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PARTNERSHIP TO ADVANCE THE BUSINESS OF SPACE

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Mr. Chairman, Senator Cruz, and members of the Subcommittee, thank you for inviting me to participate in this morning's hearing. My name is Patti Grace Smith and I am the principal in Patti Grace Smith Consulting. As a former Associate Administrator of the Office of Commercial Space Transportation at the Federal Aviation Administration, and as a currently active participant in the commercial space industry, I welcome the opportunity to comment on the state of commercial space flight.

The Emergence of Commercial Space Flight

These are milestone times for commercial space transportation. These are times for a balanced approach that looks at where we have been and why; where we are today and why; and where we would like to go. I prefer an approach that considers all space capabilities, both early and new; that values the long-standing contributors who have consistently delivered unparalleled results for our nation; and similarly values the significant accomplishments of new entrants. Plans for SLS and commercial crew and cargo, it seems to me, reflect that sort of balanced approach. As an Alabamian, I am proud to say that

commercial launch vehicles built in Decatur are a reality, with new ones built every year.

Today long-standing promises are turning into visible results. Space X, launching from Florida, has serviced the International Space Station. Orbital Sciences' Antares rocket has successfully orbited a payload from its launch site at Wallop's Island, Virginia. Virgin Galactic has test-dropped its space passenger vehicle over California as it moves closer to regular operations from New Mexico. And the Atlas V rocket is still the most reliable launch vehicle, delivering mission success one launch at a time.

These are remarkable achievements by the private sector. Yet some observers believe they are overdue when compared to America's earlier space performance. For example, President Kennedy in 1961 pledged to land a man on the moon and return him safely to Earth by the end of the decade. It took roughly 2,800 days for NASA by the time they did it in 1969. To accomplish the moon landing within this aggressive timeframe, NASA leveraged the contemporaneous capabilities of the private sector, working with industry to execute NASA's mission. NASA was the unquestioned leader, bringing the will, technical expertise, integration, and resources to the task.

Still, the commercial sector has delivered convincingly, as well. Today, the commercial sector is demonstrating not just technical accomplishments, but vision and the willingness to take financial risks to move our relationship with space forward. On the independent initiative of private enterprise, it was also roughly 2,800 days between October of 2004 when SpaceShipOne captured the Ansari X-Prize and May of 2012 when the Space X Falcon 9 docked with the International Space Station, the first for a commercial launch vehicle in the history of the nation. Many said it couldn't be done. But SpaceX delivered, a remarkable accomplishment fully consistent with the proud tradition of American space flight.

Commercial space flight has advanced at its own measured pace during some of the darkest economic times in memory. The private sector has moved forward in large part by fully embracing the precepts of safety. To that end, after the headlines and spotlights of the X-Prize success came more science, more engineering, more self-examination and a preference for caution and methodical process. “Test and develop, test and develop, and do not fly until you are ready to fly” became the order of the day.

The time was well spent. As circumstances have changed and budgets have tightened, NASA has returned to its core mission of research and development, and technology demonstration. NASA is looking now to the Commercial Spaceflight industry for vital services. And the industry is delivering.

For years -- for challenging years -- the commercial space industry has contended with skepticism. Now it must deal with the effects of enthusiasm. Both of those can be equally daunting. Skeptics used to say the industry couldn’t do it. Now there’s the risk of new enthusiasts saying “do it this way, do it that way, or the industry needs to change its aim” just as commercial space reaches its target.

That’s why I believe this is a key moment for special discernment when we must see clearly how commercial space flight got to where it is and how those responsible for it need to proceed and be supported.

The Office of Commercial Space Transportation (AST)

Congress took a major leap of faith with passage of the Commercial Space Act of 1984, legislating a framework when, practically speaking, there was so little real data on which to base choices. Fortunately, Congress produced a flexible, open venue that invited opportunity rather than proscribing innovation. This open venue will yield unparalleled benefits in due time and it all began with an Act of Congress.

A visionary product of the 1984 legislation was the Office of Commercial Space Transportation (AST). It began life in the Office of the Secretary of Transportation. It migrated successfully to a new status as one of the FAA's major lines of business. It was a fortunate turn of events. It enabled the early AST leadership to observe and absorb established safety practices and to build on them as it has helped guide an industry from the nursery to emerging maturity.

The industry and the office continue to evolve. An increasing number of tests and accelerating data collection will provide a clearer picture of what future regulatory steps may be in order. Scientist and regulator alike will learn more as manifests for operational flights become more robust and trips to suborbital space become regularly scheduled flights. Commercial spaceports operating as national assets will connect other launch sites as part of a transport and national security resource. Commercial space transportation will take its rightful place as a respected, recognized and, indeed, required part of our national transport grid. We are in an enriching learning environment where the growth in information will help us do better what we have already done well.

AST has proven itself a balanced advocate but firm regulator. I am not suggesting that the way things are, is entirely comfortable or ideal for either the regulator or the entrepreneur. Yet healthy tension and constructive disagreement are valuable commodities in a risk-persistent environment like rocket flight. And all parties have managed well.

Neither entrepreneur nor regulator has a monopoly on knowing what's best in every case. So they have worked hard – together – to keep finding out what's best. And that's proven to be the genius of the commercial space flight regime Congress established. In fact, the legislative/regulatory model now in place has worked to the credit of

the industry, to the credit of the regulators and to the envy of space efforts in countries around the world.

Therefore, on any list of policy proposals:

I would unreservedly favor keeping the Office of Commercial Space Transportation within the FAA, for the near term, while a more robust launch manifest emerges. Although the Commercial Space Launch Act was approved at a time when hard data was scarce, the Act allowed the industry to establish itself. In 1984, despite limited data, we had little choice. Now we do.

Since we are still moving toward regularly scheduled launches in private human spaceflight, I believe we should take advantage of the pending opportunity to allow performance data to guide our way and inform our judgment. The Office of Commercial Space Transportation (AST) located with the Federal Aviation Administration is, I believe, in the best position to gather essential data on which Congress can base future choices.

At the same time, I believe Congress may be the best place to resolve jurisdictional questions surrounding hybrid space vehicles, those vehicles that have both space and aviation-like elements. These vehicles are designed for placing payloads or humans on either suborbital or orbital trajectories. They are built by a few companies in low volumes. Vehicle type and production certification is prohibitive in terms of cost and performance. Congress could address the issue, and then assign responsibilities to a supervising regulatory agency, the FAA.

Sub-orbital Launch Operations

I would propose that AST continue to supervise and solely regulate sub-orbital commercial launch operations. That would extend to any and all activities associated with rocket launches of either humans or cargo.

This is especially important for launch operators like Virgin Galactic and other similar air-launched systems. The FAA's Office of Commercial Space Transportation licenses the launch system as a whole, but the FAA's Office of Aviation Safety (AVS) certificates the carrier aircraft when the aircraft is flying alone – even when that aircraft is operating in support of launch-related activities. This inefficient "dual license" requirement should be reconsidered. Managing two regulatory regimes for nearly similar operations risks introducing inconsistencies and gaps between regulation which could affect safety.

A related issue is the automatic revocation of an experimental permit upon issuance of a license. This "permit invalidation" inhibits smooth, rapid improvements in safety and capability. The CSLA should allow experimental permits to be valid for a particular design of a reusable suborbital rocket after a launch license has been issued for launch or reentry of a rocket of that design. Failure to resolve this issue produces cost, time lost, and uncertainty. Resolving this issue is a specific step Congress can take to assist the industry's growth and development.

Strengthen "informed consent"

While the Commercial Space Launch Act requires the licensees obtain informed consent from their spaceflight participant customers, it is silent on the issue of potential claims from participants in the event of a flight incident or accident. I recommend that the statue should allow for agreements not to sue, to include participants. These would be agreements under which all parties agree not to sue each other for any harm they may suffer, known as reciprocal waivers of claim.

Launch Site Safety

Safety governs the future of space operations. It is at the core of both the work AST does, and the success of the commercial space flight industry. To that end, in September of 2007, the Air Force and the FAA entered into a Memorandum of Agreement on Safety for Space

Transportation and Range Activities. It took years to work it out. But it has proven itself a useful, necessary and key instrument for enhancing safety on the ranges and understanding among the parties. It has made operations easier for new launch entrants at federal launch sites. It has produced common standards for launch operations among the federal and non-federal/commercial launch sites.

Memorandum of Understanding

Among other Memoranda of Agreement, there is also a Memorandum of Understanding among the National Transportation Safety Board, the Air Force and the Federal Aviation Administration regarding space launch accidents. Although fortunately there has been no occasion to call it into operation, it is, as I see it, the kind of guiding document that will make it possible for all the overseeing parties to work effectively together if the need arises. At this point, I believe no adjustments are in order.

Indemnification

On another subject, I strongly favor extending indemnification provisions for a minimum of ten years. The current one-year extension breeds uncertainty in the same way that a series of one-year contracts in the sports world undermines confidence that a long-term contract inspires. The indemnification provision is a recommendation that Congress is not obliged to follow. But it sends a powerful message that says to the rest of the world: "The United States supports our commercial space industry and is willing to share the risk." Indemnification provides our domestic commercial space industry much-needed leverage in competing for business with state-sponsored launch efforts in other countries. The absence of the risk-sharing approach – or lack of assurance about its future – would create doubt and instability in the launch industry.

Creative approaches to acquisition

Space Act Agreements (SAAs) are an important public-private firm-fixed price approach to space system development. NASA's use of Space Act Agreements (SAAs) demonstrates NASA's willingness to proactively engage the private sector to identify potential opportunities for commercial space companies to meet NASA's needs and requirements. They dramatically reduce NASA's exposure to risk and incentivize commercial providers to keep development costs as low as possible while maintaining the highest standards for safety. Space Act Agreements often are not funded – rather, they result in monies flowing to the USG from partners using (and paying for the use of) NASA facilities and services. SAAs allow the USG to write any requirements that may be desired into the agreement.

The work products are already demonstrating contributions to NASA's beyond LEO human exploration missions in ways that will reduce costs while enhancing capabilities. For example, Bigelow Aerospace's SAA will help commercial space achieve escape velocity from Low Earth Orbit. In fact, on next Thursday, May 23rd, NASA Associate Administrator Bill Gerstenmaier and Robert Bigelow will participate in a kick-off briefing on Capitol Hill to describe the SAA and answer any questions that Members or Hill staff may have.

Nationally Integrated Space Capabilities

There are now eight FAA-licensed launch sites in the United States, with others under discussion. I believe we should explore ways to facilitate NASA's use of these sites as a matter of economy, convenience and safety. NASA currently makes available services to orbital and sub-orbital companies and it seems reasonable to return the courtesy.

The integration of assets and capabilities also helps address the matter of what commercial launch sites are up to when they are not launching rockets, their intended core business. I believe it would be extremely

worthwhile for Congress to require that the Federal Aviation Administration, NASA and the Air Force explore the value of involving privately operated commercial spaceports as part of a national network to meet overall American space flight needs.

On-Orbit Authority

I agree with the DOT/FAA Commercial Space Transportation Advisory Committee (COMSTAC) that on-orbit authority needs to be discussed. Currently, uncertainty surrounds jurisdiction and regulatory questions of on-orbit operations involving space transportation. A thorough look should address questions like: Specifically, what are the safety hazards and needs posed by spacecraft while operating in the National Airspace System (NAS)? How should the U.S. government handle on-orbit authority? What is the need for on-orbit authority and does the FAA play a role in satisfying that need? FAA/AST should examine "space traffic coordination" and create scenarios and analysis exploring the issue. AST should simulate and model with the FAA's Next Generation Airspace effort how the integration of regularly scheduled space traffic would look in the NAS. FAA/AST should begin infrastructure studies to identify monitoring requirements for on-orbit activities to the extent required for space traffic coordination.

NASA's Educational Programs

Finally, I am very concerned about the cuts to NASA's educational program at a time when NASA is on a different trajectory and with a vision different from any before. Like every other sector of the space industry, commercial space is dependent on America's ability to produce and equip with a specific set of technical skills and capabilities the next generation of space professionals. It is vital work that needs to begin early in a student's educational journey. These skills and capabilities derive from the STEM disciplines that can support space operations today, and those that young minds can dream and create for the future. No one teaches what NASA does like NASA. I

recommend that Congress take another look at the benefits of STEM education and reconsider the enormous investment value of NASA's education program.

Going Forward

The FAA's Office of Commercial Space Transportation has performed pioneering service in a comparatively new and still evolving industry. It has worked effectively with the Air Force and with NASA and with the industry itself. And while forging a regulatory framework, it has been an active, open and attentive companion to seasoned talent in its own environment. I'm talking about NASA. Its work in human exploration and crew and cargo transport is unparalleled. Those of us in the space industry understand that NASA remains a living legend, changing, improving, adapting to new science and exploration.

In fact, the United States' diverse spaceflight talent is a major asset that we are fortunate to maintain. Other nations have put objects into space. Other nations have put humans into space. Some have conducted commercial space launches. But no other nation has done all these things using the resources and genius of both the public treasury and private investment. With safety as its imperative, the United States has shown to the world the ability to integrate space initiatives.

No other nation has done that. No other nation has performed space flight as well as we have. And I'm proud to say, we're getting even better at it. We are stronger than ever. We have only just begun.

Thank you.