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ZA/Environmental Manager
Constellation Program
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RE: Public Comment on the Draft Constellation Programmatic Environmental Impact Statement (PEIS)

Dear Environmental Manager:

We believe there is a potentially grave oversight in the Draft Constellation PEIS with respect to lunar surface systems and future human presence on the Moon. It is critical to not only examine the impact of the Constellation program on the Earth but also how those missions might impact the long-term human settlement of the Moon.*

The PEIS implicitly takes the position that the National Environmental Policy Act of 1969 (NEPA) was not meant to be extrapolated to apply outside the Earth's atmosphere, and therefore does not in and of itself require an extraterrestrial impact analysis. We agree with that position. However it is important that all space activities treat NEPA compliance in a consistent way. To date, the U.S. government has not taken a clear stance on whether NEPA governs extraterrestrial activities. Therefore, if NASA is taking the position that activities outside the Earth's atmosphere are beyond NEPA jurisdiction, it is vital that this position be made explicit.

Regardless of the applicability of NEPA, we assert that the public policy of the United States should include protecting those space-based resources necessary to sustain and expand human presence and economic activity beyond the Earth. NASA, as an agency of the American government, must take a pro-active environmental stewardship approach to the exploration and development of the Moon. Beyond acting on behalf of an American public consensus on environmental stewardship, the United States Government, including NASA, is legally bound by the Outer Space Treaty to adopt appropriate measures on the Moon so as to avoid harmful contamination.

Article IX of the Outer Space Treaty (1967), states (emphasis added):

*"Parties to the Treaty shall...conduct exploration of [outer space and celestial bodies (including the Moon)] so as to **avoid their harmful contamination** and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter **and, where necessary, shall adopt appropriate measures** for this purpose."*

The Treaty further states:

*"If a State Party to the Treaty **has reason to believe** that an **activity** or experiment planned **by it or its nationals in outer space, including the Moon**, and other celestial bodies, would cause potentially harmful interference with activities of other States' Parties in the peaceful exploration and use of outer space, including the Moon...**it shall undertake appropriate consultations before proceeding** with such activity or experiment."*

Although environmental impacts on the Moon are currently left outside the scope of the PEIS, the lunar activities discussed within the PEIS do raise significant environmental impact issues and concerns. As

* It has been verbally reported to us that, during the Apollo era, studies on environmental impacts and contamination of the Moon were conducted. Unfortunately, these studies, conducted in 1969/early 1970s, are not electronically archived and we have been unable to locate them.



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just one illustration, NASA is currently in the process of making technical decisions between using toxic and non-toxic propellants in the lunar lander propulsion system. Since this architecture element will repeatedly transport humans and cargo to and from the lunar surface, the use of toxic propellants could have a significant negative impact.

Since NASA uses toxic propellants in many other propulsion systems, and these technologies could be used in a lunar lander, this is a major concern for us. Toxic propellants could contaminate potential sources of water at the lunar poles, or seep into human living environments. Protecting potential sources of water at the lunar poles, and the general environment surrounding future communities, is critical to human settlement of the Moon.

However, while the PEIS indicates that NASA is leaning towards non-toxic propulsion, there is:

- no commitment made by NASA to use non-toxics on the lunar surface, and
- no commitment that NASA will consider this environmental impact in its technical choices about lunar lander propulsion, and
- no indication that NASA even understands the problem exists — that use of toxic propellants in this way could have a significant negative lunar environmental impact on future human communities on the Moon.

As this example shows, it is imperative that lunar environmental impact issues and concerns be considered and addressed immediately in all technical decisions, even if not required by the NEPA.

The Space Frontier Foundation is dedicated to opening the space frontier to human settlement. Therefore, speaking in the interest of future settlers, we strongly urge that environmental stewardship of solar system resources be made a key architectural and technical requirement of NASA's implementation of the Vision for Space Exploration, including Constellation and all other programs.

Sincerely,

Mr. Bob Werb
Chairman of the Board
Space Frontier Foundation