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Hearing on Private Sector Lunar Exploration
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Chairman Babin, Ranking Member Bera, and members of the Subcommittee, thank you for the opportunity to speak before you today about private sector lunar exploration – a topic that we’re very excited about at Blue Origin.

Jeff Bezos founded Blue Origin to bring about a future where millions of people are living and working in space. Our team of over eleven hundred people across the nation works tirelessly each and every day to enable this future. We believe that the backbone of this vision is to achieve full operational reusability with our launch vehicles, which will lower the cost of access to space at higher flight rates and higher levels of safety and reliability. We will get there through practice, and we’ve recently made great progress flying our fully reusable *New Shepard* vehicle to space and back five times in less than 12 months. We are now developing *New Glenn*, our next-generation reusable rocket that will launch people and payloads to low Earth orbit and beyond.

We are committed to building the next generation of space transportation infrastructure, providing reliable, affordable, and frequent rides to space for everything from people and satellites to deep space exploration.

We recently entered into agreements with our first two commercial satellite launch customers for our *New Glenn* vehicle. We are ready to help end the nation’s reliance on Russian engines for national security launches with our BE-4 engine. We are prepared to bring private capital to partner with NASA for a return to the lunar surface.

Why the Moon

It’s time for America to return to the Moon – this time to stay. Enabling NASA and U.S. commercial activities on the Moon is a key step on the path to long-term exploration of the solar system. Imagine driving from D.C. to Los Angeles with no rest stop. You’d have to carry all of your fuel, food, and other necessities with you, which would make for a logistically-challenging trip. The same idea can be applied to space travel. Reaching destinations beyond low Earth orbit takes days, months, or even years, limiting human exploration due to the resource and logistics challenges necessary to sustain life. Fortunately, the Moon provides the resources and proximity to enable human exploration of deep space destinations like Mars, making it the ideal proving ground and rest stop for future exploration.

For example, the lunar South Pole’s Shackleton Crater contains ice for fuel and logistics support, mineral compounds for developing structures, and near-continuous sunlight for power generation. Shackleton Crater, and other locations like it, offer a realistic proving ground for testing of critical deep space exploration technologies in close proximity to Earth.

All of this potential has not gone unnoticed. Multiple international commercial entities and nations have plans for an ambitious decade of lunar exploration. The United States should be the leader in this worthy endeavor.

Blue Moon

When you can cost effectively and precisely soft land large amounts of cargo on the Moon, there are few limits on what you can do. Cutting-edge science rovers, resource discovery and utilization missions, logistics support, and surface habitats are all made possible. The *Blue Moon* lunar lander can cost-effectively deliver over 10,000 pounds of useful payload to the lunar surface. *Blue Moon* is scalable, repeatable and based on proven technologies.

Scalable Payload Delivery

Blue Moon is optimized to fly on NASA's Space Launch System (SLS), providing the maximum payload to the lunar surface, but can also fly on many different launch vehicles, including Blue Origin's own *New Glenn*. The amount of cargo that can be delivered to the lunar surface depends on the launch vehicle, providing a flexible, scalable approach depending on the specific payload. For example, launch of a smaller payload, such as NASA's Resource Prospector, can use an Atlas V rocket, while much larger payloads can be launched on SLS.

Using SLS, *Blue Moon* can deliver over ten thousand pounds of cargo to the lunar surface, which equates to the weight of about five Mars Curiosity rovers or two Ford F-150 trucks. Delivering payloads of this size class facilitates many of the lunar exploration, science, and technology demonstration goals outlined in NASA's Planetary Science program, NASA Strategic Knowledge Gaps, and the NASA Strategic Space Technology Investment Plan. *Blue Moon's* payload capacity can enable high-value missions from resource discovery and power generation to lunar sample return.

Repeatable Missions

Blue Moon is designed to be a repeatable transportation service, providing NASA with a commercial lunar cargo delivery solution. Just pick the launch vehicle and go. There is minimal customization of each lander. This repeatability ensures low cost and reliable access to the lunar surface for NASA as well as non-governmental activities.

With this cadence and substantial payload capacity, *Blue Moon* can conduct increasingly capable missions over time, such as ongoing pre-positioning of the comprehensive infrastructure needed for a human return. These repeatable missions will be the building blocks of a lunar economy and a key step on the path to millions of people living and working in space.

Proven Technologies

Blue Origin's proven technology, developed with private investment and enhanced by NASA's expertise, provides a fast path to a domestic U.S. lunar landing capability for medium to large payload delivery.

Precision landing is critical when transporting valuable payloads to the lunar surface, and Blue Origin has demonstrated this capability. We are developing the *New Shepard* suborbital system to take astronauts into space for tourism and science purposes. *New Shepard* has successfully flown five times in less than a year with the same rocket landing from space at our West Texas launch site. This accomplishment demonstrates the capability of the Blue Origin team to rapidly conduct breakthrough missions and powered precision vertical landings from space.

The *Blue Moon* architecture directly incorporates facets of *New Shepard*, including Vertical Takeoff/Vertical Landing (VTVL) technology and in-house tank development and tooling expertise. This technology, coupled with our extensive liquid propulsion capabilities, reduces development time and risk.

Blue Origin's 110,000-lbf BE-3 is the first new U.S. liquid hydrogen-fueled rocket engine to be developed for production in over a decade. The BE-3 engine has been proven for both launch and landing on the *New Shepard* program. The BE-3U, a 120,000-lbf in-space version of the engine, is an existing engine development program for Blue Origin's *New Glenn* that will be adapted for *Blue Moon*. The BE-3U's high specific impulse, deep throttling, and relight capabilities all translate into more useful payload mass landed on the Moon.

Public-Private Partnership

Blue Origin has made and continues to make significant investments in the foundational technologies needed for *Blue Moon*. As part of a public-private partnership with NASA, we are willing to invest further in developing this capability.

Specifically, NASA could partner with Blue Origin for medium to large lander development and services using innovative contracting mechanisms that require private sector investment and cost-share. Commercial Cargo and Next Space Technologies for Exploration (NextSTEP) represent successful programs that require partners to bring capital and existing technologies towards achieving shared goals with NASA. These mutually beneficial partnerships allow the country to meet ambitious lunar objectives more rapidly, while simultaneously facilitating economic development and U.S. strategic leadership in space.

Legislative Considerations

The U.S. regulatory environment needs to accommodate the new era of commercial activities in space and the technology developments that are on the horizon. As addressed in House Bill H.R. 2809, the American Space Commerce Free Enterprise Act of 2017, there remains a need for regulatory certainty and Congressional clarification on treaty interpretation before U.S. companies begin in-earnest activities on the Moon and other celestial bodies. This committee has an opportunity to steer commercial space activities through legislation authorizing NASA and the FAA Office of Commercial Space Transportation (AST).

As it relates to the Moon, a NASA Authorization Act should include provisions that prioritize landing on the lunar surface within a certain number of years, establish the requirements for a regular cadence of cargo missions, and a strategy that includes how the Moon can serve as a stepping-stone for expanding human exploration in our solar system. NASA partnerships with commercial companies will save taxpayer dollars, while enabling industry to expand the market for space transportation and research opportunities, supporting various missions to the lunar surface in the mid-to-late 2020s.

An updated Commercial Space Launch Act can address ongoing concerns with the FAA payload review process, as well as planetary protection, and non-interference provisions of the Outer Space Treaty. This committee can ensure that commercial space companies are able to pursue missions on the Moon and other on-orbit activities by directing that regulatory and executive agencies – including FAA, NOAA, FCC, NASA, and the State Department – may not attempt to, or in any way, deny access to space on the basis of Articles VI and IX of the Outer Space Treaty. The outlook is bright for commercial activities in space; however, U.S. regulatory

agencies could stifle industry at each step of advancement without clear guidance from the Congress.

There are strategic advantages to near-term U.S. lunar surface activities, as well as national security implications for establishing infrastructure in desirable locations. Despite the Moon's size, there are relatively few sites from which to begin looking for resources, which could lead to non-interference issues among countries. Many nation states and international commercial entities have plans to go to the Moon, including China, Russia, the European Space Agency, and more. The U.S. should not overlook the benefits of arriving on the Moon first, this is the very definition of American leadership in space.

Streamlining Launch Licensing

It is also important to streamline licensing of commercial launches as industry transitions from expendable to reusable rockets. In the case of expendable rockets, FAA and Air Force requirements are nearly identical. When launching from a federal range, a company can create a single set of deliverables for the Air Force and provide the same information to the FAA to satisfy launch license requirements. It is duplicative, but not onerous. In contrast, Air Force and FAA licensing requirements for reusable rockets are completely different from each other, necessitating two entirely different but equally rigorous sets of deliverables. This is duplicative and onerous, and will increase costs, delays, and uncertainty.

Instead, we seek streamlined licensing, irrespective of vehicle type, in alignment with the structure of 14 C.F.R. Part 431, "Launch and Reentry of a Reusable Launch Vehicle". We want FAA as the single point of contact for any commercial spaceflight company interactions with the government with sole authority over launches and reentries, without regard to location or type of launch, consistent with the National Space Transportation Policy. We encourage Congress to ensure that AST is prioritizing its existing, and any new resources, on its current statutory mission.

Conclusion

The leadership of the United States during the original space race and those first footsteps on the lunar surface are forever a part of our country's collective conscious. That unifying moment is part of what makes us who we are and inspires our shared desire for exploration even today. We are on the verge of a new space age, one defined by multiple international competitors that have renewed interest in the Moon.

This Congress has the opportunity to ensure America's continued leadership in space, which, in the near term, means leading the development of a lunar economy. Blue Origin's proven technology – developed through private investment and enhanced by NASA's expertise – enables long-term exploration and U.S. leadership in space. *Blue Moon* complements NASA's SLS launch system and is a natural addition to the country's overall exploration architecture. Long-term exploration plans of any kind will require precise delivery of large amounts of cargo and *Blue Moon* can provide that. Any credible first lunar settlement will require that capability.

Together, we can advance America's strategic interests in space. We are extending an offer of partnership that includes significant private investment and proven technology.