

Hearing of the House Subcommittee on Aviation

“FAA Oversight of Commercial Space Transportation”

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Thank you Chairman LoBiondo, Ranking Member Larsen, members of the Subcommittee, and the Subcommittee staff, for this opportunity to discuss critical issues facing the FAA and the commercial space industry. My name is Mike Gold and I am the Chairman of the Commercial Space Transportation Advisory Committee (“COMSTAC”), a federal advisory committee comprised of private sector space executives from a wide variety space companies such as Boeing, SpaceX, Lockheed Martin, Virgin Galactic, and Blue Origin. Before I delve into the challenges and opportunities that the commercial space transportation industry faces, I would like to take a moment to acknowledge the passing of Dr. Nield’s predecessor, Patti Grace Smith. Patti Grace Smith served as the Associate Administrator for Commercial Space Transportation for an unprecedented 11 years, and was the first leader of the office when it was transitioned to the FAA. Ms. Smith was a beloved and well respected trailblazer in the commercial space world, who helped to create an environment of growth, innovation, and cooperation between industry and government that we’re still enjoying today. Moreover, while Ms. Smith’s contributions to private sector space development certainly deserve praise, we should never forget another important part of Ms. Smith’s life, particularly, her role as a civil rights activist. As a child, Ms. Smith courageously led the effort to integrate her high school in Tuskegee, Alabama, and her actions and those of her classmates culminated in the landmark decision of *Lee v. Macon County Board of Education*, which caused the blanket desegregation of public schools in Alabama. Ms. Smith will be greatly missed, but we in the commercial space industry will never forget her passion and idealism, and we will carry her spirit with us to the stars.

I. Mission Licensing

It’s appropriate that I begin my testimony with a reference to Ms. Smith, because I first met her at a meeting with the FAA Office of Commercial Space Transportation (“FAA AST” or “AST”) during which my question was who in the U.S. Government is responsible for licensing orbital commercial space transportation activities. The startling answer that Ms. Smith gave me then, and is still the case today, is that no one has such authority. The FAA AST is responsible for licensing launches and reentries, in other words, the AST is responsible for rockets that go up, and then capsules or other payloads that come down, but everything that occurs in between remains in a literal and legal vacuum. Like many in private industry, I’m not someone who is known for being a fan of burdensome government regulatory structures, however, this gap in the FAA’s oversight responsibilities is already creating a problematic situation that could eventually cripple American competitiveness and innovation in the space field.

The conundrum that the commercial space transportation industry faces, is that the U.S. Government has already committed to ‘supervising’ private sector activities both in and beyond low Earth orbit (“LEO”). This commitment was made a long time ago when the U.S. signed the Treaty on Principles Governing the Activities of States in the Exploration and use of Outer Space, including the Moon and Other Celestial Bodies, known colloquially as the Outer Space Treaty of 1967 (“OST” or the “Treaty”). Specifically, Article VI of the OST requires that State Parties to the Treaty “shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by *non-government entities*” (emphasis added). Article VI goes on to state that the “activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty.”

The key words from this clause for the Subcommittee’s consideration are “authorization and continuing supervision”. The FAA AST already has sufficient authority and an existing track record for authorizing the activities of non-governmental entities via the launch licensing process. It’s the second half of this requirement, the mandate for “continuing supervision”, which presents the greatest challenge. As Patti Grace Smith told me years ago and I believe Dr. Nield would confirm today, it’s difficult if not problematic for the FAA AST to issue licenses for commercial space transportation activities in or beyond LEO without additional and explicit direction from Congress. For the first forty years of the OST, this provision for “continuing supervision” was never much of an issue. All space activities were being conducted by government agencies or were being performed under the continuing supervision of NASA, the Department of Defense, NOAA, or the FCC. The problem has arisen today because of emerging private sector space activities that have little or no connection to the U.S. Government. For example, private sector lunar rovers, a concept that U.S. officials could hardly have imagined back in 1967 when the OST was executed, fall into this regulatory gap. Spacecraft that conduct satellite servicing, private sector space stations, and missions to mine asteroids are also all examples of innovative American activities that will suffer from the confusion and uncertainty that reigns in this area.

The problem is not just that the U.S. agreed to the “continuing supervision” language in the OST, it’s that the U.S. agreed to the provision and then failed to establish a means of actually meeting the requirement. This failure manifests in a problematic manner via the launch licensing process. Although the FAA AST ultimately issues launch licenses, the decision to approve or disapprove a requested license is made via an interagency process that often includes input from the Departments of State, Defense, and Commerce, as well as NASA and the FCC. The Department of State is charged with ensuring that any launch license issued by the FAA AST does not violate or interfere with international treaty obligations. When a company applies for a launch license or a payload review for an activity that isn’t being supervised by a government agency, this puts the Department of State in a difficult position when addressing whether the activity runs counter to the U.S.’s international treaty obligations, since approving the launch would lead to non-governmental entities conducting operations in space without “continuing supervision” by the U.S. Government as required by Article VI of the OST. To be clear, the Department of State wants to encourage commercial space transportation activities and has been raising concerns over Article VI for years hoping to find a resolution before the situation

becomes problematic, but the Department of State's pleas for change have largely fallen upon deaf ears.

The solution to this issue can be simple and expeditious. Specifically, Congress should, as soon as possible, direct the FAA AST to update its regulations to support a 'Mission Licensing' process. Just like is done today for a launch license or a payload review, a Mission License would involve the commercial entity applying for a license with the FAA AST. The Mission License application process should be limited, requiring only basic information relative to the planned transportation activity, and assurances that the activity will be carried out in conformity with the U.S.'s existing international treaty obligations and will not harm 1) the national security interests of the United States, 2) public health or safety, 3) the operation of previously approved payloads or related activities; and 4) historic artifacts such as those that exist at the Apollo landing sites. Upon receiving such an application, the FAA AST would follow nearly identical procedures for a traditional payload review, convening an interagency meeting to review and approve the license. The requirement for "continuing supervision" would be met by Mission Licenses including a proviso that if the proposed commercial transportation activity were to experience a material change, the license holder will be required to inform the FAA AST. This concept would fully address the Article VI concern by meeting the OST's "continuing supervision" requirement with a benign, registration-based regime. Even without the OST's Article VI requirement, establishing a simple, benign means of registering commercial space activities in and beyond LEO would make sense, if for no other reason than to avoid collisions, prevent harmful interference between domestic and foreign outer space activities, and to generally protect the safety and health of the uninvolved public. The burden on the private sector would be minimal, since the information required for a Mission License and the review process proposed is largely if not entirely already required for a standard payload review or launch license.

Many countries, even those that are relatively new space entrants, are addressing the Article VI issue in an effective and comprehensive fashion. For example, the COMSTAC recently received a briefing from the United Arab Emirates ("UAE") whose space agency is in the process of finalizing a national space law. The UAE Space Agency plans to issue authorizations to entrepreneurial space companies and academic institutions to address the "continuing supervision" requirement in a manner that encourages innovation and business growth. The UAE Space Agency is determined to create an environment that is conducive to commercial space activities, and the U.S. would be wise to learn from the UAE's example and, more generally, the U.S. should continue to grow and expand the beneficial public and private partnerships between the UAE and the American aerospace sector.

Over a year ago, a recommendation was passed asking the FAA AST to express COMSTAC's support to Congress for the Mission Licensing process, and I have personally advocated for addressing the concern over Article VI and the lack of any regime for private sector LEO or beyond LEO activities for even longer than that. I have spent my entire career in the commercial space field, and I can assure the members of this Subcommittee that no two words scare me more than "government supervision".

In many space circles, I am best known for my efforts to combat the counterproductive implementation of the International Traffic in Arms Regulations (“ITAR”). As a matter of fact, upon being appointed to the COMSTAC in 2008, my first action as a member of the Committee was to establish the Export Control Reform Working Group, which I chaired for four years. Under the ITAR, many space activities including technical interchanges and launch campaigns were often conducted with the requirement of mandatory government supervision. This often manifested in Defense Technology Security Administration (“DTSA”) personnel traveling with companies overseas to monitor private sector meetings. Not only was such government supervision sometimes irrelevant and superfluous, but the private sector companies attempting to engage in overseas business were asked to pay for their government monitors on an hourly basis, as well as reimbursing the government for all travel and overtime expenses. In my experience, conforming with export control requirements on a single foreign launch campaign would cost a private sector company millions of dollars, roughly \$300,000 to \$400,000 of which would be paid directly to the government as reimbursement for the presence of DTSA monitors. While working on launch campaigns in Russia I would often joke with my foreign colleagues that the KGB may have spied on them back in the day, but at least they had the good courtesy to do it for free. To be clear, I am not now and never was against export controls. There are numerous technologies, particularly in the nuclear arena, that warrant strong government protections. What I have opposed in the past and continue to oppose in the present is the overbreadth of the ITAR. The best example of this was a stand that was used in 2006 for the critical purpose of preventing a satellite from laying on the ground. The stand was round with four legs sticking out of it and, if placed upside down, was indistinguishable from a metal coffee table. Due to the ITAR and its requirement for government supervision, the company that I was working for at the time was forced to pay for two guards to monitor this metal coffee table on a 24/7 basis, and to also pay for two government monitors to watch the guards watching the coffee table. This is just one of many examples of how the ITAR was implemented in a counterproductive and occasionally even irrational manner. Scant government resources and critical personnel were wasted monitoring metal coffee tables as well as technologies that were widely available to anyone in the commercial marketplace.

The impact that the government supervision under the ITAR had on the aerospace sector was extraordinarily pernicious. Although there were many contributing factors, the ITAR played a significant role in wounding the American commercial space launch sector. America was at one point the only country capable of launching commercial payloads. Due in no small part to a counterproductive export control regime, America went from being the number one provider of commercial launch services, to often supporting only one commercial launch per year, sending an entire industry as well as thousands of jobs and billions of dollars to overseas competitors in Europe and Russia. Moreover, since the ITAR prevented many American companies from entering overseas markets, numerous domestic firms went out of business, particularly second and third tier parts suppliers, which forced the U.S. Department of Defense to purchase critical parts and components from foreign providers. The overall impact of the ITAR as it was previously implemented prior to the reforms of 2013, was to send American jobs overseas, weaken the U.S.’s industrial base, and increase dependence on foreign corporations.

Although this hearing isn’t about export control reform, it’s vital that we learn from the lessons of the past because we find ourselves in a very similar situation today. The ITAR

required government supervision of private sector activities, and that same word “supervision” is exactly what appears in the OST. I have seen the pernicious impact on American jobs, competitiveness, and capabilities that government supervision requirements can have and I implore this Subcommittee not to let history repeat itself. We are at an inflection point, a moment in history when we can address the Article VI requirement for “continuing supervision” and the need to maintain a safe environment for LEO and beyond LEO commercial space transportation and activities in a benign and productive fashion that will protect American jobs and encourage industrial growth. By moving forward expeditiously with the Mission Licensing concept, or some iteration thereof, we can lock in a benign, registration-based regime that mirrors the payload review process creating a regulatory environment that will encourage entrepreneurialism and maintain America’s ability to compete in a lucrative and important commercial arena. Conversely, if we continue to do nothing, which is what we have done for the past several years, leaving the issue unaddressed, we run the risk of a future Administration interpreting “continuing supervision” in a much more aggressive manner, leading to a regulatory regime that, like in the case of poorly executed export controls, harms both America’s economy and its national security by sending jobs and industrial capacity overseas to foreign competition.

I urge this Subcommittee to learn from history and to act with authority and alacrity, because what we are dealing with here are not simply regulatory issues the resolution of which will benefit the private sector, but what we are really talking about is no less than the future of American competitiveness as well as the security and economic vitality of this nation. In addition to serving as COMSTAC Chair I also recently joined Space Systems Loral (“SSL”), the world’s most prolific commercial satellite manufacturer, as a Vice President of Washington Operations. Part of what drove my decision to join SSL is the unprecedented transformation that the satellite world is undergoing. We are at the very beginning of what I would call Satellite 2.0, wherein satellites are no longer constructed on the ground, launched, and then disposed of after ten to fifteen years, but instead are serviced, restored, and refueled in orbit by robotic systems, or actually assembled, manufactured, or even deployed from a space station.

We are on the cusp of a new era of commercial space transportation systems that will support next generation satellite capabilities which will transform our daily lives. Imagine a day when you can download hundreds of hours of video in a single moment, or the ability of every American to leverage personal satellite services for imagery data or tracking, or bringing robust Internet and remote learning capability to the U.S.’s most rural and in many cases impoverished locations - all of this can and will be possible. However, like any technological advance, the capabilities born out of a new era of satellite servicing, orbital assembly, and manufacturing can be used for both civil and military purposes. We cannot even begin to guess what the advances and benefits in capabilities that this new era of satellite servicing will bring. What I can assure the Subcommittee is that the companies and countries that are able to deploy and implement these technologies will be the economic and military leaders of tomorrow. Therefore, I would urge members of this Subcommittee not only to expeditiously address the regulatory issues such as Mission Licensing that stand before us, but to keep these capabilities in mind when addressing national security policy and funding for NASA’s activities.

Currently, the Defense Advanced Research Projects Agency (“DARPA”), which has always been a stalwart for supporting American national security through industrial innovation, is

moving forward with the Robotic Services for Geosynchronous Services (“RSGS”) program. Similarly, NASA Goddard is attempting to spur satellite servicing capabilities via the Restore-L program. However, two relatively small and limited government programs are not nearly enough. There is far too much at stake economically and militarily to ignore this critical capability. The lackadaisical course that this country is currently on risks the U.S. falling behind foreign capabilities, resulting in an inevitable blow to U.S. national security and the loss of a vital new field of industrial endeavor to overseas competition. More focus, funding, and support is needed in this area, and we ignore the Satellite 2.0 revolution at our peril.

Given what is at stake, the least the government can do is create a regulatory environment that is conducive to private sector investment and development. Both DARPA’s RSGS initiative and NASA’s Restore-L are designed to create different types of private sector satellite servicing capabilities. What Congress needs to do to ensure the success of the transition of these capabilities from government pathfinder programs to actual private sector industrial capacity, is to create certainty and safety via the Mission Licensing process. It’s vital that we bring American commercial capabilities to bear not only to create jobs and enhance American competitiveness but to bolster American national security. Private sector companies and capabilities will result in dramatic savings for the government customer. For example, SSL recently submitted a bid for the Landsat 9 program that I’m sure will draw attention due its low cost. However, companies such as SSL, that operate in an extraordinarily competitive global marketplace, have by necessity learned to deliver quality products on schedule and in an affordable fashion. If Congress fails to take action and does not address the need for Mission Licensing or a similar regime, the ability of commercial space companies to bring private sector efficiencies to bear in the vital arena of satellite servicing could be substantially delayed, crippled, or fail to manifest entirely. Again, I urge Congress to address the regulatory issue at hand and to bolster funding and support for satellite servicing initiatives and capabilities.

II. FAA AST Funding

Whether it’s issuing Mission Licenses, launch licenses, or conducting payload reviews, the FAA AST has a great deal on its plate. The commercial space industry is growing and evolving at a prodigious rate, far outstripping the relatively meager funding and staffing levels of the FAA AST. At nearly every meeting of the COMSTAC we have recommended increased funding for the AST. Trade associations such as the Commercial Spaceflight Federation have adopted similar positions.

I cannot think of another example of industry regularly and uniformly advocating for increased funding of a regulatory agency. This is a testament to the leadership and vision of Dr. Nield, and the high regard that he and his staff are held in. Additionally, safety is the guiding principle of the commercial space transportation industry and the FAA AST has a vital and unique role to play in guaranteeing the safety of the uninvolved public.

Since 2006, the number of launch and reentry operations overseen by the FAA AST has increased by 200%, rising from 7 in FY 2006 to 22 in FY 2014. Similarly, authorizations issued by the AST rose from 2 in FY 2006 to a total of 11 in FY 2014. Inspections performed to ensure

safety compliance at the AST has increased 725%, from a mere 27 inspections in FY 2006 to 223 in FY 2014. Several mishap investigations have also absorbed a significant amount of the AST's time and attention.

In stark contrast to the massive increased demand on FAA AST personnel and resources, AST staffing levels have only increased by a mere 42%, from 57 in FY 2006 to 81 in FY 2014. Not only will the amount of commercial space transportation activities continue to grow, but the pace of that growth is also increasing. FAA AST is facing a critical shortage of resources and personnel. In my opinion, we are on the verge of reaching a point where there simply aren't enough bodies at the FAA AST to deal with the number and diversity of activities that are occurring in the burgeoning domestic commercial space transportation field.

What is already a dire situation is only going to get worse and the impact of insufficient FAA AST funding could stall the progress of the American commercial space transportation industry, benefiting international competition and potentially sending some domestic operators overseas. Lack of funding for the FAA AST may become a choke point that could strangle the nascent commercial space transportation industry in its crib. I would therefore like to take a moment to thank Congressman Jim Bridenstine and Congressman Derek Kilmer for their bipartisan efforts to address this issue. Through the work of Congressman Bridenstine and Kilmer, the FAA AST is on track in the House to at least receive \$19.8 million in FY 2017, matching funding levels in the Senate's appropriations bill and the Presidential Budget Request.

However, much more will need to be done in the future, and here again I commend Congressman Bridenstine's work and I hope that the members of this Subcommittee and the Congress as a whole will support a funding profile for the FAA AST that follows the recommendations of the Congressman's American Space Renaissance Act ("ASRA"). Beyond implementing a realistic funding profile for the FAA AST, the ASRA contains numerous other provisions related to the AST and its oversight of commercial space transportation, such as addressing the troubling situation we face today, wherein the Department of Defense has been placed in the role of playing 'traffic cop' for commercial space, providing the private sector with information about potential conjunctions in orbit, a responsibility that should be transferred to the AST.

In conclusion, I want to again thank Chairman LoBiondo, Ranking Member Larsen, members of the Subcommittee, and the Subcommittee staff. The Aviation Subcommittee has a critical role to play in this arena, and just holding this hearing has presented an invaluable opportunity to discuss critical issues and actions. The COMSTAC looks forward to interacting on a more regular basis with this Subcommittee and its staff, and hopes that this hearing is just the beginning of our work together. If Congress can address the regulatory concerns described in this testimony it will bolster American competitiveness, enhance the domestic economy, and support national security. I urge Congress to take action, allowing space entrepreneurs to focus less on lawyers and more on launches.