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Chairman Babin, Ranking Member Sorensen, and distinguished members of the Committee: thank you for inviting me to share my perspective on the U.S. commercial space industry for the Committee’s consideration during this critical moment in history, where assuring continued U.S. leadership in space is a top national priority.

The focus of my testimony will be on the importance of continued and increased support for NASA’s Commercial LEO Destination (CLD) program. The intent is to give the Committee the necessary background and context regarding the CLD program, the commercialization of the low-Earth orbit, the current investment landscape, and the challenges we foresee today. I will also provide issues for consideration on areas where the Committee may shape legislation to help foster the CLD program to further America’s competitiveness in space.

At Voyager Space (Voyager), we are dedicated to building a better future for humanity in space and on Earth. With nearly 50 years of spaceflight heritage, Voyager is a global leader with unparalleled experience working commercially in the crewed microgravity environment. Integral to our services and capabilities is providing commercial access to the International Space Station (ISS) and building and operating payloads for a range of users, including commercial customers and government space agencies. As the ISS is decommissioned in 2030, we are dedicated to continuing its legacy of global diplomacy and developing a next-generation successor platform – a commercially operated, continuously crewed free-flying space station, or Starlab.

Starlab began in December 2021 with an initial \$160 million Space Act Agreement awarded under the Commercial LEO Destination (CLD) program from the National Aeronautics and Space Administration (NASA) - to provide the U.S. with a next generation platform to ensure continuous human presence in low-earth orbit (LEO).¹ This Space Act Agreement is now awarded at \$218 million as of today.

To fortify our ability to develop Starlab, we have recently formed a joint venture, Starlab Space LLC, a U.S.-led transatlantic joint venture between Voyager and Airbus.² Starlab Space intends to bring in additional joint venture partners but will always maintain U.S. ownership.

¹ “NASA Selects Companies to Develop Commercial Destinations in Space,” NASA (Dec. 2, 2021) www.nasa.gov/news-release/nasa-selects-companies-to-develop-commercial-destinations-in-space/.

² “Voyager Space and Airbus Finalize Starlab Space LLC Joint Venture,” Voyager Space (Jan. 9, 2024) <https://voyagerspace.com/2024/01/09/voyager-space-and-airbus-finalize-starlab-space-llc-joint-venture/>.

Additional partnerships on our station efforts include Hilton Hotels and Northrop Grumman. Hilton's world-renowned design and architecture team is helping design crew hospitality suites and more aboard Starlab, in addition to supporting our ground-to-space experience.³ Northrop Grumman, previously a CLD competitor, joined our team in October 2023. Northrop Grumman is developing fully autonomous rendezvous and docking technology for their Cygnus spacecraft and will provide cargo resupply services for Starlab along with engineering support.⁴

The development to operations timeline of Starlab is of utmost importance as we must ensure there is no gap for U.S. human presence in LEO as the ISS is decommissioned in 2030. Key to this objective is our strategic design, which allows us to launch our station in a single flight. This has been made possible through a recent commercial contract with SpaceX to launch and deploy on Starship as early as 2028.⁵

To provide the U.S. and like-minded nations with continued access to the microgravity environment, Starlab is designed and architected to provide 100 percent of the ISS's current payload capacity and will have the ability to conduct hundreds of experiments and technical investigations each year. Additionally, Starlab Space is partnered with the ground-based George Washington Carver Science Park located at The Ohio State University, where scientists and industry experts will be able to share findings, collaborate, and use new technologies to advance both scientific and commercial endeavors.⁶

Developing these capabilities for Starlab and reaching our goals is no small feat technically or from a business standpoint. To provide context, I would like to provide the Committee with some background on the CLD program and highlight the unique challenges and opportunities of building a commercial space station.

The Commercial LEO Destination Program and Investment:

NASA expects that retiring the ISS in favor of leasing capacity on commercial space stations will ultimately save the agency up to \$1.8 billion per year, according to a NASA ISS transition report published to Congress in February 2022.⁷ To enable this, Starlab Space partners are committed to raising over a billion dollars from the private sector to realize this commercial vision.

³ "Hilton and Voyager Space to Design Crew Lodging and Hospitality Suites Aboard Starlab," Voyager Space (Sept. 20, 2022) <https://voyagerspace.com/2022/09/20/hilton-and-voyager-space-to-design-crew-lodging-and-hospitality-suites-aboard-starlab/>.

⁴ "Voyager Space Announces Teaming Agreement with Northrop Grumman for the Starlab Space Station," Voyager Space (Oct. 4, 2023) <https://voyagerspace.com/2023/10/04/voyager-space-announces-teaming-agreement-with-northrop-grumman-for-the-starlab-space-station/>.

⁵ "Starlab Space Selects SpaceX's Starship for Historic Launch," Voyager Space (January 31, 2024) <https://voyagerspace.com/2024/01/31/starlab-space-selects-spacexs-starship-for-historic-launch/>.

⁶ "Voyager Space Announces George Washington Carver Science Park Terrestrial Lab to be Located at The Ohio State University," Voyager Space (Sept. 19, 2022) <https://voyagerspace.com/2022/09/19/voyager-space-announces-george-washington-carver-science-park-terrestrial-lab-to-be-located-at-the-ohio-state-university/>.

⁷ Jeff Foust, "NASA outlines cost savings from ISS transition," SpaceNews (Feb. 6, 2022) <https://spacenews.com/nasa-outlines-cost-savings-from-iss-transition/>.

NASA remains an excellent partner as we chart the course of commercial space stations together. However, we also face the reality that this program is the first major human spaceflight initiative where NASA intends for most funding to come by private investment unlike previous “commercial” space programs such as Commercial Crew and Cargo Resupply. This is a realistic expectation given the untapped potentiation of the LEO market.

Voyager firmly believes that this is the right time to take the next step toward a truly commercial Low-Earth Orbit (LEO) market, but as this unprecedented effort is testing investment appetite in a nascent market, investors must understand three things: That the U.S. government is fully committed to leadership in crewed space stations even as the ISS de-orbits in 2030 - making way for commercial space markets and transitioning critical government research and operations to CLDs, providing adequate funding to the CLD program, and to helping industry solve indemnification and liability concerns from the investment community.

To justify this commitment, let me offer why now is the right time for this support and why the urgency behind these efforts is critical for private investment.

Commercial LEO Destination: Why Now?

The CLD program was developed by NASA to ensure that the U.S. have a continuously crewed platform in LEO after the ISS⁸. Without the success of CLD providers like Starlab Space, the U.S. will fail to have a continuous human presence in LEO for the first time since November 2000. The ISS, while an incredible feat of human engineering, cannot last forever. The ISS is over 20 years old and is exhibiting signs of its age, showing structural signs of fatigue and leaks that will only get worse. Unfortunately, today, a large percentage of the ISS crew’s time is now dedicated to performing maintenance on the ISS structure, and this will only get worse as the ISS continues to age. For example, recent reports by NASA state that from April 2020 until October 2020 (a 6-month period), only 325 hours (about 2 weeks) were spent on U.S. Orbital Segment payloads, despite each crew member having a 6.5 hour working day (not including exercise and eating) on the ISS, as the crew was faced with repairing and investigating several ⁹[OBJ]. If we choose not to support CLDs and replace the ISS, we will continue to struggle with an aging structure until the ISS is forced to retire. As Russia continues its war on Ukraine and focuses its supply chain and funding to offensive geopolitical actions, it puts maintenance of their ISS segment at risk and strains our diplomatic partnership. It is time to ensure that we support the

⁸ See *Fiscal Year 2024 Full Budget Request*, NASA, p. SO-99 (Mar. 22, 2023) <https://www.nasa.gov/nasa-fiscal-year-2024-budget-request/> (Stating: “NASA seeks to maintain access to a low-Earth orbit (LEO) human-rated platform to continue the U.S. human presence – with both Government astronauts and private citizens – to support the utilization of space by U.S. citizens, companies, academia, and international partners, as well as to expand the American foothold in space. To successfully meet NASA’s Strategic Goals and Objective 2.2 to “Develop a human spaceflight economy enabled by a commercial market”, NASA established the Commercial LEO Development Program as a focused effort to ensure that there will always be a U.S. space station in LEO that meets NASA’s enduring requirements, even after the International Space Station (ISS) is retired.”

⁹ See *Presentation on International Space Station Status by NASA’s Acting International Space Station Director Robyn Gatens*, HEO NAC (January 2021) https://www.nasa.gov/wp-content/uploads/2016/05/20210113_heo_nac_iss_final4.pdf.

next iteration of research platforms in LEO. Without continued support for CLD providers we face further potential repercussions for the U.S. that are untenable.

First, without new CLD platforms, the U.S. will have no avenue to continue to expand international partnerships on crewed platforms in LEO. The ISS has been a pinnacle of U.S. diplomacy for decades and has served to strengthen our relationship with like-minded nations on Earth as well as for future space exploration efforts. Starlab will be open to government agencies, researchers and commercial users from around the world. Providing access to space on a CLD platform will permit previously non-spacefaring nations with the ability to work with the U.S. in space. While we hope to see more like-minded nations join onto programs like NASA's Artemis and provide expertise and hardware to these programs, the reality is that many nations cannot afford to immediately provide these capabilities for international space collaboration. Working on a CLD platform is a more affordable and nearer term option that can help develop these longer-term partnerships for the U.S. Already today, we have seen traditional U.S. partners like the European Space Agency committed to using U.S. space stations like Starlab, as well as newer international partners with entities from countries like India, Mexico, Colombia, and Costa Rica.¹⁰ Without CLD platforms these relationships will take significantly longer to cultivate and ultimately, may never even come to fruition.

Second, without CLD success, the U.S. will lose access to a crewed microgravity, in-space testbed for NASA's Artemis program – which is currently available on the ISS.¹¹ The U.S. needs to test equipment, study habitation platforms, and analyze astronauts' health to safely enable U.S. astronaut exploration of the Moon and beyond. Artemis will additionally require human beings to live in space for long durations of time. CLD platforms are the only viable option to perform studies on the effects of long-term exposure to space on the human body safely for crew supporting Artemis. The Artemis program is vital to our ability to remain a leader in U.S. space exploration. CLD platforms must be operational to support this national priority.

Third, the U.S. will forfeit its ability to build and benefit from the commercial economy and microgravity research and development if it does not have access to CLD platforms. The ISS today has created a proof of concept for how a microgravity environment can spur commercial innovation and business in the U.S., while also providing invaluable research and development supporting U.S. national priorities. Examples such as progress in cancer, pharmaceutical, and biomedical research that microgravity enables are irreplicable. Today, we are only beginning to understand how the microgravity environment can continue to support these efforts as well as in

¹⁰ "Voyager Space Signs MoU with ISRO and IN-SPACE to Explore Utilization of Gaganyaan Spacecraft for the Starlab Space Station," Voyager Space (July 10, 2023) <https://voyagerspace.com/2023/07/10/voyager-space-signs-mou-with-isro-and-in-space-to-explore-utilization-of-gaganyaan-spacecraft-for-the-starlab-space-station/>; *See also* "Voyager Space and Nanoracks Sign MOUs with Five Latin American Space Agencies," Voyager Space (Sept. 18, 2022) <https://voyagerspace.com/2022/09/18/voyager-space-and-nanoracks-sign-mous-with-five-latin-american-space-agencies/>.

¹¹ Ana Guzman, "Five Space Station Research Results Contributing to Deep Space Exploration," NASA (Jan. 22, 2022) <https://www.nasa.gov/missions/station/five-space-station-research-results-contributing-to-deep-space-exploration/>.

new industries such as in manufacturing and quantum computing.¹² Without CLD platforms the U.S. will fail to receive these benefits that are key to bettering life here on Earth.

Lastly, without CLD platforms, the U.S. risks ceding LEO to the People's Republic of China. The Chinese space station, Tiangong, is state-of-the-art space station completed in April 2021 and is already operational in LEO. China opened a call for international customers, and in cooperation with the United Nations Office of Outer Space Affairs, is already flying international science payloads.¹³ This puts U.S. allies in a challenging position. Our allies in Europe and East Asia are standing by us, but this position is only possible if our commercial space stations reach orbit before the ISS is decommissioned in 2030. The Chinese station is an immediate risk to U.S. leadership in space, science, and technology, as they are operating a platform that is decades more modern than today's ISS. We are in a commercial competition in LEO, and we are already behind. Competition, however, is where America best performs when the commercial market is unleashed to create value to industry. The U.S. government must continue to nurture the emerging LEO space station industry much like it did other industries in the past with its full support of the CLD program.

The Committee thus far has provided excellent bipartisan support for the CLD program, and we offer our sincere appreciation. As we continue to build out these platforms in the face of these realities, we ask for the Committee's support for certain commitments that can help drive forward the CLD program as well as legislative and policy needs that support program growth.

Providing Commitments for NASA's Commercial LEO Destinations Program:

To attract private investors that are willing to place capital in large-scale commercial space programs, we need steady commitment from the U.S. government.

The most vital show of dedication from the U.S. government includes a firm commitment by NASA to decommission the ISS in 2030. It is extremely difficult to raise the necessary funds to support this program without a public commitment from NASA and Congress that the ISS will be transitioned and decommissioned on a clear timeline. To realize investment in a commercial space station, the market must be allowed to compete in and build a microgravity LEO ecosystem and economy. Investors must believe today that NASA does not intend to continue to utilize the ISS past 2030 and is committed to transitioning operations to CLD platforms. This drives commercial, scientific, and international partners' business to CLD platforms and investors are attuned to this fact. We ask the Committee to provide supportive language to this decommission timeline and provide CLD providers with the necessary support from the U.S. government to raise private investment for these commercial stations.

In addition to desiring to see planning for and a firm timeline for the ISS decommissioning, we also hope the Committee continues supporting the authorization at a funding level of \$295

¹² See examples of microgravity research and development: "Annual Highlights of Results from the International Space Station," NASA (2022) https://www.nasa.gov/wp-content/uploads/2023/01/annual_highlights_results_iss_2022_np.pdf?emrc=ed5a8a.

¹³ Fan Anqi, "China's space station first to be open to all UN member states: Chinese FM," Global Times -China (Apr. 18, 2022) <https://www.globaltimes.cn/page/202204/1259653.shtml>.

million for the NASA CLD program in fiscal year 2025. We recommend that NASA receive authorization for an increased funding request so to accelerate necessary investor confidence and ultimately enable CLD providers to raise the required significant private capital. Investors know that commercial ingenuity can lead to major innovation, however, risk tolerance is low with the tumultuous economy and challenging geopolitical environment.

This authorized funding increase by Congress would accelerate private investment rates earlier in the program. Early investment in commercial space stations is necessary to ensure design challenges are addressed early, to garner the customer base, and avoid costly changes late in the program. Lack of capital investment in 2024 and 2025 jeopardizes CLD schedules for all providers, which in turn risks the ability for CLD providers to launch stations into orbit prior to the 2030 ISS retirement. The U.S. cannot afford to risk this gap.

To ensure there is no gap and a smooth transition for NASA capabilities and use of continuously crewed microgravity platforms prior to 2030, we also ask the Committee to continue analyzing NASA's transition plan from the ISS to CLD platforms. We ask the Committee to consider the transition beyond just the infrastructure. NASA must be prepared to transition work off the ISS to CLD platforms immediately once the CLD station is operational. This will ensure NASA fully realizes the return it aims to receive from its investment in the CLD program and ensure taxpayer funds are utilized responsibly.

To meet this timeline, we recommend that the Committee considers providing support to NASA's Biological and Physical Sciences (BPS) program. BPS must begin developing the necessary payloads and equipment it will need to perform government research and development on CLD platforms. Specifically, we encourage BPS to develop a payload pipeline for CLDs that includes fluid and combustion equipment to further science as set forth by the recent NASA and National Academies of Science Decadal survey in 2023.¹⁴ This pipeline is vital to supporting the multiple science missions NASA intends to do within the decade, and beyond, and ensure that the workforce of experts is maintained. Without increased funding and legislative prioritization of this program, NASA risks a gap in its ability to support science missions on CLDs. This workforce is a finite resource that is cultivated long term. Without continuous and consistent work, the workforce will migrate to other programs, resulting in extreme repercussions on NASA's ability to support microgravity research on CLDs.

These commitments from the U.S. government will provide the best support possible for the CLD program, the only viable option for a continuous human U.S. presence in LEO for microgravity research. To further enhance these proposed commitments, we additionally ask the Committee to consider and analyze a few areas in legislation and regulatory frameworks to support the CLD program.

Legislative and Policy Issues in Support of NASA's Commercial LEO Destination Program:

¹⁴See recommended NASA scientific priorities: *Thriving in Space Ensuring the Future of Biological and Physical Sciences Research: A Decadal Survey for 2023-2032*, National Academies of Science (2023) <https://nap.nationalacademies.org/catalog/26750/thriving-in-space-ensuring-the-future-of-biological-and-physical> .

NASA's use of privately owned and operated space stations to host professional government and commercial astronauts continuously in orbit will require new approaches to insurance and liability risk sharing agreements with the U.S. government and international agencies. I offer this context to Congress for what CLD providers are facing as they develop operational flows for CLD platforms and ask the Committee to assess potential solutions for these issues.

Today, CLD providers are faced with commercial underwriting obstacles as we look to insure our space station and mitigate risk. NASA is asking the CLD providers to build and launch a multi-billion-dollar system intended for use as the U.S. space station. This will be the first time that a private company will have launched such an expensive and critical payload. Currently, the aviation and space insurance markets are dominated by a handful of brokers who tap underwriting capacity from a limited pool of capital covering launch reflight, satellite replacement, and loss of revenue from in-orbit anomalies (typically limited to renewable 1-year terms). It is our understanding that underwriters and re-insurers will take small coverage positions in commercial launch events to spread their risk across multiple missions. We are also under the impression that the commercial capacity for a single launch event is limited to ~\$700-800 million, a limited underwriting pool to cover the launch of an integrated space station, and possibly larger modules by other CLD providers, especially on a super-heavy lift rocket. This insurance level provides yet another risk that investors may shy away from as the premium available for a larger system will likely be dedicated almost entirely to the launch vehicle and not cover the payload provider.

CLD providers will have to assess insurance costs in our business models to cover pre-launch-ground activities and a reflight of the Starlab space station in the event of a launch failure. However, insurance for the full hardware replacement cost of a space station in the event of a catastrophic failure during the launch and in-orbit testing/deployment phase is more challenging given limited current underwriting capacity available on the commercial market. Given the national impact of this approach to build the next U.S. space station, we ask the Committee to extend and consider expanding the current framework that apportions third-party liability risk between the launch and reentry licensees and the federal government.

The Commercial Space Launch Amendments Act of 1988 (CSLAA) - Public Law No. 100-657, § 5, 102 Stat. 3900, 3901-3905 (1988), as amended - indemnifies U.S. commercial space launch licensees and related parties against third party liability claims greater than \$500 million, up to a ceiling of roughly \$1.5 billion, or \$3.9 billion adjusted for inflation. The law also requires the execution of reciprocal waivers of claims between applicable parties, which include contractors, subcontractors, customers, and spaceflight participants. The provisions that extend indemnification to spaceflight participants and provide for the payment of claims are scheduled to sunset in 2025 and were last extended by Congress in 2015.

With Starlab launching in a fully integrated configuration (single-launch design), and other CLD platforms possibly launching large modules, existing liability coverage within the insurance market and government indemnification may be less than sufficient to cover the maximum probable loss reasonably expected to occur because of a possible mishap that results in third party damage on the ground (deaths, injuries, and property loss) caused by the launch or reentry.

We recommend that the Committee consider increasing the federal liability coverage limit above \$3.9 billion based on the total probable loss to support CLD platforms get to get to space. Given the national importance of these platforms we believe it is in line with the intent behind the CSLAA to enable American competitiveness.

As we look to CLD provider's operational risk in-orbit we see potential issues regarding operations in support of NASA astronaut and payload missions aboard commercial space stations as well as for international participation on CLD platforms. We ask for the help of the Committee and U.S. government to develop solutions to these questions. We provide the context below for the Committee's consideration of these questions.

Since 2004, U.S. commercial human space flight has operated under an informed consent framework, with FAA prohibited from regulating occupant safety except in response to an incident. This moratorium, or "learning period" has been extended several times and is currently set to expire in March of 2024 (this year). While this "learning period" was intended to allow industry to develop consensus standards, operators are just now making progress on these standards.¹⁵ Furthermore, it remains unclear how commercial space stations will be integrated into the informed consent framework.¹⁶

Today, NASA plans to certify missions to CLD providers' commercial space stations as well as the crew and cargo resupply systems that will service them. However, it should be noted that NASA astronauts are U.S. government employees who are unable to sign informed consent documents waiving liability claims against commercial space station operators. Furthermore, commercial space stations in orbit are not regulated under FAA's launch and reentry licensing framework and thus would not likely fall under the informed consent regime, nor the indemnification provisions afforded by the CSLAA. With this, we ask the Committee to explore options to help transition NASA astronauts to a CLD platform, while also supporting CLD platform providers as they face this uncertainty regarding liability waivers and government employees.

Similarly, the existing ISS Inter-Governmental Agreement (IGA) established a long-term cooperative framework with 15 nations in Europe, Canada, and Japan for the design, development, operation, and utilization of a permanently inhabited space station in accordance with international law. The IGA allows member countries to more easily share critical information and provides cross-waiver of liability which prohibits any of the partners or their related entities (contractor, sub-contractor, end user, customer) to claim against another partner (or its related entities) for damage sustained as a result of ISS activities (Article 16). Exceptions include claims arising between a partner space agency and a user covered by a contract and claims for damages caused by willful misconduct.¹⁷ Absent the IGA, NASA, international space agencies (ESA, JAXA, CSA, and others) will need to establish an agreement with CLD operators

¹⁵ See Committee F47 on Commercial Spaceflight "Get Involved" section at <https://www.astm.org/get-involved/technical-committees/committee-F47>.

¹⁶ See 51 U.S.C. § 50905(b).

¹⁷ See an overview of the ISS Inter-Government Agreement: Diane, St-Arnaud, Andre Farand, Motoko Uchitomi, Robin J. Frank, *The Legal Framework for the International Space Station*, United Nations Committee on the Peaceful Uses of Outer Space Legal Subcommittee (Apr. 17, 2013) <https://www.unoosa.org/pdf/pres/lsc2013/tech-05E.pdf>.

covering liability and risk sharing regimes that will allow their astronauts to live and work together on commercially owned stations. To support CLD providers, we would appreciate the Committee considering the authorization of a new agreement, remnant of the current ISS IGA, to include similar agreements for commercial operators and international users. We view this as a substantial policy issue for this transition from a government-centric microgravity platform model today on the ISS to commercially owned and operated microgravity platforms on CLD platforms.

Lastly, as the Committee assesses current legislative priorities, we ask the Committee to consider support for policies that provide regulatory certainty and decrease risk for CLD providers. One of the opportunities that the Committee must provide this support is to assign new “mission authorization” responsibilities for “novel” space activities to one government agency.

It is my understanding that under Article VI of the Outer Space Treaty of 1967, each Party state is responsible for the “authorization and continuing supervision” of governmental and non-governmental entities' activities in space. As a Party state to the Outer Space Treaty, the U.S. has met its obligations to authorize and supervise non-governmental actors by dedicating these authorities, and the power to regulate, to federal agencies through domestic legislation.

¹⁸Today’s commercial space activities that are authorized, supervised, and regulated include commercial space launch and reentry activities under the FAA, commercial remote-sensing regulations under NOAA, and radio/satellite communication spacecrafts under the FCC.¹⁹ However, as commercial industry develops capabilities that engage in activities that challenge current authorization and supervision frameworks, such as the Starlab, the U.S government must provide regulatory certainty and clarity.

Ultimately, companies developing “novel” space activities need transparent and non-invasive supervision standards. Each activity holds a different subset of considerations to ensure that U.S. commercial activities are abiding by international legal standards to maintain U.S. obligations under international treaties such as the Outer Space Treaty and the Liability Convention. As legislative proposals begin to take shape, we ask the Committee to sincerely consider that these authorities be vested in one agency and not be bifurcated. A “one stop shop” model ensures that there is less confusion to operators, such as Voyager, on which agency and what requirements must be met when applying for authorization to operate in orbit. By providing a stable and clear location for this issue, companies will efficiently be able to comply with authorization requirements and continue to build their businesses and technology systems with a clear understanding from government on their requirements.

This approach will foster competitiveness for U.S. companies and U.S. space capabilities as it will enable companies to adequately forecast regulatory risks and considerations as they develop “novel” space activities and technologies. If companies are bottlenecked by regulatory approvals due to disjointed communication between authorizing agencies, then there will be less progress and less capabilities for the U.S. government to utilize. Additionally, what has always made the

¹⁸ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (1967), 610 U.N.T.S. 205, 18 U.S.T. 2410.

¹⁹ Steve Mirmina & Caryn Schenewerk, *International Space Law and Space Laws of the United States* (Cheltenham, UK; Northampton, MA: Edward Elgar, 2022)

U.S. a favorable venue for space innovation has been our clear and transparent regulatory framework that is incomparable to any other country's regime. Without this continued culture of encouragement for industry, we may see an influx in space innovators seeking to build "novel" space capabilities in foreign regimes that are less confusing and burdensome.

This clarity is additionally of extreme importance to investors as they perform due diligence in a risky sector. Investors are concerned with whether the technology system can work, but they are also equally concerned about whether that system will face regulatory hurdles. By providing a clear venue and process under one agency we see this issue being as less of a concern for investors.

In addition to the issue of issuing these authorities to a singular U.S. federal agency, instead of two, we urge the Committee to consider the point of indemnification under authorization and continued supervision applications. Recent proposals have considered the concept of requiring commercial actors seeking authorization under this new regime to only be permitted an authorization "certificate" if they agree to indemnify the government for any successful third-party damage claims made under the Liability Convention.²⁰

This proposal is unprecedented under the current liability regimes that commercial space actors understand today. Under the CSLAA, liability risk is shared between both commercial operators and the government in the case of third-party liability, as discussed above.²¹ In its recent FNPRM, the FCC seeks to shift all of this risk to commercial operators.²² We encourage the Committee to analyze the comments made by satellite operators on this issue and the effects that this type of requirement can have on industry, especially as contrasted against the effects that the FAA's third-party indemnification risk sharing regime had on building out extremely successful launch economy and ecosystem today.²³

One such concern under this proposed certification requirement includes the possibility that a certificate holder may face the U.S. government seeking recovery for financially burdensome claims that would be a financial strain on most space companies.²⁴ This could happen under the Liability Convention when claims arise under Article II, or "damage caused by its space object on the surface of the Earth or to aircraft in flight." Article II claims are assessed under strict liability standards where a State is absolutely liable for damage caused by space objects.²⁵

²⁰ H.R. 6131, 118th Cong. § 80105 (as passed by House Space Science & Tech. Subcommittee Nov 2, 2023).

²¹ Commercial Space Launch Act Amendments, Pub. L. No. 100-657, §5102 Stat. 3900, 167 (1988) (codified as amended at 51 U.S.C. § 50901).

²² See "Mitigation of Orbital Debris in the New Space Age," 85 Fed. Reg. 52455 § F (proposed Aug. 25, 2020).

²³ See *Liability Risk-Sharing Regime For U.S. Commercial Space Transportation: Study and Analysis*, Dep. Of Transportation, FAA, (April 2002),

https://www.faa.gov/about/office_org/headquarters_offices/ast/media/faaliabilityrisksharing4-02.pdf.

²⁴ *As seen in the Cosmos 954 case*; See Schwartz, Bryan (1982) "After the Fall: An Analysis of Canadian Legal Claims for Damage Caused by Cosmos 954." McGill Law Journal: Vol. 27:No. 4, <https://lawjournal.mcgill.ca/article/after-the-fall-an-analysis-of-canadian-legal-claims-for-damage-caused-by-cosmos-954/>.

²⁵ The Convention on International Liability for Damage Caused by Space Objects (1972), 961 U.N.T.S. 187; 24 U.S.T. 2389; 10 I.L.M. 965 (1971). Please note that under absolute liability claims in the event of a significant anomaly would likely reach high levels that are unprecedented for a commercial space company working in these

Additionally, under Article III of the Liability Convention claims of damage in space are determined under fault-based liability.²⁶ However, fault is not described or defined in international law and no State practice has tested this theory.²⁷ Therefore, in the possible event a successful claim is brought against the U.S. for a commercial space operator's damage under Article III this begs the question of whether the fault established in international proceeding can satisfy the fault-based liability standards in place within U.S. tort law.²⁸ We ask the Committee to assess this issue and amend current proposals with this imbalance in mind.

This proposal creates unnecessary uncertainty for the U.S. commercial space industry. With operators, like Starlab Space, making considerable efforts to avoid ever finding ourselves in this position with the international community to begin with, we do not wish to bare unnecessary risk and responsibilities. Examples of this include possibly needing to engage with the insurance and re-insurance markets to cover the risk this type of legislative action proposes. While this is an option, we believe that underwriters would not know how to set premiums without any damage caps or expectations of what a damage amount may look like. The insurance market may just choose not to engage with this type of risk assessment at all. We recommend that to build a healthy space ecosystem that in the case the Committee finds they wish to keep this proposed legislative language, that they consider liability caps, or allow operators to negotiate for reasonable liability caps depending on their activity.

Additionally, the U.S. government should be proposing legislation that pushes commercial innovators to want to develop their businesses on U.S. soil. These types of policies do not provide regulatory certainty or clarity to operators. This is not the case in other nations seeking to grow their space ecosystem. To attract U.S. business and U.S. investment to this country, a healthy and fair liability regime will be vital.

With the global space economy projected to be a trillion-dollar business by 2040 the U.S. cannot afford to create risky and unclear policies for industry.²⁹ Instead, we ask the Committee to understand that streamlined, transparent, and minimally burdensome requirements for those working in "novel" space activities must be a priority if the U.S. is to benefit from this potential economy and provide substantial and permanent employment opportunities for U.S. citizens.

new space activity areas. Under this proposal there would be no option of risk sharing with the U.S. government that has traditionally been the case such as in the CSLAA launch and reentry liability regime. This risk could disengage U.S. commercial innovator working on projects that may include larger operational risk.

²⁶ The Convention on International Liability for Damage Caused by Space Objects (1972), 961 U.N.T.S. 187; 24 U.S.T. 2389; 10 I.L.M. 965 (1971).

²⁷ Fault is not defined in either the Liability Convention or in the Outer Space Treaty, where the Liability Convention is born from,

²⁸ Morozova, Elina, and Alena Laurenava, "International Liability for Commercial Space Activities and Related Issues of Debris," Oxford Research Encyclopedia of Planetary Science (Feb. 23, 2021) <https://oxfordre.com/planetaryscience/view/10.1093/acrefore/9780190647926.001.0001/acrefore-9780190647926-e-63>.

²⁹ "Space: Investing in the Final Frontier" Morgan Stanley – Research, (July 24, 2020)

<https://www.morganstanley.com/ideas/in-vesting-in-space#:~:text=Near%20term%2C%20space%20as%20an%20invest-ment%20theme%20is,more%20in%202040%2C%20up%20from%20%24350%20billion%2C%20currently>.

With these considerations we believe that the Committee and the U.S. government can help build a sustainable and healthy CLD program and lay a strong foundation for the LEO economy of the future. Support through legislation and policies for the U.S. commercial industry dedicated to providing NASA and the U.S. with the only option for continuously crewed microgravity platforms is imperative to our nation.

Mr. Chairman and Ranking Member Sorensen, I appreciate your invitation to testify before the Committee today. These are exciting times for U.S. space innovation. As the Committee considers legislation that effects the LEO environment and commercial space stations, it has the opportunity to support the rapidly growing U.S. commercial space industry while ensuring continued U.S. leadership and competitiveness in space. My testimony has only touched on a few pieces of the efforts it takes to build a commercial space station, and sharing our legislative priorities today has been an incredible opportunity. Thank you for your continued support of commercial space exploration.