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

Moon Miners' Manifesto

& Moon Society Journal

172 — February 2004

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In FOCUS: Bush's Moon/Mars Plan: What it is, and what it clearly is not.

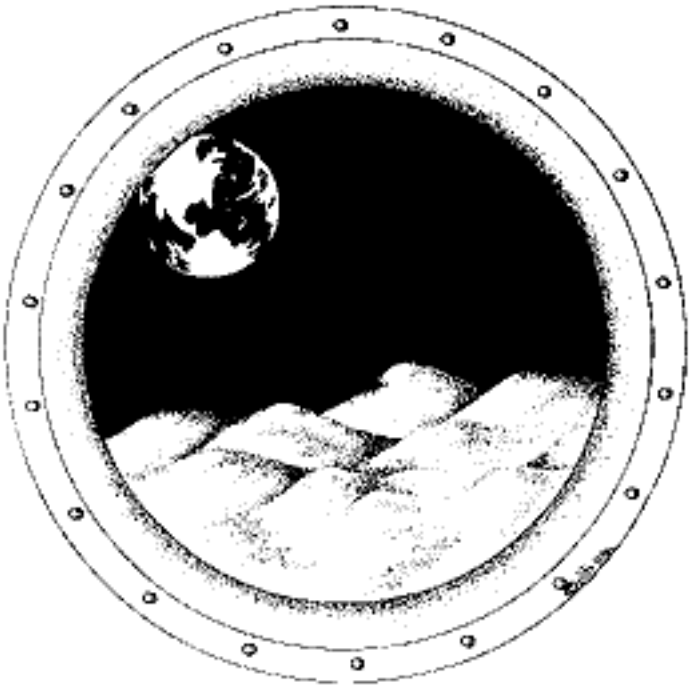
We have many misgivings:

On the plus side, he is finally abandoning the Shuttle, so expensive to maintain and operate - it never was truly reusable, only "overhaulable." On the minus side, the plan does not mention development of a heavy lift cargo vehicle, be it Shuttle-derived or not.

And while Bush is reaching out to the Russians, Chinese, and Indians to take part in the precursor robotic moon missions to start about 2008, Bush also needs to reach out to private enterprise partners, both for launch vehicles and for moon base modules and systems and lunar resource development starting with lunar oxygen, and building materials from which to make new modules for expansion.

I worry that Bush's severe undermanning of ISS sets a precedent for similar undermanning of any lunar outpost. We'll be there, but without enough personnel or instruments and equipment to do anything really useful.

It is about 70 years since Little America I in Antarctica and we still are not using local resources there (the strongest, steadiest winds on the planet for one) and while there are *always* people there, they are constantly being rotated in and out.



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In short, amidst all the premature celebration (it's not real until Congress says its real, and that's only withdrawable temporary approval) there is quite a bit to be concerned about. Unless we space-supporters step in and effectively agitate *to get the devil out of the details,* the Bush Moon/Mars Plan stands to become just one more case of "the emperor has no clothes!"

We need to agitate for several things:

- "Comprehensive" internationalization of the effort: Russia, Europe, Japan, China, India, Brazil for starters - minimum!
- "Non-trivial" free-enterprise participation: in the areas of lunar resource and building materials development, and supplemental surface transport systems, and competitive Earth to LEO transport systems.
- "Non-exclusive" agreements: Nothing in any international agreement to open and maintain a lunar outpost should preclude free-enterprise/commercial outposts elsewhere on the Moon, whether for the purpose of resource development or for tourism. [➪ p. 2, col. 2]

Moon Miners' Manifesto

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• **MMM** is being reedited for the World Wide Web by members of the 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, 600 Pennsylvania Ave. SE, Suite 201, Washington, DC 20003; Ph: 202-543-1900; FAX: 202-546-4189; 202-543-1995 NSS Space Hotline; 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 each month. Articles needing to be keyed in or edited are due on the **15th**, *Sooner is better!* - No compensation is paid.

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⇒ IN FOCUS Editorial continued from p. 1.

This may well mean a new "Moon Treaty."

- "Touch all bases" precursor robotic missions: these should include "ground truth" probes to suspect polar ice fields, and orbital missions to detect and map subsurface voids i.e. lavatubes, and possibly atypical impact areas i.e. Sudbury-type astroblems rich in copper and other "lunar-deficient" elements.
- "Fully outfitted" capacities: the outpost should prioritize not only field-testing equipment destined for Mars, but developing lunar building materials so that future outpost expansion can rely on locally produced modules etc.; test regolith harvesting techniques for solar wind volatiles, including helium-3; prototype solar collectors made wholly or almost wholly from lunar materials; etc.
- "Inter-government underwriting" of an international university consortium run optical and radio observatory networks on the Moon. This would commence with an optical observatory adjacent to the international moonbase, but eventually include satellite optical installations elsewhere, some of them operating in interferometric arrays, and a radio telescope on the Moon's farside.

What about the Mars-bound part of the plan?

Any delay involved in field-testing on the Moon habitats, equipment, and systems meant for use on Mars is certainly worth the bother. That's just simple prudence. Repair, resupply, rescue are all enormously easier on the Moon, just a three day trip away, than on Mars, up to a 25 month window-wait plus 6-9 months travel time away. Mars-enthusiasts would do well to concentrate their efforts on optimizing lunar outpost design for commonalities with what is needed on Mars, so as to make this "field-testing" as fully applicable and helpful as possible.

We disagree with the Bush plan to launch Mars Expeditions from the Moon. It would, however, make sense to launch them from Earth orbit, their oxidizer tanks topped off with lunar oxygen.

While we agree with Mars Society founder and president Robert Zubrin that it makes no sense to manufacture *initial* Mars habitats on the Moon, something that could delay a manned Mars expedition quite seriously and needlessly, *if* incipient lunar industry can make *expansion modules before* they can be made on Mars itself, it will pay to ship these from Moon to Mars rather than equivalent items from Earth.

So where are we?

We have the announcement of a proposed radical change of direction for NASA and for U.S. government involvement in space activities. Should Congrees buy the plan, that will be a start. But *there is a lot of "Devil in the details,"* and all the widespread rejoicing on the part of space-enthusiasts is worrisomely premature. Remember, it has to be Our space program! - **PK**

A Vision for the Moon

From "**The Lunar Declaration**"

In 1999, at the first annual Lunar Development Conference in Houston, Texas, the Space Frontier Foundation presented the Lunar Declaration, written by Foundation president Rick N. Tumlinson, which was signed by many of the conference's attendees [including the MMM Editor].

Selected paragraphs quoted below - full text at: www.space-frontier.org/Projects/Moon/lunarpolicy.html

" ... it is the destiny and responsibility of our species to expand our civilization and the biosphere of our home world outward into space.
" ... it is our duty to assure that this movement is safe, supportable, sustainable and unstoppable.
" ... the Moon represents the next and most vital step for humanity as we expand beyond Earth orbit.

"Be it as a training base for future human explorers of Mars and other worlds, a supplier of precious materials for the development of clean energy on Earth and construction in the space between planets, a home to observatories that will probe the cosmos, a location for commercial enterprise including hotels, or simply as land to be settled and owned by individuals who are willing to stake their lives and fortunes to open its bounties; the Moon represents a new opportunity for an unprecedented partnership between the public and private sectors that will results in savings to taxpayers and profits to those willing to take the financial risks."

NSS's D.C. Headquarters:
It is Time to Rethink its Value

by Peter Kokh

Jan. 6, 2004, Colorado Springs, CO: The Space Foundation announced today the establishment of a Washington, D.C. office. and has named Brian Chase to head the Washington office in the newly created position of vice president of Washington Operations. Chase was most recently executive director of the National Space Society (NSS) and will continue on an interim basis in that capacity.

When the leadership of the former National Space Institute and the former L5 Society began to discuss the merger that was to be effected on March 27, 1987, the latter brought to the marriage its vigorous chapter system, while the former brought its Washington DC headquarters.

In our opinion, this was always a mistake. Along with the name, "National" Space Society, the D.C. headquarters signals that the mission of NSS, all wording in the published mission statement to the contrary notwithstanding, is primarily to have an affect in the formulation of American Government Space Policy, not to advance the opening of the space frontier by all legitimate means, *including* national space policy. The D.C. presence seemed to be essential to this implicit mission.

Predictably, the grass roots chapter network became a neglected stepchild, and staff concentrated on its "space as public policy" mission.

Proverb: "If your only tool is a hammer, every problem looks like a nail."
Translation: "If your only tool is access to government officials, elected or not, every problem looks like a political one."

Meanwhile, the larger and vastly more effective Planetary Society operates quite effectively out of its Pasadena, CA office. The Space Frontier Foundation has done much to change paradigms operating out of Los Angeles. And the Mars Society has been accomplishing much out of Denver.

Being outside of the DC Beltway is not only not a handicap, it is essential to clear vision of what the challenges to opening space really are, and what they are not.

Now that Brian Chase will be leaving, and at a time when NSS has "everything on the table" in an effort to trim costs, we recommend that NSS rethink its Headquarters posture. Let's go somewhere else! These days, with the Internet, physical location is not that essential for effective action. We can maintain a congressional liaison in D.C., but the main office and staff can relocate elsewhere, where costs are less, and, more importantly, where vision is clearer and less horse-blindered.

Where? That's open. Airport convenience is one consideration, but not the only one. Location near a mecca of space tourism would be helpful. But again, a location near the Kennedy Space Center would signal that only government space efforts matter, implying that for-profit efforts are not worth our concern.

How about adjacent to the Hutchinson, Kansas Cosmodrome? or out in the Mohave desert? Or in St. Louis, MO, home to X-Prize Corp? There, the Gateway Arch could do double duty, gateway not just to the West but to Space!

We really, have no favorites, but we should rule out Washington, just outside the Beltway as well as within it, and also rule out proximity to other NASA centers. We need to be about pursuing all routes to opening the space frontier, and picking a new location could send that message. Then "National" Space Society could start signifying "The People's" Space Society, something it should have been doing from the gitgo! **PK**

Paying for Moon/Mars Space Initiative by Scuttling other Missions, Dooms Support.

by Peter Kokh

We do *NOT* support the Bush administration's most recently stated plan to pay for development of a new Crewed Exploration Vehicle transportation system, and installation of a permanent outpost on the Moon, with eventual human expeditions to Mars *by canceling currently budgeted missions* to Mercury, Europa, and Pluto - and by canceling support for the Hubble Space telescope *before its replacement,* the James Webb Space telescope *is operational.* It is important to have a plan that all space enthusiasts can get behind.

Even if all Moon and Mars enthusiasts get behind the plan, if astronomy and solar system planetary science enthusiasts are left with nothing, there will be a wide-spread assessment, and a correct one, that the space community is deeply divided. Replying to the objections of those who say "we cannot afford this" by taking from "Peter to pay Paul" in this fashion is stupid.

Many space enthusiasts have been saying, "well, that's the price we have to pay." In an effort to catch what they perceive as perhaps *"the last train out of town,"* they would leave behind a large constituency of potential supporters.

Not only are the ranks of the Planetary Society larger than the combined memberships of the National Space Society, the Mars Society, the Moon Society, and the Space Frontier Foundation *combined,* these latter memberships include many with joint membership in the Planetary Society, yours truly included.

Four years ago, we had the money to do whatever we might dream about. Now we don't. We can argue and argue about the political decisions and other events that put us in our present budgetary plight, but some of the current budgetary misadventures could surely make better sources of money for space, in their turning around, than canceling worthy space missions already approved and widely supported.

Fellow space enthusiasts, wake up! - **PK**

Mail For MMM

Time to announce "X-Prize II"

In the light of President Bush's announced intentions to redirect the nation's space activities outward, how about a second "X-Prize" to get us cheaply down to the Moon, from low Earth orbit?

David A.Dunlop
Oak Park, IL

[Over, *hard*...!]

egg on our face!

Major Goof in the December 2003 MMM #171Hardcopy Edition

Our Printing Service made a major mistake in printing the cover sheet of the December issue, reversing the positions of pages 15 and 16 in this shortened sixteen page issue. This was the worst possible place to make such a mistake. It meant that, unless we had the sheet reprinted correctly, in order for the mailing page to be on the outside of the collated and folded newsletter, the sheet would have to be flipped so that in effect the order of pages was: 16, 15, 3-14, 1, 2 - in other words, page one was tucked inside at the end.

We regret, and apologize, that we did not have in place procedures to spot this error in a timely fashion, and to handle it correctly (demanding that the printing service reprint the cover sheet.) We hope that you can all appreciate that MMM's production and mailing (not the printing) depends entirely on a volunteer staff.

Ideally, the assembly team would have caught this error as soon as the box of copies was picked up at the printer. Not suspecting that such a snafu was possible, the error wasn't noticed until the collating and assembly operation started. And our volunteers were not able to get to this step right away for personal reasons. MMM #171 was very late to begin with, because of our desktop computer problems. Add to that the delay from delivery of the sheets to be collated from the printing service to the earliest opportunity for collating and assembly, and the team felt intense pressure to get MMM out the door to the post office bulk mail unit. When the misprint was discovered, they made the decision to flip the cover sheet so that they could mail promptly.

We hope that something so egregious never happens again. Errors of omission were made at every step. Meanwhile, to have a better copy for your files:

- **Remove the MMM #171 cover sheet**
- **Reverse the sheet so that pages 1 & 2 are in the right location.**
- **Only pages 15 & 16 will be out of place.**

The MMM team apologizes for this inconvenience!

Using "Marsten Matting" to build Frontier Roads on Moon & Mars

WWII Instant Runway Technology to the Rescue?

by Peter Kokh

Recently (January 25, '04), in cable TV channel hopping, I chanced upon a History Channel "Mail Call" episode that described an ingenious World War II technology used to provide stabilized runways on the quick in newly conquered territory. Bulldozing and grading are the first steps, of course, but these measures alone did not guarantee runways that could stand up, without rutting, multiple landings of heavier aircraft.

To the rescue, a soil-stabilization technology using open-grid matting invented in Marsten, North Dakota, hence the name "Marsten Matting." You won't find a dedicated article on this on the web, though there are hundreds of references to it. So our source remains what we saw in the History Channel episode.

"Marsten Matting" in its first iteration, consisted of open grid steel panels on the order of a foot and a half wide and 12-15 feet long. They interlocked to provide a continuous mat that could be beat into the loose soil, so as to support landing aircraft and aircraft taking off.

Eventually, long runs of such matting would arrive on scene, pre-interlocked and folded, so that it could be just pulled off a flat bed of a truck and put into place, instead of each panel being carried by a pair of GI's. The design of the mats changed over time, becoming ever more strong and stable. Lighter Aluminum mats, were tried also.

Sorry, but we have no pictures to offer you. Our best advice is to try to catch a rerun of that "Mail Call" episode. But if you do find a website with more information, please let us know at kokhmmm@aol.com.

Translating Marsten Matting technology to the Moon & Mars

In our recent article on the construction of early lunar roads, MMM #169 , OCT '03, we described a vehicle which in one operation would shove aside surface boulders, and grade the soil, then compact it with a trailing weighted roller. The compacted surface could be further stabilized by microwave fusion of the surface powder. This might be enough to support light vehicles and light traffic.

But it would seem prudent to construct lunar roads to be able to handle heavy equipment traffic from the outset. Paving them with "lunacrete" - lunar regolith with added made on Luna Portland cement - presupposes an industrial ability to make that additive in quantity. And the operation of paving roads in this way could be time consuming. Could there be an easier way?

Perhaps the use of "Marsten Matting" open-grid panels made locally on the Moon, along with microwave sintering of the regolith fines filling the grid openings, would do the job. A lot would depend on how the grid was designed and the materials of which it was made. What are the options - realistic options for an early frontier outpost wanna-be-settlement - options appropriate to an early frontier not so diversified industry?

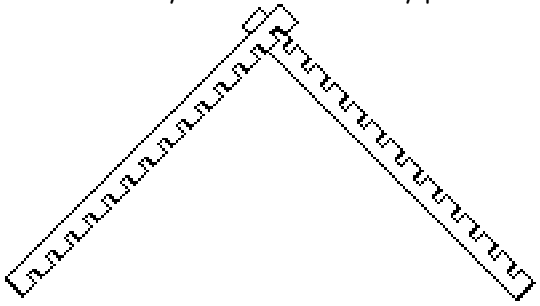
Steel seems desirable, at first blush, but a plant to make steel out of the iron fines in the regolith would seem to be a very ambitious undertaking for a small outpost. You'd want to first produce iron-enriched or beneficiated soil, then extract the iron, add the needed alloying ingredients, then pour the molten steel into the needed molds, then combine them into the desired mats.

We can make objects out of iron more simply, just by sintering free iron fines, small particles extracted from the regolith with a magnet and then sifted. But while "powdered metal" technology is good enough for some "low performance" items, this method could only produce brittle and friable mats that would disintegrate under the passage of the first vehicle.

Aluminum? The plant and equipment necessary to produce aluminum would also be prohibitively extensive and expensive for an early outpost. Magnesium or Titanium? As with aluminum and steel, we'd have to have the prior capacity to extract and isolate the needed alloy ingredients.

Glass would seem to be an unlikely candidate. But mid-eighties experiments by Goldsworthy-Alcoa funded by grants from Space Studies Institute, showed that glass fibers, made from crude lunar highlands regolith (with a relatively high melting point) and embedded in a glass matrix made from crude mare regolith (with a relatively lower melting point, lowered further still with a lead dopant brought from Earth) would produce a hardy composite with "twice the strength" of common steel. (Our advice has been to forget about imported lead as a dopant and to use readily producible lunar sodium and phosphorous which would lower the matrix melting point almost as much.)

A follow-on SSI study showed that a highly-automated plant to produce glass composites on the Moon need weigh only a few tons, making it ripe for a lunar startup industry. Open grid mats could be designed tailor made for the fabrication methods that prove most workable for lunar glass-glass composites. Square mats of crisscrossed interlocking identical spars would require only one mold and an easily automated assembly process.



Larger glass-glass composite grids of similar design could be used to stabilize steep shielding berms. **<MMM>**

Moon & Mars Surface "Landscaping" Tips
from Winter Snow Gardens & Japanese Zen Gardens

by Peter Kokh

Settlers, whether on the Moon or Mars, will live in cozy "Hobbit Burrows," their homesteads comfortably shielded and sheltered by an overburden blanket of local regolith (meteorite-pulverized rock powder). When they visit their neighbors, or go to school or work or shopping, they will make their sorties in the "middoors" environment of shielded and sheltered passageways and thoroughfares.

What would they care about the out-on-the-surface appearance of their shielding mounds and their contiguous surface perimeters? Surface landscaping might seem to be of little concern. This may be the case for many of them, even those whose homesteads have separate airlock access to the surface, probably an upscale luxury.

Yet "keeping up with the Joneses" is a hard habit to break, and one which many pioneers may take along with them. We spoke about ways to give special decorative treatments to shielding mounds in MMM #55 MAY '92, p 7. "MOON ROOFS." Once someone does something special and it receives a spotlight moment in the evening TV news or in the Luna City Home & Gardens magazine, the race will be on for ways to do likewise, *if not better.*

In truth, out-vac appearances are more likely to be a civic concern relative to the approaches to the settlement airlocks, to the settlement spaceport, etc. But once there are multiple settlements some distance apart, roadside "inns" are likely to arise, and if there are more than one, a competition of appearances is sure to rise. Similarly, the approaches to the offices of industrial park factories and enterprises are sure to be a budget line item in their design and construction.

So how would an out-vac or surface "landscaper" go about enhancing the scapes that nature has provided? That's our topic.

Moonscape and Marsscape givens

On the Moon and Mars, any exposed bedrock and any given rocks and boulders already on site will become the starting point for landscapers who may choose either to leave them in place and add more scavenged from elsewhere, or to rearrange them in more artful clusters. The same goes with the natural shape of the terrain: flat, rolling, cratered, etc. The landscaper may like what nature provides or to add a hill here and a dale there.

All these features provide the "bones" of the landscape to which the frontier landscaper can choose to add carefully placed color-contrast* sculpture accents - or, of course, to leave untouched save for a few gentle tweaks. After all, some moonscape and marsscape scenes need no help and beg to be left untouched. Others may be rather blah, devoid of interest, and from the settler's point of view, in need of a little "tender loving makeover."

* On the Moon, colors that stand out in contrast to the monochrome light to dark graytones: yellow, orange, red, green, blue - bright greens predicted to stand out best. On Mars, colors that are opposite or next to opposite on the color wheel from the ochres, rusts, salmons, and yellow-beiges of the terrain - bright greens and blues especially.

Tips from Winter Snow Gardens

As I write this article from a friend's home in the countryside south of Milwaukee, there is not quite a foot of snow on the ground, refreshed yesterday, and the view out the south window-wall is spectacular. True, no signs of life - except for fresh tracks of rabbits and other hardy critters - but then, of course, I am referring to plant life. It must seem to most southerners (and many a maladjusted northerner, alas) that "winter" and "garden" are two concepts that together, just don't "compute." But I have another friend who makes his living by landscaping for whom the two concepts fit hand in glove. Some of his ideas suggest approaches future surface landscapers on the Lunar and Martian frontiers might take to heart,

Even in winter, the "bones" of trees, shrubs, and some perennials still stand proud, even above blanketing layers of snow. If we have taken care to arrange those plants in a pleasing fashion, that beauty still shows in silhouette. Included are any landscaping rocks and boulders we may have added to the mix. Gardeners should think of "how it will look in the winter" when making garden and landscape improvement decisions.

To these "bones" we may have taken care to add color accents here and there. Apart from green evergreens and the yellows of tall grasses and the reds of dogwood twigs, there are garden "grazing balls" and other sculpture accents in eye-catching colors, made of metal, glass, ceramic, cement, wood, and plastic. They will be even more appreciated in winter settings.

In Milwaukee, St. Paul, and Quebec City, (and perhaps many other northern cities where winter revelry is not uncommon) there are annual winter ice-sculpture and snow-sculpture competitions. Like the monochrome landscapes of the Moon and Mars, northern snowscapes can be magnificent desolations of a narrowed family of related shades. We can predict that frontier artists will make sculptures out of the surface rocks and regolith soils of the Moon and Mars. To the artist and sculptor, nothing is so tempting as free raw material in abundance! [In MMM #22 Feb '89, "First Souvenirs" we wrote of the imaginative creativity that arose in abundance after Mt. St. Helens scattered ash all over Washington State in 1981.]

To sculptures made of raw regolith and rock, the pioneer landscaper can add sculptures of cast basalt, concrete, glass and glass composite, and metal. Crude

sintered powdered iron sculptures will hold up well as an early choice. before lunar industry has developed to the point where steel and other alloys can be produced.

Tips from Japanese Zen Gardens of Sand, Rock, & Stone

In Japan, gardens frequently include a Zen area of careful, spiritual compositions of sand, stone, and rock. These inanimate garden spaces demonstrate that we do not need trees, shrubs and other plants with which to landscape our sterile and barren moonscapes and marscapes in ways that please the eye and uplift the soul. For the zen gardener, it is all about composition, order, peace, and simple minimalism. Frontier surface landscapers are likely to turn to these Zen gardens for further inspiration.

Tips from unlikely scene: disco ballrooms & the 60s & 70s

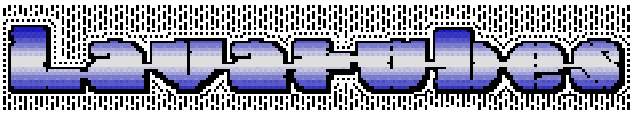
On the Moon's nearside, where perhaps the bulk of the lunar settler population will live, even the nightspans are bright. The Sun may be "down" for two weeks at a time; but meanwhile, Earth will phase from first half to full to second half. And phase for phase, the Earth taking up thirteen times as much area in the sky and with more than four times the reflectivity, thanks to clouds, snow, and ice, shines some sixty times (read 60 X) as bright on the Moon as the Moon does on Earth. The nearside nightspan will be quite bright by our standards, like an urban area under cloudy conditions, streetlights reflecting off the clouds.

But on the Moon's Farside, the Earth will always be "down, out-of-sight and out-of-mind." So when the Sun is also down it will truly be dark. Just the stars, so many stars, and the Milky Way in undreamt of brilliance and glory.

This darkness presents a hip opportunity. Breccias and other moon rocks collected during road construction and other activities can be cut and polished, to reveal, under blacklight, iridescent, fluorescent spots and streaks. The out-vac surface landscaper can arrange such cut rocks artistically, providing nightspan black-lighting from hidden viewpoints to create a fantasy scene out one's habitat periscopic picture windows. To this, farside sculptors working in glass, glass composite, and ceramic may find a way to had blacklight sensitive texture to their creations.

Perhaps the first installations to be so landscaped will be tourist resorts in the "limb regions" of the Moon, where, thanks to orbital "libration," Earth is sometimes just over, sometimes just under the horizon. The attraction of such locations is the opportunity to experience in one place Earth rise, preceded at times by the city-lit hemisphere that happens to be in darkness, then Earth hovering just over the horizon, Earth-set, and the glory of truly dark star-spangled skies. Think a combination of Niagara Falls and Las Vegas. Blacklight fantasy gardens would be a natural, to be copied in miniature by some farside homesteaders and hotels and roadside inns etc.

Imagination is not only fun. It gets things moving. Take a cue and take heart. **</MMM>**



By Blacklight Fantasy Excursions

by Peter Kokh

In the previous article, we spoke of blacklight-lit fantasy out-vac surface gardens on the Moon's Farside where truly dark nightspan conditions exist. Yet despite the glaring presence of the Earth in the Nearside nightspan skies, there is opportunity galore for this kind of fantasy lit fantasy gardening on Nearside as well, within lavatubes open for public excursions and tours. It is not impossible that without the addition of anything artificial or human-altered, just with blacklight, lavatube surfaces may include spots and streaks that shine brilliantly in blacklight. We won't know that until we go there.

We can test if that is the case in terrestrial lava tubes. Our friends in Oregon L5 who have spent so many hours in a pair of lavatubes outside Bend, Oregon may have already thought of this and tried it. In the summer of 1992, with Oregon Moonbase team members Bryce Walden and Cheryl York as my hosts and guides, I had the chance to explore these tubes, much to my delight and fascination. I was amazed by the diversity of texture in the walls and ceilings of the tubes, testimony to the varying temperatures and viscosities of the flowing hot lava that formed them thousands of years ago. It had not occurred to me to bring along a black-light flashlight.

Preparing a pre-explored Lavatube for Blacklight Excursions

If the surfaces of lunar lavatubes prove to be sensitive to blacklight, a host of practical questions remain before installation of a blacklight system can become a technically and financially feasible project. The tubes are vast in size and a lot of power, lamps, and wiring would be needed. For "dayspan-only" tours, power could come from solar collectors on the surface. This site could operated by a commercial concession in a prime tourist traffic area. We are talking about an era well into the future when there will be a substantial resident population and industrial infrastruc-ture in place and when tourist excursions from Earth are popular and affordable. But even if none of us live to see that day, the possibilities can excite us and motivate us.

The blacklit lavatube could include fantasy forests and sculputes, all glowingly and beautifully revealed by blacklight. There are no limits, and like many tourist facilities, the manmade features of this site would likely grow as profits from tourists were plowed back into the investment. Why not an Earthside enterprise analog? **</MMM>**

NOTE: for more on fluorescence in rocks, visit:

Tozour Family's Fluorescent Rocks Links and Updates Page
http://mywebpages.comcast.net/jtozour/links/links.html

Luna City Yellow Pages

Construction Contractors

Roadmaster / EZ-Berm

Manufacturers of glass composite Marsten Grid Mats for road surface stabilization and of open grid baffles for fixing high slope shielding mounds and berms.

Order assembled and ready to install, or in compact bundles of parts easily assembled and installed by our expert crews, or yours, on site.

Your choice of stock sizes or made to order.

North Junction: Frigoris Central Industrial Park
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www.roadmaster-ezberm.com.ln

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Custom Surface Landscapers

Let us reshape your surroundings to add interest and draw attention. We specialize in both bold and subtle makeovers of both private and commercial properties. For samples of our work in Luna City and environs, visit our convenient online showroom at:
www.moonrescapers.biz.ln/showroom/
or visit our offices at 133 Crisium Parkway, Luna City
*1-737-2273

Sculpted Moonscapes, Inc.

Let SCI add interest to the sight out your window. We can reshape the terrain in your lot and design interesting additions. We are the moonscape architects for the famed Luna City Hotel grounds. We specialize in both residential and commerical properties and welcome your input.

http://www.sculptedmoonscapescom.ln
visit our offices at 260 Full Earth Road, Luna City
*1-737-2273

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or online at www.graywright.com.ln.

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Peaceful interior and exterior Zen Gardens
of Rock, Stone and Raked Regolith
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Magnificent Desolation *Plus*

Add some playful fun to your outscapes!

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- skulls of cattle, rabbit, fox and more
- driftwood and driftwood piles
- "dead" scraggly bristle cone pines, etc.
- old and rusty conestoga wagon wrecks
- any similar items on request

Our sculptures are made of glass composite, glass, ceramic, cast basalt, sintered iron and other materials that resist attack by solar ultraviolet and cosmic rays

Visit our showroom in North Junction at:
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Blacklight Sculptures

Fantasy Outscapes, LLC

Statures and abstract forms of fluorescent rocks & and other fluorescent materials bring otherwise unilluminated outscapes to life.

- Our principal market is farside and limb settlements and outposts.
- But our customers also include nearsiders at high northern and southern polar latitudes for use in shaded spaces where Earthlight does not intrude.

Explore our online galleries at:
fantasyoutscapes.com.ln.

Visit our unique
Fantasy Gardens & Forest
in Founders Park, Bullseye Harbor Settlement,
in central Mare Orientale, just within the western limb.

- Stroll in shirt-sleve comfort through glass composite tubes through the "Gardens" and "Trees"
- Visit our Fantasy Interiors Showroom of blacklit meditation rooms and other in-home retreats.
- We have souvenir size blacklight creations for wall niches, ideal for nighttime mood lighting accents.

http://www.moonsociety.org

Please make NEWS submissions to: KokhMMM@aol.com

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.

Artemis Society International was formed in August 1994 as a forum for supporters and participants in the **Artemis Project™** quest to establish a commercial Moon base as a first step to a permanent, self-supporting lunar community. **ASI** does not engage in any form of commercial business directly, but seeks to build a Project support business team. Registered trademarks of the **Artemis Project™** belong to **The Lunar Resources Company®**

PROJECTS:

The Artemis Project™ http://www.asi.org/
- Artemis Reference Mission
- Artemis Data Book
- Artemis Image Library

Project LETO™
http://www.projectleto.org/

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.

Moon Society Position Papers

From Peter Kokh

When the Moon Society was formed in July 2000, one of the many things we had intended to do was to put together a series of topical position papers. To date, however, little progress has been made on this effort, the small pool of volunteer leaders being preoccupied with other matters that have seemed to be more pressing.

Now, however, in the wake of President Bush's announced intention to redirect NASA's efforts outward to the Moon and Mars, it is especially urgent that we take the Position Paper plunge.

I have volunteered to "mine" existing relevant position papers of the National Space Society and the Space Frontier Foundation for points worthy of incorporation into Moon Society Position papers, and add and modify as seems fitting.

Anyone wishing to assist us in this project can email me at kokhmmm@aol.com, or write me at the MMM submission address given just below the masthead on page 1.

Whether we do one comprehensive position paper on the Moon, or a series, is something that can be decided as we go along. But here are some of the points I think we should cover:

- Reasons for a Permanent Human Presence on the Moon
- Precursor Robotic Missions to help identify the best location for an outpost from various points of view
- Preparing the way for Human outposts on Mars
- Preparing for industrial use of lunar resources to establish an Earth-Moon economy and provide options for solving Earth's energy and environmental problems.
- Keeping open the door to private enterprise outposts
- Private enterprise participation in government & international lunar outpost programs
- The role of tourism in opening the Moon
- The future of astronomy on the Moon
- Programs to assist entrepreneurs in pre-developing now the technologies needed on the Moon and Mars, for the sake of profitable terrestrial applications ("Spin-Up")
- Funding NASA's Moon effort without scuttling worthy planetary science missions
- Any government lunar base initiative must have secure financing and sustainable support. To this end, it is important to produce lunar exports as early as possible to help defray costs.
- A new Moon Treaty is essential to protect private enterprise and property rights on the Moon under a stable regime of law.
- Involvement of University Consortiums

Moon Society needs Concrete Projects

from Charles F. Radley < c.radley@comcast.net >

One of the reasons Mars Society and Planetary society have been so successful, compared to how NSS has been in a major death spiral, is that they are working on "real projects", and the rank and file members really like to see that. There is nothing like real hardware to get people inspired and excited.

It would be great if the Moon Society could take advantage of this type of initiative, it should dramatically increase the exposure and prestige of the Moon Society, and increase membership by leaps and bounds.

Charles F. Radley

Editor's Comment: Charles Radley has proposed to the Moon Society Leadership Council, that the Society consider cosponsorship of TransOrbital's TrailBlazer mission piggy-back instrument, a radiometer to map and measure the intensity of the radio silence over lunar farside. This data would help in planning and in --- a future radio telescope on the Moon's Farside for ultimate level S.E.T.I. research.

The Artemis Project as an "Open Source" effort.

from Thomas Heidel < tomheidel37@yahoo.com >

I am not a Moon Society or Artemis Society member, but I have been exploring the ASI website. There is a lot of good stuff here and I certainly like the idea of a for-profit private enterprise commercial moonbase. Such a moonbase seems much more likely to purse development of lunar resources to help solve our problems back here on Earth than is a government one.

But it appears that the Artemis Moonbase is a proprietary project of The Lunar Resources Company, which, to judge from the skimpy evidence available on the web, may be just a wannabe corporation with no realistic prospects of carrying it off.

I have *an idea, perhaps heretical,* that I'd like to share with you. TLRC could be encouraged to take the leap, let go of the proprietary ownership, and make the Artemis Project™ an "open source" one. Everyone could contribute to a mission design and business plan *that would be out there available to anyone* who could put together the financial resources and managerial team to pull it off.

The Open Source path is responsible for the great success of LINUX. The Artemis Project has everything to gain, nothing to lose. Go to: http://www.opensource.org/

Mining the Artemis Project Website

The Artemis Data Book – http://www.asi.org/adb/

"The Artemis Data Book collects and organizes all the technical and program information we need to establish a permanent, self-supporting lunar community. The Data Book is organized into a hierachy of subsections which break down each topic into fine detail.

"If you find an empty section, you have discovered an area where you can make a significant contribution by helping to fill in the blanks."

"For more information about maintenance of the Artemis Data Book and the Web Management System, refer to section 9 Electronic Communications."

Building the Artemis Data Book

http://www.asi.org/adb/building-the-book.html

"We've spent a couple of years talking about things, posting messages that often contain solutions to our space flight and program problems. If we focus on slipping those messages into the Artemis Data Book and then massaging those little essays into perfection, we'll be building our plans for the lunar base while we chat about it.

"We have a tendency to worry about making everything in the Data Book perfect, when really we're better off getting something in there to shoot at, even if it's 50% wrong. That way we'll get inputs from experts to correct our assumptions, and our documentation will iterate toward as good a solution as possible. We might have some blunders on-line, but that's the risk we have to take when we have a world-wide team developing these things in full public view.

"We can trust the judgment of the ASI web team to figure out what's urgent and what's not. If they get overloaded, they know how to set priorities.

"Don't worry that the introductory pages might not link to new files right away. We're continually revising those documents as well, so eventually all the on-line documents will be linked. Until then, the file will show up in the What's New list, so regular visitors will see it and read it if they're interested. When the index-building engine gets running, your work will automatically show up in its proper place in the Artemis Data Book."

Artemis Data Book Full Outline
http://www.asi.org/adb/fulloutline.html
Artemis Project Image Library
http://www.asi.org/images/
Moon–related external websites
http://www.asi.org/adb/m/rews.html

The "About the Moon" Section of the ADB

http://www.asi.org/adb/m/

NOTE: The number in parentheses after a topic indicates the number of pages on the subject. Outline subtopics for which no pages have been posted are not listed below. - Ed.

About the Moon Outline (6)
M 1. Introduction to Appendix M
M 2. Historical Lunar Exploration (Summary of Lunar Spacecraft, Luna, Ranger, Zond, Surveyor, Lunar Orbiter, Apollo, Galileo, Clementine, Lunar Prospector)
M 3. The Lunar Environment (Comparison of Earth and Moon, Apollo Astronauts' Experience, Lunar Terrain, Temperatures on the Lunar Surface, Seismic Activity, **Polar Environment,** Water at the Lunar Poles, Radiation Environment, Orbital Mechanics, Lunar Ephemeris, Lunar Transient Phenomena)
M.4. Geologic Processes (Lunar Impact Processes, Volcanism on the Moon, Sinuous Rilles and Lava Tubes, Tectonics on the Moon, Lunar Stratigraphy (2)
M 5. Lunar Minerals (3)
M 5.1. Silicates (Pyroxenes, Feldspars, Olivine, Silicas, Other Silicates (1)
M 5.2. Oxides (Ilmenite, Spinels, Armalcolite, Oher oxides)
M 5.3. Sulphides (Troilite, Other Sulphides)
M 5.4. Native Metals (Iron, Other Native Metals)
M 5.5. Phosphates
M 5.6. Meteoritic Minerals
M 7. Lunar Regolith (Lunar Soil, Beneath the Surface)
M 8. Chemistry (Planetary Separation Processes, Miscellaneous Minor Elements, Vapor-Mobilized Element, Solar-Deposited Elements, Reflection and Emission of Radiation)
M 10. Global and Regional Data About the Moon (Imagery and Data Sources, Geophysical Data, Gravity)
M.11. Observing the Moon (1)

It's time to Update the Artemis Data Book

by Peter Kokh

Since the Moon Society was spun off from the Artemis Society in 2000, the Artemis Project™ and the Artemis Data Book project have suffered from dwindiling attention. Much of the asi.org site needs updating, some parts badly. In addition to updating, there is a lack of interconnectivity. There are many images in the image library with no links to or from text, and that is an enormous emission. The time to keep images out of pages so that the ages could load faster in primative machines is now long past.

If you are interested in helping, email the Artemis web team at web-team@moonsociety.org

Local and Campus Contacts: Volunteer Job Descriptions

(establishing a Moon Society Outpost or Chapter)
from www.moonsociety.org

a. A Local Contact agrees to accept, read, and reply to any email inquiries about local activities (actual, planned, or possible) concerning Moon Society goals and Projects (including the Artemis Project)
b. A Local Contact can work with others who contact him/her to plan meetings, parties, and/or public outreach events that may including speaking, displays and exhibits, informational literature, etc. that promote the goals of the Society. Of course, in order to attract new local members, the local Contact can engage in such activities by him/herself in an attempt to get things going, if so motivated. There are many online resources tailor made for Moon Society use to help you engage in such activities at the Space Chapter Hub website: http://nsschapters.org/hub/
c. By agreeing to be a local contact in your community area, you are not committing yourself to be president or any other officer of any future chapter, only to work with others. Elections will pick the officers.
d. In sum, a Local Contact agrees to be just that. The Society does not expect you to work miracles by yourself.
e. This is a vital position, and the Society has dignified the it with the term Outpost. An Outpost is one or more persons, but short of the number needed for full chapter status (five), who represent the Society on the Outreach Frontier.

✓ For further information, contact the Chapters Coordinator at chapters-coordinator@moonsociety.org
✓ The current Chapters Coordinator is Peter Kokh who can also be reached at kokhmmm@aol.com or 414-342-0705

Guidelines for Volunteers

1. Take on only what tasks you reasonably expect to be able to accomplish in a reasonable period of time.
2. Try to respond promptly to communications regarding tasks that you are working on.
3. If you are unable to complete a task, try to find someone else to take over the task, or contact someone in the Moon Society staff about finding a replacement.
4. Provide regular status reports to your team leader or Moon Society staff about tasks on which you are working.

Moon Society Chapters & Outposts – The Outpost Frontier Report

Moon Society St. Louis

www.moonsociety.org/chapters/stlouis/

from Keith Wetzel < kawetzel@swbell.net >

At 7:00-8:30 pm, January 8th, MSStL celebrated Moon Madness Night at the Center for Creative Learning, 265 Old State Rd, Ellisville, Missouri.

Some notes from the St.Louis Chapter meeting

We discussed Bush's Space Initiative and I suggested we organize a letter/email campaign to rally support. My suggestion was this:

1. Show support for the program
2. In the 2008 time frame requiring robotic missions to the Moon, instead of NASA Ames or JPL building & flying missions, NASA cold buy data from Commercial space missions like Transorbital's TrailBlazer, LunaCorp's Icebreaker and SpaceDev
3. Instead of having JSFC design & build the OSP/CEV, create a 'CEV-Prize' modeled after the X-Prize, open that up commerical competition. Burt Sharpe, doesn't think this is possible, but I just throw it out as a possiblity but he & David Heck agree on encourging NASA to get Commerical Companies to piggy-back on robotic missions.

Chris Nobbe will see if she can get the parents of her 2nd graders involved, possibly even the students themselves into this campaign. She also plans on doing some kind of decoration/celibration at the School to show support.

They only downside of this program (besides the possiblity of it going nowhere) is that to fund this any NASA program/project that does not fit under the Moon-Mars program is going to get cut: Pluto/Knuper Mission, Europa Orbiter/JIMO (Jupiter Icy moons Orbitor) and Other Planet missions. You will hear screams of bloody murder from Planetary Scientists and the NSF.

But if you open up Lunar exporation to commercial companies like the ones above and as they gain experience in building & flying these missions, this opens up the possiblity of paying them to develop missions to the outer planets. It is some thing to think about.

From some discussions on the Artemis-list, and on the Mars Society list, to get the most out of this campaign and to get the most impact, contact your congresspeople.

1 Call 2 Send a Fax

3 Email using the contacts webmail form (some people have gotten snail mail responses.)

4 Snail-Mail, due to the resent Anthrax scare, the processing that the mail has to go through makes this is the slowest method of communication with elected officials.

5 Write a Letter to the Editor of your local paper

Chapter & Outpost Resources Online

The Moon Society Chapters Coordinator maintains the **Space Chapter Hub** website complex at:

http://nsschapters.org/hub/

On this site are resources to help build and strengthen chapters and outposts of the Moon Society as well as chapters of the National Space Society andof the Mars Society. (While our focus and stress may differ, all space chapters face the same challenges and have the same tools at their disposal. And when push comes to shove, we are all in this together.)

Resources for Moon Society Chapters & Outposts

- Menus Unlimited for Chapter Projects
  http://nsschapters.org/hub/projects.htm
- Planing for events
  http://nsschapters.org/hub/events.htm
- Growing your chapter
  http://nsschapters.org/hub/growth.htm
- Downloadable Flyers
  http://nsschapters.org/hub/flyers.htm
- Transparencies
  http://nsschapters.org/hub/transparencies.htm
- Slide Sets
  http://nsschapters.org/hub/slidesets.htm
- Display Blueprints
  http://nsschapters.org/hub/blkueprints.htm
- Models & Exhibits
  http://nsschapters.org/hub/exhibits.htm
- Chapter Produced Videos
  http://nsschapters.org/hub/Video/videos.htm
- Chapter Speakers & Guest Speakers
  http://nsschapters.org/hub/speakers.htm
- Chapter Merchandise
  http://nsschapters.org/hub/merchandise.htm
- Space Conference participation
  http://nsschapters.org/hub/conf.htm
- Science Fiction Conventions
  http://nsschapters.org/hub/con.htm

Brigham Young U.Space Development Club

http://www.et.byu.edu/groups/sdc/

from Jonathan Goff < jag42@et.byu.edu >

We met Jan 22nd to start work on the igniter project, making some engineering decisions, starting up some CAD models, and drawings, etc. Project sections are:

- Structures and Safety
- Plumbing, Valving, and Purge
- Igniter Body and Catalyst Design
- Ignition Detection and Igniter Control

This covers several engineering fields, including structures, thermo, fluids, combustion, catalysis, electronics, and general design skills.

Lunar Resources for Rescue of Mankind in 21st C: Global Decisions must be made soon

http://selena.sai.msu.ru/Home/congresses/26_ga_egs/abstracts_e.htm

V.V.Shevchenko < shev@sai.msu.ru >
Sternberg State Astronomical Institute, Moscow Univ.

In results of many ecological investigations it has been found that the permissible level of energy production inside Earth's environment is c. 0.1% of solar energy received on the surface - about 90 TW (90 x 10 12 Watt).

On the other hand, the general estimation shows that the total energy use (and production, accordingly) in the world is about 16 TW in the end of 2000. This value will increase by factor of two (about 34 TW) to the year 2050.

If the tendency will be preserved the total energy production in the world will approach 98 TW by 2100. It means the permissible level of the energy production inside Earth's environment will be exceeded. But it is obviously that the processes destroying Earth's environment in global scale will begin before it - after the middle of the century.

Hence, the first result of the practical actions for rescue of the Earth's environment must be obtained not late than in 2020 - 2030. It means that general decisions must be approved now or in the beginning of the new century. The only way to resolve this problem consists in the use of extraterrestrial resources. The nearest available body - source of space resources is the Moon. The most known now space energy resource is lunar helium-3. Very likely, the lunar environment contains new resource possibilities unknown now. So, the lunar research space programs must have priority not only in fundamental planetary science, but in practical purposes too. **<VVS>**

President Names Eight Moon Advisers

01/30/04 Washington, DC: President Bush has named the eight people from academia and industry to a commission charged with figuring out how to get humans back to the Moon and beyond. Chair is former Air Force Secretary Pete Aldridge. Also appointed to the commission, are:

Four persons with space-related backgrounds

- **Paul Spudis**, scientist, Lunar & Planetary Inst., Houston, author of "**The Once and Future Moon**."
- Laurie Ann Leshin, planetary geochemist at Arizona State U.
- Maria Zuber, Mars scientist, Massachusetts Inst. of Technology.
- Neil deGrasse Tyson, Rose Center for Earth & Space at the American Museum of Natural History in New York.

Four additional persons:

- Carly Fiorina, chairman and CEO, Hewlett-Packard.
- Gen. Lester Lyles. Retired Air Force
- Robert S. Walker, Former Rep. R-Pa.
- Michael P. Jackson of Virginia.

GREAT BROWSING !

ONLINE PETITION: Save The Hubble
http://www.savethehubble.org

A paper Mars Exploration Rover model.
http://www.lansbergen.demon.nl/space/MarsRover.pdf

Space Resources Roundtable
http://www.mines.edu/research/srr

Characteristics of the Lunar Environment
www.tsgc.utexas.edu/tadp/1995/spects/environment.html

The Moon's Interior & Geological Activity
http://csep10.phys.utk.edu/astr161/lect/moon/moon_interior.html

China's 4 Scientific Goals on the Moon
http://www.spacedaily.com/news/china-03zy.html

10 Reasons to Put Humans Back on the Moon
http://www.space.com/news/moon_top10_031208-1.html

Moon Base Laser to Zap Asteroid-Comet Hazards
http://www.space.com/astronotes/astronotes.html

Year of Mars: Explore Mars Online
http://planetary.org/mars/

Consortium for the Development of Space Value Networks
http://www.rocketforge.org/cdsvn/

Where is Cassini-Huygens Now?
http://saturn.jpl.nasa.gov/operations/present-position.cfm

AstroExpo.com Tech Papers
The links below require a free registration on AstroExpo.com -- to register, go to http://www.astroexpo.com/manager/newuser.asp

Optimizing RLVs for Humans
http://www.**astroexpo.com**/reference/techpapersdetail.asp?id=188

Low Cost to Orbit is more a matter of Vehicle/Lunch System Design than of breakthrough technology
http://www.astroexpo.com/reference/techpapersdetail.asp?ID=187

Designing RLVs for Future Space Markets
http://www.astroexpo.com/reference/techpapersdetail.asp?ID=185

New, Free, Lunar Lander Game

from PR@spacedev.com

SpaceDev has released a Lunar Lander simulator game, in conjunction with game producer, Beltminer, as part of our ongoing work in designing missions and spacecraft for the Moon and Mars. The newly released free game-like Lunar Lander simulator is based on the idea that there are valuable natural resources on the Moon, on Near Earth Asteroids (NEAs), and on Mars that can be commercially utilized to stimulate and support the expansion of the human race into space through commercial private sector ventures. The simulator can be downloaded free of charge from this location:

http://www.spacedev.com/newsite/templates/subpage3.php?pid=53&subNav=11&subSel=2

More SpaceDev News – CHIPSat & Hybrid Rocket

The past year was a great one for SpaceDev. We started the year 2003 by launching SpaceDev's highly sophisticated CHIPSat, the world's first orbiting Internet node, into low earth orbit on January 12, 2003. After weathering the worst solar storms in recorded history, CHIPSat has realized its first anniversary in space.

We ended the year with the success of our innovative and record-making hybrid rocket motor (with Scaled Composites, hybrid propulsion technology for human space flight) that safely propelled a human toward space in an historic supersonic flight on December 17, 2003.

McKay and Angel Dream about the Moon

At a Senate hearing on lunar exploration in November, leading scientists gave their recommendations. The following are noteworthy.

Dr. David S. **McKay**, a scientist at Johnson Space Center, would like the agency to go to other locations and dig trenches perhaps 100 m. deep to examine in detail the top layer of crushed rock and dust, known as the regolith.

"There is a lot of data hidden away on the Moon that remains to be unraveled. The lunar regolith is like a giant tape recorder that has been running for billions of years."

Dr. J. Roger P. **Angel**, a pro.of astronomy at the U. of Arizona, proposes putting a large infrared telescope in a deep crater at the Moon's south pole. He suggested that the mirror of such a telescope might consist of a round dish, 20 m. wide, with a reflecting liquid that spun at a rate of two revolutions a minute. The centrifugal force, coupled with the Moon's gravity, would push the liquid toward the outer edges of the dish to form a perfectly curved surface for gathering starlight. Not only will a lunar telescope be more sensitive than the Hubble Space Telescope, but it should be able detect galaxies and stars far fainter than will be seen by Hubble's planned replacement. It may even pick up light from the very first stars of the universe half a billion years after the Big Bang. **</MMM>**

A Way to Save the Hubble Space Telescope?

thanks to Ben Huset, MN SFS < benhuset@skypoint.com >

Space Tug to NASA's Hubble Space Telescope's Rescue?

http://www.spaceref.com/news/viewsr.html?pid=10083

Article by Dennis Wingo

(Note: this story was filed last August)

> "A final servicing mission in the late 2009 time frame, though costly, is another option. It would at least allow HST to operate until the James Webb Space Telescope (JWST) comes on line in 2011.
>
> "However, what happens if the JWST fails to deploy its mirrors or suffers some equally damaging problem such as Hubble originally had? The JWST is going to deploy its mirrors and sunshades at the Earth L2 libration point, far from the ability of man to service or correct any defects in the system. That has been a major driver in cost increases in the system so far. ... What if JWST fails to deliver on its promise and HST is swimming with the fishes?"

Orbital Recovery Corporation (ORC) (London & Sydney) is developing a Spacecraft Life Extension System or SLES for the life extension of GEO orbiting spacecraft.

http://www.orbitalrecovery.com

Walt Anderson: Chief Executive Officer
Phil Braden: Chief Operating Officer
Dennis Wingo: Chief Technical Officer
Alex Polman: Chief Financial Officer
Kirby Ikin: Senior Vice President - Risk Management

Kirby Ikin has extensive experience in the space insurance and risk management sectors, which he is applying to Orbital Recovery's development of the SLES. His career includes positions as space insurance underwriter GIO in Australia and managing director of GIO Space.

Ben Huset's comment:

"Sounds like an interesting win-win.

"If ORC could do the plane change for HST from 28-51 deg and lower it NASA could service it in ISS's back yard then have ORC reboost it. Such ability used to be on NASA's short list of toys to get (OTV) but was a victim of the budget ax.e

"With **Kirby Ikin** on board this company just may do it. I've met him a few times at various xSDCs. He also is Chairman of the Board of the National Space Society."

Editor's Comment: We first met **Dennis Wingo** at the 1989 Lunar Po9lar Orbiter Conference in Houston at which the Lunar Prospector Mission project was launched. Wingo has been following the entrepreneur's path to help open the space frontier in practical but effective ways. *Cheers!*

The Earth and Space Foundation

http://www.earthandspace.org

"The Earth as an Oasis, cared for by a space–faring civilization"

The Earth and Space Foundation is an international charity that funds scientific exploration that helps us both understand the Earth's environment and explore the frontier of space, bringing the environmental and space exploration communities together to address the challenges facing society.

Vision Statement - "The Earth as an Oasis, cared for by a space-faring civilization".

Mission Statement - "Society now faces the dual challenge of the environmental preservation of the Earth and the exploration of space. Both are essential to our quality of life and our future. Neither goal can exclude the other and success in either requires boldly advancing on both. By supporting and encouraging exploration that bridges these complementary goals, the Earth and Space Foundation seeks to promote and fulfil the vision of Earth as an oasis, cared for by a space-faring civilization."

The above is the mission statement of the Earth and Space Foundation. From remote sensing of endangered habitats using satellites to the study of microorganisms and human performance in extreme environments to understand the potential for life on other planets and assist in the human expansion to these new worlds, there are universal ties between space exploration and environmentalism.

Since its establishment in 1994 the Foundation has helped support over 40 projects around the world. This work includes field research that uses space technology and information to help protect and understand Earth's environment and field research that applies environmental knowledge to help us to explore other planets.

The Earth & Space Foundation, originally founded as the Twenty-one Eleven Foundation for Exploration in 1994, forges links between the space exploration and environmental communities. It does this by helping to fund innovative field work around the world that either uses the environments and resources of the Earth to help understand extraterrestrial environments and assist in the exploration of space or uses space technologies and information to understand and care for the Earth's biosphere. By doing this it seeks to bring the environmental and space exploration communities together to address the challenges now facing human society.

Through its work the Foundation seeks to fulfil the vision of "the Earth as an Oasis, cared for by a space faring civilization".

Categories of Expeditions Supported

The Foundation funds expeditions that either use Earth's resources and environments to help us understand other worlds and assist in the exploration of space or expeditions that use space technology and data to help us understand and care for the Earth's environment. Typical categories of expedition that are supported include:

1) Using Space to Help Maintain the Earth as an Oasis

- Environmental projects using technologies resulting from space exploration. Includes the novel use of satellite communications, GPS, remote sensing, advanced materials and power sources.
- Use of data from extraterrestrial expeditions to help further our understanding of the Earth's environments and the biosphere. Includes samples and data returned from missions in Earth orbit and beyond.
- Effects of the space environment and space exploration on the Earth. Includes expeditions studying impact craters, environmental surveys of launch complexes, approved meteorite collection expeditions.

2) Using the Earth to help Understand Other Worlds and to Create a Space–faring Civilization

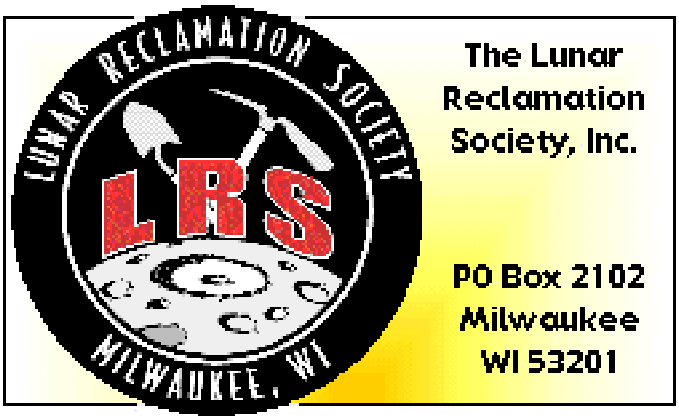
- Astro- and exobiology related fieldwork. Includes field research in Earth's extreme environments that assist in the search for life off the Earth and the study of the survival of life in extreme environments.
- Field research applying the Earth's environmental and biological resources toward the human exploration and settlement of space. Includes the use of extraterrestrial 'analog' environments on Earth to test space technologies and human physiological and psychological studies in extreme environments.
- Astronomy at the interface between Earth and space exploration / astroarchaeology. Includes expeditions making astronomical observations from remote, difficult to access, Earth locations, archaeological field projects studying the development of early civilizations that made significant contributions to astronomy and space sciences, field expeditions studying the way in which views of the astronomical environment shaped the nature of past civilizations.

3) Fostering Appreication of the Links Between Environmentalism and Space Exploration.

- Educational fieldtrips and projects that improve public understanding of the links between environmentalism and space exploration.

Past Awards: In 1998, the Foundation awarded $1000 to the Haughton-Mars Project on Devon Island. The Foundation has also supported research to perfect radar detection and mapping methods of ice, for eventual use on Mars.

NOTE: Earth and Space Foundation is *not a membership organization,* but depends on donations to fund its awards program. **</MMM>**



www.lunar-reclamation.org

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

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Toasting a Volunteer : Carol Nelson

When MMM comes back from the printer in the form of five piles of uncollated 11"x17" sheets (each with four of MMM's 20 pages), Carol Nelson swings into action. She tacks the 10-ream boxes from the printer out to DMC Marketing in Peewaukee, to use their collating and stapling equipment to help put together the hundreds of copies of MMM that get mailed every month. Carol is a former employee at DMC, where her daughter, Charlotte Dupree still works. After assembling each copy, Carol affixes the prepared mailing labels and gets the bags ready for the U.S. Postal Bulk Mail unit in downtown Milwaukee.

Carol has been doing this for years now, and we don't know what we'd do without her tireless service. We all owe you so much, Carol. Thanks!

LRS Activities & News

• Peter Kokh had two telephone interviews in January on the subject of President Bush's Moon & Mars Plans. The first was with Mike Lafferty of the Columbus (Ohio) Dispatch which led to an article in the January 20th edition, in the Science section, entitled "Fly me to the Moon and Mars." Second was on January 20th with Simon Winkler of SBS Radio Australia in Melbourne. It was 5:45 pm Wednesday evening here in Milwaukee and 10:45 am Thursday morning over there, He will put his article on the Internet and send us a link when its up.

• Peter sold the last of his gravity bricks sets - the final three going to destinations in Ohio. He is now completely out of the actual bricks (four used for each set) and intends to purchase no more. There are now three dozen Earth-Moon-Mars Gravity Brick sets in circulation. For information see:
http://nsschapters.org/hub/gravitybricks_howto.htm
& http://nsschapters.org/hub/gravityjugs.htm

LRS Event Opportunity 2004 CALENDAR

- Aviation Career Days at Mitchell International Airport: we had a booth there in 2002 with the theme "You can fly on Mars." The event was cancelled last year because of the Iraq conflict.
- Rockets for Schools weekend in Sheboygan, May 14-16. Peter has a conflict this year and cannot attend
- ISDC in Oklahoma City, Memorial Day Weekend. Peter hopes to go, and is toying with idea of presenting.
- Mars Convention in Chicago in August: we hope to be there with the Wisconsin Mars Society contingent.

LRS Upcoming Events

Updates at : www.lunar-reclamation.org/page4.htm

Saturday, FEB. –th 1–4 pm

LRS Meeting, Mayfair Mall, Garden Suites **Room G110**, which is located on the lower level "Garden Suites East" near the mall entrance below the cinema complex.

AGENDA; Peter willl discuss the Return to the Moon Position Paper he is putting together for the Moon Society in response to the Bush Moon/Mars Initiative. His reaction to the Bush Plan?: "the emperor has no clothes! - not yet, anyway." See page 1-2 In Focus this issue and page 9, column B, this issue. Also the "Save the Hubble" effort and what's at stake.

Saturday, MAR. –th1–4 pm (location above)

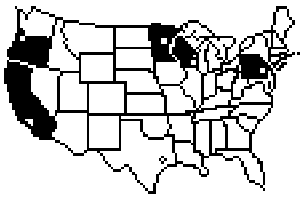
AGENDA; The latest on the two Mars Rovers, Mars Express, Mars Global Surveyor - all about Mars and Mars effort.

Collaborating Milwaukee Area Space Groups

Moon Society Milwaukee Outpost
c/o Peter Kokh 414-342-0705 - kokhmmm@aol.com
http://www.moonsociety.org/chapters/milwaukee/
MSMO currently meets jointly with LRS

Wisconsin Mars Society c/o Matthew Giovanelli
7133 West Wells Street, Milwaukee, WI 53213
414-774-8952 - marsmatt@wi.rr.com
http://chapters.marssociety.org/usa/wi/
WMS usually meets at address above on 3rd Sat. 1pm

U.S. CHAPTERS



NSS Chapter Events MMM

6 Chapters Strong

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

SOLAR SYSTEM AMBASSADORS

www.jpl.nasa.gov/ambassadors

Michelle Baker
Princeton/Philadelphia
chaos@cybernet.net

Bill Higgins
Chicago, IL
higgins@fnal.gov

Harold Schenk
Sheboygan, WI
hschenk@excel.net

Bill Hensley
Kenosha, WI
hensley@acronet.net

MINNESOTA

Minnestoa 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/]

• **Jan. 24th, 11 pm**, we will watch MER-B (**Opportunity**) land on Mars at Jim's home, via NASA TV.
http://marsrovers.jpl.nasa.gov/home/index.html
http://www.nasa.gov/multimedia/nasatv/index.html
Jim Cran, 7032 92nd Street South, Cottage Grove, MN

• **Feb 10**, **Spotlight on Mars Guest Speaker:** 7 pm Tuesday, Minneapolis Community and Technical College, 1501 Hennepin Ave., Minneapolis, MN. Free and open to the public in Room F135.

• Stardust's flyby of Comet Wild 2 (pronounced Vilt 2) will be a featured presentation at the next MAS [Minnesota Astronomical Society] February meeting

CALIFORNIA

OASIS

OASIS: Organization for the **A**dvancement of **S**pace **I**ndustrialization and **S**ettlement

P.O. Box 1231, Redondo Beach, CA 90278

Events Hotline/Answering Machine: (310) 364-2290
Odyssey Ed: Craig Ward - cew@acm.org
E-mail: oasis-leaders@netcom.com

[http://www.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.

• **FEB 21st, 3:00 p.m.** -- OASIS Monthly Business Meeting at Microcosm, address above.

• **MAR 20th, 3:00 p.m.** -- OASIS Monthly Business Meeting, location TBD.

Looking Ahead

• **March 6th -- Tour of XCOR's Mojave facility.** OASIS members only. Guests may be permitted depending on interest. Requires advance signup, ending February 28. Contact general delivery address to signup / directions.

Recurring Events

• **Fridays -** "Mike Hodel's Hour 25" webcast. The world of science fact/fiction: interviews, news, Radio dramas, artists, writers, stories, reviews. www.hour25online.com/

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

• **Regular Meetings 3rd Sat.** each month at **2 p.m.** **Bourne Plaza, 1441 SE 122nd**, Portland, **downstairs**

NEXT MEETINGS: **FEB 21st, MAR 20th, APR 17th**

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**

Thurs., February 19: Stoelting House, Kiel
Thurs., March 18: UW-Sheboygan, Sheboygan Room 120A
Thurs., April 15: Stoelting House, Kiel

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, **1-3 pm**, the **3rd Saturday**, every month, at the New and Improved **Liberty One** food court on the second level, 16th and S. Market. Go toward the windows on the 17th street side and turn right as you enter the area near the windows. Look for table sign. Parking at Liberty One on 17th St.

Meeting Dates: FEB 21st, MAR 20th, APR 17th
Call Earl or Mitch 215-625-0670 to verify all meetings

• **Upcoming Activity:** We will reprise our judging and presentation of awards at The George Washington Carver Science Fair and, for the next stage of the Science Fair System, contact Jay B. Haines for volunteer information for the regional Fair in April.

• **Recent Activities:** PASA's Excellent Adventure at The New jersey State Museum. We once again volunteered to participate in the premier outreach event in our area. The group (PASA) has contributed demonstra-tions and speakers consistently in the past and Anthony Miskowski, Super Science Weekend Coordinator asked us to come again. This time illness and missed connections didn't allow us to contribute as fully as we'd have liked but it was a great opportunity for public discussion at our demonstration table.

This year I (Earl Bennett) shifted the emphasis and the time of the presentations partly due to the time limits of the families and partly due to a fortuitous accident. The table topics where geared more towards space craft propulsion and the costs of launches. The $20,000 "Kilogram of Science " was used again to explain (after an initial introduction about Spirit on Mars (lots of smiles!)) why we try so hard "not to throw anything away that we have launched from the ground" The idea of working smart to solve problems is presented as well as using ideas that might have been previously rejected when big budgets where available. This is how I explained how we ended up with " Landing on Another Planet Without Rockets" to adults and children. This was only one phase of the talks.

Activities of various space oriented groups that are doing space exploration where discussed. I used something called The Magic Ball" purchased as a prop which I renamed "The Great Attractor" (smiles from the adults again) for its effect of drawing children to the table. This allowed talk time with their parents and older siblings on the Ion Engine, the Mini Magnetic Plasma Sail using the prop as a starting point for "not throwing away" noted above. This also led to Solar Sails (and The Planetary Society's real Solar Sail) and Mass Drivers (with a really crude device brought in for demo. but The High Frontier used to show the "real thing") . There was also talk of our charter organization; The National Space Society and the work it does (and the current state of flux) as well as "doing it ourselves" with much interest in The Mars Society and the projects it is working on (very impressive to several curmudgeons in the crowds) as well as SETI Institute and SETI League with the usual confusion between them, and some talk about Amsat and The World Future Society for its "Future of Space" article among others.

Members and friends came to help Saturday with Mitch Gordon and friends coming by; then Hank Smith coming in (by public transport from Philadelphia) to fill out the day. Sunday was a solo effort on my part due to some miss communication with two of our peripatetic volunteers.

Wrap up: Saturday had about 2500 visitors come through and many more on Sunday.All 100+ of our hand outs on the Mars Society and at least the same numbers for the Moon Miners' hand out, SETI League and PASA brochures respectively. Due to a local team,The Eagles, being Super Bowl contenders the crowds thinned out early or else the Museum might have reached a previous record of over 9,000 (I think). Well, maybe next year, which is the 25th Anniversary of the event. See you there! Thank you Tony!

• **January Meeting Notes:** We gathered at the Food Court a week after our Super Science participation and had interesting discussions with a limited number of members present: Dorothy Kurtz and Larry, our webmaster, stayed home due to illness. Dottie phoned in a brief report from

the current Planetary Report which is mostly on Mars. Check their website, libraries and, for our list members, local magazine stores for the publication.

Gary Fisher missed our Super Science outreach due to a tough cold but came in with news of The Habitation 2004 Conference which he attended January 4th to 7th in Florida. This event is on making livable even desirable conditions where people may choose to live. We live all over and inside various parts of the planet. This is good as experimentation for new sites off world. We are talking here about something beyond just a place to live in; as an example a poster session Gary mentioned was on "The Salad Machine Experiments in Lada on the I.S.S." by G.E. Bingham et. al. about edible plant growth on the Space Station. Although the conference is about as expensive as the Space Studies Institutes biannual event it may be worth going to for serendipitous reasons. You don,t just "visit other planets"; you live there and, if the majority of details have been worked out right, you may want to stay. Gary also discussed a researcher from our area who has recently worked at The M.D.R.S. who may be persuaded to give a presentation when he comes back. Details to be worked out. Gary also brought in Robert Zubrin's' latest book Mars on Earth and noted a review on Amazon.Com

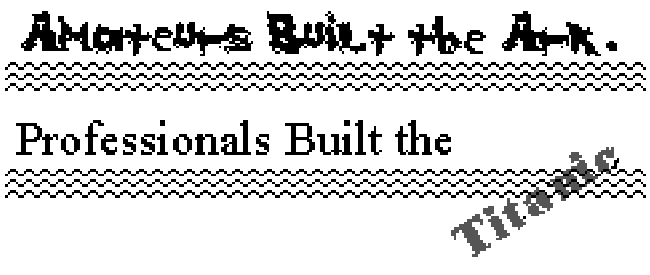
Hank Smith gave a report on Science Fiction community activities such as the meeting that was to be held for elections that where to be held the day before our meeting. Due to a communication problem that PSFS meeting did not happen so Hank will find out his position in that organization in February. Also we discussed events in other areas where the science fiction groups have science fact tracts and , in particular, the presentations at the Balticon event in Baltimore. This happens Memorial Day Weekend (yes it reads a little strange) and has a good, dense, science offering. Hank also discussed his upcoming World Science Fiction Convention visit in Boston and the website: www.norescon.org . Other events where talked of and Mitch Gordon said he will be going to this falls World event noted above September 2nd to the 6th

Mitch Gordon, our Public Outreach Coordinator will work on contact with several local TV stations to see if the current public interest in space via Mars can be fanned by appearance(s) on Philadelphia area station(s). We have several good interview shows on WYBE and WGTW that we may get on for one half or one hour respectively. Mitch also reports on NSS activities and WFS publications and events. He gave us a synopsis of two articles in The Futurist on robots "Humanoid Robots; Functional and Fun", page 12 +, as well as "Health and Happiness; the Power of Positive Thinking" from the same Jan/Feb publication.

There was also talk on Columbia University pulling out of Biosphere Two which may mean shut down. Some e-mails I have seen mentioned NSS as a possible operator (?) but this seems like a lot of work and would require lots of money. The project had not worked for technical reasons and this requires fixing.We also took an impromptu poll on what to do with Hubble (it had been announced as to be trashed the day before). I was amazed at the lack of care on the subject but decided to rephrase the question and not accept "let it go" for a response. What about shifting to a storage orbit especially if it could be used to test a space tug which could be used to move materials we humans in space (permanently) advocates want access to. This was more acceptable, the tug being a mechanism I added as an achievement mechanism.

Comment: We had good public contact at Super Science Weekend with a wide range of responses both to the landing of Spirit and to the Presidents talking up the space budget (read NASAs' at least initially). Talking about private organizations and the X-Prize and the need for public support went over well with several past members of pro human space organizations appreciating an open assessment or talk on the subjects of interest to them.The idea of combining the efforts to achieve a goal for a subgroup in a cooperative atmosphere, what PASA tries for, brought thoughtful expressions to a number of adults. We, as PASA, may not increase our umbrella groups membership but I think organizations that do something that leads to the goals we talk about will benefit. There was an oversight on my part: the literature had nothing to tell the possible benefiting societies that we pushed the "join switches" for some people. As I write this we have good and very good news: after an initial back biting and selective negative guesting when Spirit experienced Murphy effects ("it was working great....") we have both Spirit and Opportunity sending usable data. Alas; the Beagle two is still not responding and may have crashed. We in the U.S. have been fortunate in our selections of engineering techniques and our ability to send more than one craft for a mission. As I explain in some of my lectures: We may not send a single big space craft with all of our eggs in one basket anymore; but we could send several smaller craft to insure that the object of the mission, data and " pictures", is achieved. Its a pity that Beagle has no sibling en route to back it up. Maybe next time.

Submitted by Earl Bennett



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=>for those outside participating chapter areas <=

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

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Moon Miners' MANIFESTO

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