





positions of the scattered component mirrors in relation to one another. A one or two relay network for a free floating inspector cam? A walk in the park! So why don't we have one already? And why isn't such a system standard equipment on all shuttle orbiters?

### **(2 a) Tile Repair in space**

What business did NASA have selecting a thermal protection system for which repair in space was impossible? Thousands of tiles means thousands of points of potential failure. If there is, in fact, no way to repair potentially life-threatening tile damage in space, then what is the justification for going with a tile system when there are, and always have been, alternatives?

The alternatives mentioned include a titanium hull. NASA should have told Congress that while the tiles were cheaper, they carried a potentially high price tag downstream in terms of human lives, and equipment.

But there always have been other alternatives, including the choice of a different reentry path with lower heat loads. If that would have dragged out the reentry process, so what?

### **(2 b) Emergency supplies**

Every shuttle should have a week, if not two, of emergency food rations and power enough for "power down" operations. That would buy time. Time for what? Perhaps for launch a pair of surplus Soyuz rescue craft.

### **(2 b i) The fuel question**

How much fuel would be needed to gradually shift the orbit of a shuttle from the Cape-favored 28 degrees to the ISS's 50 some degrees? Is there a fuel-conserving way to do this? We owe it to future astronauts who may find themselves "up a creek" to provide them with a "paddle." Now a lot depends on the angle of intersect of the two orbits, that of the shuttle orbiter and that of the station. By choosing to launch the shuttle so that that angle is at a minimum, would greatly reduce the amount of fuel needed, for those missions where choice is possible. When the mission is one of repair or maintenance of the Hubble or some other satellite, there would be, of course, no such flexibility. Then, more fuel should be carried along.

### **(2 b ii) Docking with ISS**

There is an improvement that would make the remaining three orbiters more versatile. Currently, a special ISS docking module needs to fly in the Payload Bay on ISS missions. That precludes a SpaceHab riding on the same mission. *Why not build a docking adaptor on the roof of the Shuttle orbiter cabin itself?* Any needed shaft section could be permanently attached to the Station itself, if this is not the case already (as I suspect it is.) This would have two benefits: (a) more space in the Payload Bay for bulkier modules to be attached to the station; (b) on non-ISS missions, like SpaceHab or Hubble maintenance missions, if there were a problem that prevented safe return to Earth,

and if there were enough residual fuel to match orbits with the Station, the at-risk orbiter could switch orbits and dock with the Station until a rescue craft could arrive to take the crew back safely, and/or make whatever repairs would be needed for the orbiter to return safely,

### **Other Recommendations**

- ▣ The Administration, and Congress, should rebudget the X-38 Assured Crew Return Vehicle. *A second ACRV could be kept in ready-to-launch state at the Cape to match orbits with stranded orbiters not docked at ISS.*
- ▣ Potential commercial operators of new generation shuttles (ant the ACRV too) should be in on the brainstorming. *We'd go so far as to insist that they have veto power over any item or detail which, if adopted, would make the new vehicles unprofitable to operate and/or to turn around in timely fashion. In other words, we MUST NOT design a replacement manned shuttle vehicle system within the present NASA Culture!*
- ▣ A commercially procured, government purchased, "hotel" module should be added to the station to accommodate occasional "guests" in addition to regular crews. The most spacious design would be an inflatable one, on the TransHab or some other model, per given weight and per set payload bay dimensions., In addition to serving as an emergency shelter, it could accommodate VIPs and other occasional guests, priming the pump for any number of commercial, for-profit ventures.

### **A Shuttle Cabin Lifeboat?**

Back to the recent tragedy, accepting for sake of argument NASA's claims that in orbit inspection, repair and/or rescue was impossible to provide for, and that the Shuttle crew had no option but to chance recovery under the circumstances, and pray for a miracle. At that point was catastrophe unavoidable?

Some have called for redesigning the Shuttle's cabin to act as a "lifeboat" that would survive any kind of explosion or breakup. That is certainly something easier to imagine than to engineer. An ablative shield at the rear of the cabin would have interfered with access to the payload bay. A shield at the front would have precluded windows. Perhaps, some say, if the shuttle were fully auto-mated, windows would be unnecessary. Let's not go that route!

Now a shield at the bottom, not part of the hull, but within it? It is difficult to see how this feature could be engineered. But what would it cost to have an open-to-all engineering competition to flush out some out-of-house ideas? Let's tap all those bright minds out there!

We can see that it would be economically prohibitive, and technologically extremely difficult, to provide such a capacity as a retrofit to the existing shuttles. But a lifeboat cabin should be considered as a built-in feature of any second generation manned surface-to-orbit transport craft *when abort to land is not possible.*



The crew of the Columbia, as that of Challenger and Apollo 1 before them, gave their lives for the cause of opening the solar system to humanity. In the coming months, that cause will be put to the test, as those who do not honor it seek to use this tragedy to put it to an end. This must not be allowed to occur.

In memory of Shuttle commander Rick D. Husband, Pilot William C. McCool, Payload Commander Michael P. Anderson, Mission Specialists David M. Brown, Kalpana Chawla and Laurel Clark and Ilan Ramon, let us therefore resolve that the cause for which they gave their last full measure of devotion shall not be allowed to fail.

In Israel, it is sometimes the practice to plant trees in memory of loved ones lost. Let us honor Columbia's crew by resolving today not to rest in our efforts until seven trees in their memory shall be planted on Mars. From death there shall come life, and no life given shall be given in vain.

***Failures are the raw materials  
out of which success is forged.***

### **Moon Society | Artemis Society Statement on Loss of Columbia**

The Moon Society, Artemis Society International, The Lunar Resources Company, and the whole Artemis Project family mourn the loss of the Space Shuttle Columbia and her gallant crew. We offer our condolences to their families and the entire NASA organization.

As they and their fellow explorers continually show the sense of wonder inherent in us all, we hope to continue the blossoming of humanity into space.

***We aren't finished when we fail,  
We're finished when we quit !  
So let's not !***

### **Statement of The Planetary Society on the Loss of the Space Shuttle Columbia**

[http://planetary.org/html/news/  
articlearchive/headlines/2003/shuttle.html](http://planetary.org/html/news/articlearchive/headlines/2003/shuttle.html)

1 February 2003: The Space Shuttle Columbia was lost today in the quest to explore space. The astronauts who died during re-entry from orbit were humankind's representatives in that quest. We extend our heartfelt sympathy to the families, friends and loved ones of the crew of STS-107. We also share the sorrow of NASA and all the teams that were part of this flight. The causes and implications of this tragedy will be widely discussed in the days and weeks ahead. The Planetary Society and its members worldwide are devoted to space exploration, and we will help in any way we can with the recovery from this tragedy.

Today we can only express our concern and sorrow.

### **Space Frontier Foundation Urges "Incredible Quest" to Continue**

Nyack, NY, February 1, 2003 - The members of the Space Frontier Foundation offer their condolences to the families, friends and co-workers of the brave crew of the space shuttle Columbia, STS 107.

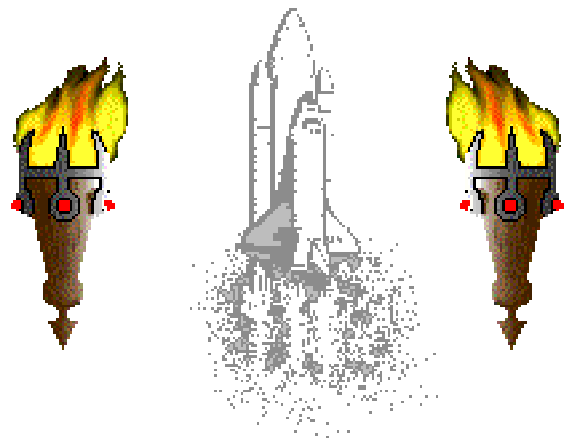
"These people were heroes of the highest order," stated Rick Tumlinson, the Foundation's Founder. "They, like all of those who reach for the stars, shared in a dream that will not die. The opening of the space frontier is the ultimate calling of our time, and those who answer that call are heroes. We call for America and the world to not give up on this incredible quest."

"Those of us in the space community have known since Challenger that accidents will happen on the edge of any frontier," stated Tumlinson. "That doesn't diminish the sorrow, but instead reminds us of the importance of this work, and the greatness of the people and institutions that have taken it on for all of us on planet earth. Instead of deterring us from the work, it should spur us on."

He concluded: "Now is not the time to talk of the hows and whys of this tragedy, as investigations have already begun by those whose job it is to understand such things. In the end, findings will be made and conclusions brought to light and a discussion and debate can be had as to what our next steps will be. There is little to say right now other than to praise the lost heroes. Our greatest tribute to them is to continue their work and never falter in our commitment to realize their legacy."

"Our hearts go out to the families of this brave crew, and their co-workers at NASA. There are no words that can adequately express our sadness."

***We shall not forget them!***



***Abandoned efforts have not led us to  
where we are today. Dusting ourselves  
off and trying again and again and again  
have built everything we enjoy.***



# The Men and Women who will go to the Moon

by Peter Kokh

The Columbia Tragedy fresh in my mind, I thought it would be a good time to talk about the Men and Women who will go to the Moon. For the feint of heart, it makes no sense to "send" people into space. They fail to see that space is a frontier that beckons people to "volunteer". As important as is the technology we need to travel in space and safely reach the shores beyond, and the technologies we will need to support our continued presence there, it is the people and the stuff that they are made of that will always be the most critical element.

That the Shuttle blew up was a "Disaster of the First Kind." That we lost seven dedicated human beings is a "Disaster of the Second Kind." That it should lead to a cancellation of the Manned Space Program, both Shuttle and ISS, would transform and magnify it immensely to a "Disaster of the Third Kind." It's all about People in Space.

## Astronauts & Other Trailblazers

At this stage of the game we are talking about astronauts and mission payload specialists, a handful of political VIPs (to up the odds of favorable budget resolutions), and less than half a handful of "tourists." There are many reasons to go to space, to be in space. Volunteers are *sent* to work, to experiment, to discover, to assemble, to test. They *volunteer* to help push the boundaries of science, to lay foundations for those who will follow, but also for the thrill of boosting up, the thrill of swimming gracefully in zero-gravity, the thrill of gazing out the shuttle windows at the beautiful Earthscapes below, the thrill of seeing clusters of city lights over Earth's nightside -- the privilege, in short, of being among the first and the few.

In time others will go with more mundane brick-laying tasks: providing commercial in-orbit services to the Space Station(s), building Tourist "Orbitels," reporting for the media, auditing, etc. And, we expect, just plain tourists themselves, people willing to spend good money for an unforgettable and "priceless" experiences and memories.

## The First Lunan "Returnees"

Soon after we begin taking tourists into orbit for extended stays, we will start reprovisioning and refueling the vehicles that brought them up from Earth for "loop-the-Moon" (no landing) overflight tours skimming over the farside of the Moon. But that could happen well before the first humans return to the Moon's surface to set up a permanent shelter there to support a continuing presence.

Most of seem to take it for granted that the early days of the Lunar Frontier will see individuals go for short tours of duty: high pay hazardous duty assignments with regular rotation and replacement. But there is good reason

to work to break that mold. In MMM # 91, December 1995, "Personnel Requirements" we wrote (abridged):

[www.asi.org/adb/06/09/03/02/091/personnel.html](http://www.asi.org/adb/06/09/03/02/091/personnel.html)

"There are several reasons why personnel may rotate at a slower rate than the rhythm of Earth-Moon support and resupply flights might seem to allow:

1. not bringing replacement personnel frees up allowable net payload mass for extra badly needed equipment.
2. not returning personnel makes room for extra "export" cargo from the Moon:
  - a. lunar liquid oxygen for delivery to LEO to refuel the Earth-Moon ferry
  - b. loads of regolith samples for delivery to Earth's surface where ongoing processing experiments can be done more cheaply and more thoroughly, i.e. with lower gross man-hour support costs, in better equipped labs
3. if the lunar descent vehicle is built as we've suggested, with the crew cabin underslung and equipped with a surface locomotion chassis that can be winched to the surface and taxi to the outpost, every descent module that returns crewless means an extra surface vehicle at the disposal of the outpost.
4. In general, average on-the-Moon labor support costs will come down as the amount of productive man-hours per ticket of passage goes up.

[snip] With all these forces operating to encourage extension of lunar surface duty times, outpost managers, both on site and on Earth, will be motivated to provide *perks and incentives for voluntary extension of planned tours of duty*. Moon duty will be exciting and prestigious at first, with no shortage of volunteers. But as duty time wears on, the view out the window less dominated by Earth, more by sterile, barren, unforgiving, and lonely moonscapes of colorless grays, lunar base personnel will be glad to get out of their sardine can quarters, be relieved of their cabin fever, and return "home."

Among the likely perks and incentives: money, the worthwhile-maker, import credits, time off, larger personalizable quarters, flextime, "plus paid" art/craft experiment time, chore rotation (time in the "garden"), eligibility for desirable excursions, etc.

[snip] From this humble beginning to an era when men and women will come intent upon staying the rest of their lives is a tremendous jump. Yet the long road from limited mission scouts to pioneer settlers starts right here, with the need on these several counts to encourage voluntary, but still not indefinite, extensions of contracted duty time.

Our humble lunar outpost will have to number more than a hundred before there is enough diversity of talent, occupation, opportunity, and social interaction to make indefinite stays tolerable even for the hearty few.

## The Growth of the Tentative Luna City

Gradually, the biologically assisted life support system will begin to take on the trappings of a veritable mini-biosphere, providing a satisfying new cradle for the displaced people from Earth. As this ecology grows ever more massive and self-sustaining, the need to be cradled by Nature will for some be satisfying enough. The need to return to the lush green hills of Earth will subside.

We will have begun to manufacture a visibly large portion of our needs on location, particularly expansion shelter and furnishings. Thriving indigenous arts and crafts will begin to endear pioneers to their new would-be home and start to add to the list of things they would have to "give up" were they to return to Earth. When this list becomes personally more cogent than the list of still missed things they gave up to come to the moon, the balance will be tipped. More and more people will choose to linger on, putting off their eventual return to Earth.

## Expatriate Terrans

In every period of history, there have been people engaged in trade or other business, who have lived "abroad" in "foreign" lands for "indefinite" periods, yet who have never surrendered "citizenship" in the land of their birth. In our own national experience, some Americans have lived indefinitely in France and elsewhere in Europe, in Japan and the Philippines and other Asian nations, in Mexico and the Caribbean and elsewhere in Latin America. Among them are artists and entertainer, educators and writers, soldiers and their families, diplomats, and, of course, businessmen.

For many who arrive in the new country on business of one kind or another, there will be some months of acculturation before one's mood swings from homesickness alternating with the excitement of experiencing new things, to a state of comfort and ease in the new "temporary" location. This transition will be smooth, quick and easy for some, difficult and slow for others.

Living in a new land for a significant period, yet never forsaking their homeland and eventual return, never embracing the frontier in a way that takes ownership and surrender, many will come to "work" on the Moon without any intention of becoming pioneers, even though their activities may help the "pioneering process" considerably. Some, arriving on temporary assignments or tours of duty will voluntarily "re-up" or agree to extended stays for the financial benefits of high pay, anticipating more comfortable retirement someday back on Earth. These "Earth-lubbers" will religiously maintain muscle tone in special gyms to facilitate ease of return to Earth's high gravity which would otherwise quickly cease to be some-thing "natural" for them,

Yet it is predictable that most expatriates will begin to feel increasingly "at home:" familiarity, second nature responses, positive anticipations, enjoying the local

music, songs, art, cuisine, local jargon and colloquialisms, comfort with the pace and the rhythms of life and the Moon's dayspan/nightspace cycles. At first unfavorable comparisons with the greater diversity, variety, and sophistication of "things back home" will slowly give way to a self-surprising respect and appreciation for what the pioneers have been able to do within the economically imposed discipline of strict reliance on what they can provide for themselves using the resources they have learned to recognize, tap, and use on the new frontier.

They will have stopped mentally translating prices from Tinstaafls to Dollars or Euros, from Lunan sunth dates and clock hours to standard Earth-style month dates and the clock times of their homeland time zone. They will have stopped checking new shops in the hopes of finding goods that were commonplace on Earth. They will have made the transition from visiting tourist to resident expatriate. Yet they will have done so, never losing yearning for the scenery, the sports, the celebrations, the music, and the food specialties of "back home"

To be sure, some expatriates will be more sheltered from the slow seduction of the frontier, by virtue of living closely together with other expatriates. This is the usual case for military personnel and for corporate staffs who often live in physical and cultural "exclaves" of the "home" country. But in their daily or periodic sorties onto the streets of the frontier, they may be absorbing more than they realize. Seeds will have begun to sprout and take root.

**"Home" is in the head** -- what we call "home" is our own sense of "the place where we feel "safe," grounded, secure, whole, relaxed., able to be wholly "oneself."

The expatriate "temporary resident" of the space frontier will arrive with an unspoken, taken-for-granted identification of "home" with Earth or, more likely, some part of the home planet. This unexamined identification may continue indefinitely, even though there is a slow, unsuspected extension of some or all of those attributes of "home" to the new frontier. For some expatriates, the balance of yearning and satisfaction will eventually tip in favor of all that the new frontier has to offer. But for others, this climax of acculturation will never arrive

The test may come on a trip "back home" in which for a moment there is a happy indulgence in all the things one had left behind. Some will feel so "completed" by this cultural reunion as to want never to return to the frontier, or to return only long enough to tie up loose ends.

But for others, this momentary reunion with the sights, sounds, tastes, and experiences of "home" will give way to an unexpected yearning for the sights, sounds, tastes, rhythms, and experiences of the frontier. For them there will be a sudden realization that they have come to belong to the new "home world." One has become more than accustomed to the idiosyncrasies of the new frontier, more

than just "at home" with them, "attached" to them. The new shoe has become more comfortable than the old one. On the trip back to Earth, one kept comparing sights, sounds, tastes, textures, expecting a healing reunion with the old, and discovering instead that the "old thrills were gone," that the usually rougher, cruder, less sophisticated sensory fare of the frontier were now closer to the heart in a way, or to an extent, one had not realized.

More significantly, one may have found one's reunion with the folks back home turned out to be unsatisfying, shallow, less than fulfilling -- "one can't go home again!" The expatriate suddenly realizes that personal bonds of affection, identification and sympathy with causes, was stronger for those on the frontier than for those back home on Earth. One had become part of the new frontier community without realizing it. It took the trip back home to reveal the slow, quiet, never-given-a-name switch on the subconscious level.

For some, such an awakening will have all the manifestations of suddenly realizing that one is "in love." One has been surreptitiously won over to the pioneer mindset without realizing it to the point of saying, "Good Lord, I have become one of them!"

The expatriate will have crossed over.

## Lunans: First True Space Frontier Settlers

First the scouts, then temporary crews, then some who volunteer to stay on for a while. The logical progression would seem to be that some would choose to stay indefinitely. But there is a big catch. Socialization (dating, relationships, marriage, and eventual pregnancies carried to term, child-raising on the Moon) has to have official sanction by the powers that be (agencies or corporations or some other policy-making authority) before a real permanent population can develop. In "Native Born," MMM # 47 July '91, I argue that we must take the plunge here. We cannot know for sure that native born Lunans will be fertile and without serious health problems until we have adult native born Lunans. Demanding that we have proof ahead of the evidence is absurd. Yet we could expect conservative agencies like NASA to be aghast at the prospects. Indeed, if we are to have settlement, a civilian authority, with local autonomy must be in charge.

Given no ban on relationships, it should not be assumed that the first to become settlers will be those who came on a temporary basis and simply never went home, getting gradually accustomed to life on the Moon. The history of frontiers on Earth gives ample evidence that there is a cross-section of any population which is willing to take the risks, even forsaking the possibility of ever returning, for a chance to start life over, to get in on the ground floor for a change, to have a chance to live a life with real significance and deep rewards, however harsh, whatever the sacrifices, no matter how many rough edges,

The first true pioneers, those who came intending to stay, will be a self-selected group. They will be bright, creative, resourceful and talented. But perhaps not the most so. Those who fit in just fine will be content to stay where they are. Frontiers are pioneered by "the second best" -- those not quite good enough to make it to the top of the pile in the status quo rat piles on Earth. Even in nature, it is capable animal populations who couldn't quite compete where they were who pioneered new territories and new niches. If Nature has Beatitudes, "Blessed Be the Second Best" must surely be among them.

These will be men and women who want a chance at a significant life, not necessarily a comfortable one. It is amazing to me that so many devotees of science fiction and of the imagined space frontier are attracted to the image of a life environment in which things are better and more advanced and sophisticated than here on Earth. The frontier will be just the opposite. A place where things will be rough, where there are always too many things to be done by too few people, where too many "favorite things" and creature comforts must be left behind. The frontier will be a place with rough edges. But there will be priceless rewards of the spirit in enduring them, in helping to make things better. The good life on the frontier will have to be won> The pioneers will be those who do not shrink from having to work for it, to fight for it, to forge it.

Occupations:

All talents will be needed on the frontier. Those who will create the essential infrastructure will be (in no particular order) architects able to work with building materials made on location, pressurization engineers, ecologists, hydroponics experts, soil-farming experts willing to work with regolith, cooks able to create satisfying cuisines from much less a variety of ingredients, sports "architects" who can design team and individual sports that are exciting to play in one sixth gravity and exciting to watch, choreographers who can pull off the same stunt in dancing, artists and craftsmen willing to forget about the media they are used to using on Earth and willing to experiment with local materials and byproducts. Without these, all bets are off.

But we'll also need just about every other kind of profession and occupation to keep it all running. The bottom line, the "sine qua non," is the desire to start over from scratch, if not the need to do so. It won't work with people who go with a "I'll try it, and I'll stay if I like it" attitude. They will be too easily discouraged by setbacks and hardships and sacrificed, too little rewarded by hard won successes. Frontiers are settled by those willing to leave the home setting without ever looking back. Such people may seem rare, but history proves that there are more than enough who will arise to the occasion - every time! If it is true that people with the right stuff are the most critical ingredient needed to establish settlement on the Moon, then we've got it in the bag. <MMM>



## The Moon Society



## JOURNAL

<http://www.moonsociety.org>

Please make NEWS submissions to  
David Wetnight at [newsmonger@asi.org](mailto:newsmonger@asi.org)  
Other submissions: [KokhMMM@aol.com](mailto: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®**

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## Columbia, the Space Shuttle Fleet ,and the Artemis Moonbase Reference Mission

by Peter Kokh

How dependent is the Artemis Project Reference Mission on the Space Shuttle Transportation System? The following webpage addresses this question:

<http://www.asi.org/adb/01/03/overview.html>

"A host of launchers are available today, and many more are being developed. We selected the Space Shuttle as the launcher for the reference mission because, although it is the most expensive launch system in the world today, it is also by far the most capable man-rated launcher.

"Current development of new lower-cost launchers in the United States and other countries will most likely change the situation before the Artemis Project reference mission is ready to launch. Until then, the Shuttle is the best vehicle that can satisfy all our mission requirements. We are being as conservative as we reasonably can in defining the reference mission. If costs and revenues balance using the Space Shuttle, they will look even better with a less expensive launcher.


"We are considering many options for getting our crew and hardware to Earth orbit, such as launching the heavy freight on a Titan IV rocket and having the crew ride up aboard a Space Shuttle or a pair of Soyuz space capsules. You will find quite a bit of discussion about all the options in [ADB] section 4.1.1.1. "

<http://www.asi.org/adb/04/01/01/01/>

[PK] In the light of the recent loss of Columbia, and the coming reevaluation of mission goals for the remaining fleet, those passionately dedicated to the realization and ultimate success of the Artemis Project™ must begin a major reassessment of available launch options, and a realistic look at some launch options that may or may not become available in the next decade.

To be a part of this brainstorming, simply go to:

<http://www.asi.org/adb/09/03/mailing-lists.html>

More Options will be available soon on the  
My Moon Society web page,  
still in preparation at press time. 

### Timely Reading from the Artemis Databook

The International Space Station as a Market for Products Produced by a Commercial Moonbase  
<http://www.asi.org/adb/02/resupplying-iss.html>

*Join (renew/rejoin) the Moon Society today!*  
<http://www.moonsociety.org/register>

*One thing is for sure; time doesn't do things. People do things. Nothing happens if we don't make it happen.*

Gregory R. Bennett



### Columbia & Safety on the Moon

On 2/2/03 Burt Sharpe <BSharpe416@aol.com> wrote:

A major adjustment I personally would welcome would be the establishment of a new office at JSC to oversee/manage ALL future NASA Lunar Surface involvement, including unmanned/robotic missions. The rationale for this would be the expectation that *someday* the Moon will have human occupants, and all the safety and operational standards and conventions that apply to their being present there should be embedded as well from the start in the projects that hopefully get done there by machines.

Peter Kokh <kokhmmm@aol.com> replied:


I'd rather NASA *not* get involved in setting safety standards for the Moon. There is a lot of risk in any frontier, and engineering risk out of the picture can be contraceptively expensive, discouraging for-profit manned missions. NASA *has to be* scared of public opinion and of the public's risk-averse mentality. But we cannot build a frontier if we cater to the same risk-averse mind set.

Yes, we want to be safe, but the frontier is worth dying for, if it comes to that.

Burt Sharpe responded:

NASA's human program successes have happened because they've been risk-proactive, rather than risk-averse; conversely it's my opinion that in the unmanned program, most failures have happened because the diligence that goes with the human "safety of flight" mindset have been largely absent from the design process (granted, so have the \$\$ program costs!). So I guess my point is I'd prefer to see a lunar program where whoever is doing it maintains a good handle on the risk situation, so that one day when there is a casualty it doesn't come as a complete surprise and isn't 100% catastrophic.

Peter Kokh adds:

It is vital to build in "recovery" options for foreseeable emergency situations. "Extrication" from threatening disaster must be an option of all architectures. 

## Soyuz to the Rescue? a Cheap, Reliable, People Launcher

by Peter Kokh

On the face of it, turning to the Russian expendable Soyuz spacecraft to open the era of commercial manned space development, seems far out. If the Shuttle uses technology from the 70s, the Soyuz is a relic of the 60s! The Russians, however, are quick to point out that their craft is anything but out of date.

"Yes, the *Soyuz's* structural design dates back to the 1960s, but the rest of it -- engines, computers, software -- are all new," Vinogradov said. "The ship looks old only to nonprofessionals."

[www.wired.com/news/technology/0,1282,57563,00.html](http://www.wired.com/news/technology/0,1282,57563,00.html)

A more salient concern is that the Russians are not geared up to produce more than two a year. That is hardly enough to serve a manned commercial space economy that through space tourism, orbital services to ISS under contract to NASA, space manufacturing and other low Earth orbit possibilities, let alone ferrying into space, and perhaps to the Moon itself, those who would open far shores to resource development and settlement.

However, the Russians have already suggested that NASA purchase Soyuz craft, with a pair of hints:


- They might be able to gear up production considerably if a steady, assured market justifies this.
- They might just be willing to license Soyuz production elsewhere.

Under another (western) manufacturer, perhaps an extended 5-person version could be designed, tested, and brought into service. Yet there is good reason to keep Soyuz manufacturing in Russia, where labor costs are lower and where the culture behind this 4-decade long success story remains intact.

While the Soyuz is a throwaway craft, it is cheaper by far, per person brought to orbit, to operate than the "overhaulable" shuttle. Someday we may have a truly reusable, quick turnaround, spacecraft that can bring people to orbit safely and inexpensively.

Meanwhile, if you want to go into space, and you are not an astronaut, you had better take a liking to Soyuz. We addressed this question previously in MMM # 39, OCT '90, pp. 1-2, "Wanted, Commercial Manned Access."

### Buran is not an option:

The USSR mothballed the *Buran*, its Space Shuttle clone, soon after its first and only unmanned flight in 1988. High costs were the problem. Russian Aerospace Agency Director Yuri Koptev has reiterated since the Columbia disaster that the program couldn't be revived. 

## Meanwhile, There's Work to be Done!

Member Opinion Piece by Peter Kokh

We've got homework we can be doing while we wait upon the shuttle situation to shake itself out, while we wait upon economic developments and more favorable times, while we wait upon everything we want to see happen just magically happen in some sort of automatic unfolding of a predestined future in accord with our Vision of what it should be, Just waiting is a dangerous game.

If by the stroke of a wand we woke up one morning to find cheap safe access to orbit, and all the sponsor money we could want, we could not launch the Artemis Moonbase™ deployment mission today. Why? Because we are not/never will be ready without much more homework.

### Orphan Critical Path Tasks

In my humble opinion, it is not enough to remain a fan club. There are critical path tasks that do not require megabucks research or cutting edge expertise to advance. Yet these "footwork" tasks are orphans; nobody has spoken for them. They are all potentially within our capacity. Let's pursue the Moon as if we mean it.

- ▣ simulate robotic and teleoperable shielding emplacement options (host a design competition!)
- ▣ test hydroponic and geoponic options for different crop species, weighing the intangibles of greenhouse morale, fresh food, fresh air, menu variety, and lessened dependence on Earth, and progress towards a biospheric life support flywheel
- identify best outfitting options for the triiple double SpaceHab Artemis Moonbase reference design (host a design competition!)
- identify all needed and desirable auxiliary modules and equipment for phase I, II, TTT, etc.
- simulate overnighing, testing various energy management strategies to determine most practical and feasible near term options
- using existing topographical and photographic data to determine logical routes between proposed outpost locations and resource locations
- develop a dependency/prerequisite technology based flow chart of how lunar industrialisation and development could best be pursued, identifying enabled domestic manufacturing and export options at each stage.
- determine valuable skills needed, not just on the Moon, but here and now to pursue this workload, and develop a recruiting plan with the above tasks in mind.
- Develop projects to pursue all of the above, ranked on the basis of manpower, expense, and talent in tow vs. talent needing to be recruited.
- and surely more useful tasks and projects

### Organizing team efforts

There are undoubtedly some items, or at least some footwork, that can be done by individuals. But critical mass teams work better for many complex tasks. Here are some of the ways Moon Society members can work together on modest but important R&D projects:

- Chapter Projects
- Multi-chapter joint endeavors (between Moon Society chapters or with NSS and/or Mars Society chapters)
- At large special interest group chapters (SIGs)
- Online Chapters meeting in dedicated rooms on the ASI-MOO (go to the Moon Society page and click on ASI-MOO in the left hand menu column)

### Where do small enterprises fit in this scheme?

The Artemis Project™ has already spun off or inspired a number of small enterprises. Can some of the R&D task load above be handled by fresh entrepreneurial startups? Moon Miners' Manifesto has pioneered the concept of "Spin-up." Spin-up is is just the opposite of "spin-off." Instead of NASA embarking on a crash research and development program at exorbitant cost and then turning over the resultant technology at no cost to commercial enterprises with the taxpayer footing the bill, in "spin-up" a private enterprise, motivated by the prospect for profits here and now from terrestrial applications of the needed frontier technology, develops this technology, with the consumer paying the bill. As a result, when the technology is needed on the space frontier, it is already "on-the-shelf" and in need of relatively inexpensive adaptation only.

It is up to individuals with an enterprising spirit to brainstorm the technology wish-list above for just such promising terrestrial applications, then get to work on a business plan to do just that. The terrestrial applications in themselves will not necessarily put the needed frontier technology "on the shelf" but they will create a body of experience from which frontier applications can be brought to maturity.

Looking at the list above, on the previous page, it would seem that the first two (indicated by a check box as opposed to a bullet) would be especially amenable to a Spin-up approach. But do not hesitate to look for Spin-up promise in any of the other items!

Can't put all the resources together to launch your own spin-up business? Why not go as far as you can in brainstorming how you think it could work and help the cause by posting a "business plan to go?" We can help develop such plans for those who may have access to all the resources needed. For an example, check out "Spinning up Glass-Glass Composites Technology" [www.lunar-reclamation.com/glass\\_composites\\_paper.htm](http://www.lunar-reclamation.com/glass_composites_paper.htm)

Working with a Local Mars Chapter

by Peter Kokh, Moon Society Milwaukee Outpost

While I am an active member of the Moon Society, I also belong to the Mars Society and its local Wisconsin chapter — http://chapters.marssociety.org/usa/wi/

To me there is no conflict, as I do not believe the Moon and Mars are competing for the same slice of pie. That would be the case if the government had to make a decision on which one to pursue a manned venture.

But I believe that except for some more exploration probes and possibly for setting up observatories on the Moon, it is best that the government keep out and concentrate on Mars, leaving the Moon to private enterprise.

In Milwaukee, my local NSS chapter (Lunar Reclamation Society) is still "recuperating" after putting on the ISDC in 1998. And, as of February '03, there are only three of us who belong to the Moon Society Milwaukee Outpost.

The local Mars people are only too happy to have us bring along our Moon-oriented displays and literature and this we do, looking for outreach events together.

Plus I am interested in Mars, both in itself, and as a vital part of settling the Moon. Mars, or more precisely, Deimos and Phobos, may someday be able to provide resources rare on the Moon (many volatiles) at a lower transportation cost than shipping them up from Earth. It will be important for the Moon settlements to diversify their import sources as well as their export markets. And Mars and its moons will be valued markets for lunar exports.

No matter how much greater popular enthusiasm may be for Mars, the bottom line is that old Real Estate axiom: "location, location, location." The Moon has it, Mars does not. Because of the greater distance, the much greater length of time spent in transit, and the much less frequent launch windows, Moon settlement will come well before Mars settlement - no matter where a first outpost is put. Given that, Mars will be a market for equipment and technologies developed for the Moon, and field-tested and debugged on the Moon.

Moreover, I would expect that the real dynamic inner core (the group that makes everything work) among the Mars settlers will not be people recruited from Earth, but people recruited from among the Lunar settler population. For the former, Mars will be a hard frontier. For the latter, Mars will be a walk in the park.

So I do not try to convert Mars enthusiasts - I try to share their enthusiasm and work with them. If there is a Mars Society chapter in your area, you may find it easier to do outreach for the Moon Society in collaboration with them, tagging along to outreach events and opportunities that they have found or created, than by trying to get something started all by your lonesome. <PK>

St. Louis Outpost Graduates, Earns Full "Chapter" status

From the Moon Society Chapter Coordinator

At the Moon Society leadership meeting Wednesday, Feb. 5th, it was confirmed that the St.Louis Outpost has the required number of current Moon Society members, five, to receive a chapter charter. Now with six members, this young chapter has elected officers, is preparing bylaws, and seeking 501c3 non-profit organization status. And, they are already doing public outreach events!

Kudos to Keith Wetzel, Dave Dietzler (Treasurer), Chris Nobbe, Burt Sharpe, Dave Heck (President) and Christie Dudley. You guys are blazing a trail for the rest of us to follow! To the Moon!

Chapter & Outpost Resources Online

The Moon Society Chapters Coordinator keeps a log (with active links) to resources appropriate for use by Moon Society Chapters and Outposts on the Space Chapters Hub website. This log is online at:

http://www.moonsociety.org/chapters/milwaukee/msmo\_output.htm

Classified Ads for Chapters & Outposts Assistance Wanted | Assistance Offered

As a totally free service, Moon Society Chapters and Outposts (even solitary local contacts) can e-mail any Classified Ads (Assistance Wanted or Assistance Offered) to the Space Chapters Hub [ www.spacechaptershub.com = http://nsschapters.org/hub/ ] c/o < kokhmmm@aol.com >

In the subject line put "Hub Classifieds" and in the message body (no document attachments) give the text of your ad. There is no word limit. The ad may be edited for spelling, grammar, and other reasons but an edited copy will be emailed to the sender for approval. The ad must be space chapter needs related.

If you have an image in gif or jpeg form that you want included with the ad, send it as an attachment or post it on a web page for the hubmaster to download.

Please put any relevant contact information in your ad. If your ad is answered, and there is no need to keep it online, please let us know so we can remove it.

Space permitting in the Moon Society Journal pages, ads relevant to Moon Society Chapter & Outpost needs will be reprinted here.

Assistance Wanted/Offered Ad Topic Examples:

- Website creation and improvements
• Newsletters & desktop publishing & mailing
• models & exhibit projects
• research & brainstorming
• speaker, and so on.
• audio-visual materials
• funding projects
<PK>

# Meandering through the Universe

Column on the Cooperative Movement on the Space Frontier  
© 2003 by Richard Richardson

## Discretionary Personal Income, and Space

One hundred Billion dollars ... That's the amount estimated to have been bet on the Superbowl ... *JUST* the Superbowl, only this one single year! Purely guessing (but I think it's a fair guess), I am confident that at least ten billion actually would have been paid out ... if, that is, the estimate of 100 billion is anywhere near the truth. Anyway, it's an amazing amount and it is only for that one game and in a time of economic hardship. Now add in the money that changes hands over *all* sports betting. Then add the moolah handed over for tickets to sporting events, the spiff spent on cable TV for access to sports channels, the brass parted with for beer to make fandom more fun, and all the other sundry accessories necessary to the modern game junkie. ... holy smokes!!!

Clearly, there is plenty of discretionary money available and just a part of it would be enough to spread Earth-life and humankind, in particular, to space. Of course, if wishes were horses, beggars would ride. Sports fans aren't going to give money to space concerns just because they could afford to. And, if we face reality we will realize that most "extra" money burning holes in peoples pockets will never be offered to space work. Not even most space enthusiasts are likely to part with a very large portion of their pocket change until and unless they are reasonably likely to get something truly meaningful in return.

We have to do more than just wish for money if we are ever to gain access to it. We would have to offer something in return that large masses of people would find to be of value to themselves and their families. Pie in the sky ... *maybe* ... for a tiny percentage of their great grandchildren just won't cut it.

Unfortunately, there just aren't many serious space settlement/development oriented groups, organizations, or businesses out there offering anything that has the necessary value and desirability. I can only think of two small investor owned space businesses that do. And I own stock in both of them. But overt investing is not everyone's cup of tea. Most people are more comfortable with simple purchases of products or services. Some space organizations sell various trinkets and knickknacks. That's a good and useful start, but it is extremely rare that such items ever appeal to more than a tiny market. Some organizations offer real opportunities to be involved in meaningful space development work (at the extremely preliminary and preparatory level currently possible), but even in the most enticing of those organizations the real costs that a person must pay to be meaningfully involved remain fairly high in terms of time, energy, sacrifice of

other personal priorities, and money, once all is said and done.

## Government Programs?

What about government programs? They have access to huge amounts of money. Considering the immense cost threshold of space access/development/settlement, it is the only way to go. Right? After all, the U.S. put humans on the Moon and the Soviet Union had people in space continuously for a couple decades or so.

Regrettably, government programs never have been and never will be sufficiently free from government to be able to sustain a program which has no fundamental constituents. By that I mean, nobody *needs* to go to space, nobody *needs* to receive ongoing help of any sort to remain in space (*because nobody needs to remain in space*), nobody will verifiably live or die — or even suffer a measurable decrease in their quality of life — if there is no effective and intelligent space program.

If there were citizens who clearly and probably had these needs, there would be a fundamental constituency. But either there are no such people or it is not clear that there is a true need for the government to provide them with the relevant services. There is no *fundamental* constituency. In fact, I assert strongly that it is actually *improper* for any Earth government to spend money on opening space unless a majority of its citizens are strongly and proactively in favor or unless the results of such a program would be clearly and verifiably necessary to the welfare of that nation's populace.

No, governments are not (and should not be) the answer to our longing to open the space frontier. And people are not going to surrender their hard earned money — even if it can be considered "excess" — for no better reason than that we would like them to. It's up to us to make our own way. That includes finding ways to get ourselves and our space peers, as well as others who might have less specific interest in space, to part with some of our/their money. That also includes creating the means by which that money works directly and efficiently to advance our space settlement cause.

## Other Options

### Space Enthusiasts & Fan Organizations?

There have been myriad ideas floated for generating money with which to finance our work and there are oodles of groups already in existence to promote our vision. Yet something crucial remains lacking. If all space enthusiasts gave a fraction of their disposable income to the same organization, it would be flush and able to do amazing things. But no group, organization or business has distinguished itself sufficiently to warrant that kind of unanimous confidence and investment.

The working idea today is that one gives their money and then, maybe, someday, something good will

happen for somebody because of the work that may or may not be done today and tomorrow by the organization in question. Explain to me again why anyone should flush any of their money down that toilet? Actually, I'm not saying that such organizations do not have an important — even critical — role to play. They do. But ultimately, they are barely discernible from "common interest" and "fan" clubs. Unless one is a fan (i.e., fanatic), one does not receive anything of corresponding value in return for the investment of the membership fee. That's why I am a member of some of these groups but many people who want to go to space just as much as I do are not. That's why vast numbers of people who love the idea of space residency and adventure but cannot also be described as "fans" contribute nary a penny.

#### The incentive of "Return on Investment"

More people *would* contribute if any of the available organizations seemed undeniably to be advancing the goal of opening space. However, the most surefire way to succeed in business (and like it or not, opening space is business) is to offer something of value, in return for an affordable and reasonable amount of money, that is strongly desired by the largest possible number of potential purchasers.

The easiest way to provide something affordable to the general public which at least has the potential of being worth owning is to form a company and sell stock in it. As I mentioned before, there are a couple companies that I know of, which seem to be truly space development oriented and which do sell stock. But, as I also mentioned, not everyone feels a sense of fulfillment in owning shares in a company. In that case the equation of equal exchange — money for anything which satisfies the purchaser to a corresponding degree — breaks down. Stock offerings are one piece of the puzzle, but one piece does not a puzzle make.

We also need a wide spectrum of businesses offering products and services which are useful and valuable to people here and now, and which are firmly dedicated to furthering the goal of humankind permanently and massively residing in space. These companies could (and I think, should) offer purchasable stock shares. However, if we are serious about wanting these companies to be and remain firmly dedicated to our space goals then they need to be co-ops. If they are *regular* private or stockholder owned companies then they will quickly become dedicated to the one goal of maximizing profit at the expense of the goals of the founders. The cooperative model provides the means to preserve a company's visionary goals in both concept and practice.

<RRR>

Richard's homepage:

<http://richardpatricia.homestead.com>

## New IMAX "Space Shuttle – 3D"

a report by Ben Huset and Rich Brown, MN SFS

Ben Huset <huset@skypoint.com> writes:

I got a sneak peek Thursday along with Jeff Root and Rich Brown and others. I highly recommend it.

Note: Its the IMAX 3D version, not the the Omnimax 2D version shown last year at Sci Museum of MN (SMM). I can hear you say, "But Ben, I saw this last year, at SMM." Well no, you didn't. You saw a long trailer promo for this movie but NOT 'this' movie.

The 3D Polaroid stereo adds ALOT to the experience. Much more than I expected. From the opening rendering of the NASA meatball in 3D it grabs you and just keeps getting better. Its almost like being the 3rd space tourist, for a lot less money and no medical check-up nor proficiency in russian required. Besides the space tourist program has been put on hold.

The film includes a too close view of a Proton launch, plus Soyuz and Shuttle launches and Lots of nice views of Station and Earth from orbit.

Its a nice 'pick-me-up' from the event of last Saturday (Columbia disaster).

Rich Brown <rab@FreeMars.org> writes:

I went in expecting the 3D to be a distracting special effect, certainly the opening titles made it look like that's what they were going to do.

The Proton launch came the closest to being over the top that way, but maybe it worked; I found myself yelling 'Yeah!' during that scene. Not that I bothered anyone else in the theater -- the 20,000 watts of audio amplification had taken over. Ultimately the 3D really gives the movie a big 'you are there' feeling.

From the Soyuz launch sequence its clear the Russians take a refreshing (and probably healthier) view toward launch safety issues. But do they always shout out encouragement to the crew... in English? GO SEE IT.

IMAX at the Minnesota Zoo, 12000 Zoo Blvd.,  
Apple Valley, MN -- February 7th through T.B.A.

<http://www.mnzoo.org/guests/imax.asp>

Space Station 3D presented by Lockheed Martin

In Cooperation with NASA

952-997-9720 or 952-997-9721 (real person) 1-877-660-4629

**IMAX Blurb:** Beginning Feb 7, 2003, MN Zoo IMAX visitors will journey hundreds of miles into space to experience life at the International Space Station. Chronicles construction of the first international research facility in space. Meet astronauts and cosmonauts from around the globe as they tell their incredible stories of living and working in zero-gravity conditions. Wonder at the precise skill and danger involved in the creation of a working laboratory in outer space. Feel yourself floating as you watch these extraordinary space walks and see history being made.



## Black Holes: Feeling the Ripples

<http://www.spaceplace.nasa.gov/>

Astronomers have finally confirmed something they had long suspected: there is a super-massive black hole in the center of our Milky Way galaxy. The evidence? A star near the galactic center orbits something unseen at a top speed of 5000 km/s. Only a black hole 2 million times more massive than our Sun could cause the star to move so fast. (See the Oct. 17, 2002, issue of Nature for more information.)

Still, a key mystery remains. Where did the black hole come from? For that matter, where do any super-massive black holes come from? There is mounting evidence that such "monsters" lurk in the middles of most galaxies, yet their origin is unknown. Do they start out as tiny black holes that grow slowly, attracting material piecemeal from passing stars and clouds? Or are they born big, their mass increasing in large gulps when their host galaxy collides with another galaxy?

A new space telescope called LISA (short for "Laser Interferometer Space Antenna") aims to find out. Designed by scientists at NASA and the European Space Agency, LISA doesn't detect ordinary forms of electromagnetic radiation such as light or radio waves. It senses ripples in the fabric of space-time itself-gravitational waves.

Albert Einstein first realized in 1916 that gravitational waves might exist. His equations of general relativity, which describe gravity, had solutions that reminded him of ripples on a pond. These "gravity ripples" travel at the speed of light and, ironically, do not interact much with matter. As a result, they can cross the cosmos quickly and intact.

Gravitational waves are created any time big masses spin, collide or explode. Matter crashing into a black hole, for example, would do it. So would two black holes colliding. If astronomers could monitor gravitational waves coming from a super-massive black hole, they could learn how it grows and evolves.

Unfortunately, these waves are hard to measure. If a gravitational wave traveled from the black hole at the center of our galaxy and passed through your body, it would stretch and compress you by an amount far less than the width of an atom. LISA, however, will be able to detect such tiny compressions.

LISA consists of three spacecraft flying in formation-a giant triangle 5 million km on each side. One of the spacecraft will shoot laser beams at the other two. Those two will echo the laser signal right back. By comparing the echoes to the original signal, onboard instruments can sense changes in the size of the triangle as small as 0.0000000002 meters (20 picometers).

With such sensitivity, astronomers might detect

gravitational waves from all kinds of cosmic sources. The first, however, will probably be the weightiest: super-massive black holes. Will "feeling" the ripples from such objects finally solve their mystery, or lead to more questions? Only time will tell. Scientists hope to launch the LISA mission in 2011.

## MERURY

### Educator Fellowship Opportunity for NASA's MESSENGER Mission to Mercury

The human race is going back to Mercury!

Challenger Center for Space Science Education announces an Educator Fellowship program for grade pre-K through 12 educators, in support of NASA's MESSENGER mission to Mercury. NASA is soliciting applications from interested educators -- DUE BY MARCH 7, 2003.

MESSENGER (MErcury Surface, Space ENvironment, GEochemistry, and Ranging) will be only the second spacecraft to venture to the innermost planet of our Solar System. Launched in 2004, it will make two passes by the innermost planet in 2007 and 2008, and go into orbit in 2009. How would you like to help take the nation along for the ride as a MESSENGER Educator Fellow?

Details: [www.challenger.org/ssr/new.html](http://www.challenger.org/ssr/new.html)

or email Elizabeth Taylor ([etaylor@challenger.org](mailto:etaylor@challenger.org)) at Challenger Center or phone 703-683-9740, 800-969-5747.

### NSS Petition to Counter Space Exploration Naysayers

<http://www.nss.org/>

"Some critics are calling for the end of human space exploration. Show your support for our efforts to explore the universe by [signing](#) the petition today so that the White House, Congress, NASA, and other key leaders know that public support remains strong."

<http://209.9.224.230/Forms/nsspetition/petition.html>

"To honor the spirit of the fallen heroes of Space Shuttle Columbia and the wishes of their families, I express my strong support for continuing the human exploration, development, and settlement of space. Exploring and opening frontiers is a fundamental part of the human character, and our universe is a vast frontier beckoning us to move onward for the benefit of mankind.

"I encourage President George Bush and the U.S. Congress to provide the funding needed to safely resume flying our Space Shuttle fleet in support of the assembly and operation of the International Space Station. I also support accelerating investment in next-generation space launch technologies and systems to help us continue reaching for the stars."

## Solar System Ambassadors

### PASA

**Michelle Baker** - Princeton, NJ/Philadelphia, PA  
chaos@cybernet.net

### CSFS

**Bill Higgins** - Chicago, IL  
higgins@fnal.gov

### SSS

**Harald Schenk** - Sheboygan, WI  
hschenk@excel.net

**No bucks, no Buck Rogers.**

*But also:*

**No Buck Rogers, no bucks.**



[www.lunar-reclamation.org](http://www.lunar-reclamation.org)

*Ad Astra per Ardua Nostra*

*To the Stars through our own hard work!*

### **LRS OFFICERS** (area code 414 unless specified)

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Carol Nelson ..... 466-2081 (\*  
LRS Board Members, plus Ken Paul ..... 426-0432)

### LRS NEWS

• **February Meeting Report:** Peter discussed ongoing negotiations with the Moon Society over an apparent misunderstanding about the terms under which LRS has been making a pdf file of each issue of MMM (since #145 May, 2001) available to their overseas members (as an alternative to high postal rates) and other members. No satisfactory resolution of the disagreement has been reached as of press time.

We also discussed the **Columbia tragedy** and the unknown implications for the future of Manned Space activities and for the International Space Station. A host of possibilities was discussed, including licensed commercial production of the Soyuz capsule, resurrecting the Apollo or Gemini capsules, using the X-38 Assured Crew Return Vehicle for people-only access to space (taking up cargo on unmanned launch vehicles like Titan, Atlas, Delta, Ariane, and Proton).

This year, the **annual Aviation Career Fair** at Mitchell Field International Airport will be on the second Thursday evening and Friday morning of April instead of the fourth, i.e. April 10th & 11th. Last year LRS & the Wisconsin Mar Society chapter co-hosted an exhibit about the possibility of flight on Mars. Peter reports that some new exhibits bought and produced since last year will make the exhibit more effective. The event is attended by hosts of supervised students learning about career opportunities in aviation.

The local **Moon Society Milwaukee Outpost** now has three members, and needs to more to graduate to full chapter status. The Outpost hopes to promote the Artemis Commercial Moonbase Project by producing models, displays, and other public outreach materials that can be duplicated by other Moon Society Chapters & Outposts.

Whether or not there will be a Rockets For Schools event in Sheboygan this coming May is not yet known. We were invited to have an exhibit last year. The event, which draws thousands of kids and adults, has been held annually since 1997.

### LRS MARCH & April Events

 **Saturday, MAR 8th & APR 12th 1-4 pm**

**LRS Chapter Meeting, Mayfair Mall, Garden Suites Room G110** (lower level, NE part of Mall) near the ground-level entrance below Cinema complex. FREE to public as usual.

- **AGENDA:** TBD - check online at:  
<http://www.lunar-reclamation.org/page4.htm>

### Collaborating Milwaukee Area Space Groups

#### **Moon Society Milwaukee Outpost**

c/o Peter Kokh  
414-342-0705 - kokhmmm@aol.com  
<http://www.moonsociety.org/chapterws/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  
contact Matt by phone or email address above

## Brian Chase, New NSS Executive Director, Introduces Himself to Chapter Leaders

from Brian Chase <Brian@nss.org>

I wanted to write to you, the NSS Chapter leadership, and introduce myself as the new Executive Director of NSS; I have been an NSS member since college and been involved in space policy and politics for my entire career. You will see my first column in the Ad Astra in the issue being printed now, and I have also attached it to provide some background information about me. I look forward to working with each of you in the months ahead.

My vision for NSS is for our organization to be not only recognized as *the* leading space advocacy organization, but for NSS to eventually be recognized as a major advocacy organization outside of the space arena as well. We live in a republic based on democratic principles, and, while it's a messy, complicated system of government, it's the best around. But that doesn't mean it's always easy to understand or that we, as citizens, always agree with the direction of our government. That's why NSS is so important, because with 20,000 members we start with tremendous potential to grow our organization and become a potent force in grassroots politics and public awareness. With your help, we will increase our membership so our ability to impact our communities, our states, our nations, and our world will only grow over time.

While most members of NSS are not chapter members, the chapters provide a critical function by providing a local voice to NSS' activities. You are the eyes and ears of NSS, and your innovative ideas help shape the future. I want to ensure NSS HQ provides you with the resources it has available to assist in your endeavors, and I will commit to provide you with relevant, current information you can use in the community to recruit new members and spread the word about the value of exploring, developing and settling space. What I ask from you, in return, is to keep me informed about your community, and to help in our efforts to recruit new members and impact space policy.

I'm working with the NSS Board on a legislative agenda and looking at ways to restart our grassroots network (such as the phone tree), and I am exploring ways to communicate more effectively with the chapters and our entire membership. You'll see information in the coming weeks and months about new services and new ways to stay informed, so please share your feedback with me. We'll also continue to explore major projects and how that could impact public awareness, science education, and general support for NSS.

Again, I feel privileged to serve as your new Executive Director, and I look forward to working with you.

*Brian Chase*

Brian@nss.org

## U.S. CHAPTERS



**NSS**  
**Chapter Events**  
**8 Chapters Strong**

**Space Chapters HUB Website:**

[ <http://nsschapters.org/hub/> ]

## 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](mailto:tomg@mnsfs.org)

[ [www.mnsfs.org/](http://www.mnsfs.org/) ]

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

**Greetings from Tom Greenwalt <[tomg@mnsfs.org](mailto:tomg@mnsfs.org)>**

As

## CALIFORNIA



**OASIS: Organization for the Advancement  
of Space Industrialization and Settlement**

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

Events Hotline/Answering Machine: (310) 364-2290

*Odyssey* Ed: Craig Ward - [cew@acm.org](mailto:cew@acm.org)

E-mail: [oasis-leaders@netcom.com](mailto:oasis-leaders@netcom.com)

*Our Website has Moved. NOTE NEW ADDRESS*

[ <http://www.oasis-nss.org/> ]

*Odyssey* Newsletter Online

<http://www.oasis-nss.org/articles.html>

**Regular Meeting 3 pm 3rd Sat. each month**

Information: OASIS Hotline, 310/364-2290; website.

Microcosm, 401 Coral Circle, El Segundo.

**FEB 15th** -- OASIS Monthly Business Meeting,

location: Microcosm, 401 Coral Circle, El Segundo.

**MAR 15th** -- OASIS Monthly Business Meeting,

location: Microcosm, 401 Coral Circle, El Segundo.

## Recurring Events







NAME \_\_\_\_\_  
 STREET \_\_\_\_\_  
 CITY/ST/ZIP \_\_\_\_\_  
 PHONE #S \_\_\_\_\_

\$38 NATIONAL SPACE SOC. dues includes *Ad Astra*  
 \$20 NSS dues if under 22 / over 64. *State age* \_\_\_\_  
 600 Pennsylvania Ave SE #201, Washington DC 20003

Join **The Moon Society** - dues address on page 9

- **For members residing in the U.S & Canada:**  
 Printed **MMM** delivered by postal mail: **\$35**  
 Electronic (pdf) **MMM** available on website: **\$35**
- **For members residing in other locations:**  
 Printed **MMM** delivered by postal mail: **\$60**  
 Electronic (pdf) **MMM** available on website: **\$35**

### INDEX to # 162 FEB. 2003

- p 1. IN FOCUS: In Columbia's Wake: Which Path?, P. Kokh
- p 4. Columbia Loss Statements of Space Societies
- p 6. The MEN & WOMEN who will go to the Moon: Astronauts; Lunar Returnees; Expatriates; 1st "Settlers"
- p 9. MOON SOC. JOURNAL: Columbia, Shuttle Fleet, & Artemis Project Reference Mission
- p 10. Mail: Safety on the Moon; Soyuz to the Rescue?
- p 11. Meanwhile, Work to be Done (Projects & Chapters)
- p 12. Working with Mars Soc. Chapters; St. Louis Charter
- p 13. Meandering Thru the Universe, Col., R. Richardson
- p 14. IMAX "Space Shuttle 3-D"
- p 15. Black Hole Ripples; Mercury Messenger Openings
- p 16. Lunar Reclamation Society News
- p 17. New NSS Exec. Dir; News of NSS/MMM Chapters



## Moon Miners' MANIFESTO

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

==> Mail Carrier, Time Sensitive Material <==

### 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

### CUYAHOGA VALLEY SPACE SOC. (Cleveland, OH)

\$15

### CHICAGO SPACE FRONTIER L5

\$15 annual dues

### LUNAR RECLAMATION SOC. (NSS-Milwaukee)

\$18 reg.  \$24 family  \$15 student/senior

### MINNESOTA SPACE FRONTIER SOCIETY

\$20 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 \$16, due in March or \$4 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

