National Aeronautics and
Space Administration

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Committee on Science, Space,
and Technology

United States House of Representatives

Statement by:

Dr. Nicola J. Fox, Associate Administrator, Science Mission Directorate

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Associate Administrator, Science Mission Directorate
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Thank you for the opportunity to discuss NASA's Commercial Lunar Payload Services (CLPS) initiative. CLPS is one of NASA's boldest and most innovative programs. It is designed to enable a lunar economy with American companies at the forefront of innovation and discovery while also advancing lunar science and technology. NASA is envisioned to eventually be just one of many customers along for the ride as we prepare to send humans back to the Moon and ultimately to Mars and deeper into space.

I want to begin by emphasizing that no other nation has done anything similar to the sheer cadence and pace of the NASA CLPS model. This includes four launches so far, including two featuring Intuitive Machines, one from Astrobotic and one from Firefly, with two more expected this year and three next year. Three weeks ago on March 16, Firefly Aerospace's Blue Ghost Mission 1 concluded operations on the lunar surface, marking the first "nominal" commercial lunar landing and the longest surface duration commercial mission on the Moon to date. It collected extraordinary science data from the NASA science instruments and technology demonstrations onboard that will benefit humanity for decades to come.

These missions are high-risk, high-reward experiments led by our American commercial vendors as we return to the Moon in an unprecedented way. This initiative has enabled access to the Moon on a scale not seen since the Apollo era by providing a range of science, technology and commercial opportunities through a competitive lunar economy that lights the way for the agency's exploration goals on the Moon, to Mars, and beyond. Landing on the Moon is hard, and the missions within the CLPS model are faced with the lofty goal of landing in scientifically strategic locations that humanity has not yet explored.

CLPS represents a bold shift in how NASA and the United States are approaching exploration, combining the ingenuity of the private sector with NASA's scientific and technological leadership. Specifically, the initiative conducts complex missions through delivery service contracts. Each CLPS delivery includes payload integration, mission operations, launch, and landing services, and the CLPS providers are encouraged to carry commercial payloads alongside NASA's. This approach accelerates scientific discovery by enabling NASA to procure lunar delivery services rapidly and cost-effectively, fosters a competitive lunar marketplace where the agency is one of many customers, and strengthens U.S. leadership in space exploration by supporting private sector innovation, all while reducing reliance on government-built spacecraft.

As additional science, technology, and human exploration requirements for payloads are developed, the pool of CLPS contractors will continue to evolve. By continuing to support commercial lunar providers, CLPS ensures that U.S. innovation remains at the forefront of lunar exploration and discovery, paving the way for sustainable human presence on the Moon, as a proving ground for science we will need to be able to perform on Mars, and beyond.

I am often asked why it is important that we continue to conduct science on the Moon. NASA's continued scientific exploration of the Moon is not only critical to answering fundamental questions about our solar system and our place in it – for example, how Earth, the Moon, and rocky planets formed. But lunar science is also essential to prepare us for human missions to both the lunar surface and Mars. Before sending astronauts, our most valuable cargo, we must understand the lunar environment, identify in-situ resources, and test new technologies to ensure safety and sustainability. By applying lessons learned from the Apollo era, we are advancing scientific discoveries and technological innovations that will enable a long-term human presence in deep space. The CLPS initiative plays a key role in this effort, allowing NASA to deploy scientific instruments and technology demonstrations that will inform future human missions and resource utilization strategies.

In addition to science, CLPS is a strategic investment in maintaining U.S. leadership in space exploration. With global competitors advancing their lunar ambitions, CLPS leverages commercial innovation to ensure that America leads in developing low-cost, high-cadence lunar access, reinforcing our ability to explore, utilize resources, and establish operational norms. This initiative not only strengthens technological superiority and deep-space logistics but also ensures that the Moon remains a place for peaceful exploration and scientific discovery, guided by U.S. leadership. We use CLPS to tap into innovation and entrepreneurship of different high-tech companies, which means America demonstrates different technical approaches to landing on the Moon. We see different companies' strengths and approaches do a really difficult thing – successfully landing on the Moon and operating there for an extended period. As they succeed, these companies will become a community of robotic lander service providers for Artemis, both in the United States and with our Artemis accords partners.

Landing on the Moon is very difficult. A spacecraft must descend from an orbit roughly 100 km above the lunar surface, traveling at 2000 meters per second, to gently touch down on the lunar surface at a specific landing location. But unlike Earth or Mars, there is no air at the Moon to use to slow down; the spacecraft can't use a capsule shape, parachutes or wings. The only way to slow down is using rocket thrust, which means one has to bring along all the mass of fuel and oxidizer you must burn to slow down, making the lander larger and requiring more launch vehicle performance to push that lander to the Moon. The lander must respond to changes to its "mass center" during the descent as the rocket burns, to avoid going out of control. There is no GPS to use at the Moon to guide the lander to its destination. The computer must autonomously guide the lander to the correct landing location and know when the lander is close enough to the surface to shut off the rocket engine. Finally, the lander must avoid landing site hazards, such as steep slopes, boulders, craters and pits – many of which are small enough that we don't have high resolution images from lunar orbit to use for the landing. In order to land on the Moon, companies must master these and many other skills.

And we're setting records. As I previously mentioned, Firefly's Blue Ghost Mission 1 marks the longest surface duration commercial mission on the Moon to date. All ten NASA payloads successfully activated, collected data, and performed operations on the Moon. Throughout the mission, Blue Ghost transmitted 119 gigabytes of data back to Earth, including 51 gigabytes of science and technology data.

In addition, all payloads were afforded additional opportunities to conduct science and gather more data for analysis, including during an eclipse and lunar sunset.

And this is just one mission. Since its inception, CLPS has achieved many significant milestones: the selection of multiple landing mission providers in multiple states with instrument providers and supply chains across the country; the first deliveries of commercial science and technology payloads that are investigating lunar soil, measuring radiation, and testing new landing technologies; and we have increased private investment in lunar capabilities by incentivizing commercial investment in lunar lander technology, positioning American companies as leaders in the growing lunar economy.

Because NASA has been a reliable first customer of lunar delivery services, this has fostered the economic environment that has encouraged or enabled commercial innovation, including: Intuitive Machines collaborations with Nokia to deploy a lunar cellular network demonstration; Lonestar Data Holdings to create a lunar data center; York Space Systems to deploy lunar communications relays; Embry-Riddle Aeronautical University to develop the student-built EagleCam; and others. With Astrobotic, there is a collaboration with NASA Space Technology Mission Directorate for TALOS engine development; and with Agile to develop new additive manufactured thrusters.

Every mission provides an invaluable opportunity to test U.S. landers, instruments, and other technologies, accelerating learning and providing a benchmark for future missions. NASA is committed to supporting its U.S. commercial vendors as they navigate the challenges of sending high-risk/high-reward instruments and technologies to the surface of the Moon. Not every delivery may be fully successful, but each success and each setback is an opportunity to learn and grow.

Throughout this process, we are also learning how to better engage with industry and adapt to a more nimble management approach. For its part, NASA must continually refine its approach to payload complement and mission planning, staying flexible with requirements while balancing risk and reliability. At the same time, commercial vendors must mature their technical teams to meet mission demands. The competitive, fast-cadence nature of CLPS fosters innovation and resilience, leading to continuous improvements in both commercial space capabilities and our understanding of how to employ them to achieve NASA objectives. We want to buy such mission services when available from U.S. industry, so we can focus our NASA workforce on cutting edge science and technology. As fixed price service contracts, these deliveries allow providers to support growing markets beyond NASA.

NASA plays a critical role in CLPS by selecting payloads, defining mission objectives, and guiding the integration of science and technology that supports broader goals for Artemis and future human exploration as well as scientific understanding of the Moon. As we move ahead, NASA looks forward to targeting approximately two lunar landing delivery missions per year, maintaining a regular cadence of competitively-selected science and technology investigations, providing opportunities to join the CLPS vendor pool, and continuing to work with industry to identify new capabilities and opportunities that would support science and human exploration goals.

Later this year, two CLPS flights will venture to the Moon's South Pole region: Blue Origin's Blue Moon Mark 1 lander, and Astrobotic's Griffin Mission 1 lander. Next year, Intuitive Machines' IM-3 mission will deliver four payloads to Reiner Gamma on the western edge of the Moon's near side, Firefly's Blue Ghost Mission 2 will deliver two NASA payloads to the far side of the Moon and a communications and data relay satellite into lunar orbit, and Draper's first mission will deliver three NASA science investigations to Schrödinger Basin, landing in volcanic terrain in the far side South Pole

region. The CLPS program is exploring opportunities to carry larger, more sophisticated payloads, including autonomous rovers and in-situ resource utilization experiments to prepare for sustainable lunar exploration. Data collected from CLPS landers will directly inform human exploration efforts, helping identify safe landing sites, resource deposits, and environmental conditions for Artemis astronauts. And NASA will continue fostering a competitive lunar economy, encouraging companies to invest in more capable landers and expanded mission services.

CLPS is a transformational program that is reshaping lunar exploration by leveraging commercial capabilities to expand scientific discovery, advance national priorities, and drive economic growth. It aligns with national priorities for American space leadership, strengthens U.S. commercial space competitiveness, and enables a more rapid, cost-effective approach to returning to the Moon to enable a long-term presence. CLPS will not only advance our understanding of the Moon, but also pave the way for sustainable human exploration. I appreciate your time and look forward to answering your questions.

Thank you.