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"(Hearing Title)"
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Chair Sinema, Ranking Member Schmitt, distinguished members of the Committee, thank you for the opportunity to submit testimony on behalf of Virgin Galactic, the world's first commercial spaceline. The importance of this hearing is significant in furthering the progress of the commercial spaceflight industry, and we appreciate the scope and attention of the Committee.

About Virgin Galactic

Founded in 2004, Virgin Galactic (VG) is the world's first commercial spaceline, pioneering human spaceflight for private individuals and researchers with its advanced air and space vehicles. Its vehicles are suborbital space labs for governments, researchers, and commercial industry to conduct research and test their innovations for the betterment of Earth and space exploration. VG's vehicles have been designed to set new standards for human spaceflight safety, frequency, flexibility, and cost. With a presence in California, New Mexico, and Arizona, our company's mission is to democratize access to space by providing frequent private astronaut journeys, microgravity research, and spaceflight training opportunities.

VG owns and operates its suborbital spaceflight system and draws its flight heritage from the historic SpaceShipOne spacecraft, which was the first private space vehicle to safely carry human beings into space claiming the Ansari X PRIZE in 2004. VG's spaceflight system opens frequent access to space and provides a transformational spaceflight experience to our astronauts.

VG's suborbital spaceflight system consists of two piloted vehicles, Mothership and Spaceship. Mothership is a four-engine, dual-fuselage jet aircraft capable of high-altitude, heavy-lift missions, including but not limited to fulfilling its role in carrying Spaceship to altitude. VG's spaceship is an air-launched, suborbital spaceplane designed to transport people and payloads safely and routinely to space and back. Spaceship's cabin comfortably seats four to six passengers or an equivalent mass and volume of science and technology payloads. In conjunction, these two vehicles allow access to space and regions of the atmosphere ranging from the troposphere to the thermosphere.

VG's current spaceship, *VSS Unity*, has flown nine private astronaut and research spaceflights. This includes the historic Unity 22 mission, which was the first fully crewed commercial spaceflight in the world, and Galactic 01, a dedicated research mission for the Italian Air Force (ItAF) and National Research Council of Italy, which flew three Italian government research specialists and over a dozen payloads to suborbital space. In addition, since beginning work with NASA's Flight Opportunities program, VG has flown a dozen research payloads for the agency.

2023 has been an exciting time for our company and for commercial human spaceflight, as we have flown five successful missions in five months, with a mix of research-dedicated, international partner, and private astronaut missions. VG's three private astronaut spaceflights for private astronaut purposes in 2023 included a flight with the first mother-daughter duo that have gone to

space, an astronaut with Parkinsons, the first Pakastani to go to space, and the first astronauts from Antigua and Barbuda.

Our future will see VG expand our fleet of spaceships to increase access to space. In 2025, our new fleet of Delta class spaceships is expected to begin flight testing. Our new facility outside Phoenix, Arizona, will serve as the final assembly and checkout facility for the Delta fleet. The Delta class vehicle design is expected to increase performance and reduce time between flights. The introduction of these next-generation vehicles is an important milestone in Virgin Galactic's multi-year effort that targets flying 400 flights per year.

Commercial Human Spaceflight Activities

While the U.S. has more than 60 years of history in spaceflight, and an immense data base of lessons learned on spaceflight technology and vehicle operations that many in industry, including VG, utilize, the commercial human spaceflight industry is still relatively new. Until recently, human spaceflight has been primarily in the domain of governments and access to space for humans has largely been reserved for those in national astronaut corps. To date, only 670 people have gone to space, and of those 670, only 64 were non-government astronauts who flew on commercial vehicles – the majority of which only flew within the last two years.

The emergence of commercial human spaceflight companies is changing the paradigm and aiming to democratize access to space for tourism and research purposes for private citizens, researchers, and government astronauts. The current human spaceflight industry is small and diverse – with vehicle systems ranging from spaceplanes to capsules. Companies are innovating not only through spaceflight technologies, but through manufacturing capabilities, ground operations, training programs, and more. The U.S. is leading the world in commercial human spaceflight and the industry, while still in its infancy, is a beacon of innovation on and off planet.

Current regulatory environment for human spaceflight is encouraging innovation and growth without compromising safety

The Federal Aviation Administration (FAA) Office of Commercial Space Transportation (AST) regulates commercial space operations to protect public safety and property, and currently has a prefect safety record. This includes rules that cover licensing of launch and landing operations, as well as governance over the establishment of spaceports. Virgin Galactic has worked closely with the FAA throughout its licensing process and continues to do so during commercial spaceflight operations. As the basis of our business, VG's highest priority is the safety of our crew and spaceflight participants (SFPs).

Virgin Galactic operates a licensed human spaceflight system, with both mothership and spaceship always operating with two pilots onboard each vehicle. The spaceflight system is licensed under Title Part 400 regulations carried out by AST. VG's spaceflight system was first granted an Operator's license in 2016, which was later expanded in 2021 to allow the company to fly Spaceflight Participants (SFPs). This license – which is maintained throughout our operations for continued accuracy – is a clear and ongoing validation of our spaceflight system, which must meet the verification and validation criteria required by the FAA.

Virgin Galactic's mothership and spaceship also operate under Title 49 Part 91 airworthiness certificates administered by the FAA Flight Standards District Office, which include annual reviews and inspections of the vehicles, their operating limitations, and the FAA approved maintenance inspection program.

Congress acknowledged the emergence of the commercial human spaceflight industry, recognizing that it is in the dynamic, iterative, and development cycle, and is not yet ready for the full-scale regulation that characterizes today's commercial air travel. Understanding that it is impossible for regulators to create effective and efficient regulations for diverse, innovative vehicles without sufficient data, Congress created a regulatory learning period during which the FAA may regulate for the safety of the public, or in response to an incident. The rationale was that "FAA regulatory burdens on the relatively new and rapidly evolving commercial space launch industry could slow innovation, particularly when it remains unclear which areas the FAA should regulate."

The Commercial Space Launch Amendments Act of 2004 established this regulatory learning period to enable human spaceflight operations to mature prior to FAA issuance of occupant safety regulations and to ensure that the agency had adequate time to develop the expertise and resources required for such regulations. Spaceflight participants operate under an informed consent and indemnification regimen that acknowledges the inherent risk and complexity of spaceflight, consistent with many other activities in the United States. The intent of the learning period is to allow the industry and the FAA to collect data that will allow for safe and effective human spaceflight regulations in the future. It is important to note that the current regulations that cover operations and public safety also provide indirectly for occupant safety. During this period, the FAA is still able to issue regulations governing the design or operation of a vehicle to protect the health and safety of crew, government astronauts, and spaceflight participants (under certain conditions).

Commercial human spaceflight readiness indicators for regulation indicate that the industry is not yet mature enough to drive a data-based regulatory framework

In Title 51 U.S.C. § 50905(c)(6), Congress directed the FAA to submit a report specifying key industry metrics that might indicate a proper level of maturity for the commercial space industry to be fit for regulation. Section 50905(c)(7) of that same legislation also directed the FAA to submit another report every two years on "the commercial space activities most appropriate for regulatory action, if any, and a proposed transition plan for such regulations."

On October 20, 2017, the FAA submitted its first report to Congress initially identifying the key metrics that may indicate the commercial space sector's readiness for regulations. The FAA divided the indicators into three sets. In each of these three sets, it is clear the emerging commercial spaceflight industry is not yet mature enough for human occupant safety regulations.

1. *The first set of indicators looks to the industry's readiness to enter a safety framework by focusing on the purpose for which people are flying, the size and complexity of the industry, and its safety.*

The size and complexity of the industry is still maturing. For suborbital flights, the global industry only has one horizontal launch company, Virgin Galactic, and one vertical launch company, Blue Origin. So far, Virgin Galactic has nine human suborbital flights to space, while Blue Origin has conducted six. SpaceX is the U.S.'s only orbital commercial human spaceflight system and was primarily developed under contract to NASA to carry government astronauts to the International Space Station. Orbital spaceflight subjects human occupants to a much different spacecraft environment when compared to suborbital spaceflight. The industry is still small and diverse in its systems – and while commercial spaceflight has been around for many years, commercial human spaceflight is still very much nascent, with frequent flights only occurring in the last two years. Defining regulations that span diverse systems without first building a knowledge database has the potential to do more harm than good.

2. *The second set are indicators of the industry's progress in developing a safety framework and focuses on voluntary safety reporting, voluntary consensus standards, and compliance.*
   While the spaceflight industry, with active participation from the FAA and NASA,is making strong progress in developing consensus, performance-based safety standards that document industry and government-derived best practices for the benefit of the commercial space industry, there is more work to do. As industry grows and continues to collect data on human spaceflight operations, an organization and a process exists to continue the development of safety standards. ASTM International is a leading standards development organization with over 120 years of experience, and ASTM's F47 Committee on Commercial Spaceflight is comprised of a variety of experts from government, industry, and academia. Subcommittees within the committee are working on multiple standards related to human spaceflight. However, with many companies have only recently begun frequent commercial operations, additional time is needed to continue to collect and analyze data for the purpose of developing a safety framework through industry consensus standards.

3. *The final set of indicators relate to the FAA's readiness to enter into a safety framework and focuses on the FAA's authority and expertise.*
   FAA AST is tasked with licensing and permitting commercial space launch and reentry. In recent years, commercial space industry growth has stretched AST's licensing resources, and recent budget requests have included increased amounts to reflect this need. As launch demand increases, AST needs the resources, funding, and personnel to carry out the necessary workload for its primary authority. Until FAA is resourced and able to perform its principal duty effectively and in a timely manner, adding additional scope and workload has the potential to delay commercial spaceflight operations, risking the rapid growth the industry is undergoing.

Looking at the indicators FAA AST identified themselves, industry is not yet mature enough for effective and efficient human occupant safety regulations – but VG believes that it is the right time for government and industry discussions on future safety frameworks. VG, itself, has a robust framework for human occupant safety within our spaceflight system, built on industry and government best practices and the experience of our team. We look forward to participating and continuing to share best practices in the proper cross-cutting forum.

Extension of the Learning Period will allow industry time to develop a standards-based safety framework and create a transition period to a permanent future framework

This learning period is currently scheduled to expire on January 1, 2024, however, due to the technical and economic challenges of spaceflight and the industry's emphasis on safety above all, commercial space companies have proceeded at a more cautious pace than envisioned in the original bill. As a result, there are only three companies currently carrying humans to space, and it would be premature to base occupant safety regulations on this extremely small set of data at this time.

VG proposes extending the learning period to provide for a transition period utilizing the collection of data and for the standards development process to properly inform future safety frameworks. This transition period should incorporate the development of an initial set of industry consensus standards that covers appropriate aspects of spaceflight participant safety, an evaluation of the practical applications of these standards, and an evaluation of FAA AST's readiness to transition to a safety framework, including their execution of existing statutory requirements like launch and reentry licensing.

The transition period process would create a deadline for developing an initial set of industry consensus standards that covers appropriate aspects of spaceflight participant safety. The road mapping for an initial set of human occupant safety standards should be done through a standards development organization, such as those currently being developed by standards development organizations, primarily ASTM, and/or industry/government advisory group and would include FAA AST participation in the development and balloting process.

After the initial safety framework is completed through voluntary safety standards, operators will have a period of time to utilize and evaluate their effectiveness. Throughout the development and monitoring periods of this standards-based approach, FAA AST would engage with operators to collect feedback on the practical application of these standards to prepare for follow-on regulatory efforts. This will help the agency develop expertise and a roadmap. At the conclusion of the transition period, the learning period would be allowed to expire.

Increased funding for FAA AST is needed for AST to keep up with the growth of the commercial spaceflight industry and effectively transition to future regulatory reforms

Congress should reaffirm its commitment to safeguarding America's leadership in commercial space launch and authorize the funding of the Office of Commercial Space Transportation at the level necessary to successfully fulfill its mission in an efficient and timely manner. Additionally, Congress should authorize research, engineering, and development funding for AST to develop a suite of tools to automate parts of the licensing process and help license evaluators handle the growing workload. Due to lack of additional resources, current resources are rightfully focused on licensing upcoming launch and re-entries – and should continue to do so. AST should first be adequately resourced to effectively and efficiently fulfill its current authority before looking to address future reforms.

Industry & government dialogue is important for the continued success of the commercial spaceflight industry

In the Commercial Space Launch Competitiveness Act of 2015 (CSLCA), Congress directed the FAA to "continue to work with the commercial space sector, including the Commercial Space Transportation Advisory Committee (COMSTAC) … to facilitate the development of voluntary consensus standards based on recommended best practices to improve the safety of crew, government astronauts, and space flight participants as the commercial space sector continues to mature."[1] Congress further clarified that "nothing" in Title 51 § 50905 "shall be construed to limit the authority of the Secretary to discuss potential regulatory approaches, potential performance standards, or any other topic related to this subsection with the commercial space industry."[2]

For many years, both FAA AST and COMSTAC have recognized the important role that the development of voluntary consensus standards can play to not only "improve the safety of the commercial human spaceflight industry as a whole,"[3] but to also "help provide a baseline for compliance with potential future regulations covering human spaceflight"[4] once the industry has reached sufficient operational cadence and technological maturity.

VG has worked with FAA AST since the company's inception to secure and maintain the licensing of its spaceflight system. In addition, VG has participated in multiple advisory councils for AST to continue industry-government partnership in identifying and advancing policies and regulations that keep up with the ever-evolving industry. This includes participating in multiple Aerospace Rule-Making Committees (SpARCs) and advisory committees, such as COMSTAC.

In addition, FAA AST must continue to participate in industry dialogue and standards organizations. Nothing must be construed in future policies to restrict AST's ability to engage in discussion on human spaceflight occupant safety while the learning period is still in effect.

Conclusion

This is an exciting time for not only Virgin Galactic, but for the entire industry as it continues to achieve milestones in human spaceflight. The Committee's tireless work and progress on national and civil space policy is imperative and much appreciated by the public, the commercial spaceflight industry, and stakeholders. Thank you for holding this important hearing and Virgin Galactic looks forward to working with the Committee.

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[1] Commercial Space Launch Competitiveness Act of 2015, Pub. L. 114-90, § 111; 51 U.S.C. § 50905(c)(5) as amended [hereinafter CSLCA].
[2] *Id.* § 50905(c)(4).
[3] Kelvin B. Coleman, Jennifer Bailey, Tara Halt, Rachita Puri, John Sloan, *Regulatory Preparation for U.S. Commercial Human Spaceflight*, 73rd International Astronautical Congress, Sept. 18-22, 2022, available at https://www.faa.gov/sites/faa.gov/files/Regulatory_Preparation_Commercial_HSF%20_FAA%20_Coleman_IAC_Paris_B3_2%20_Sept_2022.pdf.
[4] FAA, *COMSTAC Recommendations for Human Spaceflight (HSF) Regulation*, at 2, Nov. 2021, available at https://www.faa.gov/space/additional_information/comstac/media/HSF_Recommendation_Summary_Final.pdf.