"Towards an Earth-Moon Economy - Developing Off-Planet Resources"

Moon Miners' Manifesto

& The Moon Society Journal

www.MoonMinersManifesto.com

217 | AUGUST 2008

In this issue, MMM is proud to be the sole publisher of noted space authority and author Philip R. Harris' new essay, **Lunar Enterprises and Development**, in five installments, this issue featuring the first.

Above is a cut from NASA's 2007 poster about the agencies progress towards returning to the Moon.

Feature Articles in This Issue

Our "Environment" includes more than Earth

In this month's In Focus Editorial (pp. 1-2) and feature Essay (pp. 7-9), we argue that the Solar System and even the Universe at large, are parts of the total environment within which humanity has arisen, and without which any philosophy of the destiny and vocation of humankind cannot but be inadequate and stunted.

This may come as a jolt to the average Joe or Joan for whom "The World" is basically our home planet plus window dressing points of light in the day/night sky.

IN FOCUS Taking the Lead in the Holistic Environmental Movement

"Oh no, complicating discussion by adding in a new term!" Sometimes it is necessary. Environmentalists, despite the sincerity of their passion, and the apparent soundness of their philosophy, have produced a very one-sided movement. It *is* one-sided, because the context of the rise of humanity includes more than our home planet, Earth. We could not be, Earth itself could not be, what we are without the larger cosmic context. And taking that meta-context into consideration vastly expands environmental "caretaking." [=> p. 2, col. 2]

Moon Miners' Manifesto

Published monthly except January and July., by the **Lunar Reclamation Society** (NSS-Milwaukee) for its members, members of participating **National Space Society chapters**, members of **The Moon Society**, and individuals worldwide.

• **Moon Miners' Manifesto CLASSICS:** The non-time-sensitive articles and editorials of MMM's first eighteen years have been re-edited, reillustrated, and republished in 15 PDF format volumes, for free downloading from either of two locations:
www.Lunar-Reclamation.org/mmm_classics/
www.MoonSociety.org/publications/mmm_classics/

• **MMM's VISION:** "expanding the human economy through off-planet resources"; the early era of heavy reliance on Lunar materials; early use of Mars system and asteroidal resources; and establishment of permanent settlements supporting this economy.
• **MMM's MISSION:** to encourage "spin-up" entrepreneurial development of the novel technologies needed and promote the economic-environmental rationale of space and lunar settlement.
• **MMM retains its editorial independence.** MMM serves several groups, each with its own philosophy, agenda, and programs. Participation in this newsletter, while it suggests overall satisfaction with themes and treatment, requires no other litmus test.
[Opinions expressed herein, including editorials, are those of individual writers and not presented as positions or policies of the **National Space Society**, **Lunar Reclamation Society**, or **The Moon Society**. **Copyrights** remain with the individual writers. Reproduction rights, with credit, are granted to NSS & Moon Society chapter newsletters.]
• **For additional space news** and near-term developments, read ***Ad Astra,*** the magazine of the **National Space Society**, in which we recommend and encourage membership
• **The Lunar Reclamation Society** is an independently incorporated nonprofit membership organization engaged in public outreach, freely associated with the National Space Society, insofar as LRS goals include those in NSS vision statement. LRS serves as NSS' Milwaukee chapter: www.Lunar-Reclamation.org
• **The National Space Society** is a grassroots pro-space membership organization, with 10,000 members and 50 chapters, dedicated to the creation of a spacefaring civilization.
National Space Society, 1620 I Street NW, Suite 615, Washington, DC 2006; Ph: (202) 429-1600 - www.NSS.org
• **The Moon Society** seeks to overcome the business, financial, and technological challenges to the establishment of a permanent, self-sustaining human presence on the Moon." - Contact info p. 9.
• **NSS chapter**s and **Other Societies** with a compatible focus are welcome to join the MMM family. For special chapter/group rates, write the Editor, or call (414)-342-0705.
• **Publication Deadline:** Final draft is prepared ASAP after the 20th of each month. Articles needing to be keyed in or edited are due on the 15th, *Sooner is better!* - ***No compensation is paid.***

• **Submissions by email** to KokhMMM@aol.com - Email message body text or MS Word or PDF file attachments
√ Mac compatible CD / or typed hard copy must be mailed to:
Moon Miners' Manifesto, c/o Peter Kokh,
1630 N. 32nd Street, Milwaukee WI 53208-2040
• **MMM is mailed 2nd Class:** *Second Class bulk mail is not forwarded.* If you move and rely on forwarding instructions at your former local Post Office, you will not receive your copy. It is the reader's responsibility to inform LRS or whatever other organization through which the reader receives MMM as a membership benefit, of any change in the reader's mailing address.

⇒ In Focus Editorial continued from p. 1.

Humanity's and Earth Life's (Gaia's) environment is in fact dual. It is a matter of both Mother Earth and Father Sky. We are equally children of the Universe at large as pointed out in our feature essay, pp. 7-8 this issue. Sadly, the integral cosmic component of our environment is all but totally ignored by environmentalists.

But we space enthusiasts ourselves fail to realize how radically pro-environment our own goals are, and in that failure, we contribute to the mutual hostility of the two groups. As we bring into focus in our "Human Expansion Triway into Space" presentation,
www.moonsociety.org/spreadtheword/ppt/Triway1.ppt
In this presentation, we show how those focused on asteroids want to preserve our planet from the threat of killer impacts; how those focused on the Moon want to tap lunar resources to help us tackle our intertwined environmental degradation / energy shortage problems; how those focused on Mars want to create a "just-in-case" "second basket" for Humanity's and Gaia's "eggs."

The Moon Society and the National Space Society, working as a team, put together a conference proposal tasked with beginning a "conversation" between space solar power advocates and environmentalists. Presented to the EPA for funding, we did not make the first cut. We may try again, but it is worth doing on our own, if need be. But sadly, not all space enthusiasts seek to combine forces with the environmental movement. Many of us, especially politically conservatives, see the environmentalist as the "enemy" rather than a natural ally. Yes, "they" are hostile to us! But to match hostility with hostility is not only self-defeating, it is childish. We must take the lead in bringing the two sides together. We must realize that we ourselves are environmentalists who treasure Mother Earth. And our own divergent focus points show that as we have just stated. We can better see both sides.

But we have apologies to make. The hostility of environmentalists to us is not without cause; we are blinded to a situational fact of life! To be truthful, given the long lead time for SBSP, it is both dishonest, foolish, and counter-productive in a manner that courts global suicide not to lend our support to shorter lead time, local and community based efforts to diminish and contain the problems, on a one-on-one basis.

If we spurn environmentalist efforts to promote wind and ground-based solar, and other cleaner energy solutions as "inadequate," we lose significant opportunities to buy Earth time, while we are continuing our efforts to bring space bases solar power technologies to a near-term readiness state. We cannot afford to do nothing while waiting 10-20 years for SPS *to begin to come online!* That would be cutting off our nose to spite our face. It would be childish and immature.

Collectively, we need to quit posturing and instead to seize the leadership in **promoting a holistic version of environmentalism** that recognizes the duality of Mother Earth and Father Sky, and in that context, work side by side with traditional Mother Earth environmental groups for a better future for our children and grandchildren and for our descendants for generations to come as we spread beyond Earth to the Moon, Mars, the Solar System at large, and begin our pilgrimage back to the stars that begin it all. *"Of stardust we are, to the stars lest us return."* Think holistic: Mother Earth & Father Sky. It's not an either or proposition. It never has been. We must change our mindsets accordingly. **PK**

LUNAR ENTERPRISES AND DEVELOPMENT

Especially prepared for *Moon Miners Manifesto*.

© Philip R. Harris, 2009 – PhilHarris@aol.com

Installment 1

Dr. Harris is a Moon Society member, a management/space psychologist, and former NASA consultant and Faculty Fellow (www.drphilipharris.com) This Is an excerpt from his 2009 book, ***Space Enterprise – Living and Working Offworld*** (www.springer.com).

EXHIBIT 1: Why the Moon?

"Of all the sites in the Solar System, the Moon is the most logical first place to establish a permanent off-world human settlement. Why? Because it is nearby, less than three days with existing propulsion technology. It has a wealth of resources that can be used to support a broad range of human activities from science and engineering to commerce and tourism. It has an abundant continuous, and virtually unlimited supply of solar energy. It offers the opportunity for a greatly expanded program of space exploration. It is within our technological reach!"

[1] David Schrunk, Burton Sharpe, Bonnie Cooper, Madhu Thankgavelu

---

After a hiatus of some forty years since humanity's first lunar landing, we are now planning to return to the Moon permanently, hopefully by year 2020. No **united** vision, plan or strategy for exploring, settling, and industrializing the lunar surface has come forth from the world's space agencies, despite numerous conferences, studies and reports on the subject. However, NASA has undertaken to implement a national space policy to do just that called, *Vision for Space Exploration*. The Agency is beginning to seek collaboration from public and private entities within the global space community in this latest orbital venture.. But to build a lunar transportation system and outpost within a dozen years, requires planner to face harsh economic, technological, and political realities, leading to the realization that the only way **Earthkind** can afford this macroproject is by means of international cooperation with major participation by private enterprise. If the limited resources of the China, Europe, India Japan, Russia and the U. S. A. were combined into joint technological enterprise on the Moon, then synergistic activities there would encourage competing space constituencies to work together on lunar development. Exhibit 1 gives the principal reasons for doing this.

The Moon can serve as the best space station and launch pad to Mars and beyond. Space science proponents would then be able to use this lunar platform for their experiments, both in astronomy and life sciences, as well as to launch from there additional planetary missions. Simultaneously, those favoring human exploration and "manned" missions might use the Moon as a laboratory for study of extreme environments and habitats, comparable to what is happening today among cooperating countries in Antarctica. In addition, champions of lunar industrialization could undertake research programs relating to manufacturing, mining helium-3, or energy transmission by power beaming, and other uses of *in situ* resources, such as lunar oxygen produced from ilmenite. [2]

The uniqueness of the Earth-Moon system provides an advantage for humanity to use this lunar laboratory to create a spacefaring civilizaton for the New Millennium! The Moon's characteristics as a resource to humanity are illustrated next in Exhibit 2. The Moon is an enormous piece of accessible real estate, comparable to the largest continent on Earth. As meteorites struck the lunar surface, they shattered solid rock which mixed with the soil creating **regolith,** a fine powder or cosmic dust which can be from three to sixty feet in depth. Apparently, it also contains a lot of oxygen, so the prize will go to whomever can extract the oxygen most quickly. Regolith has other bounty to be obtained – hydrogen, carbon, nitrogen, potassium and other trace elements. When asteroids crashed into the Moon, there is a likelihood of deposits of platinum and other valuable metals.[3] A key question, according to Dr. Paul Spudis, a planetary scientist at Johns Hopkins University, is whether the Moon's resources can be used profitably.[4] (For NASA video on *Regolith Challenge*, try online website: http://one.revver.com/watch/292585 and 295790).

In 1969, humanity's first lunar envoys installed a commemorative plaque with these words: *Here men from Planet Earth first set foot on the Moon. We came in peace for all mankind*. Then in December 1972, astronauts from the last *Apollo* mission fastened another plaque nearby on that original landing module*: Here man completed his first exploration of the Moon. May the spirit of peace in which we came be reflected in the lives of all mankind*. And within a dozen years, our species will return permanently to "Sister Moon," so called by a 13rh century visionary, Francis of Assisi! A great deal of the Earth's character has been influenced by its relative close position to this Moon – it is responsible for two thirds of our ocean tides; its gravitational tug spins the axis of the Earth, causing our planet in wobble through a set of complex and majestic cycles. And in the course of millions of years, its massive bulk prevents other celestial bodies and the sun from making Earth's axis go through extreme changes like those of Mars. (Refer to Exhibit 2)

EXHIBIT 2: Characteristics of the Moon

Characteristics of the Moon	
Radius	1740 km (0.3 x Earth's radius)
Surface elevation	+7.5 km to -5.6 km
Mass	7x1022 kg (1.2% of Earth's)
Gravitational acceleration	1.6 m/s2 (1/6th Earth's gravity)
Lunar day	27.3 Earth days (sidereal period) 29.53 Earth days (sunrise-sunrise) (one side permanently facing Earth
Surface temp.	+130° C at equator, local noon -200° C in permanently shadowed areas near the poles

Utilizing lunar resources is feasible, but the problem has been well summarized by Werner von Braun: ***We can lick gravity, but sometimes the paperwork is overwhelming*!** **Source:* NASA. For further information, contact the International Lunar Exploration Working Group through Dr David McKay at NASA/JSC (dmckay@snmail.jsc.nasa.gov).

The Moon is our "beachhead" for exploring and settling our Solar System! The author presents here a near-term strategy for utilization of its resources for the benefit of

our planet's inhabitants. By turning outward in peaceful lunar development, the human family can develop both its potential and that of its offworld bounty!

1. RECLAIMING THE MOON: RATIONALE

As this is written, we are celebrating the 50th anniversary of *Sputnik,* a satellite that launched our Space Age. It is fitting that the global space community is again preparing to move beyond Earth and back to its sister Moon, possibly establishing in the process a twin-planet economy. Recently, the magazine of the National Space Society, *Ad Astra,* devoted a whole issue to "Reclaiming the Moon: The First Steps." [5]

In these pages, space writers made a case as to why humanity should do this. Jeff Foust gave a recent review of US policy on returning to the Moon permanently, *Vision for Space Exploration* That writer explained that NASA's implemenation plan entitled *Global Exploration Strategy,* was developed with the participation of some 14 space agencies which identified 180 potential objectives for lunar exploration, divided into 23 categories ranging from astronomy and lunar geology, to commercialization and technologies testing. Six exploration themes emerged for such endeavors – human civilization, scientific knowledge, exploration expertise, global partnerships, economic expansion, and public engagement. Within that context, NASA then engaged in a *Lunar Architecture* study that favors the building of an international Moon base. Before 2020, a decision is to be made at to site for the first outpost – the current consensus is a location the lunar north or south pole. Some are for the Shackleton crater near the latter where the Sun hangs low on the horizon for most of the lunar day, thus enabling use of solar power both on the Moon, and possibly power beaming space-based energy to the home planet in the future. Others are for a base near Malapert Mountain also near the South Pole because of similar sunlight advantage and direct view of the Earth.

Lunar scientists estimate that some 20 billion tons of ice may be present in permanently shadowed regions of craters near both poles. In early 2009 mission is planned for a *Lunar Reconnaissance Orbiter* to gather data confirming which is the best location to start a research outpost. Both international and private partners will help to determine the eventual size of this base, which I have called *Lunar World*.*

The current thinking is to start with crews of 4 to be rotated every six months until permanent occupants, dubbed *Selenians* [or *Lunans*], determine to stay longer. A versatile lunar lander, yet to be built, is critical for bringing humans, robots, and equipment to the lunar surface.

By 2013, the Agency hopes to have made decisions on this spacecraft, plus a heavy-lift launcher, possibly the *Ares 5* with the *Orion* as a crew exploration vehicle presently being now built by Lockheed-Martin. Significantly, this is all viewed as a long-term, evolutionary process.

In this same 2007 Spring issue of *Ad Astra,* Jeanna Bryner discussed the split in astronomer thinking on orbital telescopes, or one that is lunar-based. That year a series of meetings were inaugurate called,

"Astrophysics Enabled by Return to the Moon," examined both alternatives, noting that lunar telescopes would benefit by the Moon's lack of clouds or any blurring atmosphere erected on a permanent platform. The astronomers are attracted to the farside of the Moon which is free of radio pollution, but for which no base is yet planned for there. Thus it is more likely that a deep-field infrared observatory will be erected on the lunar South Pole where the necessary living, power, and communications infrastructure will exist in the near-term. An upright telescope could be built that has a 330-foot scope of the Moon that enables astronomers to view the galaxies in a way impossible on Earth. Semi-autonomous robots are expected to service the anticipated facility.

Again this same issue of *Ad Astra*, Andrew Chaikin wondered what it would be like soon for Earth's inhabitants to look up on the Moon, knowing that people are actually living and working there. That writer sees the Moon as a spectacular world, a cosmic library full of secrets about our universe to be decoded. While NASA has the ability to turn our dreams into machines, Chaikin wants care in choosing dreams wisely that will take us down the path of becoming a *multiplanet* species, living out our DNA destiny! The Moon, then, is the stepping stone, a place to teach and prepare people for living in other worlds beyond their home planet!

There is so much to be learned in this big lunar laboratory – human-robotic relations, closed-loop recycling, telemedicine, tele-education, scientific, and technological innovations. Literally, a permanent, sustainable lunar settlement means changing human culture and species! Almost four decades ago, *The New York Times* did a special supplement on "The Moon as a New Frontier." [6]

The feature opened with: *A new age began when Man first steeped onto the Moon at 10:26 p.m. (Eastern daylight time) on July 20, 1969... The Moon is no longer merely a disembodied orb, a subject of myth, and abstraction in the sky. It has been touched and now is a place.* Yes, a place for human exploration, some 261,643 miles from Earth at the minimum! In size, it is 1.4 that of Earth but in mass, 1.81 that of our planet. Its temperature daytime when the sun at its zenith, is 2, 250 degrees Fahrenheit, while at night minus 250 degrees, The Moon spins at uniform speed, but orbits at variable speed, and its wobbles are called librations. This orbiting land mass, some 2,160 miles in diameter, is presently three days away from Earth. As the Moon revolves around the Earth, our orbiting planet revolves around the Sun.

Regarding its origin, there are three basic theories about our Moon – it broke away from the Earth; it was formed with our planet from a the same whirling cloud of dust, and other material, evolving with less density; it was formed elsewhere, passed near the Earth, was slowed down by debris, and captured by its gravity. The Moon's multiple value to humanity extends from an object of study and a base for examining our universe, to a place for building laboratories, factories, and habitats (see exhibit 3). Others propose to utilize its raw materials, as well as to establish a refueling stop for launching spacecraft out into the Solar System. There are those who envision the lunar surface as a listening post for us to better decipher cosmic messages, from particles to subatomic objects.

* Dr. Harris has written about the first industrial park on the Moon in *Launch Out – A Science-Based Novel About Space Enterprise, Lunar Industrialization, and Settlement* (www.buybooksontheweb.com)

The second man on the Moon, Buzz Aldrin, has long argued that the Moon could provide both rocket propellant and shielding for human structures, as well as supply of our space needs because of its weaker gravitational field (about one-sixth that of Earth). With an MIT doctorate, he would like to see a fleet of "space tugs" built to create "Trans-Lunar Rendezvous," using the Moon as a refueling depot. No wonder Buzz Aldrin wrote a book for children – *Reaching for the Moon*, for it *will* be the generations of youth who will make the most of lunar opportunities. [7]

EXHIBIT 3: Lunar World?

One view of a 21st century lunar base, beginnings of a major industrial park, and settlement on the Moon. **Source*: artist rendering by Lockheed Missiles & Space Company, Inc., Sunnyvale, California, U.S.A.

As we prepare to return permanently to the lunar surface, author James Hansen reminds us that two-thirds of today's Earth population was not alive when the first humans visited the Moon.[8] And only four of the six astronaut commanders who piloted a spacecraft down to a lunar landing are among the living. Of the twelve moonwalkers who had a great time there, nine are still with us, all in their 70's.

The implication is that earthkind needs a massive re-education as to the Moon and its potential. Further, this second time, we depend on the established technologies and memories of the Apollo missions legacy. Perhaps Harrison Schmitt, the last man on the Moon, put it best when he said: *that return will be comparable to the movement of our species out of Africa some 150,000 years ago….a return to the Moon today will be comparable to the permanent settlement of North America by European immigrants….Apollo was our evolutionary path to the future*.[9] Schmitt, a former U. S. Senator from New Mexico, recently gave these reasons as to why we must go back to the Moon. The include (1) clean abundant energy; (2) stepping stone to Mars; (3) species survival; (4) expanding understanding of the universe; (5) save Earth from threats from space; (6) education in space exploration stimulates the mind in unique ways; (7) lunar tourism and settlement.

When the Doctors Buzz Aldrin and Harrrison Schmitt met at a Lunar Base Symposium in Houston, TX (June 1999), they concurred with the event's organizer, Rick Tumlinson, founder of the Space Frontier Foundation, that going back to the Moon is a opportunity for a *new synergy between government and the private sector*. This time, Tumlinson believes the Moon is close enough to Earth for private enterprise to play a big role there, and to make it profitable. (The space between the two celestial bodies is called *cislunar.)* Just imagine if the peoples of this planet were to work together on this venture for the benefit of all!

"Ten Reasons to Put Humans back on the Moon" was the title of an online essay by science writer, Robert Roy Britt (www.space.com/moon, 12/8/03). In addition to the above motivations, he added these:

- Satisfy the soul by the exploration quest for new knowledge…
- Bring nations together in an offworld technological enterprise…
- Gather rocks from the "attic of the Earth" for further scientific analysis…
- Study catastrophe regarding asteroid impact to answer survival questions about our cosmic shooting gallery…
- Spur technology advances, including for health and economic benefits.

Finally a worldwide meeting of lunar experts in 2003 gathered for the fifth time, calling now for a sequence of technological, exploratory, and commercial joint missions that would culminate in establishment of a permanent human presence on the Moon. Further, these ILC/ILEWG conferees issued **The Hawaii Moon Declaration,** which underscore the importance of lunar development for humanity in the 21st century. These are the words of many representatives from spacefaring nations: [10]

The Moon is currently the focus off an international program of scientific investigation. Current missions underway or planned will lead to the future use of the Moon for science and commercial development, thereby multiplying opportunities for humanity in space and on Earth. We need the Moon for many reasons: to use its resources of materials and energy to provide for our future needs in space and on Earth, to establish a second reservoir of human culture in the event of a terrestrial catastrophe, and to study and understand the universe. The next step in human exploration beyond low Earth orbit is to the Moon, our closest celestial neighbor in the Solar System.

REALTY CHECK: THE UNITED NATIONS – OUTER SPACE TREATY

The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and interest of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.

Outer space, including the Moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on the basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies. There shall be freedom of scientific investigation in outer space, including the Moon and other celestial bodies, and the States shall facilitate and encourage international cooperation in such investigation.

---Article I, the United Nations 1967 Outer Space Treaty.

1.1. *International Lunar Agreements and Initiatives*

The legal context for any nation or consortium to carry out activities on the lunar surface is evident in the above United Nations' Outer Space Treaty of 1967 (refer back to chapter section 9.4). In December 1979, a second document was drafted entitled, *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*. Because of its anti-developmental provisions, many of the leading spacefaring nations, including the U.S.A. and the former U.S.S.R., did not sign this document prepared by the Committee on the Peaceful Uses of Outer Space (COPUOUS). Only nine nations, largely representing developing economies, signed that resolution, while five others had not yet ratified it. In 1984, this so-called treaty went into force after being ratified by only five nations. But in the summer of 1994, the Moon Treaty or Agreement came up for review in the United Nations General assembly, and within the U.S. State Department. In a private letter to the author (May 18, 1995), its chairman, Peter Hohenfellner, informed me that at the thirty-seventh session of COPUOS (June 6-16, 1994) this Moon Agreement revision was considered and it was recommended that no further action be taken, which the 49th General Assembly of the United Nations endorsed. While he says no new developments are expected on the issue in the near future, Hohenfellner did find interesting material on the subject which United Societies in Space, Inc. (USIS) submitted, commending their proposal for a Lunar Economic Development Authority. Unfortunately, this Committee failed to sufficiently review the position of critics of this unpopular lunar document, such as the opposition from the National Space Society. The latter's position was that if lunar resource development were to be controlled by a monopolistic international organization, it would slow the process, discourage entrepreneurs, and possibly delay lunar settlement. This lobbying, especially over property rights, lead to the U. S. Senate voting not to ratify the agreement.

Realistically, any international plans for lunar development will have to consider the implications of these two UN space agreements. Eilene Galloway, director of the Paris-based International Institute of Space Law, notes that while only nine nations originally approved this Agreement - its provisions are a problem for commercial entities and entrepreneurs wishing to exploit the Moon's natural resources. While the Outer Space Treaty accepted by the international community forbids national appropriation by means of sovereignty and is accepted in U. S. Constitutional Law, the claims of institutions and individuals on the Moon and its resources are still unclear. It would appear that exploiters or developers may remove such resources, but have no private property rights over them. Thus, S. Neil Hosenball, the U. S. representative to COPUOUS, made the case for the establishment of an "international regime" to deal with resources above or below the Moon. While the Outer Space Treaty makes the point that the Moon is the "province of all mankind," the Moon Treaty uses the terms "common heritage of mankind," requiring an international regime for the "equitable sharing" of lunar resources. [11]

Since then a variety of nations have been undertaking a series of lunar missions. Several outcomes from annual international conferences point to a growing global consensus emerging on lunar development, particularly relative to exobiology on the Moon. Concurrently, energy scientists worldwide, including those within the Russian Academy of Science and Japan, are showing exceptional interest in lunar solar energy, whether beamed from the Moon or its orbiting satellites. Leadership is coming from a strategic and international partnership being formed by proponents of wireless power transmission. Speaking at the International Astronautical Federation's 45th Congress, Dr David R. Criswell, co-inventor of the Lunar Solar Power System (see Appendix B), observed: [12]

> *By mid century 2050, lunar power industries can be sufficiently experienced and profitable to diversify into a wide range of other products and locations, other than solar power beaming. Specialized industries on asteroids and other moons will arise. Mankind can begin the transition to living independently off Earth. People can afford to move to space and return, allowing the womb of biosphere Earth to the evolution of other life.*

1.2 *Asian Lunar Initiatives*

Japan has the oldest mission efforts toward the Moon in the region of Asia. Furthermore, Japan's Lunar and Planetary Society proposed to institute evolutionary lunar programs, involving orbiters and landers, roving robotics and telepresence, astronomical projects, habitat studies, and even tourism. As far back as 1994, Japanese business leaders and scientists urged that their government's Space Activities Commission invest in a 30-year, 3 trillion yen undertaking to build a Moon station by 2024, entirely constructed by robotics! Japan's Science and Technology Agency welcomed the proposal which included solar power generation. In July 1994, a task force report of that Commission accepted those recommendations for Japan's space policy to include the building of a manned station and observatory on the Moon, preferably with its international spacefaring partners. In March 1996, Mitsubishi Corporation made a major investment in the ambitious plan of LunaCorp (Arlington, Virginia) to provide interactive robotic exploration of the Moon, as well as high-definition lunar video for space theme parks, television networks, and scientific research. In 1997, its space agency planned *Lunar A*, a lunar orbiter and penetrator probe. Exhibit 4 indicates the scope of imaginative Japanese macroplanning for the Moon.

>>>>.*CONTINUED NEXT ISSUE, MMM #218*

REFERENCES to Parts Above

1. Schrunk, D., Sharpe, B., Cooper, B., and Thangavelu, M. *The Moon - Resources, Future Development, and Settlement.* Chichester, UK: Springer-Praxis, 2008, 2nd.ed. (www.praxis-publishig.co.uk).
2. In addition to the above book, we recommend: Harrison M. Schmitt's *Return to the Moon*. New York, NY: Springer-Copernicus-Praxis, 2008…In 1984, a NASA study at the California Space Institute took place on the theme, "Strategic Planning for a Lunar Base." Edited by Drs.. Mary Fay and David McKay with Michael Duke, the proceedings were published in 1992 under the title, *Space Resources,* by the U. S. Government Printing Office, Washington, D.C. These four volumes of NASA SP-509 are still relevant and available from www.univelt.com. Refer especially to volume 4 on *Social Concerns* in which the contribution of your author appear….For updates on lunar development, subscribe to *Lunar Enterprise Daily,* Space Age Publishing (www.spaceagepub.com or news@spaceagepub.com). Also see www.lunarlibrary.com developed by Ken Murphy, who graduated from the International Space University., plus the blog site, Out of the Cradle which includes Murphy's lunar bibliography.

3. Science & Technology, "Spaceflight – Objective, Moon, " *The Economist,* May 28th, 2005, pp. 79-80 - (www.economist.com)…."The Fans of Mars," *The Economist,* March 11th, 2000, pp. 85-86.
4. Spudis, P. D. *The Once and Future Moon*. Washington, DC: Smithsonian Institution Press, 1996 See "The New Race to the Moon," *Science,* Vol. 300, May 2, 2003 (www.sciencemag.org) and the "blog" discussion on "To the Moon, Mars, and Beyond, March 4, 2007 – www.kelloggserialreports.blogspot.com/
5. *Ad Astra,* The Magazine of the National Space Society," Vol.10: 1, Spring 2007 (1620 "I" St. NW, Ste. 615, Washington, DC 20006, USA; www.nss.org). See articles, Jeff Foust, " Moon Base : The Next Step in the Exploration of the Solar System," pp/ 28-31; Jeanna Bryner, "Lunar Observatories: Grand Plans vs. Clear Problems," pp. 32-35; Andrew Chatiklin, "Building the Future," pp. 36-37….In *Ad Astra,* Nov./Dec. 2001, Philip Harris, "Time for a Return on our Apollo Investment," pp.31-32 (www.drphilipharris.com).
6. "The Moon: A New Frontier," *The New York Times* Special Supplement, Aug. 3, 1969, 20 pp. (www.thenewyorktimes.com)….For an update, see Johnson-Freese, J. and Handberg, R. *Space, the Dormant Frontier: Changing the Paradigm for the 21st Century*. Westport, CT: Greenwood Publishing Group, 1997.
7. Aldrin, E. (Buzz), *Reaching for the Moon*. New York, NY: Harper Collins, 2005….with John Barnes, *The Return*. New York, NY: Forge Books, 2000….Also see Tom Hanks IMAX/DVD , *From Earth to the Moon,* or Walt Disney Television's two-hour movie, *Plymouth,* about the first lunar colony (tel: 818/5608844 or fax: 818/566-6566)….
WEBSITES: Check out online, www.moonslociety.org or www.TheMoonPeople.org or www.moonbasesanalog.net....Then download "pdf" files on your computer from www.adobe.com/products/acrobat/readstep2.html ….Inquire about attending the annual International Lunar Conference at wwwspaceagepub.com or the yearly International Space Conference at www.isdc2007.org (subsequently change the year in this website for future sessions)!…This open online wiki-type encyclopedia is worth a visit – www.Lunapedia.org…. Again you may want to listen to a Real Audio radio show, *Space Beat* –http://expert.ccpurdue.edu/ -Jstudy/.
8. Hansen, J. *First Man: The Life of Neil A. Armstrong*. New York, NY: Simon & Shuster, 2006….See also Pyle, R. *Destination Moon - Apollo Missions in the Astronaut's Own Words*. Washington, DC: Smithsonian Books/Collins,2005.
9. Schmitt, H. H. *Return to the Moon: Exploration, Enterprise and Energy in Human Settlement of Space*. New York, NY: Springer/Copernicus/Praxis, 2005…."My Seven – Why We Must Go Back to the Moon," *National Geographic,* July 2004 (www.nationalgeographic.com/magazine/0407).
10. Durst, S.M. et al (eds.) *Proceedings of the International Lunar Conference 2003/International Lunar Exploration Group 5*. San Diego, CA: UNIVELT/American Astronautical Society, 2004, Vol. 108 in SCIENCE AND TECHNOLOGY SERIES with CD_ROM supplement.
11. Galloway, E. "Status of the Moon Treaty," *Space News,* Aug.3-9, 1998, pp. 21-22. See also Glen Reynold's "Return of the Moon Treaty, " *Ad Astra,* May//June 1994, pp. 27-28 (www.nss.org).
12. Criswell, D. R. "No Growth in the Two Planet Economy, International Astronautical Federation Proceedings (8.1.704) at the 45th Congress Jerusalem, Israel (October 9, 1994).

www.drphilipharris.com/about/enterprise.html

Dr. Philip R. Harris is a licensed psychologist and professional futurist. He has published extensively, and is currently writing his 47th book - **Space Enterprise - Living & Working Offworld**

Best known for his classic, **Managing Cultural Differences** now in 7th edition.

"Mother Earth" & "Father Sky"

The Duality of the Human Environment

By Peter Kokh – kokhmmm@aol.com

[Expanded from an article previously published in the July 2008 issue of the SGAC Newsletter

http://www.spacegeneration.org/newsletter/SGAC-Newsletter-Jul08_opt.pdf

The number of serious problems confronting the world at large today continues to grow, and become ever more difficult to manage with each passing day. The human race seems to be having a full-scale adolescent style crisis. If we do not soon emerge in fair shape, we may face something much worse than a worldwide depression -- a new Dark Ages. How long that would last and to what depths we might sink, dragging our host biosphere with us, cannot be known.

Population growth is outstripping our ability to access available resources at the standard of living levels with which we in the Developed World have become all too comfortable. Maintaining energy use at customary levels and maintaining the present state of "health" of the environment are beginning to look like either-or choices.

Poverty is on the rise in many areas, even in First World Nations. There is no end to a list of pressing top level concerns. Solutions requiring investment in one area, make investment in other areas harder to support. Are we caught in an "end of times" downward spiral? I think we need to take a look at just who we are, just where we came from, how we fit into the scheme of things as a people. If we can get a better insight into these things, we will have made a big step in putting the problems in the right context to begin to see solutions.

Most people consider our planet to be the only context in which we can understand our origins, our present history, and our future. One hears remarks such as "we need to find solutions to terrestrial problems right here on our home world, not out there somewhere." Well, quite frankly, it's too late for that. Our "home world" was Africa, and modern man has been on the move to wherever our developing technology would take us for at least 80,000 years. Our world used to be flat, but now we all consider it global. While few realize it, when man first set footsteps on another world, the "world" as a continuum of human horizons shattered that global limit forever; with that first step we became children of the Sun.

On every new frontier, we faced a new set of resources, of food sources, of climate conditions, of life-threatening dangers. Each time our great resourcefulness earned us the comfort of becoming "at home" in previously unforgiving, danger-fraught alien territory.

Backup a few steps to the real "Genesis." Of all the various elements of which our bodies are composed, only hydrogen is primeval. [Primeval helium is not found in living tissues, biochemical molecules, and substances.] All the higher elements have been forged in the interiors of stars which, at the end of their lifetimes, have exploded as "novas" scattering their enriched debris throughout the universe. It is from such "salted" gas and dust clouds that new stars began to form with attendant rocky worlds.

Genesis has it only half right. It should read,

"Of stardust thou art,
And to the stars thou shalt return."

Too many people think of Mother Earth alone. But where would we be without the Sun's light and warmth! Where would the Sun be without the countless older larger stars that ended their lives in a life-giving explosion? The Sun is but the most locally prominent part of Father Sky. Mother Earth and Father Sky are an inseparable pair. Together they constitute the holistic human environment. Without both, our existence and subsistence would be unthinkable. Nor can it be understood, preserved, enhanced, have a trans-adolescent future. We are children not just of Earth, not just of the Solar System, but of the Universe. "Mother Nature" is more comprehensive than "Mother Earth."

In that context, the suggestion that all solutions to our problems must be found here on Earth is not only wrong, but ignorant, stupid, self-defeating. Frankly, it is doctrinaire smelling of "orthodoxy."

Looking outward, the Moon *shares Earth's orbit* about the Sun. It is ours, a hinterland continent with resources for us to access and use. It is Earth's "pantry".

Yes, we have major energy, environmental, and social problems, all complexly interlinked. If accessing resources from space can help in any useful way in dealing with these crises, then assertions that we should look beneath our feet for all solutions becomes a cult of ignorance. And beyond the Moon are other resource-rich bodies, the asteroids, comets, and everything else in our Sun's considerable family.

Now the Environment seen as Earth alone, is clearly susceptible to the exponentially increasing effects of inhabitation by an excreting technological species. But what about the Environment seen as including "Father Sky?" The Solar System is, by terrestrial standards, very vast. Is it possible that we could in any sense pollute that larger ecosphere? Perhaps. Extensive use of mass drivers used to move small bodies such as asteroids, if the exit velocity were to be within a certain velocity range, could create small, limited but dangerous streams of pressure vessel-rupturing shot. Our possible negative effects on the solar environment are, however, hard to assess at this time. Let us hope our successors will be on alert.

On the positive side, Earth Life will accompany us as we spread the continuum of our presence beyond Earth's atmosphere. Sure, we could process some sort of Solyent Green nutrient to make it unnecessary to bring with us sustaining plant life. I will be most happy to have lived out my life in this "more primitive" age in such a case. The oasis of life that sustains us, is, in our opinion, not something to be outgrown.

Do we share the Universe

Looking out further, while the Moon seems to be barren, sterile, Mars may or may not be. But at best, any Martian life is stunted at a very low rung up the ladder of life. Around Jupiter, Europa's extensive ice covered global ocean hides mysteries about which we can as yet only wonder. The same may be so for other ice-covered moons of Jupiter and Saturn.

We know of advanced multicellular structured life forms only here on Earth. Are we alone? As mammals? as intelligent environment-modifying creatures? Many easy, flippant answers display an incredible ignorance of how very vast the universe is, not only in space, but also in time. No matter how rare "other" fertile "earths" may be percentage wise -- e.g. "one in a billion" -- the universe is so vast that there must be hundreds, even thousands *of billions* of other civilizations throughout quadrillions of cubic light years and through the most recent two thirds of the time since our universe seems to have come of age. That said, our nearest "contemporary" neighbor might lie beyond the distance in both space and time within which there could be any meaningful interaction or exchange.

At any rate, it is most likely that the Universe is multiply fertile on a grand scale.

Humans and the Universe?

"Go and fill the world" in this expanded sense, begins to take on an interstellar connotation. Technology may limit us to much less than that. Some worlds will be able to support native born flowerings of life such as has Earth. Others may be able to support the beginnings of life, but not allow it to get much further. Others still may have all the needed resources but not the environmental conditions. Some grand beginnings will occur on planets whose suns are too short-lived to allow the full flowering such as that has happened here on Earth.

And there perhaps is our ultimate Genesis mission: to sow life where it could not have arisen on its own; to advance life where local conditions have held its evolution in check; to speed up evolution where the local Sun may be too short-lived. See "Welcome-Mat Worlds", MMM #45, May 1991, reprinted in MMM Classic #5, pp. 25-28 – *at* www.lunar-reclamation.org/mmm_classics/

It is not mankind that is called to return home to the stars, but Earthlife, Gaia herself. Earth-life cannot reproduce itself elsewhere on its own. Thus, with no apology to those whom the following makes them squeamish, an intelligent dominant species can be seen as the reproductive organ of its planetary Biosphere. Through us alone, can Earth-life, Gaia, Mother Earth spread beyond its current limits. Father Sky calls us to this pilgrimage home. It calls us to fulfill the destiny of Mother Earth, and in the process tap full endowments of the Mother Earth - Father Sky union, to save Mother Earth from the ill effects of our technological adolescence. Someday, when our civilization has become more adult, we will be Solarians, children of the Solar System.

As noted, our species is not originally "Terran" but African. We have been on an epic journey of expansion to one frontier after another. To stop now, in the belief that the world cannot be more than round, a belief as mistaken as the one that held the world to be flat, would be to turn our backs on ourselves, on our origins, on our destiny. We must not hide our light under the basket of Earth's defining atmosphere. We must continue to develop the depths of our given talents. We can only do that by accepting the challenge to keep pioneering new frontiers. What other way to continue to give praise and glory to the creative forces which have forged us?

Those of us who want to look outwards for help with Earth's intractable problems, are environmentalists too. But we see "environment" as a much larger bi-parental context. Our origin is on flat plains of Africa. Our destination is wherever our pilgrimage to keep on exploring our hidden given potential will take us. "Of Stardust thou art, to the Stars you shalt return."

Mother Earth is not a spinster but wed to Father Sky. Her terrestrial brood is but the first. We must reject the demands for terrestrial solutions to terrestrial problems. We must educate others to the much vaster space-time context in which we have come into being, and within which our future lies. ***Our Environmentalism must be holistic to be effective*** **<MMM>**

The Moon Society www.moonsociety.org

An international nonprofit 501(c)3 educational and scientific organization formed to further the creation of communities on the Moon involving large scale industrialization and private enterprise

Objectives of the Moon Society

include, but are not limited to:

- Creation of a spacefaring civilization which will establish communities on the Moon
- Promotion of large-scale industrialization and private enterprise on the Moon
- Promotion of interest in the exploration, research, development, and habitation of the Moon, through the media of conferences, the press, library and museum exhibits, and other literary and educational means
- Support, by funding or otherwise, of scholarships, libraries, museums and other means of encouraging the study of the Moon and related technologies
- Stimulation of the advancement and development of applications of space and related technologies and encouragement their entrepreneurial development
- Bringing together persons from government, industry, educational institutions, the press, and other walks of life for the exchange of information about the Moon
- Promoting collaboration between various societies and groups interested in developing & utilizing the Moon.
- Informing the public on matters related to the Moon
- Provision of suitable recognition and honor to indivi-duals and organizations which have contributed to the advancement of the exploration, research, develop-ment, and habitation of the Moon, as well as scientific and technological developments related thereto.

Our Vision says Who We Are

We envision a future in which the free enterprise human economy has expanded to include settlements on the Moon and elsewhere, contributing products and services that will foster a better life for all humanity on Earth and beyond, inspiring our youth, and fostering hope in an open-ended positive future for humankind.

Moon Society Mission

Our Mission is to inspire and involve people everywhere, and from all walks of life, in the effort to create an expanded Earth-Moon economy that will contribute solutions to the major problems that continue to challenge our home world.

Moon Society Strategy

We seek to address these goals through education, outreach to young people and to people in general, contests & competitions, workshops, ground level research and technology experiments, private entrepreneurial ventures, moonbase simulation exercises, tourist centers, and other legitimate means.

Our Full Moon Logo above:

The Moon in its natural beauty, empty and deceptively barren, waiting for human settlers to shelter and to mother as their adopted second human home world. We have work to do!

Masthead Design: Charles F. Radley, Society Vice-president\

Society Prepares for 1st Annual Meeting

By Peter Kokh, President

As a new feature in the Moon Society's recent bylaws revision of February 6th, as reported in MMM #212, February 2008, Moon Society Journal Section (p.9), this year, on the third Wednesday evening of the month after Society elections are finalized, we will launch our first Annual Membership Meeting.

Save Wednesday evening, September 17th!

The meeting will be online, in the ASI-MOO special chat room environment, 9-11 pm ET, 8-10 pm CT, 7-9 pm MT, 6-8 pm PT. We realize that this window will not be convenient for many members. But neither would any other window. But why *this* window? This is the time and day slot in which the Society's Leadership Council, Management Council, and Board of Directors meets.

Practice now! If your schedule makes attendance at this event possible, and you have never been on the ASI-MOO, you will save yourself a lot of frustration that evening, if you first practice loging on. It is quite simple.

1 Go to our homepage www.moonsociety.org

2 Scroll down the left hand menu column until you come to the ASI-MOO image link. Click on this link

3 Ignore the preliminary information on this page (for advanced users) and scroll down the page until you see the dual links: **Java MOO client: Framed Popup**

4 Click on either (I like Popup but that's a personal preference)

5 Wait for the window to fully open. Some browsers are faster than others. Below the preliminary introductory text, you will see a line, below which you can type.

6 Type these three words: connect {your) username password all in lower case, each word separated by a space with no quotation marks. Hit carriage return

7 You will find yourself in the "Commons" Now you want to go to the "Auditorium" where the Members Meeting will be held. The instructions in the Commons say that the Auditiorium is "NorthWest" so type NorthWest without quotes and with capitals as indicated, then hit carriage Return, and you should be in.

Most likely problem you will have is not knowing your **username** and **password**. If this turns out to be the case, just contact me at president@moonsociety.org and tell me what your problem is. If you prefer an answer by phone, give me your phone # and best times to call in your email. We'll get you in, but ***do not wait until the last minute*** as I will be busy with other things!

Format and Topics of the Meeting

In preparation for the meeting, we will post an **Annual Report** in the **Members Area** of our web site:

www.moonsociety.org/members/reports/annual_report2008.pdf

Annual Membership Meeting Continued

Publicizing this Meeting

Meanwhile, the notice for this meeting, including this "how to attend" information, will be printed in MMM (this is it) and posted on the Artemis-List as well as sent by email to all current members with current email addresses in our database. *If you have changed your email address, do call that to our attention!* You many change it yourself at www.moonsociety.org/mymoon/ though you will need your username and password to access that page. Otherwise simply email your current email address to president@moonsociety.org

Meeting Structure

The meeting will be chaired by Chairman of the Board, R. Scotty Gammenthaler. After a review of the contents of the Annual Report, the floor will be open to questions from members. Members who plan to ask questions are invited to submit them in advance to president@moonsociety.org as this will help in bundling related questions and responses. However, this is not necessary and spontaneous questions are welcome.

Questions can be about problems with membership processing, Society response to problems, current projects and new project ideas, the overall direction of the society and suggestions in this regard, membership benefits, how to grow the society in numbers, name recognition, and project output, etc.

The Annual Report

The annual report as prepared by the president, will cover recent bylaws changes, elections results, our Vision, Mission, and Strategy, existing and proposed new projects, our primary and auxiliary websites, Moon Miners' Manifesto, our affiliations and collaborations, the treasurers report, awards of recognition for significant service to the Society, and our plans to make the Society ever more effective, *and more.*

To the Curious:

If you are reading this and are not a current member, by all means so join or rejoin. We will be most happy to benefit from your ideas and energies and initiatives.

A Learning Experience

We have never held an annual Membership Meeting before and so this will necessarily be one of those "leaning experiences." But even before the curtain falls on this first one, if you have ideas for features that should be included, don't wait to share them with us. We want this first meeting to be as comprehensive as possible.

Other Preparations:

We have been working on a Questionnaire, asking current and former members how they first heard of the Moon Society. We hope that the results of this survey will help us better direct our efforts to grow the Society. We hope to get this out soon.

Quarterly Town Meetings?

This is another but related idea that we have been considering – holding an online Town Meeting quarterly (three a year plus the Annual Meeting) and probably rotating the day of the week on which it is held. The idea would be to elicit continuous feedback and to provide more opportunities to participate. **<PK>**

Moon Society Gears up for More Action With new Project-oriented Teams

By Peter Kokh

At the August 6th Management Council meeting in the moon-leaders room of the ASI-MOO online chat-room environment, in discussing recent major membership growth, the effect of aggressively pursued carefully thought out projects took center stage. In the past two years, two projects in particular absorbed the lion's share of Society leaders' attention:

√ The production of the "**Moon Colony Videos**" suggested by director James Gholston and led by former Hollywood videographer and screen writer Chip Proser

√ The production of a **working demo model** of the current favored design of a **solar power satellite**, suggested by Major Peter Garretson, USAF, with teram leaders vice-president Charles Radley and Chairman of the Board, R. Scotty Gammenthaler

Both these projects have been highly successful, and are continuing! Chip, with assistance at recent ISDCs from James Gholston and David Dunlop, continue to produce more excellent videos. Our Solar Power Beaming Demo team, now under Peter Kokh, is following through with production of **two additional units** requested by Space Adventures and the National Space Society. **Online "Kits"** that will help other groups produce their own units comes next, and will be based not on the original but on the improved design for the two additional units.

But this is not all that's going on in your Society!

We have also committed to aggressive pursuit of the goal of **advancing the viability of production of real solar power satellites from Lunar Materials.** This team is led by Dr. Peter J. Schubert and Peter Kokh. This project goes to the heart of our long term strategy to advance the day when there will be civilian settlements on the Moon producing things that will help people on Earth better handle our environmental and energy problems and challenges.

The same duo is behind an effort to commence **a conversation between the space and environment communities on a more comprehensive plan to save and heal our home planet's environment.** Dr. Peter Schroeter had called our attention to an opportunity to get funds from the Environmental Protection Agency, EPA, for innovative conferences on addressing environmental problems. In collaboration with the National Space Society, we put forth a proposal for a "Mother Earth-Father Sky" conference, later renamed the Planet Earth & Space Conference/ Our proposal did not make the first cut, but is stil alive, and worth pursuing with or without EPA support. The editorial and essay in this issue address the need.

Other active projects include **Lunar Surface Logistics.** It makes no sense to put up scattered moon bases without equal thought given to transportation and commerce between them, absolutely necessary for our vision of the Moon's role in Earth's future. This area includes our Google Group: Railroading on Moon & Mars, but also the mapping of logical transportation corridors, road making, road vehicles and support, cableway systems and more. This effort is not yet at the stage we need it to be, identifying specific doable projects.

Finally, Director David Dunlop is in the early stages of resurrecting a Lunar Reclamation Society effort from the early 1990s focused on **Experimental Lunar Agriculture**, and has identified a number of new doable projects. We will not be able to live long term on the Moon without autonomous agriculture and biosphere life support. Our efforts will address the agricultural aspect.

Different from the "ASI Discussion Teams"

Society old timers who came aboard in the mid-late 1990s in the Artemis Society years will remember the lengthy list of Artemis Society Teams. Is this Moon Society effort just a revival of older ASI-? The answer is a resounding "No!"

While the intention was for the many ASI Teams to come up with concrete projects that would further the cause, in reality, these teams for the most part never got beyond the "discussions" stage. Each Team has/had a discussion list, predictably with a high noise to signal ratio, and again for the most part, never identifying concrete projects within the team's area of attention.

Moon Society "Project Teams"

Our recent measured successes have been the result of **identifying specific projects with defined goals and achievement levels.** Each new team has a Team Leader who aggressively moves the effort on towards the defined goal. Looking at the successes of the past two years, your President would like to add one more key person to each team, **the project manager**, whose role will be to identify **action items** and recruit volunteers to address each of them, in order to aggressively move each identified project forward. It would be misleading to say that we are there yet. Are these two roles in conflict? They need not be.

The **Team Leader** is in charge of keeping us focused on the vision and mission of each team.

The various **Project Managers**, one for each identified concrete project of each team, is in charge of moving forward a specific project within the team's area of focus,

Project Focus Moves to Front Center Stage

We will soon redo the **Registration Page**, and our Welcome Packet & Vistors' pages to give the opportunity to join Project Teams front center priority visibility.

Presenting our (current list of) Project Teams

- √ **Promotional Video Team**
- √ **Public Relations Team**
- √ **Solar Power Beaming Demonstration Team**
- √ **Lunar Materials for SPS Team**
- √ **Space & Environment Conversation Team**
- √ **Experimental Lunar Agriculture Team**
- √ **Lunar Surface Logistics Team**
- √ **Lunar Analog Research Team**

Growing our Society

Obviously, to advance the work of all these teams, we need more members, the more the better, new members ready to roll up their sleeves, more total dues money to fund our growing list of concrete projects. We are gaining a reputation among space groups as "the little engine that could!" **We need *your help!***

Comments? president@moonsociety.org

Houston Chapter Website Cited as "Best!"

From Chapters Coordinator, Peter Kokh

Since coming aboard as Chapters Coordinator in 2002 (two years prior to being elected Society President), I have worked to support all levels of chapter activity. A website is a very important tool both for supporting current chapter activity, and for attracting new members.

Chapters need not go to ad-infested "free" sites on Angelfire, Tripod, or other host systems. Any chapter or outpost can have a free area on the Moon Society with the address of:

http://www.moonsociety.org/chapters/chaptename/

Chapters and outposts taking advantage of this arrangement include St. Louis, Houston, and Milwaukee. The (South San Francisco) Bay Area (BAMS) and (Dallas-Ft. Worth) North Texas outposts also have sites, but they are not actively updated.

These sites are easily maintained by Website Director software that comes with the site space. Best of all, there is total freedom of website design. Chapter/outpost webmasters are free to come up with their own (see the St. Louis site as a prime example:

http://www.moonsociety.org/chapters/stlouis/

This is a very nice site, but needs updating.

The Milwaukee Outpost has a unique template as well. http://www.moonsociety.org/chapters/milwaukee/

But two easy to use templates are provided Mike Delaney mdelaneyis@eircom.net has created one adopted by BAMS & North Texas. Neither is currently updated. Check out: http://www.moonsociety.org/chapters/bams/

Houston uses a template created by the chapters coordinator. See:

http://nsschapters.org/hub/webtemplates/template_4.htm

This template was selected by former Houston outpost leader, Craig Beasley. Eric Bowen took over this site upon reactivating the Houston chapter, and he has done a marvelous job with it.

Again, chapter and outpost leaders may use either of these templates or come up with their own.

In short, we have tried to make it easy for you as well as to allow chapter and outpost webmasters to exercise total freedom of site design. The two provided templates make it easy for webmasters new to the game to get started and provide service to their chapters.

Houston Chapter's New Discussion Forum

For its members, all Moon Society Members, and with special space set aside for all Chapters and Outposts of the Society to have their own discussion space

http://moonsocietyforum.com/

The Houston Chapter invites all Moon Society members and interested guests to participate in our new discussion forum, available 24 hours a day! Moon Society members may give their membership number at registration for access to the private "Members Only" discussion section.

All Moon Society Local chapters and outposts will be provided with their own designated sub-forum *upon request.*

Chapters & Outposts

Moon Society St. Louis Chapter

http://www.moonsociety.org/chapters/stlouis/
Contact: Keith Wetzel <kawetzel@swbell.net>

Meetings **2nd Thursday** monthly, Buder Branch Library 4401 S. Hampton, in the basement conference room

Next meetings September 11th, October 9th

We are preparing for our annual outreach event at **Archon 32, October 3-5th** held at the Collinsville, IL Gateway Center (convention center) and adjacent Holiday Inn,just off exit 11) on I-55/I-70. (11 miles east of St. Louis/Mississippi River.

Moon Society Phoenix Chapter

http://www.moonsocphx.blogspot.com/
Contact: Craig Porter <portercd@msn.com>

Meeting the 3rd Saturday of the month

Moon Society Phoenix' next meetings are on Saturdays **September 20th, October 18th** at 1056 S Country Club Dr, Mesa, AZ at 3: PM.

At our July 19th meeting, Ms Catherine Book, Director of Programs for CopperCon28 with us to answer any questions we had about CopperCon28 and to update us on our participation in the Con, August 29th-31st at the Embassy Suites Scottsdale. CopperCon is one of the big Science Fiction Convention programs in the valley. While we are participating in the program we are also manning an outreach table with handouts about the Moon and Moon maps, with lots of "eye candy" for the youngsters at the Con. We are presenting three seminars on the return to the Moon. Charles Lee Lesher will speak on "Space Based Solar Power Systems." The Rev. Dr. Bonnie Ann Burgard will speak on the dynamics of the race to return to the Moon involving and the participating countries. The third by Craig Porter will be about the "University of Luna Project" and why it is necessary enable the successful return to the Moon in a successful manner economically, technically and socially.

We welcome our newest member, Colin Ho, an undergraduate student at ASU majoring in Astronautics.

The Chapter has applied for two trade name applications. Trade Name "**Moon Society Phoenix**" is required to open a Chapter checking account. Trade Name "**Tranquility Community College**" is needed to secure our educational outreach program.

Moon Society DUES with ***Moon Miners' Manifesto***

Electronic MMM (pdf) **$35** Students/Seniors: **$20**
Hardcopy MMM: U.S/Canada **$35** Elsewhere: **$60**
Join/Renew Online - www.MoonSociety.org/register/

Moon Society Mail Box Destinations:

Checks, Money Orders, Membership Questions

Moon Society Membership Services:
PO Box 940825, Plano, TX 75094-0825, USA

Projects, Chapters, Volunteers, Information, etc.

Moon Society Program Services
PO Box 080395, Milwaukee, WI 53208, USA

Moon Society Houston Chapter

http://www.moonsociety.org/chapters/houston/
Contact: Eric Bowen <eric@streamlinerschedules.com>

Next Meeting Place & time

Monday, September 22, 7 pm at the **Freeman Branch Library** at **16616 Diana Lane**, next to the Harris County Courthouse Annex in **Clear Lake**, just off Bay Area Blvd. We hope to be able to arrange a speaker from NASA JSC.

Our New Discussion Forum open to all
http://moonsocietyforum.com/

The Houston Chapter invites all Moon Society members and interested guests to participate in our new discussion forum, available 24 hours a day! Moon Society members may give their membership number at registration for access to the private "Members Only" discussion section.

All Moon Society Local chapters and outposts will be provided with their own designated sub-forum *upon request.*

Bay Area Moon Society Outpost

http://www.moonsociety.org/chapters/bams/
Contact: Henry Cates hcate2@pacbell.net

Moon Society Tucson Outpost

Contact: Ben Nault bnault@comcast.net

Moon Society Milwaukee Outpost

Contact: Peter Kokh kokhmmm@aol.com
http://www.moonsociety.org/chapters/milwaukee

For news of our NSS Partner Chapters in Portland, Milwaukee, and Minneapolis/St. Paul,
see pages 18-19, this issue

Moon Society Chapter Photo Gallery

Moon Society Phoenix Table Setup @ Leprechon 34

Why not start a Moon Society Outpost in Your area?
All it takes is one person - you!
write: chapters-coordinator@moonsociety.org

< End Moon Society Journal Section >

GREAT BROWSING

Why the long Delay after SpaceShipOne?
http://www.thespacereview.com/article/1165/1

Short Fiction: What if Apollo Landings were fake?
http://www.thespacereview.com/article/1161/1

Are Orion and Ares Engineering Projects Failing?
http://www.thespacereview.com/article/1158/1

Technical Challenges facing Space Solar Power
http://www.thespacereview.com/article/1147/1

Economic Cycles and Space Development
http://www.thespacereview.com/article/1156/1

Student satellites: encouraging or a sign of panic?
http://www.thespacereview.com/article/1170/1

New Energy Programs a threat to Space Programs?
http://www.thespacereview.com/article/1169/1

"Pit Stop": a new way to return from space
http://www.thespacereview.com/article/1167/1

Review: (training regimes for) Tourists in Space
http://www.thespacereview.com/article/1166/1

Shuttle Retirement & Commercial, Civil Spaceflight
http://www.thespacereview.com/article/1173/1

The COTS Conundrum
http://www.thespacereview.com/article/1179/1

Europe's Growing Space Ambitions
http://www.thespacereview.com/article/1178/1

Constellation Program not Robust Enough?
http://www.thespacereview.com/article/1177/1

Review: Orphans of Apollo (MirCorp effort)
http://www.thespacereview.com/article/1176/1

Lessons from the Arctic Frontier
http://www.thespacereview.com/article/1181/1

GREAT SPACE VIDEOS

MOON COLONY VIDEOS - The Moon Society

30 plus thought-provoking videos, produced for the Moon Society by Chip Proser (Celestial Mechanics, Inc.) can be found at.
http://www.moonsociety.org/video/
or at:
http://www.mooncolony.tv/
http://www.stickymedia.com/

Help us put MMM in a Library near You!

A library subscription to a library in your community will help spread the word about local, national, or international Moon-focused programs and projects, grow name recognition and invite readers to join. The cost, directly fromn the publisher is $10 a year. Send *by postal mail only,* your check of money order for $10/per year, With the complete name & address of the Library, made out to

"Lunar Reclamation Society"
Attn: Library Subscriptions
PO Box 2102, Milwaukee, WI 53201

Lunar Passenger Railroads

By Frederick L. Hills - <Fredhills7@aol.com>

The importance of railroads in the American economy was recognized and in 1862 congress authorized financial support for construction of the Transcontinental Railroad. It was completed in 1869. By 1870 there was 53,000 miles of track in America.

Railroads will no doubt play an important role in development of lunar society. Nothing can match the speed and efficiency of railroads for moving enormous quantities of freight or people. Furthermore, it is obvious that airplanes and ships will not work there.

Traditionally trains were the transport of choice for the common man especially before the advent of automobiles and highways. It seems that rail transport on the moon will be available long before any other convenient mode of private transport is developed. (A 500-mile trip on an Apollo style rover does not sound appealing.) The wealthy may have private rail cars as did railroad executives and dignitaries of old.

In this article I will focus on the design of the rail passenger cars and railroad tracks. Once those issues are resolved, the development of cars for freight transport is fairly straightforward. The locomotive presents some technical challenges that will have to be resolved. Most challenging, perhaps, is providing a source of energy to the locomotive.

There are three characteristics of the lunar environment that present significant design challenges: lack of atmosphere, weak gravity (1/6 that of Earth), and wide temperature swings between lunar day and night. These issues will be discussed in turn.

Air for passengers

Airliners carry everything the passenger's need except air. The air is simply pumped in as needed and stale air exhausted to the atmosphere. Lunar rail cars should exhaust nothing. Air must be re-circulated and reconditioned as needed. CO2 and water is removed from the air to maintain a normal ratio. Oxygen must be added as needed to maintain balance.

Dealing with weak gravity

There may be an increased danger of jumping off the rails on the moon, but the most serious and predictable problem is rollover while rounding bends in the track.

For example, on scanning a map of the Washington, DC area for the main rail line going south, I found several curves. One measured 333 meters in radius. A train running at 60 miles per hour will experience a significant outward or centrifugal force. However, in this case the force of gravity is 4.5 times as strong as the centrifugal force and the cars will not roll over. On the Moon, however, the picture is not good. There the centrifugal force, which on a similar curve will the be the same as on Earth, is one and a half times greater than the gravitational force. Roll over would be inevitable.

There are two options to prevent disaster, run trains at low speed around curves or find a mechanical solution to the problem. Two solutions come to mind: make the tracks much wider, or design the track to prevent rollover. The first option requires a wide roadbed and longer ties to hold the rails: an expensive solution.

The second option that I suggest is to add a third rail. This would only be needed along the inner side of a curve to prevent the primary wheels from lifting off the

track. This inner side of the track must also be securely anchored so as not to pull up as forces push the car over.

Each truck on American rail cars has two axels. A third axel could be added between and slightly above the others to carry the extra wheel as shown in the illustration. The rail spacing shown is somewhat wider for additional stability on strait runs, but still narrower than the body of the cars.

Temperature extremes

The lunar surface temperature is -292 degrees F (-180C) at night, and +248 degrees F (+120C) during the day. This presents a problem for both rail cars and track.

Obviously temperature control is going to be a priority for passenger cars (and at least some of the freight cars). Shiny aluminum shell for car bodies would minimize heating during the day by reflecting sunlight and minimize heat loss during the night by low radiation.

The car should be well insulated and an air conditioning system will be required. Appropriately placed radiators can radiate excess heat and, when needed, electric heaters can warm the air.

Temperature is a bigger problem for the rails since they will expand and contract with temperature. This is a problem even on Earth where welded steel rails can be hundreds of feet long. On hot days they run out of space and buckle. So when temperatures are high workers have to walk the track in search of buckled sections and stop the trains if they find any.

We should be able to make steel rails on the Moon. If we assume 40-foot rails (rather short but suitable for this environment) then expansion for a temperature increase of 300 degrees C would amount to 1.73 inches (4.4 cm). That is if the rails are laid and butted together while hot, there would be a gap between them of nearly one and three quarter inches as the temperature drops to its lowest night time value. There would certainly be a loud 'clack' sound as the train crossed the joint and over time damage to the rail. This can be reduced by cutting away one half of the width of the rails on the last two inches of each end. This would allow them to overlap up to two inches and reduce wear on the rails.

The point is that lunar railroads look feasible and over time designs would improved to decrease wear and maintenance.

The lunar passenger coach

The lunar coach can be as spacious and comfortable as their Earthly counterparts. But the shape will be more like an airliner cabin. The internal pressure versus the outside vacuum will dictate choice of a cylinder with rounded ends.

Food service could be done airliner style or from vending machines. Baggage should be stored below the floor as on airlines, but handled from the cabin rather than below. Ideally storage and retrieval would be automated and controlled by pushbutton. Most mechanical and electrical equipment would also be below the floor. This will keep the center of gravity as low as possible and further reduce the possibility of rollover. The final necessity is a lavatory.

Communication throughout the train should be available using cell phones both for staff and passengers. Service outside to cities and towns should also be available except in remote undeveloped areas.

The most restrictive requirement is elimination of the passage between cars. When riding earthly railroads you have no-doubt noticed that the cars constantly in motion. An accordion type connector would have to be fastened to the adjacent car with an airtight seal. Unfortunately the to constant motion would likely cause cracks in the accordion section and leakage (or failure).

The next issue is doors for getting on and off the train. We might note here that one of the biggest problems for the American space shuttle and International Space Station is loss of air. Doors and module interconnects leak. So the number of doors on the car should be minimized. One seems unsafe, so I suggest two: one forward right and one aft left.

Finally, lets consider the station: basically a building with passageways to the city or town and an area for boarding the train. Here we encounter the biggest problem: a pressurized passage from station to railcar. Taking a cue from the airlines, I suggest a metal tube that can be moved enough to line up with a car door and establish an airtight connection with the car. Then the passage can be pressurized and the doors on each end opened allowing passengers on and off. (The space between the doors can be quite short so that little air is involved.)

As any rail traveler knows that stations vary greatly in size. There are big metropolitan stations and little stations for small towns. On the moon a city station might have ports for ten cars (or more?). But smaller towns would object to the cost of building air locks for every car on the train, (the minimum should probably be two). But that leaves another problem: if you get on car #3 at one town, will the station at your destination serve that car?

One solution is to treat each car like an airplane. E.g. many planes fly between Boston and Los Angeles, but each will stop at different cities along the way. The traveler would choose the flight that includes the desired cities or, failing that, choose place to change planes and complete the trip. This same approach can be used for selecting rail cars.

Finally there is the problem of 'outback' service. For places far from civilization earthly trains will stop on request to let people on or off. To provide such service on the Moon a lunar rail car could be equipped with an air lock (assumed here to be at one end of the car). A person could hail the train, and when it comes to a stop climb a ladder and enter the airlock through the outer door. After the space is pressurized, the border would open the inner door and enter. Of course the process can be done in reverse and repeated for as many people as needed.

Clearly we can look forward to the day when the day when lunar railroads will become available, that is when there are enough people in a region to make them economically viable. When that happens, life on the Moon will become more attractive and more people will settle there. **<FH>**

==========

Fred Hills, Herndon, VA is a newly elected Director of the Moon Society, and also a member of our Google Group: "Railroading on Moon and Mars."

Fred sent along a short story, a murder mystery, that takes place on a lunar train -- "Murder on the Tycho Express."

Fred's first piece of Lunar Fiction, "Nubian Pool" ran in MMM #214, April, 2008.

Murder on the Tycho Express

By Fred Hills - <fredhills7@aol.com>

Bessel is a small town located in the Sea of Serenity. Sunshine streamed through the rooftop windows in the railroad station and fell on the tiled floor. Doug Mason walked in from the adjacent town mall carrying a suitcase. He pulled a train ticket from his pocket, "One rider, Bessel to Autolycus, 4 June 2068" it read.

The station was part of the first lunar railroad system which now ran from Dawes in the Sea of Tranquility to the Town of Wallace near a crater of the same name.

The train was due in at 3:30PM CST. Doug walked over to a window, and looking down the tracks spotted a six-car train rolling toward him. He heard it pull into position, aligned with the boarding doors.

Soon the announcement came that passengers could proceed to the gates. This station only had two gates (the minimum allowed). He walked swiftly to gate B as specified on his ticket.

As he waited his turn, he gazed at the short passage and double doors ahead. The arrangement was much like that at terrestrial airports except that the tunnel was quite short and the doors at both ends were airtight.

The stewardess for the car checked his ticket and motioned him on. He walked onto the car and placed his suitcase in a tub next to the door. Immediately the tub with his suitcase disappeared and another popped up. (Baggage is handled by an under-floor system.) Seats are not assigned so he picked an empty seat at the back of the car.

Doug had the look of an athlete at 6 feet tall and almost 200 pounds. He settled into his seat next to the window and gazed out across the Mare. The crater Bessel, for which the town was named, was out there beyond the horizon. Next he opened a novel that he purchased for the trip. It was about a seaman on a nineteenth century whaling ship out in the Pacific.

He read until the train slowed for the next station. New Phoenix was a sizable city and a station of commensurate size. Eight people boarded the car.

An elderly lady in a black dress was talking with a middle-aged woman right behind and they took seats together. Next came a young couple with two children. Two more people straggled in before the door closed.

Doug was an observant fellow. In fact he worked as a detective with local police and sometimes took work as a private investigator (PI).

He went back to his book but couldn't even finish the chapter before the train slowed to a stop. This stop was for the town of Sandwich. The station was on the left side of the train. Two people boarded. The first was a man who took a seat in the middle section.

The second, a middle-aged woman dressed in an orange sweater and white shorts, looked at Doug and asked, "Is this seat taken?"

It's yours."

"I'm Amanda," she said settling into the seat.

"Glad to meet you. My name is Doug Mason."

"Where are you going?"

"Autolycus"

"That's a strange name."

"It's named after the crater that is about 40 miles north of the city. How long have you been on the Moon?"

"Three months. I was going to college in Boston."

"What are you majoring in?"

"Well, It was history, but after a year I switched to economics."

"Do you live on campus?

"No. I was living in an apartment with a girl from India. She is studying economics and suggested that I try it."

"Do you like it?"

" No, it involves too much math. So I decided to move up here with my dad." She opened her purse and it fell to the floor as she removed a mirror. A lipstick rolled over to Doug's shoe. He picked it up as Amanda retrieved the purse and rounded up other contents.

"Thanks," she said.

Doug returned to his book as Amanda worked on her makeup. Soon the train stopped again. He looked out but saw only flat plains. The stewardess announced that they were picking up a passenger. She then came to the back and proceeded to pull the storage cart out of its berth. Doug got up and helped. Next she closed the door and activated the entry system.

He stood to the side and looked out the window. Below he saw a rover and two people in space suits. One picked up a bag and walked toward the train car.

Doug knew of stops like this but had never experienced one. He heard the outer door open and then close. There was a distinct sound of air entering the chamber and soon the door opened. It was a woman with her helmet under her arm.

The stewardess handed Doug a large bag. "This is for the space suit," she said. The woman stepped out of the lower portion of the dusty suit and placed it in the bag. Next she removed the upper portion and put it in the bag followed by the helmet.

"Thank you," said the woman who was dressed in a simple jump suit. She then picked up her suitcase and took a seat in the middle section.

The stewardess closed up the bag for the space suit and put it aside. Next she vacuumed up the moon dust all around and pushed the storage cart back into place with Doug's help.

"You're very good at this," said Doug.

"I have had a few years to practice and she comes into town about once a month."

She thanked him as he returned to his seat.

———

The train rolled on for some time and then the PA system came on. The stewardess announced: "There are two choices for dinner tonight: Roast beef with mashed potato and green beans, or catfish with carrots and rice." She got out a cart and began serving the first section.

She continued on until the cart was empty.

Amanda got up as the stewardess returned that cart. She bounced from side to side with each roll of the train.

Doug returned to his book.

A few minutes later Doug saw Amanda emerge from the rest room. She looked over her choices in the magazine rack while apparently waiting for the stewardess to return the cart.

"What have you got there?" said Doug as she sat down.

"The Ladies Lunar Review", she replied.

"What is it about?"

"I don't know yet, but it looks interesting."

Doug watched as she began scanning the magazine. She seemed most interested in the fashion ads.

Doug noticed that the stewardess was not busy now that dinner had been cleaned up. So he arose and went forward, approached her and said: "Hello, I'm Doug Mason from Bessel. I would guess you are from Fresnel.

"No, I'm from New Phoenix. Let me guess, you are in the building trades."

"Nice try. I work for the sheriff in Bessel most of the time. Here is my card."

"Very nice. Where do you get cards like this?"

"There is a very good print shop in Bessel. Say, I would like to take you out to dinner next time I'm in New Phoenix."

"Oh my. Well maybe, but now I have to answer a call."

She went and talked to someone in the middle of the car. Doug returned to his seat unsure of what kind of impression he left.

Amanda was still reading and one article caught her attention: "Global Warming" she observed. "Do you know the reason my father came to the moon? It was after four successive crop failures on our farm in Kansas. It was too hot and rains few and far between. He saw an add for people to run a farm on the moon, and, best of all the government would pay his way to get here."

"Yes, the global temperature on the Earth is up about two degrees centigrade, which is considered the critical point."

"How is he doing?" Doug continued.

"He is quite happy here, and he says his crops have been producing nicely."

Doug saw a woman ahead get up and move to the isle. It was the one that came aboard with the elderly woman in black. She wore a green skirt and a white blouse. She walked forward a few steps then groped for something hold on to. Several people tried to help, but she slumped to the floor.

A young woman in the mid section announced she was a nurse and went to help. She knelt beside the woman, examined her eyes, and felt the pulse in her neck and her wrist. After several minutes she announced the woman was dead.

The stewardess said aloud, "Can someone help me move the body out of the isle?"

Two men stepped in and moved the body under a nearby empty seat.

The stewardess made an announcement as few minutes later. "May I have your attention please: a woman on this car died minutes ago as many of you know. There is no reason to believe that anyone else here is in danger. The conductor and the police have been notified and will meet us at the next station where the body will be removed. Thank you."

Doug walked forward a few minutes later and spoke to the lady in black. "Pardon me madam, I am a detective with the Bessel sheriffs department." He handed her his card and continued: "I don't know what your relation to the woman that sat here is but I noticed that the two of you were conversing as you boarded. Can I be of any assistance?"

"I just met the woman in the station. This is all such a shock. Yes, just talking with someone will help. Sit down."

They continued with small talk and gradually she relaxed. Then Doug asked: "Did the lady take any medicine with her dinner?"

"No. But she ate most of her roast beef dinner."

"Did anything unusual happen during dinner?"

"Why, yes. A woman coming down the isle dropped her purse and it landed right between us.

"I picked it up and handed it back to her."

"That's all?"

"Yes."

"Can you identify the woman?"

She stood up and turned around. "I see her. Last row on the left."

"Thank you very much."

Soon the train began slowing for the Boulder station. Doug got up to talk to the stewardess: "I am a detective with the Bessel sheriffs department. The passengers will need to stay put until the police have decided how to proceed here."

"I guess you're right. The conductor will be coming in, too."

She picked up the mike. "Due to current circumstances, please remain in your seats. The conductor will come in shortly and give us further instructions."

The conductor and a policeman walked in as soon as the door opened. The former greeted the stewardess. She interrupted: "This gentleman is a detective and has something to say."

"I'm Doug Mason with the Bessel sheriff's depart-ment. I strongly suspect foul play in the death of one female passenger, and recommend that everyone here stay until we sort things out."

"We can't keep the train here," said the conductor.

They conferred for a while, identified six passengers who were to get off here and decided that none of them were needed for the case at hand. They were allowed to depart and the train went on.

Next, the conductor, the policeman and Doug cleared the last five rows of the car, reversed one seat and put in a table so four people could confer. The stewardess put up a Curtin to isolate the back rows.

Doug, the policeman, and the conductor sat down at the table. Doug proceeded to lay out his hypothesis. "It seems likely that the victim was poisoned by one of the passengers. Amanda, who was sitting next to me had, I think, opportunity. My hope is that by examining the victims travel companion, the victims effects, and questioning the suspect we can unravel the plot." The policeman and conductor agreed to give it a try.

First they asked the nurse to join them.

She introduced herself as Lynn McKenzie, a nurse with the hospital in New Phoenix.

"What can you tell us about the women's death?"

"It's pretty clear that it wasn't a case of loosing her balance. She simply passed out and collapsed to the floor. Her breathing was shallow but regular. Her pulse was unusually fast and it got steadily weaker and finally undetectable."

"What was the cause of death?"

"I don't know since I've never seen a case like this. But some kind of poison seems most likely."

Thank you miss, you may go.

Next they met with the lady in black who reiterated everything she told Doug. She gave them the victim's purse and they let her return to her seat.

Doug opened the purse: "lets see what this tells us."

"There is a bunch of letters in here. This one is from a lawyer in Autolycus. Would you look that over officer? This drivers license gives her name as Janet Clegg and an address in Bessel. Here is her ticket to Autolycus but it gives her name as Janet Wilson!"

The officer put down the letter and said; "apparently this lady is recently divorced and won a substantial amount of money in the settlement. It also indicates she plans to change her will."

"Let's bring in Amanda," said Doug.

The conductor invited her in to sit at the table with them. She looked nervous but serious.

Doug opened with an introduction: "I am a detective; the man next to you is a police officer from Boulder; and next to me is the conductor. We are examining the circumstances of the woman's death."

"What has that to do with me?"

"You were one of the last people to interact with her. Please give us your name."

"Its Amanda Clegg and I'm living with my dad at present."

"May we see your ticket?"

She handed it over and said, "I'm going to Fresnel to do some shopping."

"Do you know the woman who died here today?"

"Never saw her before," she declared.

Here is her driver's license. Please read the name on it.

Amanda stared at it and hesitated. Her face turned pale. She read aloud "Janet Clegg" in a shaky voice.

"Do you recognize the address on it?"

"Yes, it is the address of my Dad's apartment."

"Please dump out your purse on the table."

She did so. It looked like the usual collection of stuff in a woman's purse: brush, tissues, wallet etc.

Doug pulled out her driver's license. "Is this the address of the place where you and the girl from India lived?"

"Yes," she replied matter-of-factly."

"Do you recall dropping your purse by our seat?"

"Yes"

"There was an eyedropper bottle in there. Where is it?"

"Its empty. I thru it out."

"I'll check that out, " said the conductor as he got up.

Soon he returned with an eyedropper bottle. "I think this is it. There is a little fluid left in here – and it does not look like the stuff indicated on the label."

The officer opened his briefcase and announced, "I have an analyzer with me."

Amanda, feeling defiant, said: "Big deal."

The officer pulled out a device about the size of a typical novel and turned it on. When the green 'ready' light came on he carefully squeezed out a single drop and let it fall in to the receiving well. After thirty seconds the results were displayed and he read off the message: "Poison - extract from the Cerbera Odollam tree found in India".

Doug looked Amanda directly in the eyes. "So its cold-blooded murder! You killed your stepmother using poison obtained from India by your roommate. All over a little money!"

"She's a bitch! She deserved to die for trying to cut me out of her will!" screamed Amanda.

"We will let the court decide that," the officer said as he pulled a pair of handcuffs.

The police officer led Amanda off the train at the next stop, Linne'.

The stewardess approached Doug and said, "This the end of my shift and I get off here. It was a pleasure to meet you." She handed him a card and left.

It was the business card, which he had given her, but on it she had written "Linda NP7-3329" in flowing script.

PS: Three months later she changed her name to Linda Day Mason. <**FH**>

Contract Incentives for an Open Architecture ILN
(Google X-Prize Teams Included)

David A. Dunlop[1], The Moon Society,
Dunlop712@yahoo.com
410 N. Ashland, Green Bay, WI 54303

Introduction

There is a lunar community of interest in how an "open architecture" can be designed into "infrastructure" to increase opportunities for entry by commercial providers. This community of interest includes those who would wish to see costs of going to the Moon reduced, the pace of scientific and commercial projects accelerated, and the flexibility of planning and contracting for lunar missions increased.

Now there is interest in creating a commercial paradigm of space transportation providers. The Google Lunar X-Prize competition is the most visible expression of this movement. According to Dr. Pete Worden, the Director of NASA AMES Research Center, the cost challenge is to pioneer "micro" lunar lander missions that can perform useful functions "in the low tens of millions range from "perhaps a low of $28 M to $48M to $68M at the high end." [1]

As one example, the NRC final report on the Scientific Context for the Exploration of the Moon mentions **the utility of an increased network of laser reflectors on the lunar surface**. [2] It would make economic sense for agencies such as NASA, ESA, JAXA, ISRO, Roscosmos, and CNSA to provide potential contracts to any Google Lunar X-Prize teams that would deliver, in this example, a laser retro reflector to the lunar surface. A variety of scientific instruments that are recognized as elements of a lunar science network might be contractually placed in this manner on private landers.

Google Lunar X-Prize Contracts:

Under the Google Lunar X-Prize there are the first and second prizes to be won. When those prizes are won, the remaining teams would remain without the financial incentive from the Google Lunar X-Prize. Many teams might simply disband once the financial prizes are taken, and even once the prestige and recognition of being winners of the competition was secured by others.

> *It would seem to be a tragic loss of capital and intellectual resources to have many teams which have gone in essence through phases A, B, and C of their mission development to fail to realize their goal of achieving a lunar landing and demonstrating innovative technologies by reason of simply not being first.*

Contract incentives of equal proportion to the Google Lunar X-Prize by the national funding agencies might create many "winners" in the realm of education, science, technology, and the ability to demonstrate greatly improved cost efficiency. For the national space agencies to offer contracts to establish a lunar sensor network may be a way to quickly and cost effectively "harvest" the capital investment and technology innovations of the Google-X Prize competition and develop a more commercial space model in the process.

National space agencies would have to develop their own criteria in assessing the credibility of potential contractors. NASA has in fact proposed something of this

sort in conjunction with its ASMO mission proposal. This is a paradigm shift in the way business has traditionally been conducted by NASA. It is also the paradigm followed by the ESMO ESA mission.

Having a known and publicly described set of such instruments with fixed priced contracts also facilitates planning on the part of those who might wish to include the possibility of such contracts in their mission and financial plans.

To propose science contract packages from national space agencies for ILN sensors would create a financial climate equivalent to the Google Lunar X-Prize and create a "commercial market" for such micro landers. $ 150 million represents a third of one NASA Discovery mission. A $ 25million by each of the 6 major space agencies would be the equivalent of more than 7 Google Lunar X-Prize Competition First prizes or 30 second prizes. ILEWG might encourage early budget and contract commitments by national space agencies especially if their impact is spread over a 5 or 6 year period or longer.

This contract model could focus on payments for a more complex set of milestones for criteria such as: a. design, b. construction, c. launch, d. deployment, e. data return. Phased contract incentives equivalent to the Google Lunar X- Prize first prize might provide financial sustainability of those teams whose engineering and mission planning credibility warrants such contracts and that remain intact after the fist and second prizes have been awarded.

The aggregation of contracts for a variety of sensors defining a ILN network node would fall into the low range of lunar lander costs projected by Dr. Worden but not preclude other private, commercial, or national efforts and projects of these teams. This could also make "national flag" lunar mission commitments from the 14 ILN signatory nations much more likely and foster financial collaborations between such national flag agencies and commercial organizations.

Collaborative commitments by national space agencies in this model result in a mix of successful public science, "national flag", and corporate lunar landing missions.

References

[1] Personal communication.

[2} The Scientific Context of the Exploration of the Moon: Final Report, NRC, Space Studies Board, 2008, p. 53,65,66.

Next Month:

A Major Abstract on the

Feasibility of Lunar Railroads

from the view point of lunar materials engineering,
by materials science expert

Gordon Haverland, Grande Prairie, Alberta, Canada. Haverland is a long time Moon Society member and has been nominated for the Board of Advisors.

A longer abstract by Haverland on

Extra-Terrestrial Engineering: Materials Perspective
Will be published to
http://www.moonsociety.org/publications/papers/

Lunar Reclamation Society, Inc.
P.O. Box 2102
Milwaukee
WI 53201
www.lunar-reclamation.org

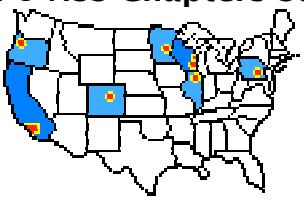
2008 LRS OFFICERS | BOARD* | Contact Information

PRES. / MMM Editor – *Peter Kokh **NSS**
< kokhmmm@aol.com > 414-342-0705
VICE-PRES. Doug Armstrong **NSS** 414-273-1126
SECRETARY – *James Schroeter **NSS**
< James_Schroeter@excite.com> . 414-333-3679
TREAS./ Database – *Robert Bialecki
<bobriverwest@yahoo.com>..... 414-372-9613

LRS Upcoming Events – September & October

MEETINGS: September 13th, October 11th, 1-4 pm
LRS Meeting, Mayfair Mall, Garden Suites Room G110
AGENDA: Space News, Moon Society/NSS News

MMM 8 NSS Chapters Strong



NSS Chapter Events
Space Chapters HUB Website:
[http://nsschapters.org/hub/]

ILLINOIS

Chicago Space Frontier L5
610 West 47th Place, Chicago, IL 60609

INFORMATION: Larry Ahearn: 773/373-0349

OREGON

Oregon L5 Society

P.O. Box 86, Oregon City, OR 97045

voice mail / (503) 655-6189 -- FAX (503)-251-9901
[http://www.OregonL5.org/]

Allen G. Taylor <allen.taylor@ieee.org>
Bryce Walden <moonbase@comcast.net>
(LBRT – Oregon Moonbase) moonbase@comcast.net

* **Meetings 3rd Sat. each month at 2 p.m.**

Bourne Plaza, 1441 SE 122nd, Portland, downstairs
September 20 – October 18 – November 15

COLORADO

Denver Space Society
(formerly Front Range L5 Society)

1 Cherry Hills Farm Drive
Englewood, CO 80113

http://www.angelfire.com/space/frl5/

Eric Boethin 303-781-0800 eric@boethin.com
Monthly Meetings, every 2nd Monday, 7 PM
Next: August 11th, **September 8th, October 13**
Englewood Public Library, Englewood, CO 80110
1000 Englewood Parkway, First Floor Civic Center

MINNESOTA

Minnesota Space Frontier Society
c/o Dave Buth, 433 South 7th St. #1808
Minneapolis, MN 55415

David Buth (w) (612) 333-1872, (h) (612) 529-9871
Email: info@mnsfs.org
[www.mnsfs.org/]

MN SFS News & Pictures
Info on past/future Events
www.freemars.org/mnfan/MNSFS/2008-12-Review/
Ben's Minicon Pix
http://freemars.org/mnfan/MiniCon/2008/index1.html
Minicon science room Pix
http://freemars.org/mnfan/MiniCon/2008/index-sci-rm.html

WISCONSIN

Sheboygan Space Society
728 Center St., Kiel WI 54042-1034

c/o Will Foerster 920-894-2376 (h) <willf@tcei.com>
SSS Sec. Harald Schenk <hschenk@charter.net>
>>> **DUES:** "SSS" c/o B. P. Knier
22608 County Line Rd, Elkhart Lake WI 53020
[http://www.tcei.com/sss/]

SSS meets the 3rd Thursday of the month 7-9pm

Sep.18: UW-Sheboygan, Sheboygan @ Room 6101
Oct.16: Stoelting House, Kiel
Nov.20: UW-Sheboygan, Sheboygan @ Room 6101)

PENNSYLVANIA

Philadelphia Area Space Alliance
PO Box 1715, Philadelphia, PA 19105

c/o Earl Bennett, EarlBennett@erols.com
215/633-0878 (H), 610/640-2345(W)

[http://pasa01.tripod.com/]
[http://phillypasa.blogspot.com]

• **PASA regular business luncheon/formal meeting 1-3 pm**, the **3rd Saturday of every month** at the **Liberty One food court** on the second level, **16th and S. Market.** Go toward the windows on the 17th street side and go *left*. Look for table sign. Parking at Liberty One on 17th St. Call Earl/Mitch 215-625-0670 to verify all meetings.

Next Meetings: Sept 20th - Oct 18th - Nov 15th

July 19th Meeting Notes: our July meeting was at Mace's Crossing at 1714 Cherry Street, about a block past the hotel where Philcon had been last fall (across from Logan Circle on the south side of the street). It is a small place with American food in a close setting ("intimate"). The meeting was held at the usual time frame from 1- 3 pm.

Report by Earl Bennett.

No further PASA News available at press time.

CALIFORNIA

OASIS: Organization for the **A**dvancement of **S**pace **I**ndustrialization and **S**ettlement
Greater Los Angeles Chapter of NSS
P.O. Box 1231, Redondo Beach, CA 90278

Events Hotline/Answering Machine:(310) 364-2290
Odyssey Ed: Kat Tanaka - odyssey_editor@yahoo.com

[http://www.oasis-nss.org/wordpress/]

oasis@oasis-nss.org
Odyssey Newsletter Online
http://www.oasis-nss.org/articles.html

Regular Meeting 3 pm 3rd Sat. each month
Next: Sept 20th - October 18th - November 15th

OASIS 30th Anniversary Event

OASIS hosted a reception on Saturday, July 19, 2008 at 3:00 PM to mark the 30th Anniversary of the chapter. The reception was held at the Western Museum of Flight at Torrance Airport. Tickets were $25.

No information about upcoming OASIS meetings or events was Posted on the website at time of printing.

NAME _____

STREET _____

CITY/ST/ZIP _____

PHONE#S _____

- **$45 National Space Society dues** include ***Ad Astra***
- **$20** NSS dues **if under 22 / over 64.** *State age* ___

600 Pennsylvania Ave SE #201, Washington DC 20003

Moon Society dues include *Moon Miners' Manifesto*
Electronic MMM (pdf) **$35** Students/Seniors: **$20**
Hardcopy MMM: U.S. & Canada **$35** – Elsewhere: **$60**
P.O. Box 940825, Plano, TX 75094-0825, USA

INDEX to #217 AUGUST 2008

Member Dues -- MMM Subscriptions:
Send proper dues to address in chapter news section

=> *For those outside participating chapter areas* <=

- **$12 USA** MMM Subscriptions; • US **$22** Canada;
- US **$50** Surface Mail Outside North America

Payable to "LRS", PO Box 2102, Milwaukee WI 53201

CHICAGO SPACE FRONTIER L5

- $15 annual dues

LUNAR RECLAMATION SOC. (NSS-Milwaukee)

- $12 low "one rate"

MINNESOTA SPACE FRONTIER SOCIETY

- $25 Regular Dues

OREGON L5 SOCIETY

- $25 for all members

O.A.S.I.S. L5 (Los Angeles)

- $28 regular dues with MMM

PHILADELPHIA AREA SPACE ALLIANCE

- Annual dues for all with MMM $25, due in March or $6 times each quarter before the next March

---

SHEBOYGAN SPACE SOCIETY (WI)

- $15 regular, • $10 student,
- $1/extra family member

"SSS" c/o B. P. Knier, 22608 County Line Rd, Elkhart Lake WI 53020

Moon Miners' MANIFESTO

Lunar Reclamation Society Inc.
PO Box 2102, Milwaukee WI 53201-2102

Address Service Requested
==> *Mail Carrier, Time Sensitive Material* <==

PRSRT STD
U.S. POSTAGE
PAID
MANASOTA FL
PERMIT No. 802

Please renew promptly so as not to miss an issue