

STATEMENT OF DR. GEORGE C. NIELD, ASSOCIATE ADMINISTRATOR FOR
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BEFORE THE HOUSE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,
SUBCOMMITTEE ON AVIATION, ON FEDERAL AVIATION ADMINISTRATION
OVERSIGHT OF COMMERCIAL SPACE TRANSPORTATION, JUNE 22, 2016.

Chairman LoBiondo, Ranking Member Larsen, Members of the Subcommittee:

I appreciate the opportunity to speak with you this morning about the Federal Aviation Administration's (FAA) oversight of commercial space transportation. In my testimony today, I will provide a brief background on FAA responsibilities, discuss recent developments in the commercial space transportation industry, identify some of the key challenges associated with this dynamic industry, and describe how we work with our stakeholders, including the Congress.

Background

The FAA has exercised oversight responsibility of commercial space transportation activities since 1995, when the Secretary of Transportation delegated authority over the activities to the FAA Administrator, and the Office of Commercial Space Transportation (AST) was established at the FAA. The FAA, through AST, licenses and permits the launch and reentry of commercial space vehicles consistent with public health and safety, safety of property, and the national security and foreign policy interests of the United States during commercial launch or reentry activities. The mission AST carries out is unique within the FAA in that it also includes the responsibility to encourage, facilitate, and promote U.S. commercial space transportation. This dual mission is an important part of our culture at FAA AST. These complementary mission objectives together provide an oversight framework that has proven to be very beneficial both to the industry and to the American people. Our track record bears this out; while the FAA

has licensed or permitted over 280 launches, there have never been any fatalities, serious injuries, or significant property damage to members of the public.

FAA policy for commercial space transportation is primarily guided by the Commercial Space Launch Act (CSLA), the National Space Transportation Policy, and the National Space Policy. The CSLA provides the FAA the authority to oversee public safety and to issue regulations. The National Space Transportation Policy offers direction for how the FAA provides safety oversight for non-federal launch and reentry operations and how the FAA interacts with other federal agencies with interests in space. Finally, the National Space Policy directs federal agencies to, among other things, “minimize, as much as possible, the regulatory burden for commercial space activities and ensure that the regulatory environment for licensing space activities is timely and responsive.” In exercising authority delegated by the CSLA, the FAA issues launch and reentry licenses, experimental permits, launch site operator licenses, safety approvals, and payload reviews. To date, the FAA has licensed or permitted more than 280 launches and 10 reentries. Additionally, we oversee 10 active launch or reentry sites, or “spaceports,” as they are often called, and eight active safety approvals.

Our responsibilities are not limited to protecting the public on the ground or in the air. In 2004 Congress granted the Secretary of Transportation authority to oversee the operations and safety of the emerging commercial human space flight industry. We think this industry segment holds great potential and promise. In order to ensure that the industry has an ample “learning period” to develop, Congress prohibited us from promulgating any regulations governing the design or operation of a launch vehicle intended to protect the health and safety of crew and spaceflight participants until the year 2023, absent death, serious injury, or close call. However, Congress did encourage us to continue to work with industry on ways to improve human space

flight safety. In August of 2014, we released a set of “Recommended Practices for Human Space Flight Occupant Safety.” This 62-page document covered three major areas: design, manufacturing, and operations. While the practices are voluntary, and do not constitute regulations, we believe that the document gives industry a great start in understanding the various areas of concern that future safety frameworks may address.

The FAA also funds the Center of Excellence for Commercial Space Transportation, which provides grants to a consortium of universities for the purpose of conducting research important to the continued safety, growth, and expansion of U.S. commercial space transportation. Areas of research include: Space Traffic Management & Operations, Space Transportation Operations, Technologies & Payloads, Human Spaceflight, and Space Transportation Industry Viability.

It is important to note that we are working hard with our colleagues within the FAA in the air traffic organization and in the aviation safety, airports, NextGen, and security and hazardous materials safety offices to ensure commercial space transportation is effectively and efficiently integrated in the National Airspace System (NAS). We are extremely focused on working closely together to protect the safety of the traveling public and persons and property on the ground.

Recent Development in the Industry

Advances in commercial space transportation technology development and investment have been dramatic to say the least. According to a recent report by the Tauri Group, the year 2015 was a record-setting one for space ventures. The investment and debt financing in these enterprises totaled \$2.7 billion, with more venture capital invested in space in 2015 than in the

prior 15 years combined. Nearly two-thirds of the investment in space ventures and startups since 2000 has been in the last five years.

These investments have been augmented by recent actions in government contracting and a strategic vision to advance the development of the industry. NASA recently announced an expansion of its commercial resupply services program (CRS) to include three launch providers that are charged to deliver cargo to the International Space Station. Orbital ATK, Sierra Nevada Corporation, and SpaceX were all awarded contracts through this program in January of 2016. Additionally, the Boeing Company and SpaceX have been awarded contracts by NASA to take American astronauts to the International Space Station beginning as early as 2017 under the Commercial Crew program. Although these are NASA contracts, the FAA is a critical partner in the programs. Just as it has been the case for the Commercial Cargo missions to date, every future Commercial Cargo and post-certification Commercial Crew flight will be licensed by the FAA, and we are already working with the companies, NASA, and other stakeholders to ensure smooth processes for conducting these important flights.

As the industry has matured, we have observed significant advances in space transportation technology. This is evident in the recent reusability technology demonstrations from two companies, Blue Origin and SpaceX. Blue Origin has demonstrated that it can launch and land the same rocket multiple times, and SpaceX has demonstrated it can deliver heavy telecommunications satellites to geostationary orbit 22,000 miles above the surface of the Earth and land the first stage of its rocket safely, both on land and on a drone ship in the Atlantic Ocean. If the ability to reuse rockets becomes more common across launch service providers, and the companies with this capability can successfully and regularly reuse rockets on missions with customer payloads, the price of reaching orbit likely will drop significantly. These are

incredible advancements that demonstrate an ongoing and ever-increasing technological evolution and the competitive nature of the industry.

An emerging segment of the suborbital space flight industry is space tourism. Several companies are working on plans for future operations that will take people to the edge of space, where they can observe the curvature of the Earth, peer into the blackness of space, and experience several minutes of weightlessness. Systems under development include launch vehicles that carry capsules that will land under a parachute, hybrid launch vehicles that take off and land on a runway, and high altitude balloons. The end game for these companies continues to evolve as they push the envelope on what is possible. Some of these companies would like to offer point-to-point travel that enables someone to take off from New York in the morning and land in Tokyo just a few hours later; some want to offer the opportunity to experience space as a thrill of a lifetime that tourists can remember forever; others want to open up suborbital space to researchers and scientists.

Although there are many types of operations and many different motives, one thing remains the same for all of them: they need a regulatory structure that allows them to be innovative while ensuring the safety of the public. Through our work with other stakeholders and our partners inside and outside the FAA, we are determined to provide this structure for all who want to be involved in this new commercial space race.

While there are many companies focused on low-Earth orbit and suborbital space, the FAA is working with others that want to push the envelope even further. Moon Express has recently announced its plan to send a payload to the Moon, and SpaceX has announced its intention to launch a spacecraft in 2018 to land on Mars. These ambitious plans require new ways of thinking about regulations and about what constitutes government authorization and

supervision. The challenges associated with these emerging space operations and their impacts on the agency are discussed in greater detail below.

Key Challenges

The FAA's strategic initiatives plan recognizes that great technological advancements require the FAA to safely integrate new types of user technologies, such as unmanned aircraft systems and commercial space vehicles, into the NAS. This is crucial as we anticipate increasing launch rates and complex operations. It is imperative that every FAA line of business has the tools, relationships, and infrastructure necessary to address the challenges associated with integration into the NAS.

In 2014, the NAS saw a dramatic rise in commercial space activity with 21 successfully completed space operations (18 launches and 3 reentries). The following year saw Blue Origin and SpaceX demonstrate successful flyback and landing of reusable launch vehicle stages.

To keep pace with the industry's growing launch rate and the increasing complexity of operations in the NAS, the FAA will continue working to improve the facilitation and integration of space operations into NAS planning. This effort includes evaluating safety technologies such as the Space Data Integrator, or SDI. AST is working in partnership with the Air Traffic Organization on SDI, which will enable us to track space mission progress as the vehicles fly through the NAS. SDI uses an automated process to take a space vehicle's real-time position and velocity and convert it into a format that the FAA's existing Flight Management System can interpret and display.

Perhaps most importantly, SDI provides near-real time error detection, giving the FAA early notification of abnormal activity that could affect air traffic. In the event of a failure, the

FAA can identify contingency Aircraft Hazard Areas and coordinate with air traffic facilities to mitigate the impact. We anticipate a demonstration of this tool as part of a partnership with SpaceX later this year.

Another interesting challenge relates to new and non-traditional space operations. Today, FAA licenses the launch and reentry of commercial space launch vehicles, but does not license their activity in Earth orbit or beyond. For example, if a company planned to launch a payload to the Moon, the FAA would license the launch of the payload, but not the activity the payload engages in after successful delivery to Earth orbit. However, Article VI of the Outer Space Treaty requires the U.S. government to authorize and continually supervise the activities of non-governmental entities in outer space.

Section 108 of the Commercial Space Launch Competitiveness Act (CSLCA), which Congress passed last year, directed the Office of Science and Technology Policy (OSTP) to develop an authorization and supervision approach that “would prioritize safety, utilize existing authorities, minimize burdens to the industry, promote the U.S. commercial space sector, and meet the United States obligations under international treaties.” This recommendation was forwarded to Congress on April 4th of this year and includes legislative text that fulfills this reporting requirement. In these situations, the FAA Administrator, through the delegation in authority from the Secretary of Transportation, would “grant such authorizations to the extent consistent with the international obligations, foreign policy and national security interests of the United States, and United States Government uses of outer space.” We support this approach.

Finally, perhaps one of the most pressing challenges associated with future space operations is how we keep pace with the congestion of space and the growing problem of orbital debris. To operate safely in space, operators must know where their systems are located and

when their systems will approach any of the approximately 18,000 other tracked and cataloged objects also on orbit. Safety-related space situational awareness data for these tracked objects provide space operators information necessary to safely plan maneuvers and mitigate collisions. Currently, the Department of Defense collects space surveillance data and compiles it to create space situational awareness to provide orbital safety. The CSLCA required the Secretary of Transportation in concurrence with the Department of Defense to provide a report on the feasibility of a civil agency processing and releasing this data and information. We hope to provide this report to Congress soon.

The Role of Congress in Supporting the Industry

The commercial space transportation industry has seen significant change since the passage of the first Commercial Space Launch Act in 1984. It is clear that the industry exists in large part because of the foresight of Congress in passing that important legislation. Congress remains an active participant in this industry and the recent CSLCA demonstrates how critical that role is.

As we wrestle with how to answer some of the challenges associated with this dynamic industry, Congress has asked us and some of our other partners in the federal government to take a look at various issues related to the commercial space transportation industry. We are working diligently to respond to those critical reporting requirements. These reports will help to inform stakeholders, including federal agencies and the Congress, and provide necessary data to make needed progress on many of the issues discussed in this testimony.

In addition to the policy guidance Congress gives us, the FAA also relies on Congress for the resources necessary to keep pace with the industry. Since 2006, the number of launch and

reentry operations we oversee has increased by 200 percent, the number of licenses and permits we issue has increased by 450 percent, and the number of inspections we perform to ensure safety compliance has increased by 725 percent. Over that same period, our staff has increased by only 42 percent and we have never missed one of our statutorily prescribed time limits for issuing a license or permit.

Our vision at FAA is to be recognized and respected as the world's foremost authority on commercial space transportation. Congress is critical in helping us realize that vision. As the commercial space transportation industry continues to grow, we must ensure that we maintain our ability to keep pace. The FAA appreciates that so far the appropriations committees have provided the full operations request for AST in fiscal year 2017. This funding is critical to the work we are doing to support the industry that Congress laid the ground work for over three decades ago. We cannot continue our efforts without your guidance and support.

In closing, I would like to quote my predecessor and a true visionary, the late Patti Grace Smith, who passed away just a few weeks ago. Speaking at a conference at the University of California, San Diego, Patti told the audience, "Space is an attitude. It's a set of capabilities, an acceptance of risk-taking activities to uncover potential breakthroughs and endless possibilities. That is precisely why we love it."

What a great insight.

Thank you for the opportunity to speak with you today. I would be happy to address any questions that you may have.