

Remarks at NASA Lunar Exploration Workshop
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Thank you Doug (Doug Cooke) for that very warm introduction and good morning ladies and gentlemen.

To our guests, who include participants from 12 nations, the commercial sector and academia—welcome. As Deputy Administrator, one of my most important responsibilities is to work closely with other nations, industry and outside organizations. I am delighted that this workshop has such a strong international component.

And I'm also pleased to see so many innovators and strategists from our nation's private sector and academic institutions participating today. All of you were invited to attend because collectively you represent some of the world's best talent in the area of space exploration strategic planning. Decades from now, when humans routinely live and work on the lunar surface and we're getting ready to journey to Mars, all of us in this room can look back to this unique moment in time when we started to plan the strategy. It is an exciting time to be in at the ground floor of what promises to be an exciting and historic process.

To the organizers of this event, who've put in a lot of effort to make this event happen, thank you for all your hard work. In particular thanks to Doug Cooke and Lisa Guerra, and there are many others.

Fittingly, this exploration workshop is being held in a building honoring one of America's most optimistic and visionary presidents, Ronald Reagan. Our nation's 40th president always expressed great faith in what the space program could accomplish for our citizens and for people around the world. Reagan once said about the space program: "The future doesn't belong to the fainthearted; it belongs to the brave." And it was President Reagan, of course, who initiated the program that became the International Space Station, our first large scale space effort to bring many nations together to explore in space.

We are here today to consider how, with creativity and dedication, the world's space faring nations, working together, will advance scientific, economic and exploration progress on the moon, beginning not in 2018 when humans return to the lunar surface, but right now, with the precursor robotic missions we are planning and conducting.

And it's time. We have built upon the accomplishments of our collective space programs. But it's been 35 years since we ventured beyond Low Earth Orbit. It is now time as President Bush said two years ago "to extend a human presence across our solar system."

Soon, due in large measure to what will transpire at this workshop, and in other idea-generating activities being sponsored this year, people

around the globe will be able to look up at the moon, and with the aid of a strong telescope, be able to see the glimmering lights of a research outpost on the lunar surface. At this research outpost pioneering explorers may be learning how to obtain useful resources such as oxygen from the lunar soil.

Elsewhere, explorers may very well be pursuing other activities that come about as a result of ideas generated this year, perhaps deploying small antennas on the back side of the moon, which can be linked to form the largest radio telescope ever built, free of radio noise from Earth.

And throughout the lunar surface, on the front and back side, at the poles as well as along the equator, men and women could be engaged in geological exploration of a land mass the size of Africa, searching for key clues to the origin of our Earth-moon system.

You might have noticed that I did not mention what countries these explorers will come from. This was purposeful, as it is not NASA's intent to dictate who will do what once the next great era of lunar exploration begins to unfold. Individual nations and commercial organizations will each choose to pursue programs of lunar exploration that reflect their specific interests and priorities. In many cases, through gatherings such as this workshop, these various groups may find that they have much in common with each other – and through these interactions, the seeds of future collaborative efforts may be born.

During this workshop, we are looking forward to obtaining a variety of views regarding potential themes and objectives for lunar exploration. Eventually a comprehensive global plan for exploration of the moon will be developed using information from many sources, including the individual inputs provided at this workshop.

Let me emphasize that consensus is not the goal of the workshop breakout sessions in which you will soon participate. Rather, the collection of a wide variety of ideas, perspectives, and justifications for lunar exploration themes and objectives is desired. Results of these breakout sessions will reflect individual opinions and will be presented by a group spokesperson to reflect the breadth of the group's opinions during plenary briefings on the final day of the workshop. So, what we hope eventually comes out of this collaborative process and others is a blueprint for everyone, one that will be consulted whenever a new opportunity for a lunar mission or activity arises.

And while we do not know what the comprehensive global plan for lunar exploration will look like yet, let me suggest that the next explorers who alight on the moon will come in the spirit reflected in the plaque that our upcoming speaker Jack Schmitt and his fellow Apollo 17 crewmate Gene Cernan placed 34 years ago in the Taurus-Littrow Valley. That plaque stated, "May the spirit of peace in which we came be reflected in the lives of all mankind."

Today, I am glad that you are present at the creation of what promises to be one of the boldest and most comprehensive strategies for science, commerce and exploration ever developed.

Tonight, look up at the thin sliver of the moon, and ponder the fact that we are all working toward the accomplishment of something big, something that will have lasting impact for generations.

I am excited that the pace of lunar exploration is picking up with Europe's SMART-1 mission now underway and China's Chang'e, Japan's SELENE, India's Chandrayaan-1, and NASA's Lunar Reconnaissance Orbiter missions soon to commence.

Following these missions, we might see robotic landers that will check out potential human landing sites, leading up to the return of human explorers as early as 2018, taking advantage of NASA's new generation of crew, launch and cargo vehicles. These systems will be able to carry larger and heavier cargoes into space and carry more people to the moon than we were able to on each mission during the Apollo era. And this time, when we reach beyond low Earth orbit, these will no longer be brief or tentative visits.

With respect to these new systems, it is important to note that when NASA unveiled to the global community last year what we call our exploration architecture, we specified in detail how we will get back to the moon, but we deliberately did not lay out a master-plan for NASA to take on the job of constructing the infrastructure required for lunar

exploration. Indeed, NASA has neither the resources nor the intention to explore alone. We believe it is necessary to have strong partnerships to undertake this effort that will in many ways reflect the best aspects of human civilization. It is quite possible that the next generation of lunar explorers will come from many countries and work together on research stations of international design and construction, possibly in much the same fashion as occurs in Antarctica today. It is up to this workshop to start developing ideas that will hopefully lead to joint activities to advance future lunar exploration, science and commerce.

While we have no preconceived notions about what lunar activities will rise to the top in priority at the end of the process, I would like to mention the larger context in which we hope your work product will contribute. We want to ensure that the moon is an integral part of a broader exploration strategy that will enable us to live and work productively on other planetary surfaces, beginning with the moon but leading up to Mars and other destinations. I think it is self-evident that it is much easier to learn to live off the land on a body that is three-and-a-half days away from home, rather than one that is nine months away.

We also want the strategy you help to develop to take an expansive look at opportunities for productive lunar science in such far flung fields as planetary science, astronomical research, space biology, Earth science and solar physics. To cite just one example, as planetary scientist S. Alan Stern wrote last year in the publication *Space News*, “Imagine

what we will know when not six, but 16 and then 60 lunar sites have been sampled. Imagine the value of core samples drilled not three meters deep as in Apollo, but 30, 300 and then 3,000 meters deep.” Playing into the point that the Vision for Space Exploration encompasses the entire solar system, Stern also wrote in his piece that, “A deep understanding of the evolution of the Moon’s geological, thermal and chemical evolution, will illuminate results that robotic missions will return at bodies as diverse as Mercury, Vesta and Venus.”

And of course, we want you to address the boundless opportunities there are to incorporate the moon into our sphere of commerce. We believe there will be a private sector role in supporting a variety of lunar surface systems and infrastructure, including lunar habitats, power and science facilities, surface rovers, logistics and resupply, communications and navigation, and *in situ* resource utilization equipment.

I know our agenda presents to you a tall order. These are complex issues we are dealing with in laying out a strategy that we hope will be sustained for over 25 years.

Now it is my great pleasure to introduce to you a distinguished gentleman who can speak with great authority about the subject of lunar exploration. For those who don’t know Senator and Dr. Jack Schmitt, this is a true honor for all of us to hear from the last man and the only scientist to have the experience of stepping down the lunar module and setting foot on the moon.

Our guest speaker was born in one of America's great frontier states, New Mexico, and he has lived an exciting life exploring the frontiers of geology as a Fulbright Fellow in Norway and a Kennecott Fellow at Harvard University. He's really been a geological Indiana Jones, traversing some of the world's most stunning landscapes to dig up knowledge from our planet's ancient past. He's also served the people of New Mexico as their senator, and currently leads NASA's Advisory Council, providing us wise advice and counsel on how we can best implement the goals of the Vision for Space Exploration.

Jack was selected as a NASA scientist-astronaut in 1965, and became an integral contributor to the science return of all our lunar missions, by helping to train all of the astronauts who walked on the moon and participating in the decision making on the science objectives of the missions. And when it came to a mission filled with fascinating science, Jack was fortunate to be the lunar module pilot on Apollo 17, the mission which launched to Taurus-Littrow in December, 1972. Jack and Gene Cernan spent three days on the lunar surface, while the late Ron Evans orbited overhead.

I'm sure Jack can tell you many fascinating things about his 22 hours on the lunar surface. But I'd like to tell you about something that didn't happen. Prior to Apollo 17 Jack pushed hard within NASA for a bold mission on the far side of the moon, on the dark lava floor of the crater Tsiolkovsky. He suggested to mission planners that we could

conduct such a mission by placing a pair of Tiros weather satellites 30,000 miles above the moon to provide a communications link back to earth. Well this idea proved to be a bit too challenging for NASA's mission planners at the time. I would like to suggest, though, that Jack's idea represents the kind of daring thinking that we hope you will generate at this workshop. It is now my great pleasure to introduce to you, a great scientist, astronaut and statesman, the Honorable Jack Schmitt.