service airports. The RSA is typically 500 feet wide and extends 1,000 feet beyond each end of the runway. Many airports were built before the current 1,000-foot RSA standard was adopted approximately 20 years ago. In some cases, it is not practicable to achieve the full

standard RSA because there may be a lack of available land. There also may be obstacles such as bodies of water, highways, railroads, and populated areas or severe drop-off of terrain.

The FAA began conducting research in the 1990s to determine how to improve safety at airports where the full RSA cannot be obtained. Working in concert with the University of Dayton, the Port Authority of New York and New Jersey, and the Engineered Arresting Systems Corporation (ESCO) of Logan Township, NJ, a new technology emerged to safely stop overrunning aircraft. Engineered Material Arresting System (EMAS) uses crushable material placed at the end of a runway to stop an aircraft that overruns the runway. The tires of the aircraft sink into the lightweight material and the aircraft is decelerated as it rolls through the material.

The EMAS technology improves safety benefits in cases where land is not available, or not possible to have the standard 1,000-foot overrun. A standard EMAS installation can stop an aircraft from overrunning the runway at approximately 80 miles per hour. An EMAS arrestor bed can be installed to help slow or stop an aircraft that overruns the runway, even if less than a standard RSA length is available.

As of October 2014, there are two manufacturers of EMAS products that meet the FAA requirements of advisory circular 150-5220-22B, "Engineered Materials Arresting Systems for Aircraft Overruns"—ESCO and Runway Safe. The FAA must review and approve each EMAS installation. Currently, ESCO's EMAS is installed on 112 runway ends at 68 U.S. airports, with plans to install 3 EMAS at 2 additional U.S. airports. Runway Safe's EMAS is installed on four runway ends at Chicago Midway Airport. To date, there have been 15 incidents where ESCO's EMAS has safely stopped overrunning aircraft with a total of 406 crew and passengers aboard those flights.

EMAS and other RSA improvements have minimized adverse impacts otherwise resulting from runway excursions. For example, in July 2013, Asiana Airlines Flight 214 landed short on Runway 28L at San Francisco International Airport. Although the aircraft sustained severe damage and three people died, everyone else on board the aircraft survived, with many being able to walk away, due to an RSA improvement that provided the standard 600' of available "undershoot" before the runway. Had it not been for this enhancement, the aircraft would have landed short in San Francisco Bay. And in March 2017, a McDonnell Douglas MD83 aircraft carrying the University of Michigan Men's Basketball Team overran Runway 23L during a rejected take-off at Detroit Willow Run Airport, and entered an RSA that had been improved to meet current standards. Although there was damage to the aircraft, there was only one minor injury reported.

Conclusion

In this age of innovation that is reshaping the NAS, the pace of technological change is nothing short of amazing. What has not changed, however, is the FAA's focus on safety. It is our number one priority and the foundation for everything that we do. The United States is the gold standard in aviation safety and the FAA is committed to maintaining that standard. In our quest for continuous safety improvement, we welcome external review of our systems, processes, and recommendations. We are confident, with the support of this Committee and the robust engagement of our stakeholders, we can innovate safely and continue to solidify America's role as the global leader in aviation.

This concludes my statement. I will be happy to answer your questions.