

GOVERNMENT PROMOTION OF SAFETY AND INNOVATION IN THE NEW SPACE ECONOMY

HEARING

BEFORE THE

SUBCOMMITTEE ON SPACE AND SCIENCE

OF THE

COMMITTEE ON COMMERCE,
SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

ONE HUNDRED EIGHTEENTH CONGRESS

FIRST SESSION

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED EIGHTEENTH CONGRESS

FIRST SESSION

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GOVERNMENT PROMOTION OF SAFETY AND INNOVATION IN THE NEW SPACE ECONOMY

WEDNESDAY, DECEMBER 13, 2023

U.S. SENATE,
SUBCOMMITTEE ON SPACE AND SCIENCE,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Subcommittee met, pursuant to notice, at 2:31 p.m., in room SR-253, Russell Senate Office Building, Hon. Kyrsten Sinema, Chairman of the Subcommittee, presiding.

Present: Senators Sinema [presiding], Cantwell, Peters, Luján, Hickenlooper, Schmitt, Cruz, and Vance.

OPENING STATEMENT OF HON. KYRSTEN SINEMA, U.S. SENATOR FROM ARIZONA

Senator SINEMA. The Subcommittee is now in order.

Welcome, everyone, to our hearing on the U.S. Senate Space and Science Subcommittee. Thank you to each of our witnesses for their participation today.

Thanks to our subcommittee Ranking Member Schmitt for working with me on these issues, and to Chair Cantwell and Ranking Member Cruz for their collaboration. A thriving commercial space industry is essential for continued American leadership of space innovation, which in turn advances critical economic, national security, and scientific interests.

The new space economy presents exciting opportunities where visiting, living, and working in space can become reality. I am proud that America is leading these global efforts to safely advance the technology that enables space exploration, including human spaceflight. I am also proud to see my home state of Arizona leading the way in commercial space.

Arizona is a shining example of how to build meaningful careers and innovations in the new space economy thanks to public, private partnerships at Arizona State University and University of Arizona, as well as the investments from innovative companies to produce space vehicles and conduct research across the state.

To keep America on top, we must foster an environment that enables and encourages innovation without sacrificing safety. This will require Congress to streamline authorization processes, enable a work safe—a workable safety framework for in-space operations, and clearly define proper responsibilities for different Government agencies.

In October, the Subcommittee heard from leading industry representatives and experts on the current regulatory environment

and how it could be improved. Witnesses all emphasized the need to address mission authorization, the learning period, and other pressing matters while looking ahead to a future with unknown capabilities.

The time for action is now. Competitor nations, including adversaries like Russia and China, are making major space investments. It is imperative that a U.S. framework establishes the norms for a workable international business climate, promotes our national interests, and serves as the models for others to follow.

Commercial space companies are working right now to provide orbital and satellite services, mitigate orbital debris, manufacture in space, deliver space tourism, and so much more. The question of how regulation of these new space activities will work, often referred to as mission authorization, remains unclear, even as businesses and NASA press for a clear and efficient authorization framework.

The White House National Space Council released draft legislation in November to extend existing responsibilities of the Departments of Transportation and Commerce, while dividing mission authorization authority between them. I am heartened that the Administration is working on this critical issue, but the proposal contains numerous ambiguities, new undefined terms, and broad grants of open ended authority.

Unfortunately, the Council declined to attend today's hearing and answer questions on their proposal, but I hope to hear from them soon and gain further clarity in future discussions. One thing that is clear is that we cannot simply continue with the status quo that results in licensing delays, regulatory uncertainty, and inefficient uses of taxpayer dollars and private resources.

The proper regulatory framework will both remove unnecessary burdens and provide the necessary certainty for the space industry to prosper safely now and into the future. For this to happen, we must keep mission authorization fully distinct from mission success. The Government's job here is to allow innovation, investment, and dreams to flourish, while ensuring safety.

We need a framework that relies on our greatest asset, our people, to push both industry and the country forward. To succeed, we will need a robust workforce equipped to support the commercial space ecosystem.

I am passionate about making sure that Americans and Arizonans have rewarding careers to choose from when graduating either from a certificate program, vocational school, or with advanced degrees. Encouraging public, private partnerships and leveraging the existing expertise of entities like NASA will be essential to ensure we have the engineers, technical experts, and skilled workforce to win the next century in space.

As I said in October, Congress must take the same enterprising, pioneering approach to commercial space that has served us so well in earlier generations. I believe this requires a flexible regulatory environment, able to attack the issues of today head on without compromising adaptability to the issues of tomorrow.

Thank you. I will now turn to Ranking Member Schmitt for his opening statements.

**STATEMENT OF HON. ERIC SCHMITT,
U.S. SENATOR FROM MISSOURI**

Senator SCHMITT. Thank you, Madam Chair, and thanks for working so diligently and with me on these important issues. Thank you to our witnesses for joining us here today. While we may not agree on everything that is discussed here today, your agencies have been and will continue to be invaluable to our space efforts.

As I have stated before, Missouri has blazed a trail in our Nation's path of exploration. St. Charles, Missouri, marked the beginning of Lewis and Clark's expedition to explore our Nation's expansion to the West. And Marshfield, Missouri, produced Edwin Hubble, who fathered our Nation's exploration of distant galaxies.

Today, Missouri is home to over 54 companies who supply our Nation's civil and commercial space missions. Space has been a unifying force for our nation, dating back to the space race with Russia in the 1950s and the 1960s. Then our Nation rallied to meet the challenge of beating Russia to the moon, culminating in Neil Armstrong's famous words, "one small step for man, one giant leap for mankind."

Today, America is engaged in a new 21st century space race, one in which we will—one in which we compete with China. Once again, we face the challenge of landing on the lunar surface before China has the chance to plant its flag on the moon, claiming it is their domain.

Fortunately, America has the pieces in place from an industry perspective to win this important challenge. However, regulatory ambiguity and uncertainty are standing in the way from truly unleashing our Nation's commercial aerospace industry capabilities.

In the intensifying space race with China, retaining U.S. leadership is imperative, not just for economic and security interests, but to ensure all nations follow appropriate rules and norms in space.

As we contemplate new frameworks for space regulation, our policies must balance enabling the deployment of new technologies for commercial operations while ensuring safety, while sustaining our role as the preeminent leader in space.

Currently, there are four key agencies who exercise authority or jurisdiction over space, the FCC, the Department of Transportation's Federal Aviation Administration Office of Commercial Space Transportation, AST—I was just going to give acronyms—NASA, and NPS. It plays a small role, but for whatever reason it is in our Nation's space endeavors.

As today's—at today's hearing, we are examining the role of some of these agencies responsible for whether or not their roles need to be refocused or changed to meet the demands of our Nation's rapidly evolving commercial space industry.

I have already helped lead those efforts, along with Senator Sinema and others here in the Senate, and Senator Hickenlooper who is here, with the Launch Communications Act, which streamlines the FCC's commercial launch and reentry spectrum licensing process to provide a more certain and timely licensing process to keep pace with the launch and reentry demands at the commercial—with the commercial space industry.

That bill has passed the Senate and look forward to working with the House to get it signed into law. Recently, in an attempt to address current regulatory uncertainty and confusion as relates to our Federal policies for new and novel in space activity known as mission authorization, the Biden Administration released a proposal that would divide responsibilities between the Departments of Transportation and Commerce.

Despite being met with opposition, the White House, in a statement, said the proposal ensures that our Government will build a regulatory environment that supports commercial expansion to benefit all Americans.

I will make mention that the National Space Council, which authored the Administration's proposal, was invited today's hearing and is noticeably absent. It is disappointing they are not here to answer simple questions.

Madam Chair, it is important that our industry has regulatory clarity and certainty as we focus our efforts here in this committee on a commercial space bill. As we embark on this new frontier of space exploration, the stakes are profound.

We must make the hard decisions, which may include creating new authorities for some agencies and reforming or eliminating authorities for others. Just as our Nation did as Sputnik and the Soviets cast a dark shadow upon the earth in 1957, we must meet this moment.

I stand ready to work with you and to bring forward balanced light—to bring forward balanced light touch policies that empower, not hinder, American ingenuity and innovation, and get the Government out of the way.

I am eager to hear from our witnesses today to assist this committee in shaping the policies that retains America's primacy in space. I yield back.

Senator SINEMA. Thank you, Senator Schmitt. Now, I will introduce our witnesses for today's hearing. Our first witness is NASA Deputy Administrator, Pam Melroy. Ms. Melroy has logged more than 924 hours in space, is one of only two women to ever command a space shuttle and flew more than 6,000 hours during her Air Force service.

She has also served in leadership roles at Lockheed Martin, the Federal Aviation Administration, and the Defense Advanced Research Projects. Deputy Administrator Melroy, you are recognized for your opening statements.

**STATEMENT OF HON. PAM MELROY,
DEPUTY ADMINISTRATOR,
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

Ms. MELROY. Thank you. Chair Cantwell, Chair Sinema, Ranking Member Cruz, and Ranking Member Schmitt, I am extremely pleased to be here and have the opportunity to appear today on what is a critically important topic.

This is a really exciting time for space. There is a lot going on, especially in commercial space, which is playing an increasingly important role in NASA's amazing mission to conduct meaningful scientific investigations throughout the universe.

We are working to return humans to the moon under the Artemis program, and then pressing forward for the first humans on Mars. We are unlocking the secrets of the universe with the James Webb Space Telescope.

And our vision for NASA is that we take on the hardest and most complex challenges that no one else can do. At the same time, where industry is ready, we are increasingly transitioning to commercially provided services where it makes sense. And let me give you a few examples.

When NASA decided to retire the space shuttle, we needed a new way to transport astronauts and cargo, including critical science, to the International Space Station. And working with Congress, the agency funded and authorized the development of new commercial space launch capabilities and spacecraft capable of carrying humans.

Under this model, NASA and one of our commercial providers, SpaceX, we together have launched eight crews to the space station from American soil. And SpaceX has launched three additional private human spaceflight missions, opening the door to a new private commercial human spaceflight market.

And all of these launches are commercially licensed by our colleagues at the FAA. As NASA looks to the future, we plan to build upon the success of commercial crew and cargo and leverage the tremendous progress of the commercial space industry. We are very excited.

We expect the first two robotic commercial lunar landers under NASA's commercial lunar payload services to launch in January, delivering critical science and technology payloads to the lunar surface.

NASA is just one of many customers for these commercial lunar landings, and by the end of the decade, commercial space stations will be on orbit, hosting both NASA astronauts and other private activities.

As NASA acquires more of these commercial space services to accomplish our mission, the agency's success is inextricably linked to the success of a commercial space industry. And we did this by design. We did it by intent.

Over the years, NASA has strategically fostered the growth of the commercial space industry, which has increased competition, lowered costs, and accelerated innovation in the market. Our commercial space industry is the envy of the world. However, this innovation does raise important questions about who will authorize and supervise commercial space activities.

We have to balance that amazing innovation and economic growth with protecting the space environment for coexisting users like NASA, Government activities and for future use, foreign policy considerations, and of course, national security concerns.

So as NASA is increasingly a customer of commercial services, we really need greater clarity regarding who is responsible for authorizing and supervising commercial space activities. This clarity is vital for our mission success.

That is why NASA is pleased that the National Space Council recently put forth a recommendation to Congress to make a logical extension of the authorities of the Department of Commerce and

Transportation to better enable the authorization and continuing supervision of commercial space activities.

Important things such as orbital debris mitigation, space-based manufacturing, commercial human spaceflight, and the recovery and use of space resources. This proposal gives industry a clear path to provide on-orbit services to NASA and other customers, while protecting against interference with the Government's own missions and interests, while ensuring also that space continues to be a safe place for all operators.

The intent of this supervision is not to stifle or slow down industry, but rather to work with industry in advancing commercial space. The space industry needs a clear, predictable, timely, and flexible process to initiate non-governmental space activities safely and successfully.

I look forward to the opportunity to continue to discuss this important and exciting topic, and answer any of your questions.

[The prepared statement of Ms. Melroy follows:]

PREPARED STATEMENT OF HON. PAM MELROY, DEPUTY ADMINISTRATOR,
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Chair Cantwell, Chair Sinema, Ranking Member Cruz, Ranking Member Schmitt, distinguished members of the Subcommittee, thank you for the opportunity to appear today to discuss this critically important topic. It is an exciting and active time for space, especially commercial space, which is playing an increasingly important role in helping NASA explore the heavens and do meaningful science.

NASA is working to return humans to the Moon under the Artemis program and then pressing forward to put the first humans on Mars. We are unlocking the secrets of the universe with missions like the James Webb Space Telescope. Our vision for NASA is that the agency takes on the hardest challenges that no one else can do. At the same time, where industry is ready, we are increasingly handing over some missions to the commercial space industry.

Let me give you a few examples. At the end of this year, the first commercial lunar lander will launch under NASA's Commercial Lunar Payload Services initiative, which will deliver science and technology experiments to the lunar surface. NASA is one of many customers of these commercial lunar landing missions. By end of the decade, commercial space stations will be on-orbit hosting both NASA astronauts training for deep space exploration and non-U.S. government astronauts. As NASA acquires more and more of these commercial space services, the success of NASA is inextricably linked to the success of the industry.

By the way, this was by design. Over the years, NASA fostered the growth of the commercial space industry, which has increased competition and accelerated innovation in the market.

However, this innovation raises important questions about who will authorize and supervise commercial space activities. We need to balance U.S. innovation and economic growth against protecting the space environment for future use, foreign policy considerations, and national security concerns, all while meeting our international obligations.

As NASA is increasingly a customer of commercial services, increased clarity regarding who is responsible for authorizing and supervising commercial space activities, particularly where we are not the only customer, is vital for the success of NASA's missions.

To be clear, Congress has authorized and funded NASA to use commercial capabilities in low Earth orbit and beyond. Where we are the sole customer, we feel confident that we can exercise appropriate oversight through our contract. However, where there are multiple customers, both Federal and non-federal, the U.S. government faces new challenges with respect to authorizing and properly overseeing these missions. These challenges often create risks for NASA and the U.S. government overall.

That is why NASA is pleased the National Space Council recently put forth a recommendation to Congress to extend the authorities of the Departments of Commerce and Transportation in a logical way to better enable the authorization and continued supervision of novel space activities, such as orbital services, orbital de-

bris mitigation, space-based manufacturing, commercial human spaceflight, and the recovery and use of space resources. This proposal will enhance safety of NASA operations when we are using commercial services by utilizing the existing expertise and capabilities of relevant Federal regulatory agencies.

The intent of this supervision is not to stifle nor slow down industry, but rather to work *with* industry in advancing commercial space. We want to preserve safety, but also economic opportunity. We want it to be flexible because NASA knows that technology evolves and we must evolve along with it. And we want the process to be timely, transparent, and efficient so it can keep up with the rapid growth of commercial space activities. We are and will continue to be a strong advocate for our commercial partners in the interagency especially where their success is vital to our mission.

The space industry needs a clear, predictable, timely, and flexible process to initiate non-Governmental space activities safely and successfully. NASA needs a robust and thriving space industry to achieve our own goals. The risk to *all* space activities of not having some form of coordinated oversight is too great.

To ensure the certainty of future novel commercial activities critical to NASA's mission—from commercial lunar landers, to resource extraction, to space nuclear power—and ensure novel commercial activities do not interfere with NASA missions, it is critical we get the authorization and supervision regulatory regime right.

NASA looks forward to continuing to work with industry, our interagency partners, and Congress to strike the appropriate balance between adherence to responsible, safe behavior, and nurturing our growing space economy.

Thank you again for the opportunity to discuss this important and exciting topic. I look forward to answering your questions.

**STATEMENT OF HON. JOHN HICKENLOOPER,
U.S. SENATOR FROM COLORADO**

Senator HICKENLOOPER. Great. Thank you so much. Our second witness is Kelvin Coleman, the Federal Aviation Administration Associate Administrator for Commercial Space Transportation.

Mr. Coleman has more than 25 years of experience at the FAA and formerly worked for the U.S. Naval Air Systems Command. Associate Administrator Coleman, you are recognized for your opening statement.

**STATEMENT OF KELVIN B. COLEMAN,
ASSOCIATE ADMINISTRATOR, COMMERCIAL SPACE
TRANSPORTATION, FEDERAL AVIATION ADMINISTRATION**

Mr. COLEMAN. Thank you. Chair Cantwell, Chair Sinema, Ranking Member Schmitt, and distinguished members of the Subcommittee, thank you for the invitation to be here today to discuss the important topic of promoting safety and innovation in the new space economy.

The success of the U.S. commercial space industry is critical to our Nation. Likewise, clear, predictable, transparent, and right-sized regulation of U.S. commercial space is also critical for U.S. continued leadership in space. The Department of Transportation and the FAA are strongly committed to enabling safe U.S. commercial space activities in a manner consistent with our Nation's priorities.

This is why the Department of Transportation and the FAA unequivocally stand in support of the Administration's proposal regarding mission authorization and supervision of novel commercial space activities that puts forward a clear and predictable oversight framework that will impose minimal regulatory burdens on U.S. private sector actors in space.

The proposal features a clear delineation of regulatory oversight roles and responsibilities that smartly leverage existing U.S. departmental authorities and expertise. Specifically, the proposal logically extends the Department of Transportation's existing human spaceflight responsibilities to include human spaceflight activities in space.

This will ensure a consistent single agency oversight of human spaceflight activities throughout our mission's full lifecycle from launch all the way through reentry. Further, the proposal gives recognition to commercial in space transportation and appropriately assigns responsibility for this very specific grouping of activities to the Department of Transportation, which currently oversees U.S. private sector transportation operations to and from space.

Regulatory oversight clarity and process efficiency are important benefits garnered from this very commonsense, oversight construct. Over the last several months, we, together with our interagency partners, have worked tirelessly and given careful and thoughtful consideration to the needs of U.S. private sector and U.S. Government operators in space while crafting this important proposal.

We are steadfastly committed to continued close collaboration with the Department of Commerce, NASA, the Department of Defense, and other agencies to collectively ensure the application of consistent standards in promoting safe and sustainable novel space activities.

Since September of last year, I have been privileged to lead the FAA's Office of Commercial Space Transportation, which carries out the Department of Transportation's statutory responsibility to regulate U.S. launch and reentry, and U.S. launch of reentry site operations only to the extent necessary to protect the public health and safety, safety of property, and national security and foreign policy interest of the United States.

Overall, we have licensed nearly 700 commercial launch and reentry operations and 14 non-Federal space ports, more than any other country in the world by far in both categories. Safety is the FAA's North Star, and we are proud of the fact that no FAA licensed launch or reentry operation has resulted in a fatality or injury to a member of the public or cause significant public property damage.

In recent years, we have witnessed the pace and growth of U.S. commercial launch and reentry operations increase significantly, along with a commensurate increase in demand for my office's licensing products and safety services.

Looking forward, in order to maintain safety while keeping pace with industry, we will remain reliant on the incredible work of a fully staffed Office of Commercial Space Transportation team. I am happy to mention that with Congress's support, we raised our total staff size to 147 with the addition of 33 new staff members last fiscal year.

My office also remains extremely focused on implementation of the streamlined Launch and Reentry Regulation Part 450, which is performance based and allows for the obtaining of a single license for a portfolio of operations from multiple sites.

To facilitate industry transition to Part 450, we provided to industry an assortment of aides, including license applications check list, advisory circulars, as well as virtual tutorials and workshops.

I remain very confident that Part 450 offers a step in the right direction toward efficiency and workload reductions for both the Government and industry without sacrificing safety. Thank you again for the opportunity to participate in today's hearing. I look forward to your questions.

[The prepared statement of Mr. Coleman follows:]

PREPARED STATEMENT OF KELVIN B. COLEMAN, ASSOCIATE ADMINISTRATOR,
COMMERCIAL SPACE TRANSPORTATION, FEDERAL AVIATION ADMINISTRATION

Chair Cantwell, Chair Sinema, Ranking Member Cruz, Ranking Member Schmitt, and members of the subcommittee, thank you for the opportunity to be here today to discuss the important role the Department of Transportation (DOT) and the Federal Aviation Administration (FAA) play in ensuring the safety and economic competitiveness of U.S. commercial space activities. We are committed to continuing to enable safe space transportation and keeping pace with the growth of the commercial space sector while prioritizing U.S. leadership.

U.S. commercial space capabilities and innovation are vitally important to our Nation. The U.S. commercial space transportation industry is rapidly developing new technologies that will assure our Nation access to space, take us back to the moon and to other interstellar destinations, connect global communities, help us better serve the planet, and improve the daily lives of our citizens. Commercial space activity worldwide surged in the past decade, resulting in a half-trillion dollar global space economy that will nearly double in the next decade. The United States contributes roughly half of all commercial activity, and the U.S. commercial space industry will continue to be an extremely important contributor to the growth of this space economy. My testimony focuses on DOT's authorities and responsibilities for commercial space, the Biden-Harris Administration's proposal to establish additional regulatory roles and responsibilities for DOT and FAA regarding new and novel U.S. in-space activities that will ensure the U.S. remains the world's pre-eminent commercial space country of choice, and ongoing efforts to streamline and improve our commercial space regulatory framework.

Overview of the Office of Commercial Space Transportation and its Responsibilities

The Secretary of Transportation (Secretary), in accordance with Title 51 of the United States Code (U.S.C.), regulates and oversees U.S. commercial space transportation operations, which include launch and reentry operations worldwide, the operation of launch and reentry sites, and human space flight missions. This authority has been delegated by the Secretary to the FAA. The FAA, through the Office of Commercial Space Transportation (AST), which I have led as Associate Administrator since September of last year, carries out these authorities to protect the public health and safety, the safety of property, and the national security and foreign policy interests of the United States. In addition to these important responsibilities, the FAA is also responsible for encouraging, facilitating, and promoting commercial space launches and reentries by the private sector and facilitating the strengthening and expansion of U.S. space transportation infrastructure. To put it simply, consistent with these responsibilities, our mission is to enable safe commercial space transportation, and we recognize and embrace the central role the DOT and the FAA play in ensuring the U.S. continues to be the global leader in space.

Since 1989, the FAA has licensed or permitted nearly 700 commercial space transportation operations, more than any other country in the world by far. To put the growth of the commercial space sector into perspective, in Fiscal Year 2023, AST oversaw the safety of 113 operations, tripling the number of licensed operations since Fiscal Year 2020. Additionally, we have received a 186 percent increase in license applications since Fiscal Year 2020. And in the last few years, we've seen an increased use of reusable launch vehicle technology, new manufacturing techniques, and other innovation. The FAA has leveraged its licensing and regulatory capabilities and other various programs and initiatives to enable the growth of the U.S. commercial space industry in a manner that has resulted in an impressive safety record for this rapidly growing industry. No FAA-licensed launch or reentry operation has resulted in a fatality or injury to a member of the public, nor has there been any significant public property damage. Looking forward, we expect the total

number of licensed commercial space operations to double by Fiscal Year 2026. This is fantastic growth, and the FAA is committed to seeing it continue.

Additionally, the FAA's involvement in commercial space transportation operations is extensive; it also includes license modifications and license renewals, conducting payload and policy reviews with our interagency partners, conducting an assortment of safety analyses, safety inspections, mishap investigations, and more. We've seen significant increases in all of these activities. For example, since Fiscal Year 2020, we've increased safety inspections by 124 percent.

Currently, about two-thirds of the AST organization is dedicated to working on these important activities. The FAA's impressive safety record and ability to keep up with this rapidly growing industry are in large part because of the incredible staff that I have in AST. Thanks to recent support from Congress in Fiscal Year 2023, which allowed us to expand our team, we were able to hire an additional 33 new employees using various hiring and recruiting authorities, raising our total staff size to a current level of 147 individuals, which allows us to address many of the growing demands that have been placed on our office.

Looking forward—Novel Space Activities

Last month, the Biden-Harris Administration unveiled a legislative package titled the "Authorization and Supervision of Novel Private Sector Space Activities Act," which, if enacted, will provide clear and predictable authorization and supervision for novel U.S. private sector in-space activities. The Administration's legislative package would expand the Department's licensing authority to include the operation of human space flight vehicles in outer space and the operation of space transportation vehicles if the operation is for the sole purpose of conducting in-space transportation. This is a logical extension of the Department's existing authorities and will simplify the process for industry. The authority to license operations of human space flight vehicles in outer space would ensure consistent oversight of human space flight activities throughout a mission's full lifecycle, addressing public safety, space sustainability, and other U.S. interests and, after the learning period¹ expires, occupant safety from launch through reentry. AST would utilize our extensive expertise in space transportation to carry out in-space transportation licensing authority. For some missions, this authority would allow for in-space transportation operators to apply for a single license to conduct all transportation activities, including launch, in-space transportation, and reentry, which will reduce the regulatory burden on applicants and ensure consistency in transportation rules from launch through reentry.

We recognize the importance of a robust domestic commercial space transportation industry to the Nation. The Department's approach to the authorization and supervision of these in-space activities would prioritize a clear, predictable, and flexible oversight process that promotes access to space and imposes minimal burdens on the industry. The Department would also work closely with the Department of Commerce, NASA, and other departments and agencies to ensure the application of consistent standards.

We are in full support of the Biden-Harris Administration's commitment to fostering a policy and regulatory environment that enables the competitive and burgeoning U.S. commercial space sector, including through this legislative package, and we look forward to continued conversations with Congress on this incredibly important topic.

Efforts to Streamline and Improve FAA's Commercial Space Regulatory Framework

At the present time, as we work to enable safe space transportation within our existing authorities and keep up with this rapidly growing industry, we have also undertaken efforts to streamline and improve our commercial space regulatory framework. These efforts include:

Part 450: In December 2020, the FAA published a final rule to consolidate, update, and streamline all launch and reentry regulations into a single performance-based part, which is found in Title 14, Code of Federal Regulations, Part 450 (Part 450). We designed Part 450 to allow a commercial space operator to obtain a license for a portfolio of operations, which enables an operator to streamline and include different vehicle configurations, different mission profiles, and even multiple sites under one license. The FAA anticipates full implementation of Part 450 will reduce the number of times an operator will need to come to the FAA for an approval. Ulti-

¹ 51 U.S.C. 50905(c) places restrictions on the Secretary's authority to issue regulations governing the design or operation of a launch vehicle to protect the health and safety of crew, government astronauts, and space flight participants.

mately, this will free up licensing resources and ensure there are adequate resources available for evaluating the safety of new operators, vehicles, sites, and technologies. Additionally, among other things, Part 450 enables coordination between the FAA and our Federal range partners, including the National Aeronautics and Space Administration (NASA) and the Department of Defense, on ground safety at Federal launch sites to eliminate gaps and duplication in oversight. By March 10, 2026, all launch and reentry licenses issued by the FAA under legacy regulations will no longer be valid, and launch and reentry vehicle operators must be in compliance with Part 450.

We are committed to ensuring this transition to Part 450 is as smooth as possible. Part 450 is a relatively new rule, and as we approach these next two years, through various initiatives, AST is working to ensure that the FAA has the tools in place to ensure that the industry has a full understanding of how to achieve compliance with Part 450 and how to take advantage of the intended benefits of this streamlined process. Among these initiatives are:

- (1) **Continual Website Improvements:** We have worked, and continue to work, on improving the FAA’s website to ensure that information is easily accessible for prospective license applicants. For example, we have replaced relevant portions of the website that contained licensing information with a “Getting Started with Licensing” page² that provides prospective applicants with important information they will need to successfully submit an application to the FAA for a license, permit, or safety element approval. The page contains a link to commercial space regulations, a link to all active Commercial Space Transportation Advisory Circulars, a link to contact AST and provide project and operator information in order to efficiently begin the pre-application process, a link to pre-application checklists, a detailed step-by-step process for all applicants, and more. Additionally, we have added a tool to the page to guide prospective applicants in determining what type of license they will need.
- (2) **Application Checklists:** We have developed application checklists that prospective applicants may use when applying for a launch or reentry license, experimental permit, launch site operator license, or safety element approval. These checklists provide prospective applicants with the information they need in the pre-application process to ensure they submit a comprehensive, compliant, and complete application for FAA review and approval.
- (3) **Virtual Tutorials and Workshops:** We have posted educational videos on our website that cover various Part 450 topics, including a Part 450 modular “at your pace” training video that offers a broad walkthrough of Part 450.³ We have also hosted workshops to assist prospective applicants with Part 450. For example, we held a Part 450 workshop in 2020 with industry participants where we did a broad walkthrough of Part 450 and provided a crosswalk of mapping tools comparing the new rule to legacy regulations. Additionally, this summer, we held a compliance and enforcement workshop with industry participants. We plan to develop more training videos and hope to host more workshops in the future.
- (4) **Guidance:** The FAA has published guidance on means of compliance with Part 450 requirements through Advisory Circulars to assist the commercial space industry. As of today, the FAA has published 18 Advisory Circulars related to Part 450 compliance, which cover topics like Space Nuclear Systems, Flight Hazard Analysis, Ground Safety, Population Exposure Analysis, System Safety Program, High Consequence Event Protection, and Computing System Safety. The FAA anticipates publishing two more advisory circulars in the near term, one that will provide guidance to the industry on elements required for a complete application and one addressing denial and tolling processes. We are working to publish more advisory circulars in the future to further facilitate applicants’ understanding of and compliance with Part 450.
- (5) **Licensing Electronic Application Portal:** FAA is working to develop a Licensing Electronic Application Portal (LEAP), which will be used to accept, modify, exchange, and approve licensing materials under Part 450. LEAP is expected to enhance our ability to identify, track, and quickly resolve questions and issues both internally and externally with applicants.

Human Space Flight Occupant Safety: In addition to supporting industry’s efforts on voluntary consensus standards and updating a set of recommended practices for human space flight occupant safety, DOT established the Human Space Flight Occu-

²https://www.faa.gov/space/licenses/licensing_process/.

³https://www.faa.gov/space/workshop_training/part_450.

pant Safety Aerospace Rulemaking Committee (Human Space Flight SpARC) on April 21, 2023. The Human Space Flight SpARC allows us to engage with the commercial space industry and will provide consensus information, concerns, opinions, and recommendations to the Department regarding the establishment of a commercial human space flight occupant safety framework. We expect recommendations from the Human Space Flight SpARC by the summer of 2024, which we will use to plan our efforts with the industry on a future safety framework.

Financial Responsibility: On March 15, 2023, DOT established the Financial Responsibility Aerospace Rulemaking Committee (Financial Responsibility SpARC) to engage the commercial space transportation industry and solicit information, concerns, opinions, and recommendations about updating the financial responsibility regime for licensed launch and reentry operations. The financial responsibility requirements for a launch and reentry license have not been updated in years, and the Financial Responsibility SpARC's recommendations, due in early 2024, will help the FAA modernize the financial responsibility regulations.

Conclusion

I once again would like to reiterate the importance of the commercial space transportation industry and express the strong commitment of the Department of Transportation, especially the Office of Commercial Space Transportation, to ensuring the U.S. continues to be the global leader in space. The U.S. must remain the world's preeminent commercial space country of choice, and the Administration's proposal on in-space authorization will ensure that. We will continue leveraging our licensing and regulatory capabilities, as well as other programs and initiatives, to enable the growth of the U.S. commercial space transportation industry, and we are committed to continued growth. Thank you again for the opportunity to be here to discuss the important role DOT plays in ensuring the safety and economic competitiveness of U.S. commercial space activities. This concludes my testimony, and I will be glad to answer any questions from the Committee.

Senator HICKENLOOPER. Thank you, Mr. Coleman. Our next witness is Richard DalBello. Mr. DalBello serves as the Director of the Commerce Department's Office of Space Commerce.

Prior to this role, he spent time as Virgin Galactic's Vice President of Global Engagement and in the White House's Office of Science and Technology Policy. Director DalBello, you are recognized for your opening statement.

STATEMENT OF RICHARD DALBELLO, DIRECTOR, OFFICE OF SPACE COMMERCE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Mr. DALBELLO. Thank you. Chairs Cantwell and Sinema, Ranking Member Schmitt, Senator Hickenlooper, and members of the Subcommittee, thank you for the opportunity to testify today.

My Office, the Office of Space Commerce, or OSC, along with our colleagues and NOAA and the Department of Commerce, appreciate your continued support and advocacy for the commercial space industry.

For over 30 years, OSC has worked to support and enable U.S. leadership in the commercial space economy. Over those years, we have partnered with industry to solve complex policy and export control issues, to open new markets, to encourage investment, minimize Government—and to minimize Government competition with industry.

Our office is currently the regulator of the U.S. commercial remote sensing industry, and we are implementing now the next generation of space situational awareness program. The U.S. commercial sector is a driver of our economy and underpins our national security, prosperity, and leadership.

According to the Bureau of Economic Analysis, the U.S. space economy accounted for more than \$211 billion in 2021 and employed over 360,000 Americans. To ensure continued U.S. space leadership, the Government needs a regulatory system that can support the dynamic and evolving commercial sector.

We believe the Administration's legislative proposal developed with DOT, DOD, NASA, and the rest of our interagency partners, is the right vehicle for addressing this change. U.S. space regulatory responsibilities are currently shared across multiple agencies. Most rules were put in place prior to the recent surge in commercial activity.

As more novel space activities are tested, flown, and operated, uncertainty about how such activities will be regulated could negatively affect both investor confidence and space safety. We support the legislative proposal recently released by the White House.

We are confident it will create a modern, flexible regulatory system that protects vital U.S. interests, responds to industry needs, and ensures continued compliance with international obligations. The proposal would, without perturbing existing authorities, establish a regulatory framework designed to cover anticipated new technologies while providing the flexibility to respond to those that we cannot envision today.

OSC is ready to rise to the challenge, and our recent remote sensing regulatory streamlining demonstrates how we would manage new responsibilities. This year alone, we have taken actions which have relieved our licensees of over 70 burdensome restrictions while simultaneously protecting national security and the foreign policy interests of the United States.

Beyond a supportive regulatory framework, a robust civil space situational awareness, or SSA capability is essential for safety and vitality of the space sector. Commercial space companies have launched thousands of new satellites over the past few years, and they have plans to launch tens of thousands more in the upcoming years.

As orbits become increasingly congested, there is a need to better track space objects and deconflict traffic. Space Policy Directive 3 assigned us the responsibility for providing a future SSA service. OSC intends to provide these services globally to commercial and civil space operators, offloading those responsibilities from DOD so that DOD can focus on its core mission.

TraCSS, the name of our program, Traffic Coordination System in Space will provide basic satellite tracking data and associated products free of direct user fees to support the sustained growth of civil and commercial space activities. Although TraCSS received significant funding in 2023, we lack a specific Congressional authorization for the program.

The White House proposal would provide such authorities and help us engage international partners in our SSA and space traffic coordination.

Over the last year, we have made good progress on the TraCSS program, hiring key staff and beginning acquisition of commercial infrastructure necessary for the operational safety system. We have entered into formal agreements with DOD and NASA on data sharing and the future of SSA technology, and we will soon initiate a

series of pathfinder programs that will engage the commercial sector to identify cutting edge technologies and clarify global market pricing.

In conclusion, OSC is expanding our activities in support of the U.S. industry to match the speed and scope of its growth. The Administration's proposal, addressing both space mission authorization and space situational awareness, would give us the tools to effectively carry out these activities.

We look forward to working with you and your staff to ensure a safe and sustainable space environment for all humanity.

[The prepared statement of Mr. DalBello follows:]

PREPARED STATEMENT OF RICHARD DALBELLO, DIRECTOR OF THE OFFICE OF SPACE COMMERCE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, DEPARTMENT OF COMMERCE

Chairs Cantwell and Sinema, Ranking Members Cruz and Schmitt, and Members of the Committee, thank you for the opportunity to testify regarding the Office of Space Commerce's (OSC) promotion of safety and innovation in the burgeoning space economy. My office, along with our colleagues at the National Oceanic and Atmospheric Administration (NOAA) and the Department of Commerce (DOC), appreciates the continued and consistent support, advocacy, and interest of Congress in these important issues.

For over 30 years, the Office of Space Commerce has worked to support and enable U.S. leadership in the commercial space economy. As the principal unit for space commerce policy activities within the Department of Commerce, our mission is to foster the conditions necessary for the economic growth and technological advancement of this industry. We are advocates for industry within the government; we work closely with the space sector to make sure we understand their needs and that policymaking takes those needs into account. Another key element of our work is to develop the next generation U.S. civil space situational awareness and space traffic coordination system called the Traffic Coordination System for Space (TraCSS).

Our office is acutely aware of the importance of our Nation's space industry—and the remarkable workforce which constitutes it. The United States' commercial space sector is a fundamental workhorse of our economy and underpins our Nation's security, prosperity, and leadership. It provides the services and ever-expanding connectivity which define our daily lives. American space companies provide the kind of industrial innovation, entrepreneurial ingenuity, and economic competitiveness that will secure our global leadership far into the twenty-first century. The Office of Space Commerce's recent reorganization and elevation within NOAA reflects the priority that Secretary Raimondo, Deputy Secretary Graves and Administrator Spinrad put on this important business sector.

In addition to its role as advocate for the space industry, OSC is also a regulator. OSC's Commercial Remote Sensing Regulatory Affairs (CRSRA) Division provides a clear example of how the Department would intend to implement the additional authorities requested in our legislative proposal. CRSRA has developed a regulatory approach that is easily understandable, provides licensing responses rapidly—usually several weeks—and yet is responsive to national security and other critical U.S. interests. In addition to the support we have received from U.S. industry in response to our regulatory implementation, we are also seeing many foreign firms applying for U.S. remote sensing licenses as the regulatory “flag of choice.”

According to the DOC's Bureau of Economic Analysis, the U.S.' space economy in 2021 accounted for more than \$211 billion in gross output—representing 0.6 percent of our national GDP—and employed 360,000 Americans in nearly every state in the country. The government's continued facilitation of American space leadership necessitates a regulatory system that can support the dynamic and evolving commercial sector. The OSC recognizes that the U.S. space industry faces competition from companies and regulatory regimes abroad. Just as our companies constantly innovate, our government must also adapt to new circumstances.

Enabling Innovation—the “Authorization & Continuing Supervision” of Non-Traditional Space Activities

The U.S. space regulatory system is decades old and its responsibilities shared across multiple agencies. It is not sufficient at a time when a whole range of new

space technologies and platforms are being developed and flown, from robotic in-space satellite servicing to commercial space stations. As more novel space activities are tested, flown, and operated, uncertainty about how such activities will be regulated in the future could affect technical planning, impact business cases, erode investor confidence, and undermine space safety. The U.S. must develop a way to authorize and supervise those commercial activities which do not directly fit within our legacy regulatory system.

This is why the Office of Space Commerce and the Department of Commerce support the legislative proposal recently released by the White House, in coordination with the Department of Transportation and NASA. We are confident that this proposal would create a regulatory system that protects vital U.S. interests, responds to the needs of industry, ensures continued compliance with international obligations, and maintains the U.S. as the “flag of choice” for commercial space.

This proposal would establish the framework for a new, modern, and flexible regulatory system, building on the strengths of our office and those of our interagency colleagues in DOT and NASA. As we move forward, we are committed to conducting any rulemaking transparently and with full engagement of stakeholders, including industry. The DOC is in an ideal position to address many of the new and emerging commercial space activities. Our recent regulatory streamlining for remote sensing systems demonstrates our ability to balance national security while promoting commercial innovation. As a result of this streamlining, we have reduced our average license processing time from 48 days in 2020 to just 14 days today. We also recently relieved 11 of our licensees of 69 operating restrictions, allowing these licensees to offer their full imaging capabilities to the world.

The Administration’s proposal does not establish new regulations; rather it is designed to provide future flexibility, understanding that we may not be able to fully envision years into the future types of novel space activities that will need authorization. As we move forward, my office is committed to transparent rulemaking processes that provide for the engagement of stakeholders, including industry. These rules will build on best practices and knowledge developed by industry, will adhere to strict and quick timelines and, where applicable, will be based on a presumption of approval. Likewise, OSC will continue to regularly engage with industry, including through our Federal Advisory Committee to ensure that industry maintains a meaningful and trusted “voice at the table.”

Ensuring Space Safety & Sustainability—the “Traffic Coordination System for Space”

A robust civil space situational awareness (SSA) capability is essential for the safety and sustainability of Earth’s orbit—and the innovation and vitality of our space sector. Commercial space companies have launched thousands of new satellites over the past few years and plan to launch tens of thousands more. Orbits are becoming increasingly congested, putting commercial, civil, and national security space missions at risk. There is a growing need to better identify and track objects in space, and to deconflict—and eventually coordinate—orbital traffic. “Space Policy Directive-3,” assigns the DOC responsibility for providing basic SSA services to commercial space operators—offloading those responsibilities from the Department of Defense (DOD) so that DOD can focus on its “protect and defend” mission.

We recognize the urgency of fulfilling this mission to prevent the next catastrophic collision in space. In partnership with industry, government, and academia, the OSC is making great strides in implementing an operational public SSA and space traffic coordination (STC) services system called the “Traffic Coordination System for Space” (TraCSS).

TraCSS will provide basic satellite tracking data and associated products and services, free of direct user fees, to support commercial and civil space satellite owner/operators, enabling commercial growth while keeping space operations safe and sustainable. We are developing TraCSS to be a modern IT system leveraging the best-of-breed software, data, and analytics from the commercial sector. This will not only keep us at the edge of innovation but also catalyze the growth of new commercial markets.

We are pursuing a phased development approach for TraCSS to build up capabilities and ensure a smooth offloading of SSA and STC responsibilities from the DOD. TraCSS will ingest unclassified data from DOD and integrate commercial SSA data and services. Over time and with each phase, more commercial data and commercial SSA services will be integrated as core capabilities. This public-private collaboration will continue to evolve through ongoing research, integration, and testing to advance capabilities for civil SSA and STC. These combined efforts are improving SSA data interoperability and increasing SSA data sharing, and coordination across the U.S. Government is ensuring that there is no disruption in basic SSA safety services.

Although we have made significant progress on TraCSS with FY23 funding, the Administration's legislative proposal would provide the Commerce Department with authorities to fully implement the TraCSS program's public-private approach and allow it to successfully scale. The proposal supports stakeholder and operator coordination and participation in TraCSS, encouraging the information sharing needed to effectively conduct space traffic coordination and provide SSA services that have meaningful utility for space safety.

I'd like to highlight some of the many milestones and achievements our office has made with regard to space situational awareness over the past year:

- *Collaborating and coordinating with the Department of Defense:* DOD and OSC engage in weekly working group calls and semi-annual in-person workshops on the transition of SSA responsibility. As part of a pilot project to assess spaceflight safety in the medium Earth orbit (MEO) and geostationary Earth orbit (GEO), the OSC partnered with the DOD through 2023 to award seven contracts to U.S. commercial space firms for space situational awareness data analysis for a subset of spacecraft in the MEO/GEO orbital regime. The pilot project demonstrated that the U.S. Government needs to clearly define program goals, metrics and contractual deliverables to assess commercial performance and to take full advantage of commercial capabilities. It also helped identify clear areas for government-funded "commercial pathfinder" projects with the private sector in Fiscal Years 2024 and 2025 to mature industry capability tailored specifically for OSC TraCSS service needs. These pathfinder projects will directly feed into procuring commercial SSA data and services for sustained TraCSS operations.
- *Defining the scope of basic Space Traffic Coordination services:* On January 26, 2023, the OSC issued a "Basic SSA Services" Request for Information (RFI) seeking input and feedback on the planned scope of basic safety services that the TraCSS program will provide. This input informed OSC's development of capabilities to share basic SSA data, information and services to space operators and the public. The scope of basic safety services will evolve over time to meet the safety needs of the growing commercial space industry, while also ensuring that TraCSS fosters, rather than disrupts, the marketplace for advanced commercial SSA services.
- *Progressing toward deployment of TraCSS Phase 1.0 initial capabilities:* The OSC, working closely with its partners at DoD and NASA, continued to make good progress in our architecture and procurement strategy with the objective of deploying Phase 1.0 initial capabilities in the fourth quarter of Fiscal Year 2024. The OSC developed a procurement strategy that has three distinct components: TraCSS-OASIS—a data lake repository for storing, sharing, and disseminating government, international, and commercial SSA data; TraCSS-SKYLINE—the SSA application layer providing close approach and potential collision alerts, warnings, and other safety services; and TraCSS-HORIZON—a development & testing environment and modeling, simulation, & research environment to advance the state of the art in SSA. In 2023, OSC awarded a cloud utility contract for TraCSS and is progressing on major procurements. We have also defined planning for procurement of a minimum government infrastructure for TraCSS—involving the Cloud Utility, System Integration/Cloud Management, and User Interface.
- *Engaging commercial providers on Space Traffic Coordination services:* The OSC hosted two workshops—a virtual workshop on July 12, 2023 and an in-person workshop on July 19, 2023—for commercial Space Situational Awareness data/products and service providers to discuss TraCSS. The OSC hosted these workshops as part of a series of continuing engagements with the user community to discuss the future of TraCSS. On April 12, 2023, the OSC hosted a live video presentation about TraCSS, where the OSC shared its findings from the Basic SSA Services RFI. On July 28, 2023, the OSC released a second video presentation updating the progress of TraCSS, discussing related interagency cooperation between the DOC, DOD, and NASA; the primary objectives for TraCSS; the three components of TraCSS (OASIS, SKYLINE, and HORIZON), what they handle, and how they work together; the roll-out of capabilities across Phase 1 of TraCSS; the engagement approach for integration of commercial SSA data and services in Phase 1; and expectations for future phases. At the recent AMOS (Advanced Maui Optical and Space Surveillance Technologies) Conference, the OSC held multiple engagements with commercial SSA providers on TraCSS including roundtables, public panel discussions, and bilateral meetings.

- *Developing SSA and STC standards and practices:* The OSC and the National Institute of Standards and Technology (NIST) have continued to coordinate and engage to share input from the U.S. Government and commercial industry to develop internationally accepted common standards, best practices, and guidelines for space situational awareness and space traffic coordination. In the next month, OSC is planning to host a virtual listening session on specific technical standards for data output from TraCSS. OSC is also a member of the U.S. Technical Advisory Committee (U.S. TAG) for the International Organization for Standardization (ISO) Technical Committee, Aircraft and Space Vehicle, Subcommittee 14, Space Systems and Operations to support the development of consensus-based technical standards for commercial and civil space sector use.
- *Mitigating the impact of orbital debris:* The OSC participated regularly in the Orbital Debris R&D Interagency Working Group led by the White House Office of Science and Technology Policy. The Office supported the development of the July 2022 National Orbital Debris Mitigation Plan, a national effort to meet the U.S.' space sustainability priorities to mitigate, track, and remediate debris, and continued participation in the Interagency Working Group to deliver implementation updates. The implementation plan accomplishes objectives outlined in the U.S. Space Priorities Framework and builds upon the National Orbital Debris Research and Development Plan published in 2021 that OSC worked on as well.
- *Advancing the state of the art in SSA:* OSC is partnering with NASA on the R&D component of the Traffic Coordination System for Space (TraCSS-HORIZON). NASA will be managing a TraCSS-HORIZON partition consisting of a modeling, simulation, and research environment focused on basic R&D, the academic community, and fostering innovative SSA and STC services to advance the state of the art in SSA. This includes addressing scientific questions on how the space environment impacts SSA, space weather, and orbital debris—and crucially for collision avoidance, how this environment can be forecast. Additionally from late 2022 onwards, through a funded project with MIT Lincoln Labs, OSC has provided independent evaluation and feedback to commercial SSA providers to help validate and verify their commercial products.

Although we have made significant progress on TraCSS with FY23 funding, the White House's legislative proposal would provide the Commerce Department with authorities to fully implement the TraCSS program's public-private approach and allow it to successfully scale. The proposal supports stakeholder and operator coordination and participation in TraCSS, enabling the information-sharing needed to effectively conduct space traffic coordination and provide SSA services that have meaningful utility for space safety.

The Office of Space Commerce's Vision for Globally Coordinated SSA/STC

The White House's proposal also provides Commerce with much-needed guidance and authority to engage in international dialogue and collaboration on SSA and STC. This global dialogue is critical to sustaining American leadership in SSA and supporting commercial opportunities for American SSA data providers. It will also require the OSC to open lines of communication with nations operating SSA systems, including those that have not traditionally coordinated their efforts with the U.S.

To that end, OSC, working in partnership with the Department of State, is engaging with allies and partners to frame options related to global data standardization and best practices for information sharing. OSC has identified that the Consultative Committee on Space Data Systems (CCSDS) standards appear to be the most widely adopted in the SSA community today; listening sessions with spacecraft operators and commercial SSA providers suggest that they are well known and frequently used. CCSDS standards—as well as derived and complementary standards produced by the International Organization for Standardization—are developed through an international consultative process, are openly available free of charge to all users, and are directly applicable to the types of SSA data and information that TraCSS will provide. OSC is exploring whether adjustments to the standards would be necessary to fully meet operational needs.

Conclusion

In summary, the Office of Space Commerce is expanding its activities in support of the U.S. commercial space industry, to match the speed and scope of the industry's growth. This legislative proposal would give us the tools to effectively carry out these activities. We fully endorse this proposal and look forward to working with you and your staff, to build on our efforts with DOT, NASA, and DOD, to ensure a safe and sustainable space environment for all humanity. This is critical not just

to America's commercial interests, but also our national security and civilian missions.

Thank you for the opportunity to testify today, and I look forward to taking your questions.

Senator HICKENLOOPER. Thank you, Mr. DalBello. Our final witness is John Hill. Mr. Hill serves as Deputy Assistant Secretary of Defense for Space and Missile Defense in the Department of Defense.

He previously served as the Principal Director for Space Policy and has held a variety of assignments at the Department of Defense. Deputy Assistant Secretary Hill, you are recognized for your opening statement.

**STATEMENT OF JOHN HILL, DEPUTY ASSISTANT SECRETARY
OF DEFENSE FOR SPACE AND MISSILE DEFENSE,
DEPARTMENT OF DEFENSE**

Mr. HILL. Thank you. Chairs Cantwell and Sinema, Ranking Members Cruz and Schmitt, distinguished members of the Subcommittee, on behalf of the Office of the Secretary of Defense, it is an honor to testify today here alongside my distinguished colleagues. Services delivered from space-based systems drive modern economies.

The contributions of Earth observation systems, positioning navigation and timing systems, and satellite communications and data transport systems are essential to modern life. The same is true for national security.

The National Defense Strategy highlights the indispensable contributions that these space systems make to the integrated ability of the Joint Force to defend the homeland, to deter strategic attacks against the United States, our allies, and partners, and to deter aggression while being prepared to prevail in conflict when necessary.

To an increasing extent, commercial space systems are contributing to these national—these essential services, much the same as the commercial economy has supported defense needs across all sectors of the economy throughout our history.

The Department of Defense is utilizing commercial services and benefiting from the competitive commercial market forces that are driving innovation in the space sector to an ever greater extent. The United States has led the way in exploring space and developing new markets for services delivered from space.

Now, U.S. commercial industry is pursuing new opportunities to develop markets for services and manufacturing delivered in space. Services that can expand the potential for space exploration and for services delivered from space.

The United States has also been a leader in establishing legal and regulatory frameworks for spectrum, space launch and reentry, and remote sensing that make our Nation a highly attractive place for commercial space entrepreneurs and investors to do business, all to the benefit of our economy and our national security.

So, it is appropriate to consider what legal and regulatory framework updates may be required to enable these new forms of commercial space activities. The Department of Defense is not a regulatory agency, but we have a long history of cooperating with our

civil regulatory agency partners to help them understand any national security dimensions of the decisions they may be making.

We have also worked closely with these agencies to update regulations so that the national security considerations reflect up-to-date considerations of risks and risk mitigation approaches. The recent rewrites of regulations for licensing commercial space launch services and private remote sensing space systems reflect this partnership.

The Administration's legislative proposal on authorization and supervision of novel private sector space activities likewise continues this approach by requiring consultation with the Secretary of Defense concerning matters of national security.

And to be very clear, often the overriding national security consideration is to enable the competitiveness of U.S. industry without burdensome licensing conditions, while managing any risks of a given activity through other means available to the Department and our partners across the national security community.

Finally, the Administration's proposal includes important authorities by which the Department of Commerce will be able to conduct a number of inherently civil space situational awareness functions currently handled in the Department of Defense.

The transition of these functions to a civil agency will enable the Department of Defense to focus our work on the inherently military aspects of the space situational awareness and space domain awareness missions.

The Department of Defense has worked together with our inter-agency partners to craft the Administration's legislative proposal. That proposal accounts for our national security concerns, including concerns for sustaining a space environment that enables national security space operations. It likewise accounts for U.S. treaty obligations and broader national interests.

We urge your support and thank you for your attention. I look forward to your questions.

Senator HICKENLOOPER. Great. Thank you all for being here. And Chair Cantwell will be back. She wanted to make sure that I said that. She goes from one fire emergency to the next. Let's start the questioning.

I will start with you, Mr. DalBello. Colorado is a leader in the aerospace economies and is going to rely on efficient, thorough, reliable approvals from the Federal Government to be able to do the innovations necessary to succeed in space.

We are working on a—to introduce bipartisan legislation to create a modern mission authorization that will allow large and small companies to have regulatory certainty for how their activities will be reviewed and be able to maintain and—or maintain our obligations to our international partners and maintain levels of safety.

This will ensure U.S. remains a global leader in space. Mr. DalBello, if authorized by Congress, how will the Office of Space Commerce prepare its resources and personnel to authorize novel in-space activities on a thorough and timely basis?

Mr. DALBELLO. Thank you very much for that question. Absolutely, one of the first things we do would be to engage—this is broad allocation of authority that we are seeking in our legislative package.

And the first step to implement that would, of course, be to engage in a regulatory review process which would involve the commercial sector. So, first of all, we would do this in partnership. Second, we would seek those things, I think you mentioned most of them.

One is clarity of purpose. The private sector needs to understand what are the Government objectives that we are pursuing. The second is there should be strict timelines. The private sector needs to know what a license to—what does the licensed process look like? How long is it going to take?

And then finally, the process needs to have flexibility. Recently, as I mentioned in my oral testimony, we actually reduced the restrictions on remote sensing industry licensees this year.

We did that because as the—we have written into our regulations, as the global environment changes, as technologies advance, we have to have a regulatory system that is responsive so that the private sector isn't burdened with old and unnecessary regulations.

So, we would seek to take the same approach, engagement with industry, engagement with our colleagues in Congress, and we would move forward and put together a regulatory system that met those requirements.

Senator HICKENLOOPER. Create a system that evolves and innovates as it goes, what a concept. Ms. Melroy, for innovation to truly flourish, small businesses need an opportunity to compete with larger players in the arena to—which have historically been awarded to the large contracts.

Administrator Melroy, in your testimony, you discussed NASA's role as a purchaser of services from the commercial sector. How can smaller businesses enhance NASA's future through the NASA Small Business Innovation Research and Small Business Technology Transfer Programs to effectively compete for the open contracts in this burgeoning space economy?

Ms. MELROY. Senator, thanks for asking a topic that I am very interested in. I do believe that small businesses are the backbone of our country economically, but also bring the kind of innovation that we need for the mission that we have.

We are very excited to say that we have raised the amount of money that we have awarded to small businesses by hundreds of millions of dollars over the last 5 years or so, and SBIRs and STTRs, as you pointed out, are a key part of that.

One of the great examples comes from the State of Colorado, and that is advanced space. We developed the capstone mission, which is even now exploring the novel near rectilinear halo orbit around the moon in preparation for future human spaceflight activities there to help us understand that orbit better so that we can be more efficient when we operate, and that started under an SBIR in 2015.

Senator HICKENLOOPER. Absolutely. Mr. Coleman, Administrator Coleman, your testimony highlights FAA's responsibility for facilitating commercial space launches and reentries by private sector.

FAA has seen 186 percent increase in license applications since Fiscal Year 2020. Because of the FAA's work, every U.S. licensed launch or reentry operation for spaceports has met, without excep-

tion, the highest levels of safety, despite the obviously unforgiving nature of the space environment.

We introduced the Bipartisan Spaceport Act to provide dedicated support for infrastructure needs at U.S. spaceports such as Colorado Air and Spaceport. How does the FAA support the infrastructure needs of emerging spaceports around the country to continue with licensing along with prioritizing safety?

Mr. COLEMAN. Thank you for the question, Senator Hickenlooper. In 2018, as a result of the Reauthorization Act for the FAA, we did stand up an Office of Spaceports, which supports the infrastructure needs of our 14 licensed spaceports in the U.S.

We work very closely with those spaceports to address policy concerns, funding concerns, other issues that are of interest to those spaceports. And so, we have worked very closely with those spaceports in that regards.

We also have authorization for a spaceport infrastructure matching grants program, if you will. We have had that authority for some years now. We haven't had it appropriated, but we do have that authority in place to ensure that, you know, spaceports are being developed appropriately to support our launch service providers' needs.

Senator HICKENLOOPER. Great. Thank you so much. I am going to cut myself off. Turn it over to the Ranking Member and Vice Chair, Senator Schmitt.

Senator SCHMITT. Thank you, Senator. I am going to try to go in kind of rapid fire because we only get 5 minutes and I have questions.

But we did get a chance to visit some of us already. Deputy Administrator Melroy, I really appreciate your service. You are the only one here in the room, I think, that has been to space. Raise your hand if anybody else has. I think you are it.

So, thank you for your service. It is a very distinguished career. In my office, we talked about just how novel these in person space activities are, and it just presents, you know, different realities.

Like there is not a lot of data surrounding all of this right now as the regulatory framework is sort of being grappled with. Could you just talk a little bit about that with that—with those human operations, how certification really does, kind of depend on individual vehicles, right. I mean, could you talk a little bit about that, amplify that a little bit?

Ms. MELROY. Thank you, Senator. Yes, I really enjoyed our discussion on this. And yes, it does give you a novel perspective being in space. I think it is where everything comes together, and you actually see how it all works.

And actually, NASA has more than 50 years of human spaceflight experience doing things like satellite servicing, building the International Space Station, servicing Hubble and so forth, using humans.

We have new technologies that we are seeing autonomous, but of course the human spaceflight expertise is core with us. So, I think we—one of the areas that we are interested in, we have worked very successfully with the FAA over the last decade on commercial crew. We have come to clarity.

We need to protect our astronauts. We would expect any regulator to worry about public safety and to set a threshold and a bar, a performance-based bar. We go much further in protecting our astronauts, and we do that contractually today.

And we have worked with our commercial providers to certify the vehicle for the operations that we do. It works very well for us because we have a spacecraft such as SpaceX's crew Dragon that goes—carries our astronauts to the International Space Station and back, and that—we have a long history of how to certify a spacecraft.

Senator SCHMITT. Do you do you think that that sort of in years the benefit of the validity of a learning period kind of approach to all this, would you agree?

Ms. MELROY. Well, NASA thinks that it is—we would prefer not to extend the learning period, and I will tell you why. Although we certify these vehicles for NASA operations, we are concerned that spaceflight participants believe that NASA is certifying the safety for their activities as well, and that is not something that we do. We have concerns about that misunderstanding.

Senator SCHMITT. OK. Thank you. Well, we can follow up and talk more about that. Associate Administrator Coleman, I do want to ask, can you explain how the White House proposal will be different when the existing FAA regimes that we currently have already, sort of, struggle to meet statutory timelines?

And that is one big concern. So, it is—FAA, you know, we want to be very supportive, but it currently struggles with some of those timelines. Could you explain how this would be any different than that?

Mr. COLEMAN. Sure. Thank you for the question, Senator. Certainly, with launch licensing, it is a very intense process that whereby a number of factors come into play. The complexity of the operation, the familiarity with the applicant with the rules, familiarity with the regulator, with the operation that is being proposed.

The quality of the application itself, whether or not the evidence is sufficient or not to demonstrate compliance is there. These are factors that lend itself to the pace at which licensing occurs.

These activities that we are talking about for in-space transportation, mission authorization are significantly different, if you will, from launch activities and reentry activities that pose an entirely different risk exposure to the public than these activities. You know, for a launch reentry, we rely on flight safety analysis, system safety analysis, trajectory analysis.

We are not talking about these types of analyzes for these novel in-space missions. They are quite different, and we envision a very light touch approach, very similar to what the Commerce Department would apply for in-space missions that they would oversee.

Senator SCHMITT. OK. Thank you. And I had one final question before I run out of time. Mr. Hill, as commercial demands grow beyond the capabilities of Vandenberg and Cape Canaveral, do you believe that the memorandum of agreement that you currently have should be expanded to include additional ranges for reentry operations?

Mr. HILL. I think we need to always be looking at the growth of where commercial is going and ensure that where the Defense Department can support these types of growth areas.

So, looking at the MOU to see whether that is current or needs to be updated is appropriate as well, because there are spaceports going around the country, there is also increasing growth at the DOD facilities.

And as I said in my opening statement, fundamentally that is good for the Nation and fundamentally it is good for us. We just have to figure out how to accommodate those things.

Senator SCHMITT. Thank you. I yield back, thank you.

Senator HICKENLOOPER. Great. And I will continue the questioning. I thought that was the Chair coming in. Mr. Hill, I didn't get a chance to ask you a question. As you are no doubt aware of the international traffic in arms regulation—regulations or ITAR as it's commonly referred to, set strict requirements for the United States in terms of the export of defense related articles and services.

ITAR requirements can significantly impact the space industry and could have a chilling effect on our ability to be, let's say a partner of choice for allied or friendly countries that are seeking to expand their space programs using U.S. commercial technologies.

While the State Department obviously has ultimate authority—about what ends up on that, on the munitions list, DOD's Defense Technology Security Administration, DTSA, is a lead reviewer and a coordinator for potential changes.

Can you speak a little to what updates or current export policy might help bolster competitiveness of U.S. space startups seeking to export their technology to allies or allied partner nations?

Mr. HILL. Thank you, Senator Hickenlooper. My, one of my close colleagues is the Director of the Defense Technology Security Administration, so it is—while it is not in my particular area, we do consult because I have an interest from the space policy perspective.

And a number of years ago, the U.S. Government moved many items off of the International Traffic in Arms Regulation to the Commerce Department's Commerce Control list, moving them out of the classification of arms into more regular commerce types of export items.

And that has been a regular review process that is ongoing and that they do every year or two to see how has the world changed, the economy changed, because we want to focus the ITAR on those things that are truly the most concern from the munitions perspective and recognizing that space technology is moving very fast, and what is special military today could be commodity tomorrow.

And we need to stay ahead of the pace, and so that we don't constrain U.S. industry's competitiveness by regulatory lag. So, that effort has been going on a couple of years. While I can't speak to specifics that might be moving, I know that is a regular focus of both State Department and the Defense Technology Security Administration.

Senator HICKENLOOPER. Yes. No, I figured it is just going to grow. It will increasingly become a point of contention and debate. I think I would start with Ms. Melroy, and we will go down the

list. We have talked a lot about, in this subcommittee about space debris over the years, and there are a number of bills that are in process or have passed.

What is your sense in terms of—I mean, we have—a little bit we have got the Wild West out there. There have been very few restrictions or regulations. There is an enormous amount of debris already out there traveling at speeds that are hard for us, standing stably on the planet earth, hard for us to conceive of how fast these sometimes very small fragments can do enormous damage at such high speeds.

Anyway, what is your sense of what the Congress should be looking at and how it should approach this, and what level of urgency should we have?

Ms. MELROY. Yes. Thank you, Senator Hickenlooper, and thank you for your leadership on this topic with the Orbits Act. I think it is critically important. I would say that it is universally realized that that we have some real challenges in this area.

I think the active debris remediation piece of it that you addressed is a critical piece. I actually think this legislative proposal is very helpful, specifically because it is looking at the safety of the space environment.

And so, that contains many more of the pieces that we want to be looking at, orbital debris generation and remediation, but also other aspects of the space safe—space environment that the Department of Defense and NASA operate in. We think it is very important to address some of those other pieces as well.

We are currently working on this, and we are proud of the work that we do in our orbital debris models, the help that we give industry about best practices, and we have a handbook and those kinds of things. But there is a lot more work to be done.

Senator HICKENLOOPER. Well, let me—I didn't see Senator Vance snuck in under my purview. So, are you OK if they finish? Go ahead, Mr. DalBello.

Mr. DALBELLO. I just wanted to comment on the debris issue, that that is why we are so focused on the Department of Commerce on the next generation of space situational awareness.

We need better information about what is—and better and more timely information about what is in space. We need to make more reliable warnings available to the commercial sector. We need to have a plan. All around the world as I have traveled, countries are developing their own SSA systems.

There is really no clear coordination between these systems, and it is unclear that the results of individual systems can be correlated in a way that is meaningful. So, we have a task, an international task to work together to figure out, number one, let's have the best system in the world, and number two, let's figure out how to engage globally to make sure that all actors in space are operating safely.

Senator HICKENLOOPER. Great. Guys let's shift over—you don't need to—I don't see any burning desire to add to that. I will move over to Senator Vance.

**STATEMENT OF HON. J. D. VANCE,
U.S. SENATOR FROM OHIO**

Senator VANCE. Thank you, Mr. Chair. Thanks to the four of you for being here. I just want to sort of ask some questions basically about, you know, whether the new rule or the new proposal is unduly complicated.

And so, it is my understanding that under the Administration's proposal, the responsibilities for authorizing licensing and supervising commercial space missions would be split between DOT and the Department of Commerce.

Now, can you help me understand whether a mission will need authorization from the Department of Transportation or Commerce? Maybe Mr. DalBello and Mr. Coleman, when will something fall under Commerce's purview and when will it fall under Transportation's?

Mr. COLEMAN. Sure. Thank you for the question, Senator. So, there are two specific carveouts in the proposal for the Department of Transportation. Activities that involve a human being are responsibilities that will rest with the Department of Transportation.

Senator VANCE. Yes.

Mr. COLEMAN. Activities that involve the transport of goods in space also will reside with the Department of Transportation. If the sole purpose of the operation or activity is for transportation, and there are a few of those activities, those activities will rest with the Department of Transportation.

All other activities would rest with the Department of Commerce. And so, what we have is a construct whereby for a single activity, only a single agency will have oversight of that responsibility.

There is no situation in which both the Department of Commerce and the Department of Transportation will have joint oversight responsibilities for a single activity.

Senator VANCE. So, and just to follow up there Mr. DalBello, or any of you can feel free to jump in here. So, let me just sort of toss out this hypothetical and explain to me what I am missing, or if I am right, we can sort of go from there.

So, let's say we have an in-orbit servicing mission that might need to dock the commercial space station for refueling or some other purpose. Now, under the proposal, as I understand it, the in-orbit servicing mission would be licensed by Commerce.

Then the commercial space mission, or the commercial space station is licensed by the Department of Transportation. So, I guess would I as an operator need multiple licenses from each agency in order to do this particular mission?

Mr. DALBELLO. One of the things—that is a great question and we have been asked that question previously, I think. The—it is a great question because if, as Kelvin said, if it involves humans, the space station would be licensed by the Department of Transportation.

So, if it were a space tug or a refueling station, it would be licensed by the Department of Commerce. In the business of refueling or a space tug would be a commerce license. So, the—even if there were in your scenario I think a tug docks with the station perhaps to refuel the station, the two licenses would be separate in that case.

The activity of the station would be licensed by DOT, but the activity of a tug service of which the station might be one of many customers would be a Department of Commerce license.

Senator VANCE. So was there any discussion or has there been discussion for when you have a scenario like this, and you know, I understand this is probably somewhat unusual but not that unusual, where you have a scenario where you would have to go to both Transportation and Commerce to just sort of fold—basically give one agency jurisdictional control so you don't sort of confuse, you don't have multiple people going to different places.

I wonder, like are there jurisdictional disputes, where you might have Commerce and Transportation fighting over where you draw the line? You know, I just worry that as commercial space aviation or spaceflight becomes more complex, that you might create jurisdictional issues where maybe some other approach might just make it more simple.

Mr. DALBELLO. I think central to any of the scenarios we are talking about, there will be a robust interagency process that will be stood up along with these things. We do this now. I mean, our regulations in commercial remote sensing are really done, we are very tightly linked with the national security community on what we do.

And I know that Kelvin in his launch licenses has a payload review, that is broadly—it is broadly reviewed in the interagency process. So, where there is a jump ball like that, often there will be an interagency discussion.

And that is why I said, it is really important for any rule set to come with strict timelines because you have to be able to—as the commercial sector has an expectation that they can get an answer in a reasonable timeline.

So strict guidelines, strict rules, strict timelines are important to move those processes along. Sometimes you have to talk to your interagency partners, but that process also has to have momentum behind it to meet the needs of the commercial sector.

Senator VANCE. Sure. So, thank you all. I am mindful of my time here, so I will yield back with just one final comment. I guess as this stuff unfolds and we actually see how this provision plays out in the real world, just the one request is that if you see these sort of jump ball situations coming up and they are unduly complicated for the commercial space industry, maybe we can figure out ways to simplify them. That is just one big worry that I have with these things is that these like we are jurisdictional jump ball issues, as you put it, might come up more than we would like. Thank you.

Senator HICKENLOOPER. Thank you, Senator Vance. Ranking Member Cruz.

**STATEMENT OF HON. TED CRUZ,
U.S. SENATOR FROM TEXAS**

Senator CRUZ. Thank you, Mr. Chairman. Welcome to each of the witnesses today. Good to see you. I want to start with Mr. Coleman and Mr. Hill. Thank you for being here. It was great to see Starship finally succeed in conducting its second test flight just a few weeks ago.

This was, of course, after months of delay stemming from bureaucratic red tape from AST, Fish and Wildlife, and other agencies injecting themselves into the process. An environmental review had been approved for the first launch of Starship, but simply because SpaceX must continue new test launches, they were required to go through a whole new environmental review process.

To your knowledge, does China apply its own version of environmental policy review equivalent to a National Environmental Policy Act under which Chinese citizens, or perhaps a bat conservation group, can sue the CCP at a halt missile or space vehicle development? And what about Russia, does Russia do that?

Mr. COLEMAN. Thank you for your question, Senator Cruz. The first SpaceX launch that you mentioned, orbital flight test one, did result in a mishap whereby the pad was destroyed.

For the second flight, they had to repair the pad and as such, due to that change, it required a new look at the environmental piece to ensure compliance with NEPA and to ensure compliance with the Environmental Species Act, which required a consultation with the Fish and Wildlife Service.

And so, we conducted that consultation with the Fish and Wildlife Service in accordance with U.S. law. To your second question about China and their programs, I am not as familiar with what China does there, but I can tell you with a surety that we follow U.S. law and procedure in our environmental review process associated with the second launch of Starship.

Mr. HILL. Thank you, Ranking Member Cruz. I am not familiar with the Chinese legal structure, but I know enough to say I wouldn't find it as a good model for us.

Senator CRUZ. Well, look, I have been to that pad where the launch occurred, and I will tell you, the answer is no, in China you cannot do that. You don't have those suits. In Russia, the answer is no.

Let me ask you this, when China or Russia undertakes a national space mission, do either of them wait for months to go through litigation with their domestic versions of Earthjustice or the Center for Biological Diversity?

Mr. COLEMAN. I am not certain or aware of what Russia and China does in those scenarios, Senator.

Mr. HILL. To my knowledge, they do not do those things, sir. I think that is part of the value of our system, though, is the openness that we have.

Senator CRUZ. So, with all due respect, it is not the value of our system to have asinine delays that accomplish nothing, and that put us at a disadvantage compared to our competitors.

And we are in a race for space. Now, understand, I am not advocating for a wholesale repeal of our environmental laws or NEPA. I am just arguing for them not to be applied in a dumbass way that slows down commercial space.

And under the current status quo, with agencies giving the opportunity for third party lawsuits to derail commercial space development, that is slowing down our effectiveness.

Do you think that makes sense? Is the current system broken, or should the United States treat commercial space sector as advancing our national interests?

Mr. COLEMAN. Thanks for the question, Senator. I certainly believe that the U.S. commercial space sector does, in fact, advance our national interests in many ways.

We understand the benefits that commercial space plays to our national security as well as our civil space exploration interests.

And so, we work very closely with our partners, NASA and the Defense Department, to ensure that we have timely, accurate, precise licensing reviews for these very critical programs, and we will continue to do that moving forward.

Mr. HILL. Senator, we are enabling commercial launch in this country and commercial space in this country from our perspective in the Defense Department, because it benefits us in the Defense Department.

We leverage that, as I—in opening statement. And I think commercial firms are finding this to be the attractive place to invest, even though we do have this regulatory processes of ours.

And so, I think we should continue to ensure this remains the environment where companies want to put their money to work.

Senator CRUZ. Well, I think you are right that we need to work to ensure that, and that means that there should be a mandate for streamlining the process, so it actually is sensible rather than being counterproductive. Deputy Administrator Melroy, let me turn to you.

Thank you for your many years of service both to the Air Force and now NASA. In our last hearing, former NASA Associate Administrator for Human Exploration and Operations, Bill Gerstenmaier noted how the slow licensing process is causing scheduling delays for Starship and consequently the Artemis Lunar Landing Mission.

HLSHE said, these delays “simply would not be acceptable” if he were at NASA. Do you think the regulatory delays that impede programs of national interest like Artemis are acceptable?

And put another way, does the current regulatory framework for commercial space move fast enough or provide enough flexibility to allow a company to iterate a vehicle for a mission of national interest?

Ms. MELROY. Thank you, Senator. And may I just say thank you for your support of all of our Texas activities that we do and your support of NASA. It has been incredible through the years, and we appreciate it.

Of course, we are vitally interested in the success of our commercial partners, as I brought up. In preparation, I actually contacted the program manager and asked, do you think our partners are slowing us down? And was told no.

I think the complexity that we are seeing is there is a lot of new stuff happening and there are some new players who are trying to work within their statutory deadlines but are very unfamiliar with this kind of activity.

So, there has been a learning period. I don’t refer to the FAA who understands their business very well, but some of their environmental partners who are learning along the way. I can assure you that NASA works very closely with those regulatory partners and that they have signaled that they are aware of the critical na-

ture of the Artemis program and how important its success is to the Nation.

Senator CRUZ. Thank you.

[The prepared statement of Senator Cruz follows:]

PREPARED STATEMENT OF HON. TED CRUZ, U.S. SENATOR FROM TEXAS

Thank you, Chairwoman Sinema and Ranking Member Schmitt. And I'd like to welcome each of our witnesses.

Since I was elected to the Senate, space has been one of my top priorities. I am especially proud of the role Texas plays in the burgeoning commercial space sector. Our state is home to the Johnson Space Center, which has done remarkable work on the International Space Station and NASA's astronaut training facility. Texas is also home to a myriad of commercial space companies and firms conducting activities critical to the advancement of the Nation's space program.

American leadership in the final frontier is inextricably linked to the health of our commercial space sector, both in terms of the capabilities available for government needs and the economic value these companies provide in their purely commercial operation. As industry continues to innovate, they will increasingly push the boundaries on novel space activities. It is vital that these inventors have regulatory clarity and certainty else creativity and productivity will suffer.

In October, we heard from industry leaders working on space missions who made exactly this point.

Far too often we see exciting, novel technologies delayed due to regulations that have not kept pace with innovation. This has happened most glaringly with space launches. If the current trend continues, China will soon far outpace U.S. commercial space launches. The U.S. needs to take a hard look in the mirror and decide if we are more focused on maintaining our decades of leadership in the final frontier, or whether we are willing to let that slip away to communist China.

Now I want to briefly address the elephant in the room—or rather, not in the room. Just a few weeks ago, the National Space Council released their proposal on the future of regulation of novel space activities. While I appreciate their attention to this important issue, it is notable they would then decline to appear before this committee to answer questions about their proposal. While the administration has correctly said that the National Space Council has historically never testified before Congress, it is also true that the National Space Council has never before released a comprehensive legislative proposal on such an important and far reaching topic within this Committee's jurisdiction.

In fact, there may be some good things in the National Space Council's proposal, but unfortunately no one will ever know since the Executive Branch entity that has requested these changes in law is unwilling to discuss them in front of lawmakers whose support will be necessary for such changes to become law.

As a general matter, unless the desire is for Congress to completely disregard a legislative proposal, when an executive department, agency, or other entity asks for changes to the law, it is in their best interest to appear before the relevant committees when invited to answer questions about their proposal. This is especially true when that proposal has been met with a less than enthusiastic reception from the overwhelming majority of stakeholders.

That said, I do appreciate the bind the National Space Council has found itself in with regards to testifying, and look forward to working expeditiously with my colleagues to remedy the situation. If we need to formalize in statute the roles and responsibilities of the National Space Council and create a Senate-confirmed leader, then we should certainly do that.

I am thankful for the witnesses that are here, and I look forward to hearing from each of them and continuing to work with my colleagues as we craft a bipartisan commercial space bill.

Thank you.

Senator HICKENLOOPER. Chair Cantwell.

**STATEMENT OF HON. MARIA CANTWELL,
U.S. SENATOR FROM WASHINGTON**

The CHAIR. Thank you so much. Thank you for holding this important hearing. I thank you and Senator Schmitt for stewarding

this panel and for the panelists being here today. I really want to focus on technology in general and technology risks.

And I know you guys represent different viewpoints, particularly from the agency side, but I would hope that you might be able to quickly just, and then for the record if necessary, give us a more detailed answer.

What do you think are the technology risks with space commercialization? This committee played a very big role in a new certification program for the FAA, trying to correct what we thought were some shortages, both in workforce and in redundancy issues. But how do you see the commercial space challenge and what do you think are the technological challenges that we really need to focus on from a safety perspective?

We in the Northwest are very proud of the \$4.6 billion space industry that is to our economy and 13,000 jobs, but we want to get the next phase right, too. And so, how would you characterize those technological challenges from a safety perspective? And anyone who wants to—if you want to start, Mister—

Mr. DALBELLO. I would be happy to start. I think, again, we are seeing a use of space at a pace that is surprising, even to those of us who are veterans.

And as we see the fleets of commercial satellites in particular move into the single and then double digit thousands, again, what our focus at the Department of Commerce is on the space situational awareness and putting in place a next generation way to track space objects. Again, one of the issues that we have is it is not just the United States.

The Chinese have announced a mega-constellation they want to launch. I suspect we will see similar activities in Europe. So, we could see the number of satellites being launched in the tens of thousands.

So, the technical challenges, the systems we have today aren't sufficient to do the level of exquisite SSA that we need. We need to be consistently excellent at something today that we are only good at, and so—

The CHAIR. You are not just talking about the debris side of the equation, you are talking about the communication interference, I would guess, and other—

Mr. DALBELLO. No, I am talking about the actual physical objects in space. When you get tens of thousands of objects in low-Earth orbit together with human spaceflight, it is a potentially volatile situation.

The CHAIR. So, you would say number one issue, LEOs?

Mr. DALBELLO. From my perspective, that is the number one issue.

The CHAIR. OK. Mr. Coleman.

Mr. COLEMAN. Senator Cantwell, thanks for the question. I think as we see more commercial space launch activities take place, particularly in the national airspace system, we are significantly challenged to accommodate the number of launches alongside the commercial aviation activities that we are seeing.

We have been addressing that through procedural changes, policy changes, and also we are trying to address it through technological changes as well. We are looking to implement and stand up

new tools like space data integrator that will help us better understand where the vehicle's health is, where it is in the system, et cetera.

But we need to advance those efforts to better manage the proliferation of space activities that we are now seeing in the national airspace system, sure.

The CHAIR. Mr. Hill, did you want to jump in there?

Mr. HILL. Certainly. If I could pick up on what Mr. DalBello was discussing. As the volume of space vehicles grows exponentially in space, the challenge is incorporating into the space surveillance networks, Government, commercial, and others, and the data fusion that you need to do to keep track of where all of this is.

This is why one of the reasons why we are saying, this is not a traditional Defense Department mission. That is more classic civil agency type of mission. Our focus is on particular satellites that might be of a threatening nature.

The challenge we really have here with commercial is simply orbital dynamics. And certainly, technology will allow a more autonomous control, more carrying capacity in low-Earth orbit. But staying pace with that will be one of the big challenges from a safety perspective.

The CHAIR. So, you would say autonomous capacity, maybe number one, or no?

Mr. HILL. I think we probably don't know what the ultimate capacity is as a technology to actually manage it grows, but keeping pace with that and understanding—

The CHAIR. I am pretty sure our delivery system of all that equipment and freight to the moon is going to be autonomous, isn't it? Isn't it, Ms. Melroy?

Ms. MELROY. That is correct, Chair. There will be humans on the loop, but many of the activities have a time delay as well.

The CHAIR. Yes. Well, did you have something you wanted to put in—?

Ms. MELROY. Yes, I did. In the remaining, it is very difficult to narrow it down. I agree with my colleague about space domain awareness, not just for collision avoidance, but also for accountability, for things like rendezvous and proximity operations and the safety, and the accountability for those actions.

We believe that understanding the explosive potential of new propellants is important, such as the current methane systems. We are working closely with industry and with the FAA to define that for the safety of our operations as well as commercial.

I will add technology that enables spectrum sharing, and I am sure the Department of Defense could talk more about that because they have a lot of programs in that area. In addition to that, we believe that it is vital to do continued research on nuclear power and propulsion to enable deep space capabilities, but we want to do it safely.

The CHAIR. Thank you so much. What I would like to do is just have you expand for the record what you think the top three issues are. You have kind of achieved that, Ms. Melroy. But for the record, if you could do that.

If you want to add five or six other things, great. It is more—I think, part of our challenge going forward on how to look at this

is really understanding what are the technological challenges and workforce challenges in the context of even what is proper oversight. But until you really understand what the technology challenges are, you really can't decide whether you have the kind of technology support and oversight that you need.

And as people discuss, is Commerce a place to be, is FAA a place to be, and how do we coordinate between various agencies? And obviously, Mr. Hill, the spectrum issue in and of itself is pretty big.

And Ms. Melroy issued—talked about it. So, it is really a question of how do all of these things come together. And you all basically, Ms. Melroy may not have said the word pace, but everybody is talking about the rapid deployment here of next generation technology, and how do you—how does the Government even stay pace with that and what does it take for us to have the right people, the right dialogs, the right information.

So anyway, I will look forward to your written answers to those questions, too. And thank you. Thank you so much for the hearing.

Senator HICKENLOOPER. And thank all of you. We appreciate your taking the time. We know that you are in busy jobs.

Somebody was saying the other day, Senator King was talking about when you get up to certain levels, you get to the highest level where people still know exactly what they are doing.

I think you are all at that level. The hearing record is going to remain open for four weeks until January 10, 2024. Any Senators that would like to submit questions for the record, should do so two weeks from now at the latest, by December 27.

We ask the responses be returned to the Committee by January 10, wherever possible. Thank you, and again, that concludes today's hearing. We stand adjourned.

[Whereupon, at 3:43 p.m., the hearing was adjourned.]

A P P E N D I X

LESATH INTERNATIONAL INC.
Buffalo, NY, December 11, 2023

RE: TESTIMONY FOR SENATE SUBCOMMITTEE ON SPACE AND SCIENCE ON
REGULATION OF NON-GOVERNMENTAL SPACE ACTIVITIES

To the Honorable Chair, Ranking Member and Members of the Subcommittee:

In regards to your December 13, 2023 hearing regarding the regulation of non-governmental space activities, please accept this letter as written testimony to be entered into the record. Lesath International, Inc. is a for-profit company duly incorporated in the State of New York, which is developing a non-governmental, sustainable launch capability utilizing an engine fueled by methane.

Non-governmental space activities embody a paradigm that is changing not only how outer space activities are performed but also presents an opportunity for human kind to expand their presence throughout the solar system. Non-governmental space activities offer the opportunity for scientific advancement and also the prospect of developing extraterrestrial resources and solving clear and present problems such as climate change. Non-governmental space activities also provide a substantial national security advantage to the United States.

Naturally, non-governmental space activities cannot operate without sanction of the state under whose jurisdiction they are under. To this end, the framers of the Outer Space Treaty recognized the possibility governments would not be the sole benefactors of outer space activities, and that non-governmentals would have a role to play. Consequently, the Outer Space Treaty granted states the right to allow non-governmentals the opportunity to perform outer space activities subject to their “authorization and continuing supervision” of those activities.

Pursuant to that right, the Congress of the United States enacted the Commercial Space Launch Act of 1984 (Public Law 98–575), which has been amended with successive legislation with the last significant amendment being the Space Launch Competitiveness Act of 2015 (Public Law 114–90). The effect of this legislation is to execute the provision of the Outer Space Treaty permitting non-governmental activities and create a private interest for non-governmentals to perform outer space activities subject to the regulatory authority of agencies designated to license them.

Since the inception of the licensing scheme authorized by Public Law 98–575 and Public 114–90, non-governmental space activities have expanded and outgrown the current system. Moreover, other states are adopting their own domestic space laws that support non-governmental activities contemporaneously with regulations and licensing schemes. These threaten to overshadow the licensing and regulatory scheme offered by the United States, which could draw non-governmentals to foreign jurisdictions. Addressing this, the National Space Council held a series of listening sessions at the end of 2022 to specifically address the shortcomings of the current licensing and regulatory scheme. The consensus from industry input to that effort is that a “mission authorization” scheme should be implemented to supplant the current process.

The Commercial Space Act of 2023 (H.R. 6131) was introduced on November 2, 2023, which offered its ideal of mission authorization with the Department of Commerce as the sole certification agency for non-governmental space activities and light-touch continuing supervision. Concurrent with the markup of H.R. 6131, the National Space Council and the White House unveiled its vision of “mission authorization” where authority to license non-governmental space activities is bifurcated between the FAA and the Department of Commerce and given blanket authority to regulate the non-governmental space sector.

It is the issue of regulation and the competing views of “mission authorization” and regulation this Sub-Committee considers at this time. As a new entrant in the non-governmental space sector, Lesath International is cognizant of the responsibility of the United States to “authorize and continually supervise” non-govern-

mental actors under its jurisdiction, and that there are national security, diplomatic and domestic considerations the United States must take into consideration when it authorizes non-governmental space activities.

However, while this honored Sub-Committee considers the issue of regulation of the non-governmental space sector, it is judicious to bear in mind the implications of non-governmental space activities on national security and the geopolitical and geolegal arena are not all negatives and indeed present significant positives that outweigh the negatives. For example, non-governmentals providing or who seek to provide launch services not only deliver a finished product but innovative technology and methodologies that benefits the United States in terms of its economic prestige and national wealth. Moreover, the innovation of non-governmental space delivers sustainable technical solutions in time-frames and costs that might otherwise take longer periods and cost to deliver if at all.

In summation, as this Sub-Committee considers the issue of regulation from the perspective of the witnesses it has called to testify, it would be prudent to consider that a risk-averse approach to non-governmental space that applies a demanding regulatory environment could stifle the economic, technological and national security benefits that non-governmental space activities tender to the United States. Moreover, Lesath asks this Sub-Committee to take into account the United States is not the only player in non-governmental space and those who seek a less burdensome regulatory environment to operate within might seek out those jurisdictions who offer a light-touch regulatory approach. In turn, it will be those jurisdictions who benefit from non-governmental space to the detriment of the United States.

Thank you for your consideration of this testimony.

THOMAS A. PAWLAK III,
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BRIEFING AND COMMENTARY FOR SENATE SUBCOMMITTEE ON SPACE
 AND SCIENCE HEARING: GOVERNMENT PROMOTION OF SAFETY AND
 INNOVATION IN THE NEW SPACE ECONOMY

Honored, Chair, Ranking Member and Members of the Subcommittee:

This Briefing and Commentary is submitted in a non-representative capacity by Space Law & Policy Solutions, which is a non-governmental, for-profit legal and consultation firm and think-tank, through its Principal, Michael J. Listner, an attorney licensed in the State of New Hampshire. The purpose of this Briefing and Commentary is to apprise this Sub-Committee of the legal and regulatory foundations of non-governmental space activities so it may understand these fundamentals as it hears from the witnesses called and provide commentary prior to the testimony of witnesses.

Legal and Current Regulatory Foundation of Non-Governmental Space Activities

The capacity of non-governmentals to perform outer space activities derives from Article VI of the Outer Space Treaty. The language of Article VI is as follows:

“States 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-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. 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. When activities are carried on in outer space, including the Moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization.”¹

¹Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, October 10, 1967, art. vi, 18 UST 2410.

The pertinent language for non-governmental space activities in Article VI is isolated from Article VI:

“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.”

Article VI is a provision of the Outer Space Treaty, which was ratified by the U.S. and has standing of Federal law, which means the licensing of non-governmental space activities is a power delegated to the Federal government.² Article VI is the single non-self-executing provision of the Outer Space Treaty, which means it cannot operate without the aid of a legislative provision.³ In the case of Article VI, the “act” that must be legislated is “authorization and continuing supervision” of non-governmentals. Accordingly, Congress was required to enact legislation to vest this provision of the Outer Space Treaty.

The initial legislation is found in the Commercial Space Launch Act of 1984 (Public Law 98–575) and has been amended with successive legislation with the last significant amendment being the Space Launch Competitiveness Act of 2015 (Public Law 114–90). This enabling legislation is codified in Title 51, Chapter 509 and Chapter 513 of the United States Code.⁴ It is significant for this Sub-Committee to understand his enabling legislation does not create a right in outer space activities for non-governmentals but rather a private interest subject to the regulatory authority of the Article VI agency or agencies.

The current legislative sanction grants the Federal Aviation Administration Article VI authority to license both launches and reentries and regulate the industry to the extent permitted by Congress.⁵ A regulatory moratorium or “learning period” limits the authority of the FAA to regulate non-governmental space activities; this is set to expire in January 1, 2024.⁶ It is notable that while it is often recited the FAA does not have regulatory authority over the non-governmental space activities, especially those carrying crew and spaceflight participants, such is not the case as the FAA has authority to regulate human spaceflight via Title 51, Chapter 509 of the U.S. Code and Title 14, Part 460 of the Code of Federal Regulations.⁷

Nonetheless, the FAA’s ability to authorize non-governmental space activities is limited to so-called traditional space activities, including sub-orbital and orbital space tourism. The FAA does not have specific authority from Congress to license so-called non-traditional space activities outside of those approved by Congress nor does it have the authority to “continually supervise” space activities between launch and reentry.⁸

²U.S. CONST., art. VI, para. 2 “This Constitution, and the laws of the United States which shall be made in pursuance thereof; and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the judges in every state shall be bound thereby, anything in the Constitution or laws of any State to the contrary notwithstanding.”

³“Our Constitution declares a treaty to be the law of the land. It is consequently to be regarded in courts of justice as equivalent to an act of the Legislature whenever it operates of itself, without the aid of any legislative provision. But when the terms of the stipulation import a contract, when either of the parties engages to perform a particular act, the treaty addresses itself to the political, not the Judicial, Department, and the Legislature must execute the contract before it can become a rule for the Court.*[emphasis added]*” *Foster v. Neilson*, 27 U.S. 253, 314 (1829).

⁴Title 51, Chapter 513 of the U.S. Code creates a right in space resources and implicitly authorizes activities by non-governmentals to harvest space resources.

⁵Both the Federal Communications Commission and the National Oceanographic and Atmospheric Administration assert concurrent Article VI authority through their respective enabling legislation for regulation of spectrum and remote sensing. The FCC implies its Article VI authority from the Communications Act of 1934 as amended. The Communications Act does not specifically grant the FCC this authority rather the FCC implies that authority through its interpretation of 47 U.S.C. § 303—Powers and duties of Commission. The FCC claims primary Article VI authority for non-governmental space activities whose primary activity involves spectrum. The FCC is an ancillary Article VI agency where non-governmental space activities will utilize spectrum but not as a primary activity. NOAA has ancillary Article VI authority through the National Commercial Space Programs Act (51 U.S.C. § 60101 et seq.) for any non-governmental space activities that will take images of the Earth.

⁶The original “learning period” was set to expire October 1, 2023. See 51 U.S.C. 50905(c)(9). However, Section 2202 of H.R. 5860 extended the “learning period to January 1, 2024. Notably, H.R. 5617 and H.R. 6131 would extend the learning period to October 1, 2031.

⁷See 51 U.S.C. §§ 50901–50923 and 14 CFR §§ 460.1–460.53.

⁸This authority is called “on-orbit” authority and would qualify as “continuing supervision” under Article VI. Notably, the FCC asserts it not only has Article VI authority to “authorize”

Continued

The existing licensing and authorization standard was reviewed and streamlined per Space Policy Directive-2, which was issued on May 24, 2018. However, this review and restructuring left the authorization and licensing scheme largely intact and did not address the root problems of the FAA's licensing process, which is the paradigm itself.

The fundamental problem with the current regulatory scheme is three-fold:

- 1) The FAA does not have sanction from Congress to authorize "non-traditional" commercial space activities;
- 2) The current authorization and licensing scheme's focuses on payload in making a determination; and
- 3) The inequities of the current licensing process benefits larger non-governmentals with more resources.

This Briefing will discuss each of these in turn.

Lack of Congressional Action/Authority

Congress has been capricious in sanctioning non-traditional, non-governmental space activities with the last apparent endorsement being the right for non-governmentals to acquire space resources in the 114th Congress with the Commercial Space Launch and Competitiveness Act of 2015, which is codified in Title 51, Chapter 513 of the U.S. Code. Beyond this, Congress has not conferred the FAA or any other agency further authority for additional activities. Notably, the FAA has approved some non-traditional activities, including a rendezvous and proximity operations (RPO), but it did so with implied authority rather than specific authority. However, this jury-rigged approach is not conducive to facilitate continued innovation in non-governmental space activities nor regulating existing sanctioned activities. Congressional involvement and authorization is required to stimulate non-governmental space activities and investment and preserve the leadership of the U.S. in innovative technologies.

Payload Review

The licensing process employed by the FAA centers around the paradigm of payload review found in 14 CFR §415.51, et seq.⁹ Payload review can be described as focusing authorization on the intent of the payload for a space activity instead of purposely focusing authorization on the mission or activities of the proposed space activity. This means the current licensing process is less concerned about the activity itself than it is about the payload, which in essence makes the nature of the activity, *i.e.*, the who, what when, where and why ancillary to the payload itself. The standard of authorization utilizing payload review would not be well-matched with non-traditional space activities.¹⁰

Benefits Non-Governmentals With More Resources

The present licensing scheme was evaluated and modified per SPD-2; however, it remains substantially the same and continues to be complex, burdensome and expensive such that it requires significant resources in terms of legal and regulatory experts. The streamlining per SPD-2 improved the process but leaves the structure in place, which means non-governmentals that possess greater resources will be more amenable to the current process. Conversely, new entrants and non-governmentals with fewer means and experience will be at a disadvantage and will be required to expend significant resources on regulatory and legal assistance that might otherwise be directed towards engineering and technology development.

Mission Authorization

While the playing field will never truly be leveled in terms of the resources available to non-governmentals, a more manageable authorization/licensing scheme would improve the prospects of those non-governmentals who are new to the industry or do not have dedicated legal and regulatory resources to address a complex authorization/licensing process. To that end, it would be prudent to replace the current structure with a new archetype called mission authorization.

Mission authorization would centralize the authorization process to an authorized Federal agency to shift the scrutiny of the licensing process from payload to the type

non-governmental space activities dealing primarily with spectrum via the Communications Act of 1934 as amended, but also claims "on-orbit" authority as well.

⁹The licensing process also includes a policy review per 14 CFR §415.21 et seq. and 14 CFR §415.31 et seq.]

¹⁰When the FCC acts as the primary Article VI agency and issues a license under that authority, the non-governmental must still obtain a launch license from the FAA; however, the non-governmental will not be required to go through payload review.

of space activity to be performed. In other words, instead of focusing on the nature of the payload, mission authorization would look at the mission, including the activities and payloads, as a whole.

H.R. 6131 was introduced into the House of Representatives on November 5, 2023. The central purpose of H.R. 6131 is to create a mission authorization scheme for non-governmental space activities where the Department of Commerce is the certifying authority. H.R. 6131 grants the Department of Commerce authority to not only authorize non-governmental space activities but also to provide “continuing supervision” of those activities.¹¹ H.R. 6131 directs this authority in a manner that will be considered “light touch” supervision for non-governmentals.

Alternatively, the Biden Administration released its ideal for “mission authorization” on November 15, 2023. The draft “Authorization and Supervision of Novel Private Sector Space Activities Act” proposes to bifurcate the “authorization and continuing supervision” of non-governmental space activities between the FAA and the Department of Commerce. Under the draft proposal, the FAA would authorize non-governmental space activities involving human occupants. Conversely, the Department of Commerce would have authority over non-governmental space activities that do not involve human occupants, including remote sensing, rendezvous and proximity operations (RPO) and other novel space activities.

One of the challenges with the duality of authorization is overlap. For example, space resource extraction and harvesting, which is an authorized activity under Title 51, Chapter 513, could overlap or potentially shift between the FAA and the Department of Commerce depending on whether a human occupant is involved in a space resource activity during the entirety or different phases of the activity. Regardless of the split in authority, the draft proposal would grant both Article VI agencies authority to “continually supervise” the non-governmental activities, and both agencies would be granted blanket authorization to regulate the non-governmental space activities under their purview as they see fit.¹²

Closing Thoughts and Recommendations

As this Sub-Committee considers the testimony of the witnesses expressing the view of the government, it is judicious to consider a robust, efficient and up-to-date authorization scheme for non-governmental space activities is essential to:

1. Encourage innovation in technology and promote STEM in the U.S.
2. Encourage non-governmentals in the U.S. and abroad to perform their activities under the Article VI authority and supervision and Article VIII jurisdiction of the U.S.¹³
3. Maintain a competitive edge over other State Parties to the Outer Space Treaty who are developing their own non-governmental space laws, regulations and economy.
4. Maintain U.S. leadership in non-governmental space activities and with the resultant benefits to national security and the economy in general.
5. Ensure the sustainability of outer space and other celestial bodies.
6. Maintain U.S. leadership on the world stage not just in terms of geopolitical optics and prestige but also to shape the body of international space law moving forward.

Moreover, the national security value of non-governmental space activities is not lost on geopolitical adversaries, including the People's Republic of China and the Russian Federation. Both these States understand the value of non-governmental space activities with both employing hybrid warfare tactics, including activities within the forum of the United Nations, to discredit U.S. non-governmental space activities and actors.¹⁴

¹¹ See Outer Space Treaty, art.vi.

¹² Notably, the National Space Council User Advisory group vocally opposed the draft mission authorization proposal when it met on December 1, 2023.

¹³ See Outer Space Treaty, art. vi and viii.

¹⁴ A key example is a lawfare action taken by the PRC in the United Nations on December 6, 2021. The PRC initiated a lawfare operation using Article V of the Outer Space Treaty to file a complaint directly with the Secretary General of the UN complaining of alleged near-conjunctions of the PRC's space station with satellites from the Starlink NGSO. The intent of this operation was four-fold: 1) Engineer Article V into an implement of lawfare; 2) Discredit and sequester the utility of Starlink and non-governmental space activities. 3) Discredit the standing and authority of the U.S. to create standards of behavior and norms for outer space activities; and 4) Test the U.S. response to the use of lawfare and Three Warfares tactics directed to the outer space domain.

Lastly, as safety of non-governmental space activities is an issue this Sub-Committee will discuss with witnesses during the hearing, the Chair, Ranking Member and Members might take into account that outer space activities are never going to be truly “safe” as they are inborn with risk. The question is whether Congress believes a stringent, risk-averse and prescriptive regulatory approach is necessary for non-governmental space activities even if it stifles innovation and national security or whether a soft-touch regulatory environment that evolves through top-down regulations or bottom-up through self-regulation by the industry itself will manifest as experience in the outer space environment accumulates.

Shifting the current paradigm for authorizing and licensing non-governmental space activities from its present state to mission authorization presents many challenges. However, if the U.S. is to maintain its role as the leader and influencer in outer space law and policy, it must consider how it can evolve the current archetype to not only meet the needs of non-governmentals but also level the playing field in the industry and elicit more demand and provide the capacity to meet it.

This concludes this Briefing. This Commenter will accommodate questions of this Sub-Committee upon request.

Respectfully submitted on this 12th day of December, 2023,

/s/ MICHAEL J. LISTNER
Michael J. Listner

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARIA CANTWELL TO
HON. PAM MELROY

Federal Government Challenges in Oversight of Commercial Space Activities

The Pacific Northwest is a prime hub for commercial space activity, with a \$4.6 billion space industry that has created over 13,000 jobs. A major challenge with space commercialization is understanding what the technological and workforce challenges are. Without this knowledge, it is difficult to determine the kind of support and oversight that is needed. Defining roles and responsibilities, increasing coordination, and improving knowledge sharing for agencies will allow the government to keep pace with rapid innovation.

This Committee played a very big role in a new aircraft certification program for the FAA to address workforce shortages and improve aviation safety through proactive approaches to managing risk. The same should be done to reduce technological risk for the commercial space industry. Technological challenges and other risk factors must be characterized and addressed from a safety perspective to ensure advancement of commercial human spaceflight.

Question 1. What are the top three technological, operational, policy, or workforce challenges that your agency faces in your role supporting and overseeing the safety of commercial space activities?

Answer. NASA has increasingly served as a customer of commercial space companies in order to meet the agency's own goals. As NASA continues to acquire these commercial services, the success of NASA becomes inextricably linked to the success of the industry. Clear guidelines and requirements to safeguard commercial activities are therefore critical to NASA's mission. The following areas require special attention to enable future NASA missions:

- **Funding**—Our vision for NASA is that the agency takes on the hardest challenges that no one else can do. At the same time, where industry is ready, we are increasingly handing over some missions to the commercial space industry and becoming a customer of commercial services. However, maintaining this balance and preparing for new ways of conducting missions requires adequate resources. For example, when the International Space Station (ISS) retires, NASA plans to continue research in low-Earth orbit on new commercial space stations, which we started investing in several years ago. In order to ensure a seamless transition, NASA needs adequate funding to continue ISS operations through the end of the decade, fund commercial space stations, and build a deorbit capability for ISS.
- **Space Situational Awareness/Space Traffic Coordination/Orbital Debris and Congestion**—To ensure that space is sustainable for use by future generations, as well as safe for the U.S. government's own missions and assets, we must understand what is currently in LEO and establish common responsible behaviors. To solve these challenges, NASA is applying our technical expertise to develop new technologies and working with partners across the Federal Government on

policies to promote safe and efficient deorbit of satellites, as well as traffic coordination.

- **Spectrum Access and Non-interference**—Assured spectrum access is an element of space sustainability and requires careful management. While the primary focus has been on spectrum allocation for terrestrial purposes, increased attention on how spectrum is allocated for lunar purposes is critical given the increased number of missions to the lunar surface over the next several years. Another element of this is minimizing the radio interference between missions operating in proximity to each other.
- **New Propellant Technologies**—Methane systems are emerging as the fuel of choice for many rockets coming online in the near future. NASA has been working closely with industry partners and the FAA to define safety for the use of methane fuel. Additionally, NASA is interested in the development and use of nuclear power and propulsion to enable deep space capabilities.

Proposed National Space Council Regulatory Framework

This summer, I was joined by Administrator Nelson for our Space Summit in Washington State featuring many local space companies with plans for innovative commercial space missions.

Gravitics, in Marysville WA, is designing and manufacturing large space structures for orbital human platforms and uncrewed on-orbit manufacturing. Starfish Space, in Kent, WA is developing an orbital space vehicle to provide orbit transfer and satellite maintenance services. The vehicles' on-board software and control system uses a combination of orbital mechanics and low-thrust electric propulsion, enabling satellite companies to relocate, deorbit and extend the life of satellites.

Question 1. Given NASA's experience and expertise in keeping astronauts safe in Earth's orbit, what role will NASA have in the decision-making process regarding commercial orbiting platforms used as human occupied space stations?

Answer. NASA is taking a two-phase approach to ensure a seamless transition from the International Space Station (ISS) to commercial systems, with a goal of NASA being one of many customers of those commercial systems. In the first phase, which is happening now and slated to run through 2025, NASA will work with commercial partners to design Commercial LEO Destinations (CLDs) that will be suitable for both government and private sector needs. For the second phase, NASA anticipates that another Federal agency will have regulatory authority over CLD safety, with NASA reviewing all aspects relevant to the safety of government astronauts. Throughout the entire process, NASA will work closely with CLD partners to ensure that their systems meet NASA's requirements.

Coordination on Regulatory Decision-making within the Executive Branch Interagency

Varda Space Industries, a U.S. company that launched its first payload into orbit in June 2023, is successfully demonstrating manufacturing pharmaceuticals in space, but is experiencing delays in receiving its reentry license from the FAA. This delay has led to a decision by Varda to enter a partnership with Southern Launch to use their spaceport range near Adelaide, Australia, rather than use the U.S. Air Force's Utah Test and Training Range. While Australia is obviously a strong U.S. partner, this seems like an example of a U.S. space company choosing to pursue opportunities in other countries that offer simpler and more flexible regulations.

Question 1. In implementing the National Space Council's proposed regulatory framework for novel space activities such as on-orbit processing and manufacturing, what is the best way to maintain U.S. competitiveness through a streamlined but safe regulatory framework?

Answer. The best way to maintain U.S. competitiveness in space is to quickly establish a clear, predictable, and flexible process for licensing novel commercial space activities. This will signal to the global community the U.S.'s commitment to the safe and peaceful use of outer space and establish the U.S. as the country of choice for licensing of commercial space activities. As China is also developing a set of national space laws to include in-space mission authorization, there is a clear advantage for the U.S. to be among the first out of the gate in establishing a regulatory regime that can be adopted globally. That is why NASA is pleased the National Space Council put forth a proposal that logically extends existing authorities within the Departments of Commerce and Transportation, rather than building an entirely new process from the ground up. By extending existing authorities, this will allow the U.S. government to better and more quickly enable the authorization and supervision of commercial activities.

International Considerations for Novel Space Activities

Setting norms of behavior and safety standards for operating in space through international engagement is critical to the continued access and use of space for scientific advancement and economic prosperity. 32 countries in addition to the United States have now signed the Artemis Accords, a set of common principles, guidelines, and best practices focused on safe and sustainable space exploration.

Regarding the Artemis program itself, the United States and its partner nations intend to pursue future space cooperation in partnership with commercial industry. Within Washington, more than 40 companies are working to supply Artemis. 15 companies supply the Space Launch System rocket, 14 deliver goods and services used for the Orion crew capsule, and Blue Origin will supply NASA with a second lunar lander, creating competition, and redundancy. Other NASA initiatives such as the Commercial Lunar Payload Services or CLPS program have created the potential for private sector activities on the lunar surface operating on a purely commercial basis.

Question 1. Given the importance of government partnerships with the commercial space industry and the potential for commercial activities on the lunar surface and beyond that may be operating both in cooperation and in competition with commercial entities from other nations, can you explain how the Artemis Accords apply to commercial activities or can be used to ensure responsible behavior from all space actors, including private ones?

Answer. The Artemis Accords only apply to the civil space activities of signatory governments, including work that governments contract with the private sector, but they do not apply to purely commercial activities. However, the hope is that the Artemis Accords can inspire broader discussions on best practices for the safe, sustainable, and transparent use of space that would apply to all space actors.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. TED CRUZ TO HON. PAM MELROY

Question 1. While the National Aeronautics and Space Administration (NASA) is not a regulatory agency, what role should NASA play in licensing on-orbit activities, vehicle certification, and so forth?

Answer. As NASA acquires more and more commercial services to meet agency goals, the success of NASA's mission relies heavily on the success of the commercial industry. NASA has a significant interest in establishing a clear consistent regulatory regime; and establishing that regime quickly to maintain U.S. global leadership in space. Under the National Space Council's proposal, NASA would have an advisory and consultation role, which will not only lend NASA's technical expertise in spaceflight to the licensing process, but will also ensure the safety of NASA's own space assets.

Question 2. Last year, Congress extended the International Space Station (ISS) to 2030. NASA oversees the Commercial Low Earth Orbit (Comm LEO) Development Program to help foster a commercial space station to maintain the United States' presence in LEO. Do you see commercial providers being ready to meet the 2030 goal and what are NASA's plan in case they do not?

Answer. NASA's plan is to align the International Space Station (ISS) transition with Commercial Lunar Destination (CLD) availability to maintain our continuous human presence in space as we become one of many customers in a thriving commercial marketplace in low Earth orbit. The extension of ISS through 2030 was a critical part of the CLD strategy and provides additional time for the CLD partners to complete their development. Currently, NASA is working with multiple industry partners to maximize the likelihood that one or more of them will be ready by 2030.

Question 3. If there is a gap between the ISS and Commercial LEO stations being operational, does NASA consider that acceptable?

Answer. There was a nine-year gap between the retirement of the space shuttle and the first commercial crew flight to ISS. Although we were able to maintain human presence in low Earth orbit, and the funding freed up by the gap enabled us to develop the commercial crew vehicles and Space Launch System, it is not a circumstance we are eager to repeat with commercial LEO destinations. Our priority in preventing a gap is ensuring that commercial LEO destinations are available before 2030.

Question 4. What is NASA's contingency plan if commercial companies do not yet have space stations ready for 2030?

Answer. NASA is working diligently with the CLD providers to facilitate their ability to meet the 2030 time-frame for their operations. If no CLD is ready by the

time ISS retires, then a gap in continuous U.S. human presence would occur without an extension of ISS operations. Extension of ISS in order to avoid a gap in LEO is not part of our current plans. Any attempts to do so would be contingent on the technical viability of station, the availability of certain station keeping services, including reboost and attitude control, that are primarily provided by our international partners, and the funding to continue safe station operations until commercial platforms enter service.

Question 5. What does the United States need to do to ensure we remain the world's leader of spaceflight and that we are able to return to the moon before competitors can get there for the first time?

Answer. Artemis is a long-term exploration campaign to go back to the Moon for scientific discovery, economic benefits, and inspiration for a new generation of explorers. While maintaining American leadership in exploration, we will build a global alliance and explore deep space for the benefit of all. For the United States to carry out a successful and sustainable return to the Moon will require the agency and its partners execute programs on budget and on schedule, with a continued emphasis on safety and mission success. Continued participation and support from our international and industry partners who will be focused on performing as efficiently as possible and to the highest standards, will be required. A resilient mission manifest is essential for something as complex as developing the systems and technologies for long-term exploration of the Moon and eventually Mars in a manner that prioritizes scientific discovery and benefits for humanity. NASA and our industry and international partners intend to continue developing, testing, and learning and improving our knowledge to ensure that when we fly, we'll be successful.

Question 6. Does NASA's shift to contracting multiple vendors for space suits and lunar landers create budgetary challenges that would not exist if only contracting with a single vendor?

Answer. NASA adopted an approach to select two vendors to ensure that competition remains in the system and maintain dissimilar redundancy for Artemis. With two vendors, NASA will avoid a situation where one vendor can perceive themselves as having some sort of unique supply capability and thus inflate prices. Not only does this mitigate costs in the proposal phase, having two vendors in NASA's approach also protects against schedule concerns in the development phase. With only one vendor, should that vendor encounter technical or schedule issues, the entire enterprise could wind up waiting for the issue to be resolved. If the whole enterprise were to have to wait, the cost impacts multiply significantly across multiple programs supporting the Artemis program. NASA's approach significantly reduces this risk by giving NASA schedule mitigation options.

Question 7. In an era where both NASA and the Space Force are increasingly reliant on the commercial sector for services, are there any efforts to combine contractual mechanisms for items that both the Department of Defense and NASA use such as launch vehicles?

Answer. NASA and the Space Force coordinate and collaborate on technical and programmatic issues related to space access, including contracted launch service acquisition and execution. However, material differences exist between NASA's civil scientific and exploration needs and the Space Force's national security requirements. Despite sharing all or part of the domestic launch service provider base, requirements for launch services are quite diverse across the Federal Agencies that acquire and execute them. Risk tolerance, mission assurance, and schedule rigidity, to name a few, vary considerably depending on Agency and individual mission needs. These differences necessitate the separate and unique contracting mechanisms that each organization employs to achieve their dissimilar policy directives. However, NASA is open to evaluating whether some aspects of launch vehicle acquisition, such as vehicle certification, might be conducted jointly with other Departments and Agencies in order to avoid expending government and industry time and resources on potentially duplicative efforts.

Question 8. The National Space Council's recent proposal on mission authorization proposes a number of new responsibilities to the Department of Transportation including "other national interests." In its current form, companies and programs that have been certified by NASA as advancing the objectives of the national space program will not have a licensing exception when going through the Federal Aviation Administration. Does NASA have any concerns that this duplicative process will result in delays for vital space missions?

Answer. The National Space Council's recent proposal on mission authorization adds the category of "national interests" to the considerations that the FAA may take into account when determining whether to issue a license. This allows the Agency to have the ability to protect its assets and people in space were a proposed

licensed activity to potentially jeopardize existing NASA operations. It also is intended to permit consideration of long-term sustainability interests of the United States Government.

Related to creating duplicative processes, as is currently in statute concerning the FAA's existing licensing process for launch and reentry, it excludes space activities the Government carries out for the Government. The National Space Council's (NSpC) proposal for novel space activities likewise is intended to carve out space activities that NASA conducts for the Government.

Question 9. Over the next several years, NASA will send astronauts to Lunar orbit and the lunar surface for the first time in 50 years on a variety of new spacecraft that have been developed under unconventional commercial contracts that have varying levels of government oversight and insight relative to traditional NASA programs like Apollo, Space Shuttle and the ISS. Does NASA have the necessary visibility and insight into all aspects of the systems architectures and critical systems that impact astronaut safety under these contract types? Are there differences in data sharing, audits, or validation for these newer commercial contracts versus traditional NASA development programs?

Answer. NASA has access to specific data necessary to ensure proper insight into and oversight of NASA astronaut safety. NASA's overarching data sharing, audits, and validation for "newer" commercial fixed price contracts is often structured differently than a "traditional" NASA cost plus development contract to optimize and appropriately share cost, schedule, and technical risks. The data that NASA receives under its contracts is dependent upon the contract's data requirement deliverables (DRDs), which specify the requirements for data sharing, audits, or validation, which is tailored to the Agency's needs and appropriate risk posture. This is true regardless of the contract (*i.e.*, "traditional" vs. "commercial" approach).

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. J. D. VANCE TO
HON. PAM MELROY

Department of Transportation's Expertise of Licensing In-Space Flight

Under the Administration's mission authorization proposal, the Department of Transportation would be tasked with licensing novel in-space transportations. Associate Administrator Coleman described the differences, particularly in the risk profile, between licensing launch and reentry activities and these novel in-space missions. As I understand it, the Department of Transportation has experience licensing launch and reentry of commercial space activities but does not have experience licensing in-space vehicles.

Question 1. How will NASA work with the Department of Transportation to gain the requisite expertise on licensing in-space vehicles?

Answer. NASA is pleased the National Space Council put forth a proposal that logically extends existing authorities within the Departments of Commerce and Transportation, rather than building an entirely new process from the ground up. Under the National Space Council's proposal, NASA would have an advisory role, providing technical expertise in spaceflight to the licensing process. In addition, NASA has been working closely with the Department of Transportation for over 13 years on the Commercial Crew program.

Training for Civilian Space Travelers

As the promise of commercial space tourism expands, more non-NASA astronauts will go to space.

Question 1. What is the U.S. government doing to meet the training needs for non-NASA astronauts and space travelers?

Answer. While NASA will always have oversight and training responsibility for NASA astronauts, the training of non-governmental space travelers is not part of NASA's mission.

Question 2. What investments is NASA making in immersive training solutions for the civilian space community?

Answer. While NASA is not responsible for the training of non-governmental space travelers, we have provided technical assistance to the civilian space community and are open to continuing to do so when appropriate, presuming we have the resources to do so.

NASA Glenn Research Center

I am encouraged by the success of the partnership between Ohio's NASA Glenn Research Center and industry in developing new materials which will enable the

launch of next-generation rockets using additively manufactured propulsion systems. Glenn Research Center is a critical part of the commercial space ecosystem and the materials research conducted there is irreplaceable.

Question 1. I'd like an update on the development of groundbreaking materials like GrCop42 and GRX-810 at Glenn in partnership with industry and NASA Marshall Space Flight Center.

Answer. NASA's Marshall Space Flight Center (MSFC) and Glenn Research Center (GRC) have been and continue to lead the way in development of new additively manufactured (*i.e.*, 3-D printed) alloys. GRCop-42, developed under the Rapid Analysis and Manufacturing Propulsion Technology (RAMPT) project, was successfully flown on the Relativity Space Terran 1 launch in March 2023 (with NASA help and less than 18 months from concept to flight qualification) and enabled the rapid development of Relativity's new Aeon R large scale engine for their large Terran R launch vehicle. NASA provides continuous support on GRCop-42 to industry vendors and many other companies for implementation into flight for NASA missions, commercial launches, Space Force, and hypersonic programs. These include Blue Origin, ABL Space, Rocket Lab, Stoke Space, ABL Space, Sierra Space, Air Force Research Lab (AFRL), and several others. GRCop-42 has also enabled the advancement of new propulsion technologies such as rotating detonation rocket engines (RDRE).

GRC and MSFC have completed initial development and scale-up of the GRX-810 alloy. Material properties have been developed and hot-fire testing of liquid rocket engine injectors and nozzles were tested successfully. The GRX-810 alloy injector showed 5 times better life compared to other type injectors under the harsh conditions. Testing has shown a 1,000 times improvement in material performance. NASA has engaged with AFRL to aid with some DoD programs and has signed more than 10 research licenses and has over 40 other companies interested. The team is working to properly develop the supply chain to make this fully commercial. The novelty of the GRX-810 alloy has also enabled the processing concept of other critical alloys needed in the commercial space industry.

Question 2. How does NASA's Rapid Analysis and Manufacturing Propulsion Technology program enable the next generation of launch vehicles and what plans does NASA have to capitalize on this successful partnership?

Answer. NASA's Rapid Analysis and Manufacturing Propulsion Technology (RAMPT) project was one of a succession of projects that addressed increasingly complex aspects of Additive Manufacturing (AM) for NASA missions and the aerospace industry. The efforts demonstrated the feasibility and benefits of AM of rocket engine components and the advancements under RAMPT have enabled commercialization of AM production through specialty manufacturing vendors that have quadrupled the number of additive machines due to the RAMPT technology.

The successful completion of the RAMPT project has allowed for a supply chain to support NASA and commercial space for production of RAMPT technology into various missions through multiple on-going efforts. NASA has six formal consulting agreements with launch vehicle companies to provide manufacturing consultation. NASA has established numerous Space Act Agreements with commercial space partners to help them enable the RAMPT technologies in addition to two commercial patent licenses. NASA has started building a full scale RS25-engine nozzle in collaboration with Aerojet Rocketdyne, which is expected to result in an 80 percent cost savings and 50 percent schedule acceleration.

There will be a continued need for the development of high temperature materials for launch and advanced in-space chemical and nuclear propulsion systems. Plans for follow on investments building on the successes of RAMPT are being refined through internal planning and assessment activities. Candidate investments include: material development for high-pressure liquid oxygen environments, high temperature environments (like refractories), development processes for advanced and additive manufacturing, and composite overwrap and bimetallic development.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARIA CANTWELL TO
KELVIN B. COLEMAN

Federal Government Challenges in Oversight of Commercial Space Activities

The Pacific Northwest is a prime hub for commercial space activity, with a \$4.6 billion space industry that has created over 13,000 jobs. A major challenge with space commercialization is understanding what the technological and workforce challenges are. Without this knowledge, it is difficult to determine the kind of support and oversight that is needed. Defining roles and responsibilities, increasing co-

ordination, and improving knowledge sharing for agencies will allow the government to keep pace with rapid innovation.

This Committee played a very big role in a new aircraft certification program for the FAA to address workforce shortages and improve aviation safety through proactive approaches to managing risk. The same should be done to reduce technological risk for the commercial space industry. Technological challenges and other risk factors must be characterized and addressed from a safety perspective to ensure advancement of commercial human spaceflight.

Question 1. What are the top three technological, operational, policy, or workforce challenges that your agency faces in your role supporting and overseeing the safety of commercial space activities?

Answer. In our role to enable safe space transportation, the top three challenges our agency faces in supporting and overseeing the safety of commercial space activities are:

- (1) **Keeping Pace with Licensing Demand (Operational):** Since 1989, the FAA has licensed or permitted over 700 commercial space transportation operations, more than any other country in the world by far. In Fiscal Year 2023, the Office of Commercial Space Transportation (AST) licensed 113 operations, tripling the number of licensed operations since Fiscal Year 2020. Additionally, we have received a 186 percent increase in license applications since Fiscal Year 2020. Further, we have seen an increase in the number of pre-application consultations and license modifications from high-volume programs with large companies. To keep pace with this growth and free up licensing resources to ensure there are adequate resources for evaluating the safety of new operators, vehicles, sites, and technologies, we have undertaken process improvements, including work to incorporate automation, and efforts to streamline and improve our commercial space regulatory framework. As reflected in the President's budget request for Fiscal Year 2025, we have identified additional resource needs that would ensure we have the personnel in place to keep up with the growth in the demand for our services.
- (2) **Staff Hiring and Retention (Workforce):** To keep pace with increased demand for our licensing services, we have identified a need to grow our staff. Acquiring, training, and retaining talent in a competitive market continues to be a challenge, especially as the demand for critical positions with a small talent pool, such as aerospace engineers, increases in both the government and industry.
- (3) **Ensuring a Smooth Transition to Part 450 (Policy):** In December 2020, the FAA published a final rule to consolidate, update, and streamline all launch and reentry regulations into a single performance-based part, which is found in Title 14, Code of Federal Regulations, Part 450 (Part 450). We designed Part 450 to allow a commercial space operator to obtain a license for a portfolio of operations, which enables an operator to streamline and include different vehicle configurations, different mission profiles, and even multiple sites under one license. The FAA anticipates full implementation of Part 450 will reduce the number of times an operator will need to request a new launch or reentry license from the FAA. Ultimately, this will free up licensing resources and ensure there are adequate resources available for evaluating the safety of new operators, vehicles, sites, and technologies. By March 10, 2026, all launch and reentry licenses issued by the FAA under legacy regulations will no longer be valid and launch and reentry vehicle operators must comply with Part 450. We are working to ensure that this transition is as smooth as possible. As Part 450 is a relatively new rule, to facilitate industry transition to Part 450, we have provided and continue to develop an assortment of aids, including license application checklists, advisory circulars, and virtual tutorials and workshops, for industry to have a full understanding of how to achieve compliance with Part 450 and how to take advantage of the intended benefits of this streamlined process and the performance-based rule. We will continue to evaluate Part 450 to determine the need for any future rulemakings, and we have tasked the Commercial Space Transportation Advisory Committee for its views on Part 450 as well.

Proposed National Space Council Regulatory Framework

This summer, I was joined by Administrator Nelson for our Space Summit in Washington State featuring many local space companies with plans for innovative commercial space missions. Gravitics, in Marysville WA, is designing and manufacturing large space structures for orbital human platforms and uncrewed on-orbit manufacturing. Starfish Space, in Kent, WA is developing an orbital space vehicle

to provide orbit transfer and satellite maintenance services. The vehicles' on-board software and control system uses a combination of orbital mechanics and low-thrust electric propulsion, enabling satellite companies to relocate, deorbit and extend the life of satellites.

Question 1. The space structures being designed by Gravitics appear to require an FAA license if occupied by humans and would fall under Department of Commerce licensing if used for automated uncrewed on-orbit manufacturing. Do you agree? If an operator purchases one of these platforms for multiple human and non-human applications, what type of novel space mission license do they apply for under the space council proposal?

Answer. Under the Administration's legislative proposal titled the "Authorization and Supervision of Novel Private Sector Space Activities Act" (legislative proposal), Gravitics would require only a single license from the Department of Transportation (DOT), as the space structures being designed by Gravitics are designed to be a human space flight vehicle. Under the legislative proposal, human space flight vehicles include launch or reentry vehicles, habitats, or other objects built to operate in a suborbital trajectory or outer space, including a celestial body, with a human being on board. In other words, an unoccupied vehicle may still be considered a human space flight vehicle if it is built to operate in outer space with a human being on board. Human space flight vehicles such as the structures being designed by Gravitics, whether occupied or unoccupied, would require only a single license from the DOT. The additional uncrewed or crewed on-orbit manufacturing would not alter the oversight needed for human-rated vehicles.

Question 2. Do you have any suggestions for improving the efficiency of implementing the proposed National Space Council Regulatory Framework while maintaining safety?

Answer. We believe the Administration's legislative proposal maximizes both efficiency and safety for novel space activities. The proposal will provide clear and predictable authorization and supervision for novel U.S. private sector in-space activities and help to ensure the U.S. remains the world's preeminent commercial space country of choice while imposing minimal regulatory burdens on U.S. private sector actors in space. Further, it builds upon the strengths of both the Departments of Transportation and Commerce and is a logical extension of both Departments' existing authorities.

Human Spaceflight Occupant Safety "Learning Period"

In 2021, we saw the first sub-orbital commercial flights from Virgin Galactic and Blue Origin, and the first successful orbital commercial flight with SpaceX's Inspiration4. The space economy is growing rapidly and the landscape for commercial human spaceflight will continue to evolve. Soon we will potentially see human-occupied commercial destinations in Low Earth Orbit, on-orbit manufacturing and R&D, and potential human habitation on the Moon and Mars. At the last hearing of this subcommittee focused specifically on promoting safety and competitiveness in U.S. commercial human space travel, our industry witnesses all urged Congress to once again extend the commercial human spaceflight occupant safety "learning period."

Question 1. When do you believe the learning period moratorium should expire? What steps are needed to minimize disruption to commercial human spaceflight activities while maximizing safety for humans?

Answer. We look forward to working with Congress to determine whether the learning period moratorium should expire and to ensure there is an environment where the FAA is able to regulate commercial human space flight safety in a manner that does not stifle industry innovation and growth.

AST has been working to minimize disruption to commercial human spaceflight activities while maximizing safety for humans through numerous initiatives that will ultimately lead to a human space flight safety framework that will be designed to evolve with the industry. These initiatives include:

- (1) Industry Recommendations on a Future Human Space Flight Safety Framework: In Fiscal Year 2023, AST chartered the Human Space Flight Aerospace Rulemaking Committee (SpARC), which is comprised of a cross-section of the commercial space transportation industry and other relevant stakeholders. The Human Space Flight SpARC allows us to engage with the commercial space industry on regulatory concerns related to human space flight and will provide consensus information, concerns, opinions, and recommendations to the Department of Transportation regarding the establishment of a commercial human space flight occupant safety framework. We expect recommendations from the Human Space Flight SpARC by the summer of 2024, which we

will use to determine the appropriate scope and timing of future regulations and plan our efforts with the industry on a future human space flight safety framework.

- (2) **Development of Guidance and Recommended Practices:** In September 2023, the FAA updated its Recommended Practices for Human Space Flight Occupant Safety document. This document provides a compilation of practices and recommendations that the FAA believes are important for commercial human space flight occupant safety, including design, manufacturing, maintenance, and operation considerations. Input from industry, academia, and other Federal agencies supported the development of this recent update. This document will support the continuous dialogue across the industry through standards development organizations to develop and publish standards that can be used to improve the safety of launch and reentry vehicles designed to carry humans. This document is currently being used by the Human Space Flight SpARC to guide discussions on the future human space flight safety framework. We will continue to make updates to the recommended practices document as well as develop guidance material in the form of FAA advisory circulars addressing human space flight safety.
- (3) **Development of Industry Consensus Standards:** The FAA is working with standards development organizations, like ASTM Committee F47 on Commercial Spaceflight, to help drive industry voluntary consensus standards to publication and eventual industry adoption. As part of the design of any future human space flight safety framework, the FAA anticipates industry consensus standards as being foundational for industry adoption.

Question 2. If the learning period moratorium is extended, how would that impact any new regulatory framework for in-space human activities implemented if the National Space Council proposal were to become law?

Answer. In granting DOT additional regulatory authority for commercial in-space human space flight activities, we would rely on Congress to be explicit as to whether the learning period would also apply to in-space human spaceflight. However, an extension of the learning period would not hinder establishment of any new regulatory framework for in-space human spaceflight; at a minimum, informed consent requirements likely would be applied for in-space human spaceflight activities.

The legislative proposal unifies all human space flight oversight under a single agency, the Department of Transportation. After regulations are promulgated, in-space human space flight oversight would address public health and safety, safety of property, space sustainability, international obligations of the United States, and national security, foreign policy, and other national interests of the United States. While the learning period, which places limits on the Secretary's authority to issue regulations governing the design or operation of a launch vehicle to protect the health and safety of crew, government astronauts, and space flight participants, is in place, this oversight would also include overseeing informed consent requirements. Once the learning period sunsets, the FAA would work to promulgate regulations in continued cooperation with industry that would codify a safety framework for human space flight occupant safety.

Coordination on Regulatory Decision-making within the Executive Branch Interagency

Varda Space Industries, a U.S. company that launched its first payload into orbit in June 2023, is successfully demonstrating manufacturing pharmaceuticals in space, but is experiencing delays in receiving its reentry license from the FAA. This delay has led to a decision by Varda to enter a partnership with Southern Launch to use their spaceport range near Adelaide, Australia, rather than use the U.S. Air Force's Utah Test and Training Range. While Australia is obviously a strong U.S. partner, this seems like an example of a U.S. space company choosing to pursue opportunities in other countries that offer simpler and more flexible regulations.

Question 1. In general, can you explain how interagency coordination works for launch and reentry licensing decisions?

Answer. Both Title 51, United States Code, and Executive Order 12465, Commercial Expendable Launch Vehicle Activities, establish interagency requirements for an interagency group to advise and assist the Department of Transportation, through the Federal Aviation Administration, in performing its responsibilities for launch and reentry licensing decisions. In addition to meeting certain safety, environmental, and financial responsibility requirements, a license application evaluation must undergo up to two interagency consultations: a payload review if there is a payload and a policy review for the entire launch or reentry operation.

During the payload review, the FAA consults with the Departments of Defense (DoD), State (DoS), and Commerce (DOC), the National Aeronautics and Space Administration (NASA), the Federal Communications Commission, and any other applicable Federal agency to ensure each payload's launch or reentry does not jeopardize public health and safety, safety of property, national security interests, or foreign policy interests of the United States.

During the policy review, the FAA consults with DoD, DoS, NASA, and any other applicable Federal agency to determine whether a license application presents any issues affecting U.S. national security, U.S. foreign policy interests, or international obligations. In practice, the FAA sends a summary of the commercial launch or reentry activity to all relevant interagency stakeholders. If an interagency partner identifies an issue, the DOT coordinates with the partner agency and the operators to remedy the issue before issuing a license.

Question 2. In implementing the National Space Council's proposed regulatory framework for novel space activities such as on-orbit processing and manufacturing, what is the best way to maintain U.S. competitiveness through a streamlined but safe regulatory framework?

Answer. The legislative proposal's regulatory framework for novel space activities will provide clear and predictable authorization and supervision for novel U.S. private sector in-space activities and help to ensure the U.S. remains the world's pre-eminent commercial space country of choice while imposing minimal regulatory burdens on U.S. private sector actors in space. DOT and the DOC will work together, as well as with other stakeholders, to ensure the application of consistent standards. In the cases of the in-space activities cited above, on-orbit processing and manufacturing, these would be licensed by the DOC.

Addressing Federal Workforce and Technical Capacity Needs in Implementing Expanded Commercial Space Regulatory Authority

The Federal government must regulate the commercial space industry in a manner that both ensures the safety of the general public and human participants in specific activities. This means ensuring our regulatory agencies are well staffed, very knowledgeable, and experienced in the safety culture of the aerospace industry. Yet we have heard from stakeholders, including industry leaders, that the FAA does not have enough personnel with the right skill sets to move launch and reentry licenses along in a timely manner, or begin regulating commercial human spaceflight occupant safety when the learning period ends.

It is also clear government regulatory authorities are competing with industry for the same STEM-educated workers needed to maintain a pipeline of technical talent. In Washington State alone, we are anticipating a 60,000-person STEM workforce shortage in by 2026.

Question 1. Would adding a key technology leader to your respective offices, such as a Chief Technical Officer with significant industry experience be an effective way to keep your workforce up to speed on the rapid technology changes taking place in the industry sectors you regulate?

Answer. We do not believe a Chief Technology Officer alone will suffice to keep the workforce apprised of rapid technology changes. As reflected in the President's budget request for Fiscal Year 2025, we have identified additional resource needs that would ensure we have the personnel in place with the necessary expertise.

Question 2. What do you believe to be the biggest impediments to recruiting needed talent, experience, and expertise? Do you have ideas this committee should consider that would enhance recruitment opportunities?

Answer. As mentioned above, we have experienced significant growth in the demand for AST's licensing resources. Currently, approximately two-thirds of the AST organization is dedicated to working on license applications, including pre-application consultations with prospective applicants, license modifications, license renewals, conducting payload and policy reviews with our interagency partners, conducting an assortment of safety analyses, safety inspections, mishap investigations, and more.

To keep pace with the increased demand on our licensing resources and ensure there are adequate resources for evaluating the safety of new operators, vehicles, sites, and technologies, among our other initiatives to improve our processes and streamline and improve our commercial space regulatory framework, we have identified a need to grow our staff, and this need was reflected in the President's budget request for Fiscal Year 2025. We have found that acquiring, training, and retaining talent in a competitive market continues to be a challenge, especially as the demand for critical positions with a small talent pool, such as aerospace engineers, increases in both the government and industry.

We are using a variety of available tools to enhance our workforce recruitment, hiring, and retention strategies. Some examples of the hiring strategies we've used to ensure we have a team in place to meet the growing demands that have been placed on AST include veterans hiring authorities, mission-critical direct hiring authority, reemployed annuitants, other than full-time employment opportunities, and internship programs. In addition, in anticipation of the continued surge in demands for our licensing services, we are working on revising our internal recruiting strategy for the next three Fiscal Years to enhance our recruitment efforts for highly competitive specialized positions in the public and private marketplace. Further, we have extended our hiring efforts to other office locations besides Washington, D.C., to expand our talent pool.

Finally, AST is exploring the use of non-engineer positions, which tend to have a larger talent pool, that require technical skills and support certain engineer job functions to assist in our license evaluation, safety oversight, and regulation, policy, and guidance activities. This may have the effect of freeing up critical licensing resources.

We continue to look into ways to utilize the FAA's hiring and personnel authorities to expand our hiring pool and acquire and retain talent.

GAO Report on FAA Mishap Investigations

In just over a year, there have been several mishaps with launch vehicles intended for human spaceflight. On September 12, 2022, the Blue Origin New Shepard suborbital rocket suffered a failure shortly after launch and the FAA and Blue Origin worked together to create a mishap report that resulted in 21 corrective actions. It is expected the New Shepard launch vehicle will return to flight very soon. On April 20, 2023, SpaceX's first attempt to launch Starship resulted in the catastrophic loss of the vehicle and damage to the launch pad that sent debris as far as five miles from the Boca Chica, Texas launch site. The FAA and SpaceX worked together to create a mishap report that resulted in 63 corrective actions, and Starship flew again on the 18th of November.

The GAO just released a report examining the roles and responsibilities of Federal agencies involved in investigating commercial space mishaps and found that of the 50 mishaps between 2000 and 2023, all but one of the investigations was led by the launch operator. The report recommends the FAA "comprehensively evaluate the effectiveness of its mishap investigation process," and develop criteria for determining when the agency will authorize a launch operator to lead a mishap investigation on FAA's behalf. The Department of Transportation has concurred with these recommendations.

Question 1. How does the FAA currently ensure operator-led mishap investigations are thorough and applied consistently across the commercial launch industry?

Answer. FAA currently ensures operator-led mishap investigations are thorough and applied consistently across the commercial launch industry, as the FAA oversees all aspects of the mishap investigations in data reviews and analysis. Through the course of mishap investigations, the FAA applies consistent public safety standards and ensures the operators have met the standards prior to closing any mishap investigation. The FAA issued Advisory Circular No. 450.173-1, Part 450 Mishap Plan—Reporting, Response, and Investigation Requirements, which provides guidance to operators on developing a mishap plan, responding to a mishap, and conducting a mishap investigation. This advisory circular presents operators with an acceptable means of compliance with regulatory requirements related to mishaps. In the event of a mishap, an operator must identify and implement preventive measures to avoid the recurrence of the mishap prior to the next flight, unless otherwise approved by the FAA. In general, the FAA will not allow a return to flight operations until the agency determines that any safety-critical system, process, or procedure related to the mishap does not affect public safety or any other aspect of the operator's license. This is standard practice for all mishap investigations. This process is followed for each investigation and confirms the public safety regulations, such as those pertaining to a safety critical system, process, or procedure, are satisfied before determining the closure of a mishap investigation. More information can be found here: https://www.faa.gov/space/compliance_enforcement_mishap.

Question 2. Do you believe the current mishap investigation process is well suited to the incremental flight test approach SpaceX is taking with Starship, requiring a mishap investigation and new launch license for every flight? Is there an alternative approach that would maintain safety as effectively or even more effectively?

Answer. The current mishap investigation process is well suited to the incremental flight test approach SpaceX is taking with Starship. During the mishap investigation of SpaceX's Starship Super Heavy integrated flight test 1, the FAA ensured SpaceX identified the failures contributing to the mishap and implemented

appropriate corrective actions to reduce the likelihood of a repeated failure. While the integrated flight test 2 ended in a mishap, the same failures did not occur, which validates the FAA model of operator-led mishap investigations. We are actively looking for ways to further increase efficiencies while maintaining safety. For example, the FAA may allow an operator to return to flight during an ongoing mishap investigation if the FAA is able to make a favorable public safety determination that the issues related to the mishap will have no effect on public safety. Furthermore, the FAA is exploring a new approach to mishap investigations by embedding more reviewers within the investigation to work iteratively on the investigations and the subsequent license modification evaluations.

When the FAA determines that the implementation of corrective actions is necessary, based on the nature and extent of the corrective actions, an operator may be required to submit an application for a license modification or new license.

International Considerations for Novel Space Activities

Setting norms of behavior and safety standards for operating in space through international engagement is critical to the continued access and use of space for scientific advancement and economic prosperity. 32 countries in addition to the United States have now signed the Artemis Accords, a set of common principles, guidelines, and best practices focused on safe and sustainable space exploration.

Regarding the Artemis program itself, the United States and its partner nations intend to pursue future space cooperation in partnership with commercial industry. Within Washington, more than 40 companies are working to supply Artemis. 15 companies supply the Space Launch System rocket, 14 deliver goods and services used for the Orion crew capsule, and Blue Origin will supply NASA with a second lunar lander, creating competition, and redundancy. Other NASA initiatives such as the Commercial Lunar Payload Services or CLPS program have created the potential for private sector activities on the lunar surface operating on a purely commercial basis.

Question 1. Given differing regulatory approaches to overseeing private sector space activities among spacefaring nations, how do you assist U.S. commercial space companies in both collaborating internationally on novel space activities, and competing with non-U.S. commercial entities for markets and customers?

Answer. The U.S. commercial space transportation industry currently leads the world in launch and reentry capabilities, making it highly sought after by foreign private and government customers. Since 1989, the FAA has licensed or permitted over 700 commercial space transportation operations. Among those, as of March 25, 2024, 80 occurred internationally. And of those 80 operations that occurred internationally, 19 occurred in the last two years, or 24 percent. We expect the number of licensed operations occurring internationally to continue to increase.

The FAA has strong bilateral partnerships with many countries, including the United Kingdom (U.K.), Canada, New Zealand, Australia, Sweden, Norway, Italy, Japan, and Brazil. The FAA has over 30 years of experience licensing and permitting commercial space launch and reentry activities. During this time, the FAA has leveraged its licensing and regulatory capabilities and other various programs and initiatives to enable the growth of the U.S. commercial space industry in a manner that has resulted in an impressive safety record for this rapidly growing industry. No FAA-licensed launch or reentry operation has resulted in a fatality or injury to a member of the public, nor has there been any significant property damage to the public. Because of this, the FAA is routinely approached by other countries seeking to partner on regulatory or spaceport development. At the present time, U.S. companies are in discussions with spaceports in many countries, including Japan, Australia, Norway, the U.K., Sweden, and Brazil, in support of future launches from these countries.

Multilateral discussions are needed to ensure global consistency for safety during launch and reentry, and the FAA will strive to continue to serve as an example for global safety for commercial space transportation activities. The growth of U.S. launch activity globally also signals the need to consider recognition arrangements to reduce duplication of licensing approvals. Dual licensing between foreign governments for a single U.S. launch or reentry activity does not increase safety and will stifle the growth of the U.S. launch industry in the global markets.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. TED CRUZ TO
KELVIN B. COLEMAN

Question 1. Commercial entities have discussed how greater information sharing could be a useful tool. Should the Federal Aviation Administration (FAA) have a

public webpage where applicants and the public could get real-time updates on the status of license applications?

Answer. The Federal Aviation Administration (FAA) recognizes the importance of information sharing with applicants and is already committed to making licensing information directly available to applicants in a timely manner. The FAA does provide the public with data through a dashboard on our website that outlines active licenses and licensed launches and reentries. The website can be found at https://www.faa.gov/data_research/commercial_space_data.

Further, the FAA is in the process of developing a Licensing Electronic Application Portal (LEAP) system for operators, which will be used to accept, modify, exchange, and approve licensing materials under Part 450. LEAP is expected to enhance our ability to identify, track, and resolve questions and issues with operators, which will enhance information sharing.

Question 2. Is there a benefit to greater transparency throughout the licensing process?

Answer. Yes. Transparency is beneficial for both operators and the FAA as the trend of launches continues upward. LEAP will lead to improved transparency in the application process for individual applicants.

Question 3. In October, members from industry testified on these same issues. Mr. Gerstenmaier, a former NASA Associate Administrator, testified regarding the Office of Commercial Space Transportation's (AST) role in commercial space launches and its "co-mingling" with FAA's broader priorities. He stated this co-mingling creates confusion regarding AST's role. Is there tension between the broader FAA culture, which regulates for reliable operations in aviation, and AST's mission, which is focused on the safety of people on the ground and in the airspace, not necessarily reliable rocket operations?

Answer. We respectfully disagree with Mr. Gerstenmaier's statement that there is tension or confusion between the broader FAA culture and the Office of Commercial Space Transportation's (AST) statutory mission. AST undertakes its statutory responsibilities with a clear understanding that its mission and primary responsibilities are solely focused on protecting the public health and safety, safety of property, and national security and foreign policy interests of the United States. AST's execution of these responsibilities does not conflict with the broader FAA culture.

Question 4. The National Space Council proposal suggests a two-track system where an applicant goes to multiple agencies for specific licenses. There are concerns that this system would muddy the waters for industry rather than streamline the process. What is the benefit to a one-stop shop for licensing?

Answer. Commercial space regulatory authority is currently split among the Department of Transportation (DOT), the Department of Commerce (DOC), and the Federal Communications Commission (FCC) based on the expertise of each Federal agency, so a true one-stop-shop would not capture the strengths of this current distribution of authority. However, while commercial space regulatory authority is currently split among various agencies, those authorities are not exercised in isolation. For example, during the DOT licensing process, we are required to consult with our interagency partners in an established and process-driven manner to leverage the applicable expertise of the United States Government as a whole.

The regulatory framework laid out in the Administration's legislative proposal titled the "Authorization and Supervision of Novel Private Sector Space Activities Act" (legislative proposal) will provide clear and predictable authorization and supervision for novel U.S. private sector in-space activities and help to ensure the U.S. remains the world's preeminent commercial space country of choice while imposing minimal regulatory burdens on U.S. private sector actors in space. This proposal was developed to provide each in-space activity with a single regulatory agency responsible for licensing the activity. For example, the human spaceflight industry would work exclusively with DOT for launch, reentry, and in-space activities. This will allow for a single, streamlined license approach. The administration's proposal will allow DOT to authorize, under a single in-space transportation license, the operation of a space transportation vehicle whose sole purpose is to conduct in-space transportation activities regardless of where they occur.

The Administration's legislative proposal preserves current authorities vested in the DOC and FCC, so to the extent that a novel operation includes activities that would require an FCC or DOC license, the operator would have to obtain these licenses in addition to a DOT license.

Question 5. Given current launch and reentry licensing responsibilities and challenges at AST, how would AST ensure its increased responsibilities on mission authorization do not negatively impact core launch and reentry responsibilities?

Answer. AST's current launch and reentry responsibilities and the mission authorization authorities sought by the legislative proposal carry different risk profiles. Consequently, the nature of activities that AST would be responsible for under the legislative proposal will not require the same level of resources that are currently necessary for the reviews of launches and reentries. Therefore, the increased responsibilities under the legislative proposal will not have a negative impact on AST's current launch and reentry responsibilities.

However, as reflected in the President's budget request for Fiscal Year 2025, we have identified additional resource needs that correspond to the increased growth in demand for our services under our existing authorities.

Question 6. Should launch providers "pay into the system," just as airlines pay into the FAA Airport and Airway Trust Fund?

Answer. The FAA actively supports the expanding commercial space industry through licensing of launch and reentry vehicles, licensing of launch and reentry sites, and the efficient integration of commercial space operations into the National Airspace System. However, unlike commercial air carriers and the general aviation industry, the commercial space industry generally does not pay fees or excise taxes that directly support the FAA. Section 50920 of Title 51, United States Code (51 U.S.C.), relates to user fees and permits the Secretary of Transportation to collect a user fee for a regulatory or other service conducted under Chapter 509 of 51 U.S.C. only if specifically authorized by Chapter 509. Currently, there are no user fees authorized by Congress under Chapter 509. We recognize the need to sufficiently resource the services that support the commercial space industry, and we stand ready to work with Congress on determining an appropriate approach for this growing industry.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. J. D. VANCE TO
KELVIN B. COLEMAN

Interagency Processes

I am concerned the Administration's mission authorization proposal does not provide sufficient regulatory clarity for future commercial space operations. One topic I raised during the hearing covered which agency or entity should be tasked with making the final determination of issuing a license when certain space activities do not fit neatly within one agency's jurisdictional remit.

At the hearing, Director DalBello suggested there would be an interagency discussion in situations where jurisdictional boundaries are opaque or overlapping. I appreciate Director DalBello's commitment to ensuring these discussions will be timely. As numerous commercial space entities in Ohio seek to comply with the Administration's framework, I believe any interagency decision on final licensing authorization should be made swiftly and with as much consistency as possible.

Question 1. Can you commit that, after timely interagency dialogue, these decisions will be as final as possible?

Answer. Yes. We commit to working with our interagency partners to determine which agency is the appropriate authorizing agency in instances where jurisdictional boundaries may be unclear and to ensure license determinations are as final as possible. We also commit to working closely with our interagency partners to ensure the application of consistent standards.

Question 2. Would the concerns and challenges laid out in the prompt above be solved by placing this new regulatory framework under a single existing agency?

Answer. The framework laid out in the Administration's legislative proposal will provide clear and predictable authorization and supervision for novel U.S. private sector in-space activities and help to ensure the U.S. remains the world's pre-eminent commercial space country of choice while imposing minimal regulatory burdens on U.S. private sector actors in space. A novel space mission would require either a DOT license or a DOC license, but not both. Should the Administration's legislative proposal be enacted, we will work with DOC to align our efforts closely as the regulatory framework is implemented and guidance is laid out to ensure there is sufficient regulatory clarity for future commercial space operations.

Department of Transportation's Expertise of Licensing In-Space Flight

Under the Administration's mission authorization proposal, the Department of Transportation would be tasked with licensing novel in-space transportations. Associate Administrator Coleman described the differences, particularly in the risk profile, between licensing launch and reentry activities and these novel in-space missions. As I understand it, the Department of Transportation has experience licens-

ing launch and reentry of commercial space activities but does not have experience licensing in-space vehicles.

Question 1. What expertise currently exists within the Department of Transportation to license commercial human spacecraft in orbit?

Answer. The FAA currently licenses commercial human spaceflight during launch and reentry. The Administration's proposal to grant authority to DOT for licensing of commercial human spaceflight for activities in addition to launch or reentry is a logical, common-sense extension of DOT's current human space flight responsibilities. No other U.S. space regulatory agency, aside from the FAA, has experience regulating commercial human space flight. The FAA has already licensed nearly 40 safe commercial human spaceflight missions, both orbital and suborbital, and this number will continue to increase.

Further, the FAA's Civil Aerospace Medical Institute is actively conducting human space flight research to broaden and extend the agency's expertise in this area. Application of the results of this research will be critical once the current learning period regulatory moratorium on commercial human spaceflight sunsets and the FAA begins more extensive regulation of the sector. Additionally, the FAA has published recommended practices for human space flight occupant safety and has supported the industry's efforts to develop human space flight voluntary consensus standards. Lastly, many of the FAA's public safety skill sets can be used to support human space flight occupant safety, such as system safety, software safety, and the design and analysis of safety-critical systems.

Space Situational Awareness

The FAA plays a vital role in monitoring assets flying within U.S. airspace to lower the likelihood of a collision. The Department of Commerce is currently developing a space situational awareness (SAA) capability and a Traffic Coordination System for Space (TraCSS). The Office of Space Commerce was appropriated \$70 million in FY 2023 to deliver initial operating capability by the end of FY 2024 and NASA announced its intent to set up a test site in 2023.

Question 1. How would the lessons learned from monitoring U.S. airspace by the FAA be applied to support and enhance the management of assets beyond Earth's Lower Earth Orbit? Geosynchronous equatorial orbit? Atmosphere?

Answer. The FAA operates and manages the safest airspace system in the world. The FAA's history of licensing launch and reentry operations provides it with the experience, expertise, and processes that can be utilized in the authorization and supervision of novel in-space transportation activities. In-space transportation in Earth orbit will utilize the important service that the DOC will provide through its TraCSS system.

Training for Civilian Space Travelers

As the promise of commercial space tourism expands, more non-NASA astronauts will go to space.

Question 1. What is the U.S. government doing to meet the training needs for non-NASA astronauts and space travelers?

Answer. The FAA does not offer training to government astronauts, space flight participants, or crew. However, FAA regulations require that crew and space flight participants receive appropriate training by the launch service provider prior to flight. Some commercial vendors provide some aspects of human space training, and the FAA can issue "Safety Element Approvals" for the services they provide. For example, the Environmental Tectonics Corporation National Aerospace Training and Research Center is an FAA-approved center that meets the training requirements for commercial human spaceflight under part 460.5 of Title 14, Code of Federal Regulations.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARIA CANTWELL TO
RICHARD DALBELLO

Federal Government Challenges in Oversight of Commercial Space Activities

The Pacific Northwest is a prime hub for commercial space activity, with a \$4.6 billion space industry that has created over 13,000 jobs. A major challenge with space commercialization is understanding what the technological and workforce challenges are. Without this knowledge, it is difficult to determine the kind of support and oversight that is needed. Defining roles and responsibilities, increasing coordination, and improving knowledge sharing for agencies will allow the government to keep pace with rapid innovation.

This Committee played a very big role in a new aircraft certification program for the FAA to address workforce shortages and improve aviation safety through proactive approaches to managing risk. The same should be done to reduce technological risk for the commercial space industry. Technological challenges and other risk factors must be characterized and addressed from a safety perspective to ensure advancement of commercial human spaceflight.

Question 1. What are the top three technological, operational, policy, or workforce challenges that your agency faces in your role supporting and overseeing the safety of commercial space activities?

Answer. The Department of Commerce's Office of Space Commerce would like to bring the following "challenges" to the attention of the Congress:

- Programmatic authorizations and statutory authorities: While significant progress toward standing up TraCSS continues to be made utilizing funding provided explicitly for this purpose by Congressional appropriations, the program currently lacks permanent (statutory) authorization. Likewise, it is critical that regulatory agencies such as the Departments of Commerce and Transportation have clear authorities for the oversight of the full panoply of new commercial space activities to protect safety, ensure that the orbital environment remains conducive to civil, commercial, and security uses, protect fundamental U.S. national interests, and continue to meet our international obligations. Without updated legislative authorities to serve and oversee this industry, the Departments of Commerce and Transportation (and, more broadly, the United States Government) cannot ensure that U.S. actors will be able to use and compete in space in the long-term.
- Workforce and hiring: The Office of Space Commerce faces challenges in securing candidates with specialized subject matter expertise or technical competencies that are essential to the Office's execution of its technical, regulatory, and advocacy mission. The office is exploring available administrative workforce solutions to support evaluation of their potential impact on recruitment needs.

Proposed National Space Council Regulatory Framework

This summer, I was joined by Administrator Nelson for our Space Summit in Washington State featuring many local space companies with plans for innovative commercial space missions. Gravitics, in Marysville WA, is designing and manufacturing large space structures for orbital human platforms and uncrewed on-orbit manufacturing. Starfish Space, in Kent, WA is developing an orbital space vehicle to provide orbit transfer and satellite maintenance services. The vehicles' on-board software and control system uses a combination of orbital mechanics and low-thrust electric propulsion, enabling satellite companies to relocate, deorbit and extend the life of satellites.

Question 1. It appears Starfish Space is developing a space vehicle that could fall under two different jurisdictions due to its capabilities, both the "in-space transportation" definition under the Space Council proposal, and the "uninhabited non-transportation" category requiring a Department of Commerce license. Can you explain the licensing process applicable to Starfish Space?

Answer. Under the legislation proposed by the National Space Council, any uncrewed missions that engage in space activities beyond pure transportation would fall under Department of Commerce (DOC) jurisdiction. The Office of Space Commerce is committed to working with DOT/FAA to ensure that new regulations, and the licenses that flow from them, minimize the need for overlapping licenses. Our goal is to avoid multiple licenses to cover the same operations.

Question 2. Do you have any suggestions for improving the efficiency of implementing the proposed National Space Council Regulatory Framework while maintaining safety?

Answer. The White House's "United States Novel Space Activities Authorization and Supervision Framework," released after the hearing, provides Executive Branch agencies clearance and guidance to begin interagency coordination on possible approaches, and to hold dialogue with external stakeholders on "best practices," toward implementing any future "mission authorization" regulatory regime. The execution of this framework is currently in its preliminary stages.

Moving forward, the Department of Commerce and Office of Space Commerce encourage open and sustained dialogue among relevant agencies and the Congress, to facilitate a productive alignment between the "lessons learned," interagency consensus, and preparations being achieved through the "framework" and the scope of statutory authorities being drafted into law.

Coordination on Regulatory Decision-making within the Executive Branch Interagency

Varda Space Industries, a U.S. company that launched its first payload into orbit in June 2023, is successfully demonstrating manufacturing pharmaceuticals in space, but is experiencing delays in receiving its reentry license from the FAA. This delay has led to a decision by Varda to enter a partnership with Southern Launch to use their spaceport range near Adelaide, Australia, rather than use the U.S. Air Force's Utah Test and Training Range. While Australia is obviously a strong U.S. partner, this seems like an example of a U.S. space company choosing to pursue opportunities in other countries that offer simpler and more flexible regulations.

Question 1. In implementing the National Space Council's proposed regulatory framework for novel space activities such as on-orbit processing and manufacturing, what is the best way to maintain U.S. competitiveness through a streamlined but safe regulatory framework?

Answer. Through the experience and "lessons learned" of our commercial remote sensing regulatory reform and streamlining efforts, the Office of Space Commerce believes that U.S. competitiveness is best maintained by a regulatory framework that is open and transparent, with clearly defined and exercised licensing responsibilities and timelines, with understandable avenues for dialogue and petition, and with mechanisms for the periodic review and reconsideration of license restrictions and bounds.

The Office's successful regulatory reform efforts were made possible through close engagement with the public and the commercial sector, including through listening sessions, a public comment period, and consultation with our Federal advisory committee, the Advisory Committee on Commercial Remote Sensing (reconstituted in March 2024 as the Advisory Committee on Excellence in Space). Additionally, the Office's regulatory division engages with the academic sector and the public, including to perform educational outreach activities pertaining to regulations and to invite public submissions at any time related to the availability of remote sensing data that are then used in the regulatory process. Moving forward into any possible establishment of a regulatory regime for "mission authorization," the Office of Space Commerce is again committed to honest dialogue with stakeholders, the public, and to considering all external information and recommendations.

Addressing Federal Workforce and Technical Capacity Needs in Implementing Expanded Commercial Space Regulatory Authority

The Federal government must regulate the commercial space industry in a manner that both ensures the safety of the general public and human participants in specific activities. This means ensuring our regulatory agencies are well staffed, very knowledgeable, and experienced in the safety culture of the aerospace industry. Yet we have heard from stakeholders, including industry leaders, that the FAA does not have enough personnel with the right skill sets to move launch and reentry licenses along in a timely manner, or begin regulating commercial human spaceflight occupant safety when the learning period ends.

It is also clear government regulatory authorities are competing with industry for the same STEM-educated workers needed to maintain a pipeline of technical talent. In Washington State alone, we are anticipating a 60,000-person STEM workforce shortage by 2026.

Question 1. Would adding a key technology leader to your respective offices, such as a Chief Technical Officer with significant industry experience be an effective way to keep your workforce up to speed on the rapid technology changes taking place in the industry sectors you regulate?

Answer. The Office of Space Commerce strives to hire staff with relevant industry expertise noting the highly technical nature of the subject matter with which OSC is involved. Furthermore, specialized technical expertise is valuable to support the research, development, and operational requirements of the Traffic Coordination System for Space, a major IT system for civil space situational awareness which is operated by the Office of Space Commerce.

Notably, through the Office of Space Commerce's Federal advisory committee and via the "Private Sector Space Activities Interagency Steering Group" established by the "United States Novel Space Activities Authorization and Supervision Framework," the Office of Space Commerce frequently consults with and gathers input from the private sector and external stakeholders on the state of the space sector's technological advancement and industry capabilities.

Question 2. What do you believe to be the biggest impediments to recruiting needed talent, experience, and expertise? Do you have ideas this committee should consider that would enhance recruitment opportunities?

Answer. The Office of Space Commerce has grown and scaled substantially in Fiscal Year 2023. However, the office continues to face challenges in securing specialized technical talent and subject matter expertise. To date, the Office of Space Commerce has utilized a range of hiring mechanisms to fill its positions, from Schedule A, Direct Hire, and traditional Merit Promotion and Delegated Examining recruitment.

International Considerations for Novel Space Activities

Setting norms of behavior and safety standards for operating in space through international engagement is critical to the continued access and use of space for scientific advancement and economic prosperity. 32 countries in addition to the United States have now signed the Artemis Accords, a set of common principles, guidelines, and best practices focused on safe and sustainable space exploration.

Regarding the Artemis program itself, the United States and its partner nations intend to pursue future space cooperation in partnership with commercial industry. Within Washington, more than 40 companies are working to supply Artemis. 15 companies supply the Space Launch System rocket, 14 deliver goods and services used for the Orion crew capsule, and Blue Origin will supply NASA with a second lunar lander, creating competition, and redundancy. Other NASA initiatives such as the Commercial Lunar Payload Services or CLPS program have created the potential for private sector activities on the lunar surface operating on a purely commercial basis.

Question 1. Given differing regulatory approaches to overseeing private sector space activities among spacefaring nations, how do you assist U.S. commercial space companies in both collaborating internationally on novel space activities, and competing with non-U.S. commercial entities for markets and customers?

Answer. As an advocate, facilitator, and regulator of U.S. commercial space activities, the Office of Space Commerce recognizes that U.S. industry can best compete when working within a sensible regulatory framework that balances U.S. obligations with the sector's entrepreneurial and technological ingenuity. Through its regulatory reform and streamlining efforts, the Office of Space Commerce is promoting the United States as the global regulatory "flag of choice"—as made evident by the increasing number of foreign firms seeking U.S. commercial remote sensing licenses.

The Office of Space Commerce works closely with international counterparts to promote U.S. companies' interests abroad. This includes working with many of our closest partner countries to design compatible regulatory approaches, including industry in our bilateral engagements whenever possible, and working with our Department of Commerce colleagues in the International Trade Administration to help companies identify new markets, overcome trade barriers, compete fairly, and win overseas contracts. The Office of Space Commerce also works closely with the Department of State and National Telecommunications and Information Administration to promote U.S. standards, best practices, and guidelines to international partners and within international fora while also gathering knowledge from other space actors on their successes and challenges in these areas. Specifically, we have been engaging in the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS) and with the International Telecommunications Union (ITU) to facilitate more coordination and better communication between space operators on topics like space situational awareness (SSA) and space traffic coordination (STC).

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. GARY PETERS TO
RICHARD DALBELLO

Commercial Space Advisory Council

The nature of space flight means that this industry is constantly evolving and growing, which can make it difficult for regulatory structures to keep up. As this growth continues, I think we need to make sure that there is a commitment to robust communication between industry and regulatory experts to improve coordination, capacity, safety, and efficiency—and to ensure that future changes in regulations reflect realities on the ground. That is why I am working on legislation to create a Commercial Space Advisory Committee within the Office of Space Commerce to ensure that there is substantive cooperation as the commercial space sector grows.

Question 1. What are your recommendations for industry-agency cooperation going forward? How could current cooperation be better structured to improve the effectiveness of outcomes?

Answer. The "United States Novel Space Activities Authorization and Supervision Framework," a companion executive action to the White House's proposed legisla-

tion, provides guidance for the Executive Branch to engage, consult, and cooperate with private industry to prepare for an eventual regulatory regime. The Office of Space Commerce intends to leverage the consultation mechanisms provided by this framework, as well as utilize forums such as the office's reconstituted and broadened Federal advisory committee, *the Advisory Committee on Excellence in Space*, solicit inputs, feedback, and recommendations from external stakeholders.

Moving forward, it is important that the Office of Space Commerce be provided with proper authorities to coordinate and collaborate with industry and external stakeholders in as full and transparent a manner as possible. Likewise, statutory authorities that frame space operator participation in the Office of Space Commerce's Traffic Coordination System for Space (TraCSS) will help ensure the viability and effectiveness of this space situational awareness system.

Space Situational Awareness Authority

In 2018, the Department of Commerce's Office of Space Commerce was assigned responsibility for space situational awareness activities, including tracking objects—like debris—in space and sharing that information with industry to help avoid collisions.

Question 1. Can you speak to the importance of enabling your office to deliver Space Situational Awareness services to the commercial space industry? What should Congress and the agencies keep in mind as SSA responsibility is transitioned to the Department of Commerce?

Answer. A robust civil space situational awareness (SSA) capability is essential for the safety and sustainability of Earth's orbit—and the innovation and vitality of our space sector.

Commercial space companies have launched thousands of new satellites over the past few years and plan to launch tens of thousands more. Orbits are becoming increasingly congested, putting commercial, civil, and national security space missions at risk.

There is a growing need to better identify and track objects in space, and to deconflict—and eventually coordinate—orbital traffic. To address this need, the White House National Space Council's "Space Policy Directive-3," issued in 2018, designates the Department of Commerce as the civil agency that should, consistent with applicable law, be responsible for providing SSA and STC services and information to non-USG entities for spaceflight safety purposes—offloading those responsibilities from the Department of Defense (DoD) so that DoD can focus on maintaining access to and freedom of action in space and on protecting and defending U.S. space assets and interests. The Office is utilizing Fiscal Year 2024 funding appropriated for this purpose. However, the TraCSS program currently lacks a permanent (statutory) authorization.

The Office of Space Commerce is making great strides in implementing an operational public SSA and space traffic coordination (STC) services system called the Traffic Coordination System for Space (TraCSS). The TraCSS mission is driven by spaceflight safety, space sustainability, and the need for international coordination. Program objectives include:

- Relieve DoD of responsibility for SSA coordination of burgeoning global commercial space industry
- Provide "Basic SSA Services" in a manner that promotes safer space operations
- Encourage U.S. Commercial SSA leadership and rely on commercial SSA providers to the greatest extent possible
- Establish and maintain a resident space object data repository from which all basic services will be derived and utilized for international coordination purposes
- Conduct research and development (R&D) activities that will advance the science and technology of SSA
- Promote global SSA standards and best practices

As TraCSS progresses in its development, the Office of Space Commerce (OSC) seeks to support a phased transition of basic SSA and STC safety services from DoD to DOC and foster the commercial space industry through both bolstering spaceflight safety and leveraging the commercial SSA industry. DoD and DOC are tightly coordinating on a phased transition approach. In Phase 1, TraCSS will lean more on unclassified DoD data. With each phase, more commercial data and commercial SSA services will be integrated over time. This phased transition will help ensure there is no disruption in basic SSA safety services. Beyond data, DoD is working with OSC to ensure that its expertise in SSA analysis and spaceflight safety operations is being passed along as well. By acquiring commercial SSA data and

tools from industry, OSC seeks to support a competitive marketplace to drive innovation, advance the state-of-the-art in SSA, and provide the best value to taxpayers. OSC is also taking a phased, agile development approach to TraCSS so that TraCSS can adapt its capabilities to best meet the safety needs of the evolving and growing commercial space industry.

TraCSS development work cannot occur in a vacuum, as ensuring a safe and sustainable orbital environment will require the participation of the global community. OSC is already engaging with international partners on considerations around best practices for spaceflight safety and data standards and sharing to prevent the delivery of conflicting information about potential collision events to satellite operators.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. TED CRUZ TO
RICHARD DALBELLO

Question 1. What should Congress do to support the commercial facing role of the Office of Space Commerce?

Answer. The Department of Commerce and Office of Space Commerce is deeply appreciative of the consistent advocacy the United States Congress has provided for our work supporting the commercial space sector.

Moving forward, Congressional authorization of regulatory authorities and funding commensurate with the Office's significant mission to support a properly scaled team with unique and specialized expertise will be most valuable to support our efforts.

Likewise, Congressional support for, and funding for, the Office of Space Commerce's Traffic Coordination System for Space (TraCSS) will be vital to ensure that the United States has an effective civil space situational awareness capability that helps preserve and promote the long-term safety and sustainability—and commercial viability—of the space environment.

Question 2. From your perspective, what solutions would help support novel commercial space companies navigating the complicated regulatory regime?

Answer. Through the experience and “lessons learned” of our commercial remote sensing regulatory reform and streamlining efforts, the Office of Space Commerce believes that U.S. competitiveness is best maintained by a regulatory framework that is open and transparent, with clearly defined and exercised licensing responsibilities and timelines, with understandable avenues for dialogue and petition, and with mechanisms for the periodic review and reconsideration of license restrictions and bounds.

Question 3. Can you provide clear examples of currently unauthorized commercial space activities under the Department of Commerce's purview, such as space situational awareness (SSA), that you hope Congress could rectify in modernizing mission authorization?

Answer. The Office of Space Commerce is executing on its civil space situational awareness responsibilities, as assigned by Space Policy Directive-3, via the Traffic Coordination System for Space (TraCSS) program. The Office is utilizing Fiscal Year 2024 funding appropriated for that purpose. However, the program currently lacks permanent (statutory) authorization.

The draft legislation released last year would also resolve regulatory uncertainties that are threatening to limit industry's ability to innovate. Without clear regulatory pathways, many new space activities face difficulties securing funding, insurance, or approval to operate. Examples of commercial space activities and capabilities that do not have clear or explicit regulatory pathways, or parts of which are regulated by other Federal entities (such as for spectrum usage) but could be more appropriately or clearly covered in a “mission authorization regulatory regime,” include:

- Radiofrequency monitoring;
- Radio occultation monitoring;
- Rendezvous and proximity operations;
- In-space servicing (physically “touching” another space object);
- Lunar surface mobility and payload operations, except for spectrum use;
- Imaging activities beyond Earth's orbit;
- Physical changing of orbit (transiting/repositioning), except for radiofrequency transmission;
- In-space assembly and manufacturing;
- Space resource utilization;

- Scientific sensing by private entities (*e.g.*, magnetosphere studies, solar wind studies, radiation environment studies);
- Commercial positioning, navigation, and timing services.

Clear regulatory authorities would also allow the Department of Commerce to consider—and mitigate or avoid—potential risks to U.S. national interests posed by these activities, such as recent objections to placing human remains on the Moon, possible commercial interference with the Apollo landing sites, and increasingly congested orbits.

Question 4. How significant is the value of the Traffic Coordination System for Space (TRACSS) and what can Congress do to help define the boundaries of the program?

Answer. A robust civil space situational awareness (SSA) capability is essential for the safety and sustainability of Earth’s orbit—and the innovation and vitality of our space sector. Commercial space companies have launched thousands of new satellites over the past few years and plan to launch tens of thousands more. Orbits are becoming increasingly congested, putting commercial, civil, and national security space missions at risk. There is a growing need to better identify and track objects in space, and to deconflict—and eventually coordinate—orbital traffic. To address this need, the White House National Space Council’s “Space Policy Directive-3,” issued in 2018, designates the Department of Commerce as the civil agency that should, consistent with applicable law, be responsible for providing basic SSA services to commercial and civil space operators—offloading those responsibilities from the Department of Defense (DoD) so that DoD can focus on its “protect and defend” mission focus on maintaining access to and freedom of action in space and on protecting and defending U.S. space assets and interests.

The Department of Commerce recognizes the urgency of fulfilling this mission to prevent the next catastrophic collision in space and to support a phased transition with DoD. In partnership with industry, government, and academia, the Office of Space Commerce is making great strides in implementing an operational public SSA and space traffic coordination (STC) services system called the Traffic Coordination System for Space (TraCSS).

Although significant progress is being made on TraCSS, the program has not yet been permanently authorized in law, operating currently under funding provided in FY2024 Congressional appropriation.

The White House’s legislative proposal would remedy this, providing the Commerce Department with statutory SSA authorizations essential to fully implement the TraCSS program’s public-private approach and allow it to successfully scale. The proposal supports stakeholder and operator coordination and participation in TraCSS, enabling the information-sharing needed to effectively conduct space traffic coordination and provide SSA services that have meaningful utility for space safety.

Question 5. The Office of Space Commerce (OSC) plans to convene a meeting before the end of the year with international partners on multilateral commercial space industry cooperation. How does OSC’s international coordinating role differ from other similar diplomatic bodies, within the National Aeronautics and Space Administration or the State Department?

Answer. The Office of Space Commerce convenes dozens of meetings annually between U.S. industry, foreign industry, and foreign governments, to facilitate commercial space sector trade and partnerships around the world. No other entity within the United States government has the Office of Space Commerce’s remit to focus on the needs of, and engage in international coordination and advocacy on behalf of, the U.S. commercial space industry.

NASA’s international cooperation efforts are in furtherance of its mission, and the State Department focuses on diplomatic, national security, foreign policy, and international law issues relating to space. The Office of Space Commerce works with its partners at the International Trade Administration, NASA, DOS, DOT, DoD, and the rest of the interagency to lead and facilitate commercial-focused work internationally.

Moreover, as the designated agency responsible for civil space situational awareness, the Department of Commerce, via the Office of Space Commerce and in coordination with the State Department, is beginning to lead international dialogue and efforts promoting best practices and standards for space situational awareness and collision avoidance.

Question 6. What are your thoughts on the U.S. leading international cooperation and standards development on commercial LEO activities such as in-space traffic management or collision avoidance?

Answer re: *International Cooperation*. Ensuring a safe and sustainable orbital environment will require the participation of the global community. To be successful, TraCSS must be developed in coordination with other global SSA systems.

Much will need to be accomplished to move from the current situation to a future internationally coordinated system. The Office of Space Commerce will seek to open lines of communication with nations operating SSA systems, including those that have not traditionally coordinated their efforts with the United States. Our international coordination will also seek to align with existing efforts on space sustainability, such as the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) Guidelines for the Long-Term Sustainability of Outer Space Activities. Throughout this process, the United States will actively engage with global satellite owners and operators as well as commercial SSA providers.

The Office of Space Commerce is committed to maintaining an open and transparent system that enables global coordination. This approach aligns with our vision of the future of international STC, which we foresee as a global coordinated system of SSA providers with a series of national or regional “hubs” providing SSA information and services to spacecraft operators. These centers will be supported by networks of international partnerships, and their services will be augmented by a robust global commercial SSA sector that provides value-added services. This type of close coordination will help prevent the delivery of conflicting information about potential collision events, and will lay a solid foundation for future STC efforts.

An early focus of the Office of Space Commerce’s international SSA engagements has been facilitating alignment on standards and best practices for data and information sharing. As noted in the UNCOPUOS Guidelines for the Long-Term Sustainability of Outer Space Activities, “[w]hen sharing orbital information on space objects, operators and other appropriate entities should be encouraged to use common, internationally recognized standards to enable collaboration and information exchange.” Space Policy Directive-3 similarly directs the development of standards to improve SSA interoperability and enable greater SSA data sharing and to establish best practices for space safety. We have coordinated with the Department of State to deliver presentations on the purpose and status of TraCSS at recent UNCOPUOS meetings and to promote the concept of regional approaches to SSA within the UN system.

Answer re: *International Standards Development*. The U.S. voluntary, consensus standards system is bottom-up, industry-driven, and sector-focused, with government agencies participating as an equal and interested partner. This participation is structured under the National Technology Transfer and Advancement Act (P.L. 104–113, NTTAA),¹ which directs Federal agencies to “use technical standards that are developed or adopted by voluntary consensus standards bodies, using such technical standards as a means to carry out policy objectives or activities determined by the agencies and departments”, except where inconsistent with applicable law or impractical. The standards provisions of the NTTAA, and a limited set of foundational attributes of standardization activities that are called out in the Office of Management and Budget Circular A–119,² require agencies to use voluntary consensus standards in lieu of developing government unique standards when they are available and technically meet their mission needs. Agencies can develop standards, if there are no standards that are fit for purpose that can be adopted or used. This reflects the U.S. government’s commitment to the U.S. industry-led, voluntary consensus standards system. The U.S. standards ecosystem differs from those in several countries where government-directed, prescriptive standards are the products.

The U.S. Government has a clear role in supporting the SSA community to develop standards to facilitate the safe and responsible space traffic coordination, not only through engagements with commercial partners, but through incorporating those well-developed standards into practice. Standards play an important role and can be viewed as structurally necessary to enable a cutting-edge and innovative approach to space traffic coordination and the development of new SSA systems that allow for interoperability, flexibility, and technical certainty.

Consistent with the NTTAA and A–119, the Office of Space Commerce is working with the commercial and public-sector SSA community to coordinate the development of standards and best practices for on-orbit commercial space traffic that can be adopted and used; the Office of Space Commerce, in coordination with NIST, is

¹ P.L. 104–113 National Technology Transfer and Advancement Act of 1995, Section 12 (d)(1). (available at: <https://www.congress.gov/104/plaws/publ113/PLAW-104publ113.pdf>) Accessed January 11, 2024

² OMB 119–A OMB Circular A–119: Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities (2016) https://www.whitehouse.gov/wp-content/uploads/2020/07/revised_circular_a-119_as_of_1_22.pdf

actively contributing to the development space situational awareness standards in fora such as the International Organization for Standardization (ISO) and Consultative Committee for Space Data Systems (CCSDS).

To facilitate this work, the Office of Space Commerce is engaging with the private sector, industry partners, domestic and international bodies, and academia in universal standards development for SSA. These efforts are centered around working with all space-faring nations through groups such as the UNCOPUOS and international standards developing organizations with various degrees of membership and organizational structure. The Office has most recently engaged in public listening sessions to gain feedback on recommended standards for data exchange with our TraCSS system and other SSA systems. These will continue as we advance TraCSS' development and implementation.

Working with the SSA community, I see the Office of Space Commerce working to not only support, but accelerate, U.S. leadership in SSA standards development. Specifically, we are working to create an environment that is conducive to U.S. private and public sector engagement and influences international SSA standards development, one that reflects U.S. culture and private-public sector dynamics. In addition, we are striving to ensure that the U.S. continues to be a welcoming location by hosting international standards events, socializing and coordinating the development of standards for the universal exchange of commercial SSA between SSA systems. By engaging with the commercial and public-sector SSA community, the Office of Space Commerce has identified that the CCSDS standards appear to be the most widely adopted in the SSA community today; listening sessions with spacecraft operators and commercial SSA providers suggest that they are well known and frequently used. CCSDS standards—as well as derived and complementary standards produced by the ISO—are developed through an international consultative process, are openly available free of charge to all users, and are directly applicable to the types of SSA data and information that TraCSS will provide. The Office of Space Commerce is exploring whether adjustments to the standards would be necessary to fully meet operational needs.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. J. D. VANCE TO
RICHARD DALBELLO

Interagency Processes

I am concerned the Administration's mission authorization proposal does not provide sufficient regulatory clarity for future commercial space operations. One topic I raised during the hearing covered which agency or entity should be tasked with making the final determination of issuing a license when certain space activities do not fit neatly within one agency's jurisdictional remit.

At the hearing, you suggested there would be an interagency discussion in situations where jurisdictional boundaries are opaque or overlapping. I appreciate your commitment to ensuring these discussions will be timely. As numerous commercial space entities in Ohio seek to comply with the Administration's framework, I believe any interagency decision on final licensing authorization should be made swiftly and with as much consistency as possible.

Question 1. Can you commit that, after timely interagency dialogue, these decisions will be as final as possible?

Answer. While decision-making and notification processes would be more clearly defined through the regulatory rulemaking process and in final regulations, the Office of Space Commerce's objective is ensuring that licensees are provided with timely regulatory clarity, certainty, and finality to the greatest extent practicable.

Question 2. Would the concerns and challenges laid out in the prompt above be solved by placing this new regulatory framework under a single existing agency?

Answer. The White House National Space Council's "mission authorization" legislative proposal builds on the strengths of the Department of Commerce and those of our colleagues in the interagency, by extending current statutory authorities. The specific details of regulatory implementation would be crafted through a normal notice and comment process including OMB and inter-agency review. Moreover, even in the event that a single agency is identified as the sole regulator for these new activities, an interagency consultation process across broader government stakeholders and experts would still be an expected element of application reviews.

Regardless of the ultimate arrangement of responsibilities, the Department of Commerce is confident that we are in an ideal position to address many of the new and emerging commercial space activities on behalf of the U.S. government. Our regulatory streamlining for remote sensing systems, hailed as a success by stake-

holders in industry and government, demonstrates our ability to balance national security and other interests while promoting commercial innovation. As a result of this streamlining, we have reduced our average license processing time to 14 days, from 48 days in 2020. We recently relieved 11 of our licensees of 69 operating restrictions enabling their full imaging capabilities to the world. As we move forward, the Department of Commerce will be committed to regulatory rulemaking conducted transparently and with full engagement of all stakeholders, including industry. Likewise, the Office of Space Commerce will include consideration of novel space activities within the scope of our Federal advisory committee responsibilities, thus ensuring that representatives of affected companies have a meaningful and trusted “voice at the table” to raise and address concerns.

Space Situational Awareness

The FAA plays a vital role in monitoring assets flying within U.S. airspace to lower the likelihood of a collision. The Department of Commerce is currently developing a space situational awareness (SAA) capability and a Traffic Coordination System for Space (TraCSS). The Office of Space Commerce was appropriated \$70 million in FY 2023 to deliver initial operating capability by the end of FY 2024 and NASA announced its intent to set up a test site in 2023.

Question 1. Are you on track to meet the goal of delivering operating capability by the end of FY 2024?

Answer. The Office of Space Commerce has met its goal of delivering Phase 1.0 initial capability for a beta set of users by the end of Fiscal Year 2024. In calendar year 2023 and 2024 thus far, the Office of Space Commerce achieved the following with the TraCSS program:

- Matured the technical architecture and adopted an Agile development approach;
- Increased engagements with public, commercial industry, and government stakeholders;
- Released an RFI on a proposed scope of basic SSA services to be provided by TraCSS;
- Solidified the working relationship with DoD across multiple working groups on technical data exchange, roles and responsibilities, and operations;
- Initiated coordination with NASA on R&D activities needed to advance state of the art in SSA;
- Awarded a cloud infrastructure procurement;
- Invested in the commercial SSA industry via execution of pilot project, purchasing of commercial SSA data, and providing independent evaluation of that data to industry;
- Introduced SSA authorization language as part of the National Space Council legislative package;
- Engaged with international partners on future coordination opportunities;
- Expanded strategic communications, including monthly public listening sessions and direct industry engagement;
- Awarded a critical system integration infrastructure procurement;
- Initiated a Consolidated Pathfinder project focused on the low Earth orbit (LEO) regime with industry to validate metrics and work out the processes of acquiring, ingesting, and evaluating commercial SSA data and services for the operational system;
- Announced that the primary TraCSS operations center will be built out at the David Skaggs Research Center in Boulder, Colorado, with a backup operations center at the NOAA Satellite Operations Facility in Suitland, Maryland; and
- Released the “Global SSA Future Vision” document, which envisions the future of international space traffic coordination.

Question 2. Do you plan to utilize the existing expertise at the FAA in developing SSA capabilities and TraCSS?

Answer. The Office of Space Commerce (OSC) will be coordinating with the Federal Aviation Administration, the DoD, and related stakeholders on supporting the transition of launch collision avoidance services from the DoD to TraCSS, which is defined as Phase 2 for TraCSS. TraCSS Phase 3, which will also involve coordination between OSC, FAA and DoD, is the transition of reentry assessment and management services. Phase 1 of TraCSS is focused on on-orbit collision avoidance capabilities and does not involve the FAA.

Active Debris Removal

Congress placed an emphasis on active debris removal (ADR) technology and mitigating the threat orbital debris poses to space activities. It is important that we protect our Nation's significant investment and operation in Low Earth Orbit (LEO). We must also recognize that ADR is an unproven and untested technology. I am optimistic that it will be a useful tool in eliminating space debris, but given its unproven nature, I worry it could create more debris.

Question 1. What steps need to be taken on regulatory oversight to ensure that ADR activity in LEO is conducted in a manner which furthers space safety/sustainability while reducing debris?

Answer. Under the White House National Space Council's "mission authorization" legislative proposal, active debris removal capabilities would likely be regulated by the Office of Space Commerce.

Through the Office of Space Commerce's Federal advisory committee and other consultation mechanisms, we anticipate working with industry stakeholders as well as United States Government experts to develop light-touch licensing conditions, best practices, and standards which ensure active debris removal missions can be affirmatively licensed while preserving safety and adherence to our international obligations.

For NOAA, current and future NOAA LEO satellites are designed with orbital debris mitigation in mind, so satellites can be actively removed from space when nearing the end of their mission life.

NOAA endorses the removal of retired on-orbit assets and space debris through the use of active debris removal to protect NOAA's operational low earth orbit satellites as well as partner satellites that we rely on to meet mission goals. NOAA's satellite design principles, which adhere to the United States Government (USG) Orbital Debris Mitigation Standard Practices (ODMSP), can serve as a model for future orbital debris mitigation requirements. NOAA is ready to work with the Administration and Congress to develop necessary guidance to implement updated national orbital debris mitigation requirements and maintain U.S. leadership in the international arena.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARIA CANTWELL TO
JOHN HILL

Federal Government Challenges in Oversight of Commercial Space Activities

The Pacific Northwest is a prime hub for commercial space activity, with a \$4.6 billion space industry that has created over 13,000 jobs. A major challenge with space commercialization is understanding what the technological and workforce challenges are. Without this knowledge, it is difficult to determine the kind of support and oversight that is needed. Defining roles and responsibilities, increasing coordination, and improving knowledge sharing for agencies will allow the government to keep pace with rapid innovation.

This Committee played a very big role in a new aircraft certification program for the FAA to address workforce shortages and improve aviation safety through proactive approaches to managing risk. The same should be done to reduce technological risk for the commercial space industry. Technological challenges and other risk factors must be characterized and addressed from a safety perspective to ensure advancement of commercial human spaceflight.

Question 1. What are the top three technological, operational, policy, or workforce challenges that your agency faces in your role supporting and overseeing the safety of commercial space activities?

Answer. The top challenges facing the Department of Defense regarding the safety of commercial space activities involve the imperative of transitioning inherently civil aspects of space situational awareness and traffic safety operations to the Department of Commerce (DOC) as a properly authorized, funded, and enabled civil regulatory agency. These challenges are analogous to challenges faced in the early ages of aviation when the military first provided support for air traffic safety before the establishment of the Federal Aviation Administration.

The Department of Defense (DoD) supports the safety of commercial space activities—and the activities of all space operators—by sharing space situational awareness information through the United States Space Command's Space-Track.org website and through space situational awareness sharing agreements and arrangements entered into pursuant to 10 USC § 2274. When DoD is able to provide this kind of information, DoD may also inform space operators regarding projected close

approaches between spacecraft and other objects in space, helps isolate sources of radio-frequency interference, and provide support for safe orbital insertions and other safety-related support. DoD has, when able, provided these inherently civil support services for many years as an adjunct to the military's security-focused space domain awareness mission. The absence of a civil agency with the capability to perform these missions forced commercial actors to continue to rely on the DoD to fill the gap.

Worldwide space operations have expanded well beyond the point that responsibility for such inherently civil functions should transition to a civil agency specifically authorized, funded, and enabled to perform them. DoD is working closely with DOC to transition responsibility for inherently civil space situational awareness sharing functions. The Administration has proposed legislation that would provide necessary authorization to the Department of Commerce (DOC) for this purpose. As envisioned, in performing these functions, DOC would be able to utilize space situational awareness data that DoD collects, as well as commercial and other resources available to DOC. Meanwhile, DoD personnel would be relieved of civil support activities and able to focus their efforts on inherently national security missions. Further, the proposed legislation would also allow for DoD to provide feedback to the Departments of Commerce and Transportation on novel space activities that could have safety or national security risks to national security operations.

Coordination on Regulatory Decision-making within the Executive Branch Interagency

Varda Space Industries, a U.S. company that launched its first payload into orbit in June 2023, is successfully demonstrating manufacturing pharmaceuticals in space, but is experiencing delays in receiving its reentry license from the FAA. This delay has led to a decision by Varda to enter a partnership with Southern Launch to use their spaceport range near Adelaide, Australia, rather than use the U.S. Air Force's Utah Test and Training Range. While Australia is obviously a strong U.S. partner, this seems like an example of a U.S. space company choosing to pursue opportunities in other countries that offer simpler and more flexible regulations.

Question 1. In implementing the National Space Council's proposed regulatory framework for novel space activities such as on-orbit processing and manufacturing, what is the best way to maintain U.S. competitiveness through a streamlined but safe regulatory framework?

Answer. Pursuant to existing law on licensing commercial space activities such as space launch and re-entry and private remote sensing, civil regulatory agencies consult with the Department of Defense (DoD) on licensing decisions. In these consultations, DoD works with civil agency counterparts who have competence for both the administrative aspects of the licensing process and for the technical and operational matters related to the license. The combination of these competencies enables DoD and our civil agency counterparts to work through most national security questions in ways that do not involve license restrictions and support the competitiveness of U.S.-licensed firms—which is itself a national security interest. Additionally, these relationships facilitate DoD's ability to support commercial space activities, such as through access arrangements to use DoD ranges where compatible with DoD's operational, safety, and security needs. DoD sees the statutory authority for the Secretary of Defense to determine national security aspects of licenses, and the consolidation of both the administrative and technical competencies related to licensing, as best practices that should be continued in the U.S. approach to licensing commercial space activities.

International Considerations for Novel Space Activities

Setting norms of behavior and safety standards for operating in space through international engagement is critical to the continued access and use of space for scientific advancement and economic prosperity. 32 countries in addition to the United States have now signed the Artemis Accords, a set of common principles, guidelines, and best practices focused on safe and sustainable space exploration.

Regarding the Artemis program itself, the United States and its partner nations intend to pursue future space cooperation in partnership with commercial industry. Within Washington, more than 40 companies are working to supply Artemis. 15 companies supply the Space Launch System rocket, 14 deliver goods and services used for the Orion crew capsule, and Blue Origin will supply NASA with a second lunar lander, creating competition, and redundancy. Other NASA initiatives such as the Commercial Lunar Payload Services or CLPS program have created the potential for private sector activities on the lunar surface operating on a purely commercial basis.

Question 1. Do you have thoughts on this issue from a national security perspective?

Answer. From a broad national interest perspective, it is important that nations continue to see the United States as their preferred partner for engaging in space activities. The Artemis program is a prime example of a U.S.-led, mutually beneficial international civil space partnership. Among the many benefits of such partnerships, nations working together develop common understandings of best practices for existing and new forms of space operations that contribute to the overall safety and sustainability of operations in space. The relationships developed through such partnerships could also extend to common interests in developing new norms more directly beneficial to national security, such as the overwhelming international support for the U.S.-sponsored United Nations General Assembly resolution in 2022 that called on nations to commit not to conduct destructive direct-ascent anti-satellite missile tests.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. TED CRUZ TO
JOHN HILL

Question 1. Space Force oversees missions critical for our national security including tactically responsive space missions. What is the impact to these types of programs when there are delays in the licensing process?

Answer. Under the National Security Space Launch (NSSL) programs, DoD uses commercially provided launch vehicles and services to launch payloads for major national security space programs. These launches are not subject to licensing by the Federal Aviation Administration (FAA). DoD considers successful performance on non-DoD missions as a valid criterion during the process of qualifying launch vehicles for use on NSSL missions. For less critical national security missions, DoD will also contract for services on commercial launches licensed by the FAA. The FAA's regulatory processes for approving these launches have not caused delays that affected our missions.

Question 2. One concept that could be explored is adopting a "fast lane" license review process, where you link the license review process to a particular project of national significance or governmental contract. What are the potential benefits to an expedited license review process?

Answer. As noted above, a Federal Aviation Administration launch license is not required for space activities the government carries out for the government, including our support to the launching of intelligence community space missions. Thus, the suggested "fast lane" concept would have limited impact on how the defense and intelligence communities perform our responsibilities. Where our activities leverage commercial services, the current licensing processes have not caused delays that affected our missions.

Question 3. Does the Department of Defense consider continuous American presence in low Earth orbit to be a strategic national interest? Why or why not?

Answer. The Department of Defense is continuously present in low-Earth orbit and many other orbits, although these are non-crewed missions. DoD sees the continued presence of Americans in space as a component of U.S. leadership in the domain and a national interest. As the National Aeronautics and Space Administration (NASA) is responsible for the government's crewed space missions, DoD would defer to NASA regarding the specific orbits and activities to prioritize.

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. J. D. VANCE TO
JOHN HILL

Defense Applications of Commercial Space Assets

Space assets, just as commercial assets outside the space domain, can easily have an underwritten defense/military application. This means a commercial space asset could be perceived or targeted as a military asset at any time.

Question. What measures is the Department of Defense taking to ensure the capabilities of current and future space assets can be repurposed and/or applied in multiple settings—including for defense/military applications?

Answer. The Department of Defense (DoD) relies on commercial services and supplies across many sectors of the economy. Examples include energy, transportation (airlift, sealift, and land transport), security services, and cloud computing services. In space, DoD has a long history of utilizing commercial services such as satellite communications, Earth observation, and, more recently, satellite operations and space situational awareness. Across sectors, commercial firms compete for DoD busi-

ness and address any risks they perceive through the terms of the contract and through commercial market insurance. As the market for commercial space services continues to grow, DoD anticipates our options to leverage these services to meet our national security needs.

