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

Moon Miners' Manifesto

& Moon Society Journal

www.lunar-reclamation.org/mmm/

176 — June 2004

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 world-wide. **Editor:** Peter Kokh, c/o LRS, PO Box 2102, Milwaukee WI 53201. Ph: 414-342-0705. **Submissions:** "MMM", 1630 N. 32nd Str., Milwaukee, WI 53208; Email: kokhmmm@aol.com

Guest Editorial ◙ How to Make the Moon-Mars Initiative Work

By Jeffrey G. Liss < JGLJGL@aol.com >
Senior Vice President, National Space Society

The President articulated the obvious - a space program goes somewhere! His redirection of NASA back to the Moon in 15-20 years, then on to Mars, comes with both a timeline and cost reasonable in this environment.

However, ambiguities in his speech (omitting references to permanence), NASA's subsequent Level 0 Exploration Requirements (focusing on Mars), and the media's preoccupation with the glamor of a Mars "mission" (a quarter-century away), have muddled the vision. They have (a) made it seem that all the unknown long-term costs of going to Mars must be addressed near-term, confusing a Congress which must implement the Redirection, and (b) increased the risk that even after expending billions, 25 years from now we may be left with but one or two flags-and-footprints "missions" to Mars and no permanent beachhead on either the Moon or Mars.

Consequently, the priority of the space community must be bringing the Moon-Mars focus back to the near-term, to programs that (i) proceed in stages, each with its own perceivable goal and associated cost estimates (which, being near term, are more reasonably ascertainable and periodically reviewable by Congress) and (ii) are ratchet-like, so that any pause or reduction in funding would leave some new infrastructure in place.

To create that permanent beachhead, we must focus on the Moon. The Moon can be reached, grow incrementally, and return benefits - all in a more conceivable time frame.

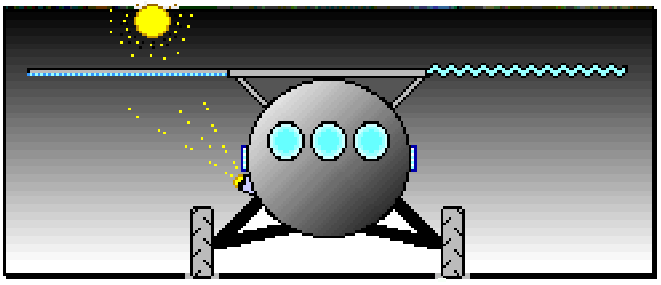
Most attractive about the Moon as the first permanent offworld human outpost, as compared to Mars, is PROXIMITY. The Moon is close, a couple of days away; Mars is many months farther. That means

- *More payload:* With less rocket power needed to get to and from the Moon, each launch can send more payload or use smaller vehicles.
- *More trips:* In any time period we can make more trips, send more people, and establish more infrastructure.
- *Continuous Access:* The Moon is accessible almost any time; Mars is reasonably accessible only once every two years.
- *Less Risk:* As Moon trips are shorter, there is less chance of malfunctions enroute.

[⇒ page 2, column 2]

Coach with Special Micrometeorite Shield

During dayspan, travelers on the Moon will have to deal with the very black sky and its high contrast to the glare of the sun off the surface. The Lunar Greyhound Coach at right has a micrometeorite shield testing two eye-relief options,. At left, a spotlight below the window shines upward on a matte sky-blue surface. At right the sun shines through a translucent shield. More, page 7.



Moon Miners' Manifesto

Moon Miners' MANIFESTO/ Moon Soc. Journal is published every month except in January and July, by the Lunar Reclamation Society.

• **MMM** is being reedited for the World Wide Web by members of Artemis Society International. => www.asi.org/mmm

• **MMM's VISION:** "expanding the human economy through off-planet resources" -- the early era of heavy reliance on Lunar materials; earliest use of Mars system and asteroidal resources; and the establishment of the permanent settlements necessary to support such an economy.

• **MMM's MISSION:** to encourage "spin-up" entrepreneurial development of the novel technologies needed and promote the economic-environmental rationale of space/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. Any presumption that participating organizations can be labeled by indirect mutual association is unwarranted.

• For the current 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 non-profit 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 over 25,000 members and 80 chapters, dedicated to the creation of a spacefaring civilization.

The National Space Society, 1620 I Street NW, Suite 615, Washington, DC 2006; Ph: (202) 429-1600 <= **NEW HQ**

FAX: (202) 463-8497; nss@nss.org ⇒ www.nss.org

• **MMM's desktop publication** has received ongoing support (computer hardware and software) from the **Space Frontier Foundation**, 16 First Ave., Nyack NY 10960; 800-78-SPACE - SFF seeks to open the space frontier to human exploration and settlement as rapidly as possible.

openfrontier@delphi.com ⇒ www.space-frontier.org

• **The Moon Society** is "dedicated to overcoming the business, financial, and technological challenges necessary to establish a permanent, self-sustaining human presence on the Moon." — See contact information on page 9.

• **NSS chapters** 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.

√ **EMAIL** to KokhMMM@aol.com (*preferred*)

√ **Typed* hard copy** to:

Moon Miners' Manifesto, c/o Peter Kokh,
1630 N. 32nd Street, Milwaukee WI 53208-2040

* *Handwritten submissions may be ignored.*

⇒ **Guest Editorial** continued from page 1.

• *Help Nearby:* If anything goes wrong, technically or medically, help is closer.

• *Quick Turnarounds:* With unexpected discoveries or dangers, new equipment or scientific instruments can be sent up relatively quickly.

• *Permanence:* A Lunar outpost could be started sooner, augmented more frequently, and sooner attain the critical mass to become permanent.

A growing Lunar facility would enable, decades sooner than a Mars base:

• *Exploration:* Identification of the best sites for future habitats, mining ores and other materials, and scientific discovery.

• *Lunar Resources:* Finding, mining and developing the techniques to use local resources (including energy, oxygen and metals) to evolve toward self-sufficiency and produce fuels to reduce the cost of space operations.

• *Off-Earth Industrial Base:* Development of infrastructure and test facilities to support the industrialization / commercialization of space and exploration of the solar system.

• *Visibility:* A lunar base overhead every night would provide a tangible reminder of our space achievements and an inspiration to further progress.

• *Space Tourism* is more likely to develop quickly with a nearby destination like the Moon.

Further, a Moon base will, decades sooner, provide a (i) low-gravity, (ii) isolated, (iii) stable, (iv) magnetic field free, and (v) vacuum environment in which to perform

• *Cutting-Edge Physics,* including nuclear materials experiments we might prefer done off-planet

• *Medical Research,* including on the effects of low gravity, possibly revolutionizing geriatrics, and possibly determining whether the Moon might make a therapeutic home for the elderly.

• *Sensitive Biological / Genetic investigations,* so that the accidental release of contaminants could not get into Earth's environment.

• *Astronomy,* particularly using the Lunar Farside (shielding sensitive instruments from Earth-based TV and radio interference).

• *Industrial Research* that could lead to major breakthroughs.

The Moon phase of the Moon-Mars Initiative can be done in digestible steps that can, as funding or interest fluctuates, be speeded up or slowed down with less risk of total cancellation than a Mars-oriented program.

For example, the first landing, robotic or otherwise, can carry a homing beacon by which follow-up uncrewed missions can deposit, as funding permits, new modules and equipment without having to use payload capacity for crews and return vehicles. An early module could be a hab module, allowing extended crew stays. Later deliveries could be

rovers, building cranes, mining equipment, kilns for metallurgy, telescopes for astronomy, medical labs and other scientific modules, and more habs. This staging would allow for both short visits by scientific specialists and the gradual building of a permanent habitat.

All these activities, on the Moon, will set the stage, a quarter-century from now, for continuing on to Mars. We will have developed vastly improved propulsion technologies, experiences working in space and on other worlds, technologies for dealing with the harsh temperature and radiation extremes of the Moon (which could be adapted for the somewhat less rigorous Martian environment), and a space infrastructure with many startup costs amortized, so that the incremental cost of taking that long next step to Mars would be much less daunting.

Most of all, unlike after Apollo, we will have established a beachhead in space from which there can be no retreat. **<JGL>**

The Exotic Moon:

In Search of Color & Beauty

Available Media will Challenge Frontier Artisans

by Dave Dietzler <Dietz37@msn.com>

Recently, I went to an art gallery here in St. Louis called Macro-Sun International to listen to a sitar player and see some belly dancers. There were plenty of statues of the Buddha, Siva, Ganesh, dragons, elephants, Krishna and lots of fine furniture, clothing, jewelry and incense on sale. Some of the statuary was made of carved stone, but most of it was made of wood or copper.

Once again our limited stable of lunar materials raises its dragon's head to challenge us. We can forget about wooden carvings on the Moon except for the most wealthy men and women alive. Given the geological reality of the Moon, unless we find that Sudbury type impact we dream about we can forget about copper, zinc, tin, brass, bronze, gold and silver. Lunar artisans will have plenty of stone, cast basalt and iron to work with, but not much of the traditional materials.

I guess the bright side is that there won't be any competition with plastic on the hydrocarbon poor Moon, if anybody wants a plastic Siva!! Imagine artisans casting and hammering aluminum, magnesium and titanium in solar furnaces with the use of free lunar vacuum. Red hot magnesium, a fairly soft metal, will catch fire in air but our lunar artisans may do some original work in the vacuum with it. We could have plenty of shiny grayish or silvery statues of these metals. We might even chrome plate them. A chrome plated aluminum Ganesh will truly be a creation of the 21st century!

For the want of yellowish metals we can work with pure iron and then expose it to hot sulfur vapors to form a pyrite finish, a coating of fool's gold. We could put pure iron statues in hot oxygen baths to form a rusty red coating.

But what about glass? I noticed a dearth of glass items in this gallery. Has glass never enjoyed the popularity in Asia that it has in the West? Besides glass flowers and cut glass work, how about a glass Buddha or eight armed Vishnu riding a lion? On sandy silicate covered Luna, we will have plenty of glass and our oriental artisans may find lots uses for it. I can see clear, frosted, iron tinted green and brown glass elephants as well as shiny black cast basalt elephants and dragons. I am sure that it will be more affordable to transport artisans to the Moon and put them to work using local materials than it will be to ship kilotons of finished copper, gold, wood and ivory times to the Moon! I hope they enjoy the challenge of working with lunar available materials as much as we do (at least Peter Kokh and I).

We have discussed neon signs, red and cobalt blue glass filters over spotlights, prisms to cast rainbows of color (some prism fiber-optic light pipe systems will be large enough to illuminate stages with selected colors), plants, flowers, tropical fish and birds to add color to our lunar dwellings.

As I watched the girls belly dancing, I realized that there were other colorful creatures to jazz up those steel and underground lava tube enclosed lunar cities we intend to build someday -- human women with all their finery. Colorful silks, jewelry, cosmetics and such don't amass too much and the girls will be bringing luggage with them anyway.

Going to the Moon is *not* going to be like going to a hospital and being forced to give up your clothes and wear those humiliating hospital pajamas nor will it be like joining the army and being dressed up in a uniform or going to jail with all us cowards. Travelers will have their own clothes, although they might have to wear a G-suit to keep from passing out or getting sick during rocket ascent to LEO.

The fairer sex will have their feathers and dance for us. That will add color to the exotic Moon. Perhaps we can sell them some cobalt blue tinted glass jewelry while they are up there too. <DD>

Relevant Articles in MMM Issues Past

#2 FEB '87 "Moon Garden"
#13 MAR '88 "APPAREL"
#16 JUN '88 Jewelryy
#26 JUN '89 "Thermoplastic"
#43 MAR '91 p4 DAYSPAN; NIGHTSPAN
#63 MAR '93 p 10. Color the Moon anything but 'gray'
#76 JUN '94 p 5. WALL Surfaces & Trimwork
#77 JUL '94 p 4. Inside Mare Manor: "Cinderella Style"

Online

#2 article above at www.asi.org/mmm/
www.lunar-reclamation.org/art/painting_experiment.htm

Musing about Space Elevators: Drawbacks & Advantages

by Dave Dietzler <Dietz37@msn.com>

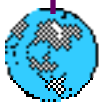
I've been reading up about space elevators. I'll concede that they are possible, but only if we can mass produce C60 carbon nanofiber cables and do it cheap, and only if we have rockets big enough to send the reel of cable plus its electric motors and solar panels up to GEO.

It will take a lot of horsepower to haul things up 22,400 miles so we will need big solar panels array. As David Heck and I agreed way back in December, I believe, space elevators will be slow. If you climb the cable at 1,000 miles per hour, which will take a lot of energy (just consider fuel gulping jets that travel at this speed), it will take almost a day to reach orbit!! A rocket or jet/rocket spaceplane can get you to LEO in ten minutes. This is an important consideration.

And what if the cable snaps? Can you parachute down? You can parachute back or glide back in rocket propelled vehicles if there is an engine failure. The bright side is that space elevators won't explode.

Another drawback is that a space elevator only touches one place on Earth. A rocket can take off from anywhere on the globe. And space elevators can only take you to GEO or fling you off the counterweighted end into space. Rockets can ascend to any orbit and any altitude and any inclination to Earth's equator. So space elevators are not a free lunch and rockets will be with us for a long time.

I do see one great use for near term space elevators - cargo. Humans can fly up in rockets. Cargo can be hauled up slowly to GEO. So what if cargo takes its time or the cable snaps? Cargo is what costs. Humans aren't that heavy. Ten humans with luggage only weigh a metric ton if we estimate 100 kg. (220 pounds) per person and luggage. With an early space elevator consisting merely of a cable and a reel we can send thousands of tons of cargo to GEO. From there it will either be flung off the end of the counter balancing cable at about 44,000 miles up or use ion drives to go to lunar orbit or a Lagrange point station or even Mars. In this way, we can have our cakes and eat them too. We can fly humans via our VTOLs and HOTOLs to LEO space hotels and haul cargo up by cable to save a fortune. Whether it will be economical to send loads of rocket fuel up to GEO and then send it down to LEO via ion drives to fuel up taxis in LEO that they fly to higher orbits, cycling stations or escape velocity i do not know. Making sure all this does not crash into the cable will be tricky.



In Arthur C. Clarke's **Fountains of Paradise** a 44,000 mile high tower was built. If we just have a big station at GEO and lower a ribbon of C60 nanofiber to Earth's surface and extend a counterbalancing ribbon another 22,000 miles this should be much more practical that a solid tower, and this is something we will be less likely to crash into as it can be reeled up and out of the way with advanced warning!! More to think about. <DD>

Editor's own musing: Hey Dave, what if we have a cable passenger car that rides up the elevator à la maglev? Once the car cleared the atmosphere, it should be able to build up some real speed without heat from air drag or friction from contact with the cable.

But what about power demands? If the power were generated in space by a solar power satellite network, the amount of power needed might not be a problem.

Personally, while I believe a space elevator could work, I am a "doubting Thomas" about finding a way to build it. It is going to be one very tricky engineering proposition, and I'll have returned to stardust long before it becomes more than science-fantasy.

Launchtracks, an alternative to Elevators

As to cargo, let's not forget the other long-talked-about option: launch tracks up the side of equatorial mountain massifs. In essence, a launch track is a grid-powered "first stage" that remains on the ground. We highlighted a set of candidate mountains in MMM # 99 Oct. '96; p 4. "Mountains Made for Launchtracks" - which identified four special merit peaks:

- **Mt. Cayambe**, Ecuador, 19,160 ft., 0°, 40 m. NE of Quito
- **Mt. Kenya**, Kenya, 17,040 ft., 0°, 100 mi. NNE of Nairobi
- **Mt. Cameroon**, Cameroon 4+°N, 13,353 ft., 60 miles from the Nigerian border, 10 mi N of the port of Buea
- **Mt. Kinabalu**, Sabah, Malaysia, 13,455 ft., 6+°N. Near NE tip of Borneo. About 40 miles ENE of the South China Sea port of Kota Kinabalu, and 80 miles WNW of the Sulu Sea port of Sandakan

All of these are on or near enough to the equator and have reasonable transportation access. The first two are checked for being virtually smack dab on the equator. As such both are candidate mountains for an Earthside terminus of a space elevator, one handy for the Americas, the other handier for Europe, Africa and western Asia. The last, while 6+ ° off the equator, would be handier to Pacific Rim customers.

Lauchtracks have the significant advantage of being deployable from Earth's surface, and involving nothing more exotic than Maglev transportation. Reserved for cargo canisters only, to be delivered to a specified holding area, an orbital ":cargo yard," they could be engineered for massive G-forces and seem significantly more near term. Let's pursue both options, pushing the possibilities as far as they will go, making no premature choices Baloon-launching is another nearer-term option, but one that has met with limited trial success and promises less down the road. **<PK>**.

National Parks on the Moon

by Peter Kokh

World Book: [a] **National park** is an area set aside by a nation's government to protect natural beauty, wildlife, or ... places of cultural, historical, or scientific interest. ... Governments create national parks to guard their natural treasures from the harmful effects of farming, hunting, logging, mining, and other economic development.

The world's first national park, Yellowstone National Park, was established in the United States in 1872. National parks gradually spread throughout the world. Today, about 1,500 national parks ... [exist] in more than 120 countries.

The Moon is "virgin territory," -- well, almost. Intact artifacts left behind by the Apollo manned Moon landings and various robotic missions are destined either to be part of future Frontier Republic historic National Monuments or to be relocated in Lunar museums.

Now is clearly the time to think and act ahead about preserving and protecting some areas of the Moon of especial geological interest or scenic beauty by setting them aside as, for now, International National Parks (to be transferred to the Lunar Frontier Republic as the latter emerges as a de facto civil authority.

There are at least two steps here. The first is the creation by international treaty, provisional classes of lunar "national parks," and a set of "protocols" which would protect them from economic and industrial development, allowing or disallowing road development and commercial "concessions." Of course, once jurisdiction passes to the local frontier authority (a stepped process which should be milestone-driven and established beforehand by treaty to remove it as a political and power-play issue,) that authority would have the right, limited and defined in its own constitution, to review and reset any such protocols.

The second step is the nomination by an international committee of self-selected geologists and other scientists, tourist industry panels, commerce and industry representatives, and interested individuals of specific features or regions to be so protected. This list, to be an "attachment" to the original treaty establishing a Lunar National Park System, could always be added to later on.

For both of these steps, there will be considerable disagreement. Some will want to guarantee the treasured sites on the originally list from any and all human encroachment, while others will seek more pragmatic provisions. A reasonable compromise would be to create classes: class A containing the most protected, class C those only minimally protected. Some will favor only a few original parks, others will want to preserve half the Moon or more. There will be wide differences of opinion on the merits of individual areas to be selected for the original list. But it should be possible to find broad agreement on a starter list, and compromise positions on the protocols governing them.

Mining & Processing Industry Protocols

We have previously pointed out that "Moon mining" is not likely to be an especially "scarring" operation. The elements we need are to be found in the already "pre-mined" impact-pulverized debris blanket of rock and powder, meters-thick, that covers the entire lunar surface: the "regolith." That said, we can split mining operations into those seeking to "produce" elements found just about everywhere or, at least rather widely [oxygen, silicon, iron, aluminum, calcium, titanium, magnesium - all in parts per hundred; others found in parts per ten thousand] and those concentrated only in a few atypical areas. Clearly, any mining activity seeking elements in this first classification, since it can be done most anywhere, can be completely forbidden within the selected park areas and their approaches.

Any rare and strategically needed elements which are especially concentrated in an area nominated for inclusion in the Lunar National Park System, could be mined within the area in question, in a tightly regulated "clean" operation, and then processed elsewhere. What we have in mind is the possibility that we would discover that a protected impact crater area is of the Sudbury (Ontario) type, rich in asteroid-endowed metals otherwise absent on the Moon in economically producible abundances, such as copper, zinc, gold, silver, platinum - all industrially strategic. Lunar geologists have yet to identify any such "heaven-blest" area, it is possible one or more may be identified in the future.

Tourist Industry Protocols

Some areas, chosen for inclusion on the original list for their especial noteworthy geological features, might also be identified as having especial scenic value. Others areas of no unique geological interest, may be nominated for inclusion on the merits of outstanding scenic appeal alone. In either case, if we are not to be left to "tour" them at the end of an Earth-bound telescope or from the porthole of a passing spaceship, we need to consider public access.

Access can be restricted to guided "Eco-tours" aboard "self-contained" excursion coaches, or opened up to do-it-yourself self-guiding tours for individuals in private vehicles. The limited access provisions would apply to especially fragile sites and may include "pack it in, pack it out" regulations to guarantee that human detritus would not accumulate. An option, once traffic merits, would be excursions via suspended monorails or cableways, hugging the high ground where possible.

Once tourist traffic and volume grew to the point where it made sense, could allow and provide for carefully regulated tourist-serving "concessions" within the park area - hotels, restaurants, "general stores," even RV camping grounds. If these operations could be conveniently placed at, or just outside, the park boundaries, that would be preferable.

Transport Corridor Protocols

Roads and trails are an important item to discuss. In some especially delicate areas, we may want to allow only a bare minimum of overland access, keeping the route as "rustic" as possible. For especially scenic craters, rilles, escarpments and other high vantage points, we may want to provide only scenic "rim roads" or scenic overlooks, with no access to the floor or area below other than by specially equipped go-anywhere, off-road vehicles that do not require intrusively bulldozer-graded routes. In a few cases, the Alpine Valley providing access between northern Mare Imbrium and Mare Frigoris for example, we will want to provide for a major highway, a minimum of traveler-serving concessions, and tightly regulated signage.

The merit of transportation access is obvious. How else are we to enjoy these treasures set aside for us? By browsing through a book or watching a DVD documentary? We could provide both, of course, for tourist wannabes and those selecting their itineraries. But for the future Lunans themselves, if not for Earthworms like ourselves, access is clearly in order -- access with thoughtful restrictions.

Some Park–worthy nominations

There are noteworthy areas, features of special scenic interest -- at least form our wrong-end-of-a-telescope vantage point -- in all areas of the Moon's surface: in the nearside highlands and maria; on the farside. As we do not know (although many are prematurely "sure") where the first outpost will be sited, and where early and subsequent industrial settlements will spring up, it will be important to identify candidate sites all around the globe for protection. With my 12" globe of the Moon in hand, I'd like to start the list off with the following short starter-list nominations:

- **nearside craters:** Aristarchus, Plato, Copernicus, Tycho, Theophilus, Proclus - there are equally outstanding craters elsewhere on nearside, that could be added to the list if settlement, transportation, or mining activities were to be considered nearby.
- **other nearside features:** the Alpine Valley, Hadley Rille, the "interruptions" or "bridges" along Hyginus Rille, the Straight Wall, the Altai Scarp, the Rheita Valley
- **nearside historical sites:** the Apollo Moon landing sites, the Lunakhod sites, any intact landers.
- **Farside Craters:** Tsiolkovsky is at the top of my list, Van de Graaf

Once the site of the initial international outpost is agreed open, worthy sites within reach should be identified and protected appropriately. One may argue, of course, that most places on the Moon are already protected by their very remoteness and inaccessibility. But the day may come, when many noteworthy places will no longer be remote and inaccessible. Establishing a Lunar National Park System infrastructure, even without a short list of first inclusions, would be a wise move for these reasons:

- It is easier to establish such a system now, when the threat seems remote, than later, when economic counter-interests may have arisen.
- Early establishment of a Lunar National Park System will be a media coup, thrusting the Moon and its beauty into the public consciousness.
- It will whet the appetite for lunar tourism, thus helping create the justification for development of the vehicles and systems needed for on-location tours.

Extreme Touring

As on Earth, some parks will get the majority of tourist visitors, being "on" the most popular itineraries. But also as on Earth, there will be a tourist market for those who wish to explore "off the beaten path" in remote or usually overlooked areas or in "virgin" territory.

First Robotic Tele–tours

The very act of establishment of a Lunar National Park System by treaty, along with a starter list of included areas, will lay the economic grounds for private enterprise to land robotic "tour guides" on location, to photograph and explore the especially scenic features with maximum "ooh and aah" appeal, to be included in edited tourist documentaries on video and DVD or in **NATIONAL GEOGRAPHIC**, along with promotions of the sponsor tourist companies, of course. Tourism "pump-primers." A next step would be actual live tours, rehearsed or unrehearsed, exploring especially mysterious areas such as the first lavatube to be entered.

Flora & Fauna Preserves

When *we* think of "National Parks," places of great geological and biological beauty come to mind: Yellowstone, Banff, Great Smokies, etc. Yet we too have preserved areas in which life is sparse, if not all but invisible: the Grand Canyon, Arches, Haleakala, for example. Biological preserves would seem to be out of consideration on the barren and lifeless Moon. But someday, that may not be the case.

In pressurized urban areas, we may set aside and designate as "wilds" areas left to be seeded at random by the birds, insects, squirrels, and ventilator winds, as an experiment and educational project spanning generations. We might also set aside areas to be landscaped and planted with trees and plants and wildlife of no economic importance at all, just for settler enjoyment and appreciation of beauty, and as places for peaceful retreat.

On a larger scale, heavily-traveled inter-settlement routes between neighboring population clusters may one day be relocated into pressurized tubes or rilles with broad fringe areas that can be planted with a mix of crops and purely ornamental plants -- parkways. And there may be small scale "national forests" created in pressurized structures by private enterprise seeking tourist dollars.

A Lunar National Park System will have a profound impact of the way lunar settlement develops, and even on its pace. The time is ripe. Let's get started! **<MMM>**

The Black Sky "Blues"

Revisited

[cf. MMM #138, Sept 2000, pp. 4-5, "The Black Sky Blues"]
by Peter Kokh

In the earlier article four years ago, I wrote:

"We've all grown up with the night. We don't mind it. Nighttime darkness is only temporary. With dawn comes welcome visual relief. On the Moon, that relief never comes. Our pioneers will be transplanting themselves to 'Black Sky Country.' And that can have long term psychological consequences.

"With the sky black even at 'high noon,' the contrast volume between surface and sky is intense. Shadows are bottomless visual pits. This will cause some eyestrain. Of course, this will be more of a problem for those who spend a lot of time out on the surface - in the 'out-vac'. But it will affect those who spend most of their time in pressurized spaces as well: in what they see through various types of 'windows' (visiscreen, periscopic windows, etc.); it may affect 'skylights' as well."

I suggested that spacesuit helmet visors might have a "differentially reflective coating that would 'brighten"' the sky, even if just a bit, without interfering with clarity of visibility of the moonscape." And that for skylights, perhaps we could "produce some sort of frosted and translucent, but not transparent, glass pane that will not only let in sunlight but appear itself to be bright, giving the illusion of a bright sky beyond."

"Without real experimentation, we would not pretend to guess what will work best. But we should be trying a lot of things, including foamed glass, aerogel, special coatings or laminate layers, etc."

But I had also brought up the possibility that "electronic images of the surface scene outside offer , for good as well as mischief, the opportunity to be manipulated. The viewer may be able to select a sky color and brightness to his or her liking. The [tele]viewer [device], much like an Internet browser, would then 'interpret' the black areas at the top of the picture accordingly. Pick a light gray to go with the moontones, or a smoky blue. A visiting Martian pioneer, might prefer a dusty salmon. Homesick for Earth? Pick a brilliant blue. The idea is not to deceive oneself but to prevent eyestrain - if it has become a personal problem."

Technology now at hand

When I wrote that, I was making a leap of faith. But since, American Football fans have become familiar with a new computer-assisted TV trick that paves the way: the insertion of an orange line on the screen to show the viewer where the football has to be advanced for a "First Down."

How do we get from *this* "scrimmage line" to *our* first down - the apparition of a blue sky on a visiscreen showing the moonscape outside one's homestead habitat? A smart computer program would scan the scene looking for the "horizon," able to distinguish between the black sky above that line and dark shadows below it. The viewer could control the result, the tint color, contrast, brightness, etc. And, of course, the viewer could turn the program off, preferring reality, however black.

Some years ago (a couple of decades, actually) I bought a pair of "rain glasses" that had the effect of brightening the view and giving it a distinctive yellow cast, creating for a moment the illusion that the sun was shining. They were fun to wear for a while, then I threw them away, preferring reality. Some of us are more affected by cloudy and rainy and otherwise "dreary" days than others. Moi? I have always been able to make my own sunshine.

Some pioneers will handle the black skies well, and need no artificial assistance to "pretend." Others may want to wean themselves of blue skies gradually, and such smart screen moonscape monitors will be available with a "blue skies patch." Software is all we are talking about.

There just might be competition among software providers. The introductory program would just shade the black sky uniformly blue. Improvements would make the sky a deeper below above, and a milkier blue near the horizon. But then comes the fun! Programs that can be set to random insert alien space ship landings, or balloons, or World War I biplanes, or geese flying south in formation, or clouds of various types, even storms, lightning and more. It might amuse the kids, but perhaps most adults would tire of the "let's pretend" games fairly quickly.

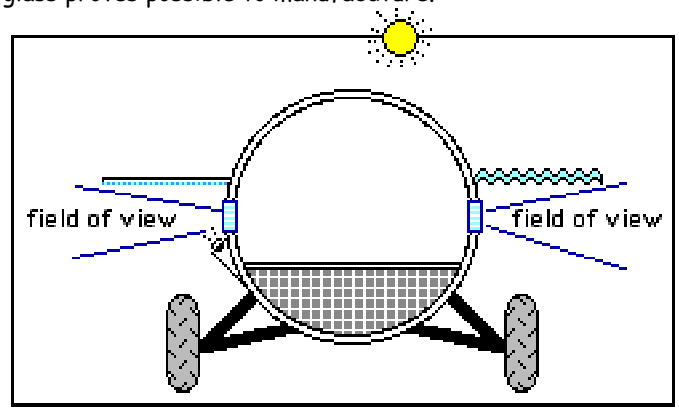
Out of the Homestead and into the Rover

Most Lunans, in their every day work and recreation schedules will rarely venture out-vac, beyond the airlock onto the surface, or even through the dockport match-lock into pressurized rover for an excursion or to travel to another settlement. But when they do, they will have much less to distract them from the view out the porthole or visiscreen. If some manage to pay little attention to the out-scapes in their daily routines, once out on the surface, on the way to somewhere else, it'll be harder not to notice.

Yet, with highway rights of way being free for the taking, once traffic volume allows, coaches may be very wide track, to the point of having twin aisles like our wide-body jets. Those who do not care to look out the window will have plenty of opportunity to sit "in the middle."

For those who do want to see where they are going and to appreciate the moonscapes, there are at least two options that would "moderate" the starkness of the view. the black skies in particular. There could be the smart flat screen monitors built into the seat back in front with the sky-effects fully controlled by the passenger. For"window seat passengers," the porthole could sport a sort of "visor"

that would project outwards, blocking most of the sky to within perhaps 10-15 degrees of the horizon. Its underside could be a light matte blue, lit from a lamp below the window. Or it could be made of a special light diffusing glass such as we mentioned as an option for skylights, if such a glass proves possible to manufacdture.

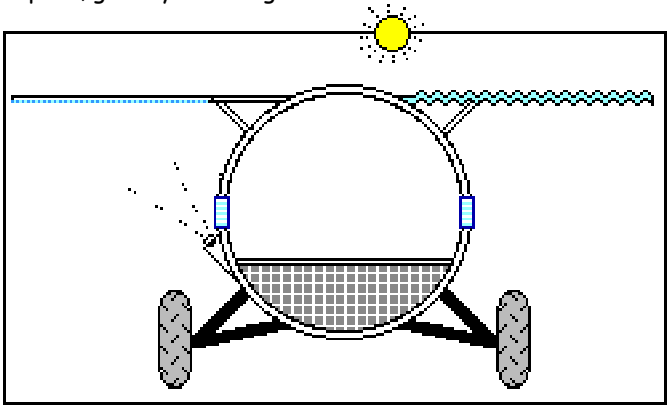


ABOVE: On the left, an uplit visor with a blue matte underside masks much of the black sky at left. At right, a sun light diffusing glass visor does the trick naturally.

How might frequent traveler's react to devices like these? Reactions might run the gamut from "Why should we pretend this is not the Moon?" to "Wonderful!" to "You need to tone it down a bit." to "Junk the fake clouds." We differ in our tastes and tolerances. Market forces will determine what stays and what goes. One coach, on a busy route, might be equipped with several options, to test the market waters.

The convenience of passengers is far less a concern than that of drivers, however. Eye strain can affect safety. So whatever the fate of such passenger window visors, we predict that driver windshields will be visored somehow, or visiscreens, equipped with sky effects programs such as those described above, will replace windshields.

Yet another option is a wide-eave micrometeorite canopy, either underlit or sunlight diffusing that leaves black only the horizon-hugging area of the sky. Such a shield makes sense: while some micro-meteorites will travel in low-angles hugging the horizon, and sneak under any canopies, most of them, coming in at higher angles, would be intercepted, greatly reducing the abrasion of vehicle windows.



We will lick those "Black Sky Blues!" **<MMM>**

Music to Watch Moonscapes By

by Peter Kokh

With the new Lockheed/Tom Hanks IMAX film "Magnificent Desolation" featuring the video footage shot on the Apollo Moon Landing Missions due to be released soon, I eagerly anticipate the background music selection (or will the music be specially commissioned?) as much as the promised "put you right there" visual experience. Music can endow lifeless scenes with undefinable significance, affecting our impressions far more than we might admit.

Will composers write symphonies, overtures, and theme music with the moonscapes as inspiration? Why not? Should not the pioneers have their own counterparts to Antonin Dvorak's "Symphony from the New World?" or "The Grand Canyon Suite" by Ferde Grofe? While we could look for suitable existing pieces (as was done for 2001: A Space Odyssey) fresh compositions which would be forever identified with the lunar frontier and become part of frontier culture are preferable and will come in time. Some such music could be written now. Certainly the actual pioneers will add to whatever we provide as start.

A Challenge to Computer Music Composers

Imagine a computer program that would blend a whole range of themes keyed to many different moonscape features: topographic features such as craters, rilles, mountains, mare planes, rolling highlands, boulders and shadows; geochemical features such as various types of regolith, and automatically interwove them, each given proper prominence or understated subtlety according to the changing scene outside one's vehicle window? A tall order? Yes! Such a computer program would "read" the passing terrain much as a music box reads the spikes on a rotating drum or disk.

Themes keyed to scene components are not new. Just think of "Peter and the Wolf" by Prokofiev. Yes, from that classical piece to the sort of "Music of the Terrain" readers that translate shapes, colors, textural nuances into music is quite a leap. Surely someone is up to the challenge!.

For this idea, I give credit to William K. Hartmann who wrote in his recent science fiction mystery novel "Mars Underground" page 185 (paperback edition):

> "Flat-lit by the high sun, the plain looked like a giant's sheet of music, with rocks scattered like notes that would play some strange music if only you knew how to read it."

There is more than one solution to this equation. Different composers could use different instruments and different themes for the various types of terrain features and shadings. Listeners would set the relative volume or stress according to which features are of most interest.

At night, there could be a program that keyed in to black lit phosphoresce perhaps. The bottom line is that music can bring the barren desolation to life. **<MMM>**

http://www.moonsociety.org

The Moon Society was formed in July, 2000 as a broad-based membership organization with local chapters, to spearhead a drive for further exploration and utilization of the Moon in cooperation with other like-focused organizations and groups. Some of the Society's goals:

- Creation of a space-faring 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.
- Stimulating and encouraging the development and use of space technologies on Earth and in space.
- Promoting collaboration between various societies / groups interested in developing / utilizing the Moon.

Artemis Society International was formed in August 1994 as a forum for supporters & participants in the **Artemis Project™** quest to establish a commercial Moon base as a first step to a permanent, self-reliant lunar community. **ASI** does not engage in any form of commercial business directly, but is building a Project support business team.

PROJECTS: The Artemis Project™ http://www.asi.org/

- Artemis Reference Mission
- Artemis Data Book

Moon Society DUES include **Moon Miners'Manifesto**

- **Electronic (pdf) MMM $35** **Students/Seniors**: **$20**
- **Hardcopy MMM**: U.S. & Canada **$35** Elsewhere: **$60**

Join/Renew Online at www.moonsociety.org/register/
Or mail check or money order to:
PO Box 940825, Plano, TX 75094-0825, USA

Please send all mail related to Memberships to:
The Moon Society Membership Services
at address above.

Please make **NEWS submissions** to KokhMMM@aol.com

Moon Society Elections 2004 BALLOT

Dear Moon Society member,

We are now conducting the annual election of officers and directors in the Moon Society. This election is being conducted by both email and paper mail ballots. You may vote either way. Your ballot must be recieved (email) or postmarked (postal mail) August 1, 2004.

Four directors will be elected this year to maintain the total of seven. Officers whose terms expire this year are President and Secretary. All posts are two year terms. **Note*** Two nominees for director are also nominated for Officer positions (Kokh and Grey.) Votes for Officers will be counted first. If either or both are elected to an officer position, votes for them as directors* will be ignored.

Each candidate that gave us an electoral statement has this statement included at the end of the ballot. Please consult these statements for guidance in voting.

This is a preferential ballot. Indicate your preference with numbers, 1 being your first choice, 2 your second, and so on using the form on the reverse side. Do not skip or duplicate any numbers. If you prefer, you can stop voting before you have reached the total number of candidates for any one office. If you do so, and during the counting that point in your ballot is reached, your ballot will be counted as "no preference" for that position.

We have sent an email ballot out to all current Moon Society members with valid email addresses on file. If you vote by email, please include your membership number and email your completed ballot to the Moon to the elections email address: elections@moonsociety.org.

If you vote by postal mail, send it to the paper mail Plano, TX address at left, postmarked by August 1, 2004.

Moon Society Officers vote

President - Two nomination were received

[ ] Ian Randal Strock # 27
[ ] Peter Kokh # 239
[ ] write in candidate _____ #_____

Secretary - Only one nomination was received

[ ] Gary Grey # 914
[ ] write in candidate _____ #_____

Board of Directors Vote

Six Nominations received for 4 slots
Place 1 – 4 beside each name (in order of preference)

[ ] Gregory Bennett # 1 (incumbent)
[ ] Steve Jackson - #154
[ ] Peter Kokh - #239 (incumbent, see Note* above)
[ ] Michael Mealling - #579 (incumbent)
[ ] Mike Delaney #891
[ ] Gary Grey - #914 (see Note* above)
[ ] write in candidate _____ #_____

Voter's Signature_____ Membership # ___

Moon Society Candidate Statements

CANDIDATES FOR PRESIDENT:

• **Ian Randal Strock** - I'm a founding member of the Artemis Project, Artemis Society International, and the Moon Society. I've previously served as a director of the Moon Society, and now, I'm excited to volunteer my efforts to serve as president.

We're at a critical juncture in the history of both manned space flight and the Moon Society. Manned space flight may very soon become the province of commercial interests, as government looks to retire from the mere transportation of humans to low Earth orbit, and that is an evolution we applaud.

The Moon Society is at the junction between the baby steps of a newly formed society -- just getting its feel for its place in the world -- and the great leaps we can take toward achieving our stated goals: creating a space-faring civilization which will establish communities on the Moon; promoting large-scale industrialization and private enterprise on the Moon; and promoting interest in the exploration, research, development, and habitation of the Moon.

The Moon Society has recently joined with 13 other organizations in the Space Exploration Alliance, to communicate our aims. Actually creating a spacefaring civilization and developing the Moon, however, will take longer to realize, and much effort. In order to accomplish these goals, the Moon Society needs to grow itself, become a more cohesive organization, and spread the word to the general public.

I've previously served in leadership roles in other non-profit organizations, including being twice elected president of Greater New York Mensa and twice elected treasurer of the Science Fiction and Fantasy Writers of America. Mensa is analogous to the Moon Society: an amorphous membership society of people with widely varying interests, abilities, and amounts of time to dedicate to the society's activities. I learned that a president needed to be a communicator and facilitator, talking with the members and helping them to realize their goals within the organization. I've since retired from my other non-profit positions, in order to devote all of my volunteer efforts to the Artemis Project.

I anticipate my role as president of the Moon Society requiring me to, first and foremost, keep in constant contact with the members, both through a monthly president's column in the Society's newsletter, and through direct contact with local groups -- both those already extant and those in the formative stages -- to encourage them and share experiences with them.

I hope to encourage members to follow my lead in spreading the word. Our greatest asset in "selling" the idea of developing the Moon is us. We who are committed enough to join the Moon Society should be out in public, telling people why. I attend 10-15 conventions a year, spreading the word, and also do my best to represent the organization in interviews with newspaper, radio, and television reporters. You can do those things, too. Even if you don't feel yourself to be a public speaker, you can write relevant letters to the editor of your local newspaper, or the magazines you read. You can tell your friends and business associates why Dennis Tito's and Mark Shuttleworth's trips were so important, and why Scaled Composites' efforts are so exciting and Earth-shattering, and why we're spending our time on this grand adventure.

The Moon Society, as is any group, is a shared idea. It succeeds if the members want it to succeed, and it fails if the members become apathetic. We're taking our baby steps, and we seem fairly steady, but now is the time to make our legs stronger, and with your support, I look forward to the opportunity to help us exercise those legs, to get us growing and building. Thank you.

• **Peter Kokh** - A member of the Artemis Society and the Moon Society since 1995, I started Moon Miners Manifesto in 1986 and continue to produce it monthly. I was elected to the Moon Society Board in 2002.

Chapters: I have worked as Chapters Coordinator the past two years to create resources local members can use in public outreach. We must make it easier for chapters to organize and work effectively, collaborating with other local groups. Thinking "outside the chapter box," we must empower individuals isolated by location or by schedule, further expanding the definition and role of "outposts."

Collaboration: A life member of the National Space Society since 1973, and an active leader since 1986, I want to forge a working partnership with NSS in order to conduct joint projects that tap our combined talent pool and resources, with the Moon Society cosponsoring the annual International Space Development Conference, and hosting the ISDC Moon Track. Given my long association with NSS at leadership levels, yet fully devoted to the Moon Society, I feel I can forge a working relationship between the two on terms most favorable to the Moon Society.

We must also partner with other organizations on specific projects. I also have a long association with Mars Society, leader, Robert Zubrin since 1989. There are many reasons why it is in our interest to collaborate, rather than compete, on many projects that will advance our shared vision of vibrant human frontier beyond Earth. As a Mars Society member with many contacts, I feel that I can forge such a relationship. In general, we need to leverage all our associations in efforts that will win us both attention and new joint members.

Recruitment: Our lay members are absolutely essential as "keepers of the vision." And we need to attract

many more of them. But by also going after persons with a wide range of expertise beyond a layman's knowledge, we will be able to undertake projects that leverage and combine these talents, projects that will start producing valuable results. We need to begin a targeted recruitment campaign for those with expertise in all the many fields that will need to be involved, not just in a return to the Moon to set up a first human beachhead, but in the establishment of a viable community of people from all walks of life. We will need chemical engineers, systems managers, agricultural and biospheric specialists, product development experts, marketing experts - the list goes on and on. The rocket scientists and other "gray" engineers may *get us back* to the Moon. But we'll need the "green sciences" engineers and others *to keep us there.* The Moon Society needs a talent pool that is both broad and deep, and *put to work* on projects that will hasten the "opening" of the lunar frontier.

Enterprise: We layman can also do more. We can work in teams to identify technologies needed on the Moon then brainstorm each of them for any promising terrestrial applications. Our goal? to pre-develop turnkey business plans entrepreneurs can follow for profits now. Any success would put new technologies "on the shelf." Yes, we will still have paid for them, but as "consumers" not as "taxpayers."

CANDIDATES FOR SECRETARY:

• **Gary Gray** - I am interested in serving as Secretary of the Moon Society. I am a past President of the Chicago NSS chapter and a long term member of the National Space Society, the Planetary Society, and the Space Studies Institute. I also have held the officer positions of President, Vice President, Treasurer and Executive Committee member (for ~10 years) in a local non-space membership organization, with a membership ranging from 1,200 to 800. If elected as Moon Society Secretary, I will work with the Board members, the Society membership, and others to promote Society membership, to strengthen existing programs, and to develop new programs or ideas to help advance the Society's objectives including the creation of a space-faring civilization. I would appreciate your vote.

CANDIDATES FOR DIRECTOR:

• **Gregory Bennett** - a member of the board of directors and president of the Moon Society, and president and founder of Artemis Society International. He has served on the Moon Society board of directors since its founding. He is retiring as president of the Moon Society this year, and seeking re-election to the board of directors.

In 1976 he founded the first local chapter of the L5 Society, which was later to spawn several National Space Society chapters in the northwest and to become the model for the many L5 Society chapters to come. These chapters form the foundation of the chapter system for the National Space Society today. During the first year of the L5 Society he had exactly 100 public speaking engagements about space industries.

In 1994, Bennett founded the Artemis Project, a program to coordinate many diverse activities toward a central focus of establishing a permanent human settlement on the moon. From that grew Artemis Society International, the non-profit research foundation that created the Moon Society.

In his day job, Bennett is president and CEO of The Lunar Resources Company, headquartered in Plano, TX. He is a member of the board of directors of the Lunar Resources Company and also of CyberTeams, and was a member of the board of Village Networking Ltd. He is also a member of the board advisors for the department of mechanical engineering at the University of Nevada Las Vegas.

He started his aerospace career with seven years in commercial aircraft development at Boeing in Seattle and then worked at the Johnson Space Center in Houston, TX for 20 years where he trained astronauts and flight controllers, developed and operated Space Shuttle simulators, developed spacecraft systems and EVA procedures, and planned space flight operations. He was responsible for delivery of the system operating procedures and neutral buoyancy development tests for the International Space Station, and served as team lead for the Flight Crew Systems and EVA consoles in the Mission Control Center's Mission Evaluation Room. Prior to his current position he served as vice president for spacecraft development and senior engineer at Bigelow Aerospace in Las Vegas, Nevada.

Bennett is also a professional science fiction writer with several novellas published in Analog magazine. He is known in science fiction fandom as the founder of the Northwest Science Fiction Society and the Northwest regional science fiction convention, Norwescon, and has helped organize and run several World Science Fiction Conventions. He also has participated in planning and operating many other science fiction conventions and served as a speaker and guest of honor at still more.

• **Steve Jackson** - Steve Jackson, president of Steve Jackson Games, is one of the founding members of Artemis Society International and has been a member of the Moon Society since its founding. His company, Illuminati Online, donated hosting for our web sites for their first two years, until we were able to stand on our own. Today Steve Jackson games operates with with a world-wide distribution of publications from their offices in Texas and Nevada.

Jackson will bring decades of sound business judgement and successful business expertise to the Moon Society Board of Directors, supported by his own dedication and enthusiasm for development of the lunar frontier. His strong experience in publications and game systems both fill in crucial areas related to the development of private ventures that will can produce profitable enterprises today which eventually lead to settlement of the moon and beyond

and his fiscal responsibility will prove invaluable guidance to the Moon Society in the investment of the Society's financial resources in projects that advance our goals of establishing permanent human settlements on the moon.

• **Peter Kokh** - If not elected President, but re-elected to the Board, I will continue to advocate leveraging the talents and connections of our members and joint endeavor partners in efforts that promise to hasten the opening of the Lunar Frontier. If not elected to either position, I will continue to do my best as a member of the Leadership Council, as Moon Society Chapters Coordinator, and as editor of Moon Miners' Manifesto..

• **Michael Mealling** - I am running for the Board of Directors for the Moon Society in order to continue to ensure that the relationship between ASI and the Moon Society is productive for both organizations. I am currently building my own startup embedded systems company, helping Masten Space Systems as their VP of Business Development, and providing timely space politics and technology commentary on Rocketforge.org. My goal is to help make the Moon Society an important part of the space advocacy community.

• **Mike Delaney** - Active as Moon Society list-master and maintaining the team and chapter infrastructure since 2001. I feel I can better contribute to the society and help it achieve a sustained growth by being on the board of directors.

I would especially like to strengthen our numbers in Europe, with particular emphasis on the British Isles where I am currently residing.

• **Gary Gray** - see statement above under candidates for Secretary.

NOTE to Voters

The Society is grateful to all members who have participated in the nominating process, an all time high! This is a sure sign of the optimism that has become evident of late in many areas. Positive things are happening inside the Moon Society and outside it. The future looks brighter, and the long patient wait for things to start turning around seems to be giving way to renewed excitement. This is evident in the candidate statements this year!

We encourage all members to exercise their right to vote. Your vote counts!

Remember, your ballot must be emailed to elections@moonsociety.org by August 1st.

If you are sending your ballot via the Post Office, it must be postmarked no later than August 1st to be counted. Don't delay! Vote now!

Moon Society and Space Exploration Alliance Call for "the Moon, Mars, and Beyond"

Press Release June 5, 2004: In an unprecedented show of unity, fourteen of the nation's premier space advocacy groups, industry associations, and space policy organizations have teamed up to form the Space Exploration Alliance. The SEA's first project is to support the effort to refocus NASA's human space activities toward exploration, including a return to the Moon and moving on to Mars and beyond.

President Bush's "Moon, Mars, and Beyond" initiative dovetails perfectly with the Moon Society's tenet that it doesn't take a government merely to launch people into space. We echo the sentiment that NASA's proper role in the development of space is long-term research, development, and exploration. This initiative, a long-term, feasible plan to permanently inhabit the Moon and send people to Mars, is precisely the type of effort for which NASA was formed. It is the type of project that causes people to strive; a fitting goal for a great society.

Near-term industrialization and the commercialization of space are best left to the private sector, and in this, we applaud Scaled Composites' upcoming first commercial launch of a manned spacecraft. It is this commercialization to which the Moon Society strives; NASA has blazed the trail into space, and now we expect companies to turn that trail into a superhighway while NASA continues blazing the trail ever farther into the heavens.

The organizations involved in the SEA include: Aerospace Industries Association, Aerospace States Association, American Astronautical Society, American Institute of Aeronautics and Astronautics, California Space Authority, Florida Space Authority, the Mars Society, the Moon Society, National Coalition of Spaceport States, National Space Society, the Planetary Society, ProSpace, Space Access Society, and Space Frontier Foundation.

Collectively, these groups count almost one million Americans as members oremployees of member companies. Their first goal as a group is to work for broad support of the new national vision for space exploration outside low Earth orbit. They also intend to aggressively refute the false impression that "Moon, Mars, and Beyond" is too expensive for this country to take on. They will demonstrate how modest but steady growth in our national expenditures on space can move the nation toward these important goals, and highlight the benefits those expendi-tures will provide.

As space exploration becomes increasingly integrated with every aspect of life here on Earth, this new focus on exploration will provide myriad advances in science and technology, untold economic opportunity, and serve as an inspiration to our nation's youth. Given those benefits and the many more that lie in store, this new program of human space exploration beyond low Earth orbit is a vital link to the future of the United States and the world.

Discovering Mars on Earth!

MyStay at a Mars Outpost Analog in the Utah Desert

A Personal Journal By Bob McGown < rmcgown@comcast.net>

It was the opportunity of a lifetime! How could I turn down a chance to visit Mars? My good friend Gus Frederick invited me to join him for a weekend as he was in command of a team at the Mars Desert Research Station (MDRS), near Hanksville, Utah (elevation ~4,500). My usual sidekick couldn't make it, so I asked Sean League, owner of Sean's Astronomy Shop, if he wanted some adventure. He enthusiastically agreed, even volunteering to drive his van.

Surviving 16+hour drive from Portland we arrived at MDRS where Commander Gus introduced us to his crew, Team 28. MDRS is part of an ambitious plan of the International Mars Society, which has initiated the Mars Analog Research Station (MARS) project.

This is a global program of Mars exploration operations research which will eventually include four Mars base-like habitats located in deserts in the Canadian Arctic, the American Southwest, the Australian Outback, and Iceland. The MDRS in Utah is well underway in this Mars-like environment. Volunteers conduct a program of extensive long-duration geology and biology field exploration operations done in the same style and under many of the same constraints as they would on the Red Planet.

The main component of the MDRS is the Habitat, known affectionately as the "hab." There is also a small observatory (the Musk Observatory) and greenhouse near the hab.

Musk Observatory

Gus had a personal project for this mission, the MDRS "Salad Machine" which was designed to be a semi-automated hydroponics system to test the feasibility of growing fresh vegetables for future crews. At last accounts it is still doing well, with some tweaking. Another project for Gus was to introduce duckweed and water fern into the gray water tanks of the greenhouse. It was an ingenious way to try to reprocess the gray water so it could be usable for other purposes.

At about 3 p.m. on April 16th, Sean and I set up the solar H-alpha Coronado telescope and the C-5 telescope with a white light filter. We noticed large solar flares and sun spot activity that afternoon. The wind was gusting up to 45 km//hr and we were skeptical about observing that evening.

Sean sets up the solar scope

However, weather finally cleared up and we set up our Alt?Azimuth 10" Newtonian telescope on the south side of the hab so we could observe with the crew.

At about 10:30 it was getting very dark and there were just a few clouds hanging on. The sky was about 75% clear with very little wind. It was a warm evening, above 60-65 degrees, and occasionally a slight breeze would wiggle the scope. We had two observing chairs and a selection of eyepieces from 13, 25, 32, 40, and 50mm. We tried some spectral filters and diffraction gratings on observing planets & stars. The lower atmosphere seemed to be turbulent, while the upper atmosphere was steady. The wind died down and the seeing conditions improved to about 3-arc seconds seeing. The darkness was excellent on a Bortle scale of 1-10. The rating on the Bortle scale was about a 3. The seeing ranged from a 5 low on the horizon to about a 7-8 on a 1-10 scale. The transparency ranged from 6 to about 8.5.

We first toured the planets. Our first observation included Venus, which was about 18 degrees above the western horizon. Venus was in a crescent phase and quite interesting. The 6 members of Crew 28 came out to observe in shifts. Mars was low in the atmosphere and unsteady. Saturn was quite striking in a 90-power 13-mm eyepiece. The Cassini division would come and go. Jupiter was very distinctive as usual with clean banding, displaying four moons spread out on the Ecliptic. We were especially interested in Jupiter because of the new blue methane band, which just became visible this month in the Southern Temperate Belt region near where Shoemaker Levy-9 comet hit in 1994.

After our customary planetary tour, we observed a few deep sky northern objects and spent the next 3 hours observing the southern sky. It was a rarity to view the southern sky and observe some of the southern Caldwell Objects, galaxies and globular clusters that included C-66 (globular cluster in Hydra), C-60 & 61 (irregular galaxy -

"ring tailed galaxy" in Corvus), C-59 (the "ghost of Jupiter), C-53 (8.0 mag galaxy in Sextans), and C-48 (N2775 - 10.1 mag spiral galaxy). We compared the galaxies for differences in our two-night observation for glimpses of possible super nova. Sean and I also spent some time observing the Virgo Cluster, M-83 (the southern pinwheel) and Leo galaxies. The sky was very black. Over all, the observing was very good despite the occasional cloud. We were able to locate deep sky objects rapidly so the MDRS research team enjoyed a good star party after all.

Bov investigates a red anthill.

The next day, Sean and I(went into Hanksville to send out mail from the MDRS team and to pick up a magnet for searching for small possible micrometeorites or magnetic nodules in the hills. On the way back, we stopped at 6 anthills about 4.5 km south of the turnoff at the hematite-strewn field along the Lowell highway. We photographed cactus and hematite deposits - "Martian blue berries." The anthills had some micro-magnetic nodules less than 1 mm in size. In some of the anthills, we found a surface layer of magnetic nodules the size of sand grains and some fine grained iron filings. Naturally, we did not disturb the anthills or the ants. The terrain is typical of a sand grain meteoretical strewn field, and analog of the Holbrook site in Arizona.

On Sunday, the 18th, Sean and I got a chance to actually experience an Extra Vehicular Activity (EVA). We suited up with the assistance at Space Tensder Steve Featherstone of Team 28. The pressurized suit has an air filtering system, which prevented the blowing sand dust, which gusted to 45km/hour during our EVA. We headed southeast about 1.2 km to the center section of Lowell Highway and Sagan Road seeking anthills to look for micro-magnetic nodules. We found an area prolific with nodules. It gave us an eerie feeling looking for specimens that had been collected by the ant colonies. Red ants are able to carry an iron nodule many times their body weight up inside the anthill and stack them in a mound up to 1/2 meter high.

That evening, the crew wrote reports and had dinner while Sean and I set up for the evening's observing. Our hopes for observing dwindled as an electrical storm came through, blowing dust with high winds as well.

Commander Gus Frederick leads an EVA

We placed the 10" Newtonian scope into the green house during the storm. Waiting out the storm, Sean and I counted meteors in the leeward side of the Mars hab between 11-11:30 p.m. We observed 9 meteors in 18 minutes radiating out of Ursa Major or possibly Leo.

The meteors ranged from 6 magnitude to 1st magnitude. We immediately thought they might be coming from Lyra. The Lyra meteor shower is active starting 16 April with a zenith hourly rate of 18 to 90. Sean and I did not see the whole sky since we were observing in the leeward side of the hab. It seemed like the meteors were coming from Leo or Ursa Major instead of Lyra. It appeared as though we might be witnessing an outburst of the meteor shower three weeks after the end of the Delta Leonoid shower in April. I contacted Wes Stone, a member of the IMO international meteor organization, to discuss the possibility of a new minor meteor shower. Wes thought it might be the Tau Draconoids, a minor meteor shower during this time of the year.

When the sky cleared, Sean and I looked in the Uranametria (Northern Edition, page 106) and searched out the super nova in NGC 3786. Ursa Major was now visible, so we set up on the northerly lee side of the hab to avoid the blowing sand and wind gusts up to 40km/hr. The discomfort was worth it to possibly get the chance to observe a 14th magnitude super nova in a 12th magnitude galaxy. We found some averted vision galaxies in the area with our 10'' Newtonian however we did not catch a glimpse of the super nova this time.

A few days earlier I had observed the super nova with colleagues Matt Vartanian and Dareth Murray at the Highgate Farm near Molalla, in a 16'' scope. Sean and I could have observed the supernova manually with the C-14 at the MDRS if the wind gusts had not been so strong. It was not possible to use the C-14 at any time during our visit due to the high wind and dust.

The great thing about the MDRS is that anyone who has an interest or talent can apply and be part of a science team for two weeks. What an experience! The scenery is breathtaking and the weather is like Mars - unpredictable!

An EVA and a Rover Ride!

To learn more, visit

http://www.marssociety.org/mdrs/index.asp

I look forward to another adventure of "Mars on Earth" somet ime in the future **<RMcG>**

Chicago Chapter Moonbase Project

from Jim Plaxco < jplaxco@astrodigital.org>>

The **Chicago Society for Space Studies** has undertaken a Moon Base project. We've had a number of planning meetings (the most recent being earlier today) and I am here to solicit your input.

The concept is to build a modular lunar base. By modular, each lunar surface unit would be 2' x 2' square and pluggable into adjacent units. The scale would be 1:87 (HO).

Our goal is twofold.

1. To have a portable display that can go on the road with us to various events, especially schools. In addition to explaining the various components of the lunar base, we are going to modify some RC vehicles so that they become Moonmobiles for the school kids to drive around the surface.
2. We will approach high schools about undertaking as a science/engineering project the construction of additional components for the model. In addition, the teams will have to write up a detailed description of their contribution in terms of its functionality, etc.

If anyone here has done anything similar or built model moon bases, we would very much like to hear from you and get your input as to what works, ideas, etc.

"Anything that is worth doing is worth doing *well*."
in other words,
"Anything that is worth doing is worth doing *patiently*."
with *aggressive* patience, of course!

THE book worm REVIEW

MARTIAN EXPEDITON PLANNING

Editor: Charles S. Cockell

Publisher: American Astromincal Society/Univelt Inc.
PO Box 28130, San Diego, CA 92198, USA (www.univelt.com)
ISBN # 0278 4017; Published in 2004;
Hard ($90) & Softcover ($ 65) plus CD ROM; 506 pages.

Reviewed by Philip R. Harris, Ph. D.*

The Mars scholars and supporters are a prolific group in terms of both conferences and publications! No sooner does Robert Zubrin come out with **MARS ON EARTH – ADVENTURES OF SPACE PIONEERS IN THE HIGH ARCTIC** (New York, NY: Archer/Penquin, 2003), then the American Astronautical Society releases this volume 107 in its "Science and Technology Series." In fact, its publisher, UNIVELT (www.univelt.com) now offers a dozen AAS books on Mars exploration.

This latest edited by Charles S. Cockell is the proceedsings of a convocation with the British Interplanetary Society. In his foreword, Cockell notes that the participants began their reporting with the assumption that a human base was already established on the Red Planet. The editor observes that "we do not yet understanding at the genetic level why humans need to explore and expand the boundires of their scientific understanding." But this collection of papers makes a telling case for the advantage of human explorers over just robots on Mars.

MARTIAN EXPEDITON PLANNING is the work of some 54 expert authors who contributed its 28 chapters. Within the context of Mars exploration and settlement, the text covers major themes as the weather and science for such expedition, the challenges to be addressed, the planning tools and experdition mobility, the environmental impact, and the human factors and medical aspects. From my perspective, the last three sections have the most signficiant contributions lead by Andrew Scheuberger, Jack Stuster, and ten others. For serious macroplanners of a Mars expedition within the next thirty years, this is "must" reading, especially when a informative CD-ROM supplement is included!

* Philip R. Harris, Ph.D., Management/Space Psychologist, LaJolla, California, USA (philharris@aol.com).

GREAT BROWSING !

Interplanetary Internet Special Interest Group
http://www.ipnsig.org/home.htm

Civilian Space eXploration Team - CSXT
The First Successful Amateur Launch to the Edge of Space - 5/18/04
http://www.civilianspace.com/

Make a Model of Space Ship One
http://www.currell.net/models/ss1.htm

Story On Bigelow Aerospace new Inflatable Space Structured Project
http://www.klastv.com/Global/story.asp?s=1899277

The Positive Side of Global Warming?
http://www.moonminer.com/The_Positive_Side_of_Global_Warming.html

Nuclear-Powered Jupiter Mission Defined
http://spaceflightnow.com/news/n0405/27jimo/

Boeing to study Neptune mission for NASA
http://spaceflightnow.com/news/n0406/02neptune/

NOTICE – MMM Cost Cutting

from Peter Kokh, MMM Editor, kokhmmm@aol.com

To avoid passing on new steep printing cost rises to our client chapters, to the Moon Society, and to our individual subscribers, it is necessary for us to make the following three adjustments:

- The 2 **Moon Miners' Review** issues (July, January) will be dropped - The 10 **Moon Miners' Manifesto** issues will be published as usual, with these changes
- The slightly gray, heavier weight cover sheet with the pre-printed blue moonscape has been replaced by plain white paper with the moonscape in grayscale.
- The blue centerfold sheet is now white paper.

Introducing – "MMM Classics"

To ieplace **Moon Miners' Review**, we are introducing an all electronic substitute. We regret that subscribers who are not online are left in the lurch, but the point is that creating a PDF format edition involves no printing or postage costs.

Moon Miners' Manifesto Classics will re-edit and republish articles from the first 10 years, from MMM #1 in Dec., '86 through MMM #100 in Nov. '96, with each bi-annual edition covering two years or 20 issues of MMM. These issues will be available for download by anyone on free access locations at both

- www.moonsociety.org (directory address TBD)
- www.lunar-reclamation.org/mmm/mmmclassics.htm

Thank you for your continued support!

Mail For MMM

Uses of Lunar Water – Re: Jonathan Goff's letter on Using Lunar Ice for Rocket Propulsion, MMM #174, April '04

A rocket operating at a [hydrogen:oxygen] mixture ratio of 6:1, uses only 3/4ths of the hydrogen. No energy is obtained from 1/4ths of the hydrogen. That is, 25%of the H would be unused. Oxygen combines with hydrogen at a ratio of 8:1. To conserve the Moon's resources, a rocket should operate at a mixture ratio of 8:1.

Hydrogen combining with oxygen releases 4725 BTU of energy per pound of hydrogen *burned*. The current Space Shuttle Main Engines produce only 3554 BTU per pound of hydrogen used because they only *burn* 3/4ths of it. To improve efficiency, development of an engine operating at a mixture ratio of 8:1 is necessary. This is the R&D that NASA should be doing but is not; so far. Considering a Moon?Mars initiative, development of more efficient rocket engines is a necessity to efficiently place heavy payloads in Earth orbit.

Another consideration, not discussed in Mr. Goff's letter, is the energy required to disassociate water into oxygen & hydrogen. Electrolysis of Hydrogen requires 96,500 coulombs per gram of hydrogen produced, This is the equivalent of 13.3 kilowatt-hours per pound of hydrogen if the arithmetic is correct. A single Space Shuttle-size engine would need 58,000 pounds of hydrogen if it operated at a mixture of 8:1. The energy required to fuel one engine then is 770,000 kilowatt hours. This would have to be supplied using solar energy.

Dale Lawrence Jensen, M.S., P.E.
Executive Engineer
Jentec Engineering, Technology, & Consulting
Lawndale, CA

The Next Issue of **Moon Miners' Manifesto** will be #177, to be published in August.

There will be no **Moon Miners' Review** issue in July. We are discontinuing MMR to save printing and postage costs.

Instead, those of you with online access will be able to download the first "tome" of **Moon Miners' Manifesto Classics,** as a **pdf** file. *Watch for the link at*

www.MoonMinersManifesto.com

The Lunar Reclamation Society, Inc.

PO Box 2102
Milwaukee
WI 53201

www.lunar-reclamation.org

Ad Astra per Ardua Nostra
To the Stars through our own hard work!

LRS OFFICERS Contact Information

LRS PRESIDENT, MMM/MMR Editor - Peter Kokh*
< kokhmmm@aol.com > 414-342-0705
VICE-PRES/TREAS../LRS/MMM Business & Database Manager - Robert Bialecki*..... 414-372-9613
SECRETARY. - Charlotte DuPree
< cmdupree@netwurx.net > 262-675-0941
NEWSLETTER ASSEMBLY - Charlotte DuPree and Carol Nelson 414-466-2081
(* Board Members, & Ken Paul < kenpaul@cape-mac.org >

LRS NEWS

June 12th Meeting Announcements:

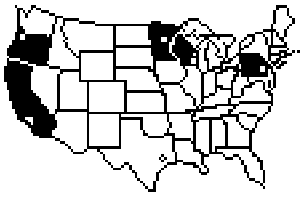
- We have been invited to participate at the James Lovell Discovery World museum for three summer events
- Tech Trek Monday, June 14th, 1-4 and 6-9
- Secret Lab Saturdays, July 10 & August 14th
- ISDC 2004: We made many contacts that promise a rosier future for MMM circulation.
- We have purchased the virtual domain name **www.MoonMinersManifesto.com** which redirects to www.lunar-reclamation.org/mmm/ (the MMM Homepage)
- We received the current NSS membership list for Wisconsin and this will allow us to do some effective recruiting to help rebuild LRS membership, and conduct more activities
- Mars Society Convention in Chicago, August Peter may present his "Mars Pulse" calendar proposal and has been asked to present about the Space Chapter Hub website and about the Outpost System, which by thinking "outside the chapter box" empowers isolated individuals who want to do helpful things.

No LRS July August Meetings (see above)

Saturday, SEPT 11th, JUNE132th1-4 pm

LRS Meeting, Mayfair Mall, Garden Suites Room G110
AGENDA: www. lunar-reclamation.org/page4.htm

U.S. CHAPTERS



NSS Chapter Events
MMM 6 Chapters Strong

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

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@excel.net>

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

[http://www.tcei.com/sss/]

We now meet the **3rd Thursday** of the month at **7-9pm**

JULY 15: UW-Sheboygan, Sheboygan Room TBA
AUGUST 19th: Stoelting House, **Kiel**
SEPT 16th: UW-Sheboygan, Sheboygan Room TBA

MINNESOTA

Minnesota Space Frontier Society

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

Tom Greenwalt (w) 763-784-6244 (h) 763-442-6015

David Buth (w) (612) 333-1872, (h) (763) 536-1237

Email: tomg@mnsfs.org

[www.mnsfs.org/]

MEETNGS: 3rd Saturday of the month from **1-4 pm**
at the: **St. Anthony Park Library**'s Meeting Room
2245 Como Ave. St. Paul, MN

- **Pictures from Last Nov/Dec Meetings (at last)**
  www.freemars.org/mnfan/mnsfs/2003-Nov/
  www.freemars.org/mnfan/mnsfs/2003-Dec/
- **Here are some of my pics from ISDC in OKC.**
  www.freemars.org/mnfan/ISDC/2004-OKC/
  www.freemars.org/mnfan/ISDC/2004-OKC/stick.html

OREGON

Oregon L5 Society, Inc.

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@attbi.com>
(LBRT - Oregon Moonbase) moonbase@attbi.com

Meetings 3rd Sat. each month at **2 p.m.**
Bourne Plaza, 1441 SE 122nd, Portland, **downstairs**
NEXT MEETINGS: May 15th, June 19th, July 17th

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/]

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

Regular Meeting 3 pm 3rd Sat. each month
Microcosm, 401 Coral Circle, El Segundo.
Information: OASIS Hotline, 310/364-2290; website.

- **June19, 3:00 p.m**. --OASIS Monthly Business Meeting, Microcosm, El Segundo. 5 p.m. public lecture - "Interplanetary Superhighway", by Dr Martin Lo of JPL
- **July17, 6:00 p.m.** -- OASIS Monthly Business Meeting, Microcosm, El Segundo

Ongoing Projects

- **MER** (Mars Exploration Rover) **full-scale model construction project** is seeking volunteers. Contact oasis@oasis-nss.org

Recurring Events

- **Mike Hodel's Hr 25 webcast**. - Fridays -- science fact & fiction with interviews, news, radio dramas, artists, writers, stories, reviews, and much more. Information: http://www.hour25online.com/.

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.triipod.com/]

PASA regular business luncheon/formal meeting from **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.

Meeting Dates: June 19th and July 18th (a Sunday). Call Earl or Mitch 215-625-0670 to verify all meetings

• **May 15th Meeting Notes:** We had good attendance with the extra treat of Jim Karcher coming with his family, wife Patrice and daughter Melanie. This was a reprise of there joining us for the previous Tuesdays events; our gathering for the special Justice Talking recording event from The Constitution Center in center city Philadelphia. The show "Lost in Space: What is the Future of NASA". This debate actually was more on the role that humans should (or not) play in space exploration and NASA's' place in that area. It was an interesting conversation with Dr. Howard McCurdy who was the "pro" advocate, when compared to the other speaker, and Dr. Robert Park who was definitely con. In addition; NASA was represented by a representative sitting in the audience: Michael Lembeck who commented later on the Presidents vision statement of January 14th. This was a fun event for us and we had many questions/editorial comments (mostly pro for space and manned exploration) from a good sized audience that was not mostly members of our group. However: we managed to volunteer for much of these question/comment opportunities and may have had as many as six people from our sub groups, especially the Mars Society, address the guests. I managed to talk to Dr. Park for a while: he doesn't object to human exploration as such but thinks the priority of NASA should be scientific research with the funds that would be required to support "man rated" systems (my interpretation of what I heard). Based on the shows dialog material I can see his reasoning: the Shuttle eats money that should not be going to it, and the Space Station also is draining funds with little of its charter goals occurring. Mr. McCurdy left right after the talk and I believe that Mr. Lembeck was not addressed by any of us. Our group adjourned to a restaurant for lively discussion after.I should note that Margot Adler, Chief of

NPRs' New York Bureau was the moderator at the event.

• **Reports:** we had an extended report and exchange with Larry our Webmaster about another area he is involved in: business cards for our members use. We voted to create a modified version of his original design, which he had prototyped for his presentation, and we will have these in place of individual members cards. The art work from our groups logo (see our website) will be added. Thank you Larry!

Gary Fisher started with a topic that many are interested in among our group: reduced cost air travel.In this case we are talking specifically to the Mars Society Convention in August. The "Early Bird Discount" of 10% holds till June 1st on Frontier Airlines. That event is from the 19th to the 22nd. Gary also reported that The Mars Society has joined the Space Exploration Alliance to get funding for N.A.S.As' Space Exploration Initiative. This is what the President is advocating and is generally supported by candidate Kerry.On another topic: Gary reported a mile(s) stone for The Spirit Rover. It has traveled a Mile! This is not exactly speeding along to my mind since it took ~ four months to do but We'll take the scientific returns.

Hank Smith told us of the long meeting of the P.S.F.S. Committee which is working on moving that groups meetings to a place called International House in the University City part of Philadelphia. Since he travels frequently to conventions and will be going to Boscon around Labor Day, he was interested in the talks on air fairs. He is a persistent volunteer around the country at various Cons and low fairs equals more outreach for Hank. We'll get a report from him (and Dotti and Larry) on Balticon in June.

Mitch Gordon talked of a position paper from NSS "Protecting the Earth from Terrestrial and Extra Terrestrial Threats" from the most recent Ad Astra . Also Mitch mentioned a book by a local author titled "Depths of Space: The Pioneer Planetary Probes". Mitch will look into whether this publication event could be turned into an outreach event for both the author and our advocacy group, Go Mitch! He also commented that the Justice Talking show was good experience for us and mentioned the possibility of a space oriented video production through the local World Future Society. This production "Spacequest Philadelphia" would be set in the Greater Delaware Valley and moderated by Prof. Arthur Shostak of Drexel University and The World Future Society. We continued, briefly, our talks on displays and funding etc. In aid of this I would like to suggest here the Pennsylvania Space Grant Consortium as a possible funding source if either project meets there requirements.

Earl Bennett brought material on many technical topics including: a NASA Tech Briefs update on "Cooperative Land-Surface/Aerial Microflyer Missions for Mars Exploration" which reports on an ongoing program that has continued for about a decade to develop systems that mimic the responses of living systems to an environment, in this case exploring the environment of Mars. A demonstration/ simulation of the concept is mentioned for possible deployment in a *Mars-like* location. Could *we* volunteer Hanksville? Although the general idea is similar to several science fiction stories plot elements this anthropomorphic cooperative assemblage (aerial, surface and eventually burrowing elements working together) could go to another planet. Researchers **Sarita Thakoor** and **Norman Lay** of Caltech have been working on this system for JPL. Other researchers working from The Ames Research Center, Intelligent Systems Program, Butler Hines and Steven Zornetzer also are involved in this work. See www.techbriefs.com/tsp under electronics/computers. From the May 2004 issue.

Also: the Summer 2004 **Search Lites** from the **SETI League** has a front page editorial by *H. Paul Shuch, Executive Director*, on a privately sponsored SETI search entitled "Return to the Ashes" on the **SETI Institute** (not League) program that was started after the U.S. SETI program was killed by congress. **Project Phoenix** was launched in 1994 to do a survey of the thousand nearest likely life supporting stars. For further details on this see the publication And: SETICon04 (see www.setileague.org) will be held August 6th to 8th at **The College of New Jersey** outside of Trenton. There was also material from the April/ May **Industrial Physicist** on the previous issues article: "Bottling the Hydrogen Genie" with the authors noting that the Hydrogen Economy" actually requires quite a bit of work, especially if applied to automotive applications. This discussion begins on page 4 of the issue. This publication has a more conservative presentation than the recent "Scientific American Frontiers" where the subject of future automobiles and there power plants.

And finally our visitor **Janet** brought an article from **Science** for May 7th on Global Warming and Satellite Calibration of Sensors. This is a subject of debate in and out of the scientific community as to whether the sensors have given us data that means the same thing from all launches.Also check N.A.S.A. and N.O.A.A. for material on this subject. Submitted by Earl Bennett.

• **Channel 48 Update:** Gary Fisher and I have been recorded at the studios of the 48 Update show that airs in the Philadelphia area between 7 and 8 p.m. during week evenings. I think we will have a full hour show devoted to space.

Highlights: I believe we were able to mention several times the groups under the PASA umbrella with major emphasis on The Mars Society. With good questioning from hostess Catherine Pugh, we went over a range of topics from the nature of PASA to the activities of the Mars Society around the world and our connection to The National Space Society as our chartering organization.

In addition: our work promoting science education and our public outreach activities were also discussed and the fun sides of being space activists as well. All in all a great chance to reach the public. And we might be able to work with 48 Update in the future. from Earl Bennett

NAME _____

STREET _____

CITY/ST/ZIP _____

PHONE #S _____

❍ **$38 National Space Society** dues includes **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 (pdf) MMM $35** **Students/Seniors**: **$20**
- **Hardcopy MMM**: U.S. & Canada **$35** Elsewhere: **$60**

P.O. Box 940825, Plano, TX 75094-0825, USA

INDEX to # 176 JUNE 2004

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

=> for those outside participating chapter areas <=
❍ $18 Individual Subscriptions to MMM/MMR: Outside North America ❍ $50 Surface Mail -- Payable to "LRS", PO Box 2102, Milwaukee WI 53201

CHICAGO SPACE FRONTIER L5
❍ $15 annual dues

LUNAR RECLAMATION SOC. (NSS-Milwaukee)
❍ $18 reg. ❍ $24 family ❍ $15 student/senior

MINNESOTA SPACE FRONTIER SOCIETY
❍ $25 Regular Dues

OREGON L5 SOCIETY
❍ $25 for all members

O.A.S.I.S. L5 (Los Angeles)
❍ $25 regular dues with MMM

PHILADELPHIA AREA SPACE ALLIANCE
❍ Annual dues for all with MMM $20, due in March or $5 times each quarter before the next March

SHEBOYGAN SPACE SOCIETY (WI)
❍ $15 regular, ❍ $10 student, ❍ $1/extra family memb
"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 <==

Non-Profit Org.
U.S. Postage Paid
Milwaukee, WI
Permit No. 3532