ROBUST IMPLEMENTATION
OF LUNAR SETTLEMENTS WITH COMMERCIAL AND INTERNATIONAL ENTERPRISE
[MOON BASE 2015]

An AIAA/SCTC Position Statement

Prepared by the AIAA
Space Colonization Technical Committee (SCTC)

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PURPOSE

To implement the President's Vision for Space Exploration, the United States must commit to the early establishment of a Moon base by 2015. This Lunar base will be an ideal testbed for opening new frontiers to human exploration by maximally employing commercial and private products and services. The AIAA/SCTC recommends that specific RDT&E goals be implemented. This will be accomplished by establishment of the scientific and industrial capabilities of a permanent Lunar settlement and development of the commercial revenue sources on the Moon.

INTRODUCTION

On January 14, 2004, President Bush reaffirmed the United States' commitment to human space exploration by completing the International Space Station by 2010, returning to the Moon to stay, and then proceeding to more distant destinations. There exists an extensive database of research and technology development indicating that the logistical feasibility of space exploration will be greatly enhanced through space resource utilization (SRU). This AIAA/SCTC Position Statement emphasizes: human settlement of the Moon; development of Lunar observatories, energy and resources uses; and sustained, active encouragement of private and international enterprise.

RECOMMENDATIONS

The AIAA/SCTC recommends that the following actions be implemented by the Administration, U.S. Congress, and supporting Government agencies as appropriate:

The Early Period [The Present-2015]:

- Implement a suite of orbital and lander precursor missions to the Moon to collect high-resolution data on: the Lunar environment; water, hydrogen and other resources to establish ground truth on resource distribution; and surface property characterization. The lander missions should demonstrate technologies and methods for establishing Lunar and space settlements.
- Establish and implement a strategic plan for use of space resources with substantial funding for SRU payloads, launch vehicles, robotic vehicles, landers for dedicated Lunar SRU missions, and Lunar surface testbeds.
- Develop an "in-situ', self-sustaining infrastructure of solar energy production and storage derived mostly from Lunar materials, and wireless power distribution (power beaming) for both nuclear and solar energy transmission on the Moon.
- Deploy communications and navigation satellite system capability for cis- and transLunar space to support Lunar development.
- Establish cost-effective crew and cargo space transportation systems with the capability to utilize Lunar-supplied propellants.

- Implement testbeds on the Earth, ISS and the Moon for human health issues related to long-term space flight, including tele-medicine, low-g environments, radiation and psychological issues.
- Implement testbeds for closed life support systems for sustaining a Lunar base.
- Implement testbeds for in-situ manufacturing systems for sustaining a Lunar base.
- Develop a human Lunar south pole base where valuable water/hydrogen, material, mineral resources can be explored/used and continuous sunlight can be utilized in a less extreme thermal environment.
- Develop technologies for Lunar surface and subsurface mining and excavation.
- Develop needed Lunar-specific resource production equipment to foster expansion of Lunar/terrestrial commerce.
- Initiate a D/He3 fusion reactor development program to resolve the usefulness of He3 from the Moon.
- Extend current advanced technology programs including electromagnetic, momentum transfer and other fuel-less launch technologies to establish capabilities that can be applied on the Moon.

Mid-Period [2015-2025]:

- Develop solar, nuclear and other advanced energy systems to support Lunar base and orbital power needs.
- Deploy and operate a group (condominium) of observatory facilities on the Moon for observations of the Earth, the Sun, the Solar System and the Universe – providing a stable, nearly limitless aperture across the electromagnetic spectrum
- Substantially expand the Lunar resource and space transportation infrastructures.
- Develop pressurized, crewed rovers and flight hopper technologies for Lunar operations.
- Establish large-scale manufacturing of Lunar base hardware elements from in-situ resources to enable among other things, construction capabilities for habitats, domes and mining machinery.
- Expand the production of Lunar water, hydrogen and oxygen to support transportation and life support.
- Construct planetary testbeds on the Moon, as needed, in preparation for future space exploration.
- Develop autonomous robotic mining and excavation technologies for the Moon.
- Develop Lunar construction technologies including landing-launch facilities, habitats, dome construction, building wall materials, roads, radiation shielding, free-form fabrication using regolith, Lunar concrete and inflatable structures.

Far-Period [2025-2050]

- Establish the first self-sustained, permanent Lunar settlement of ~1000 humans.

FURTHER RECOMMENDATIONS

It is also recommended that the United States work with international partners to set precedent(s) through a constructive interpretation and evolution of applicable space law(s), including provisions for:

- Free-market rules and approaches to the exploration and development of space
- Extension of international conventions on property and mineral rights to include assets in space based on US and other historical precedents in the history of exploration
- Extension of land management conventions and régimes to include provisions for homesteading.

Government agencies need to enable business development in the following areas to ensure sustainable viability of the exploration vision:

- Base and life support
- Resource processing and manufacturing
- Lunar communication systems
- Lunar navigation systems
- Lunar transportation systems
- Space rescue capability similar to the Coast Guard
- Methods for indemnifying business ventures from lawsuits based on fatalities or injuries
- Government sponsored anchor-tenant production contracts
- Government loan guarantees.

CONCLUSION

The AIAA/SCTC supports a strengthened space program through robust implementation of Lunar settlements with commercial and international enterprises as outlined in this position statement. The AIAA/SCTC encourages technology and business development to establish a Moon base by 2015 which will result in permanent Lunar settlement.

Respectfully Submitted,

AIAA Space Colonization Technical Committee