

**1From: Klaus P. Heiss
Director, High Frontier**

November 9th, 2004

DRAFT

“A MOONBASE OF OBSERVATORIES”

**The First Sustained Human Base outside Earth
at the South Pole of the Moon by 2020
with private and international participation.**

In response to the President’s Space Exploration Initiative announcement of January 14, 2004

In recognition of the aspirations and hopes of current and future generations,

In commemoration of all those who died in pursuit of Human Space exploration in generations past and the crew on Columbia’s last flight in particular and

To give substance and focus to the President’s explicit statement of January 14th, 2004 to NASA and the nation, we propose the following Baseline:

**ESTABLISH A FIRST US SUSTAINED HUMAN PRESENCE AT THE
SOUTH POLE OF THE MOON OF TWELVE ASTRONAUTS BY 2020 TO
DEPLOY AND OPERATE A CONDOMINIUM OF OBSERVATORIES
THROUGH 2030 AND BEYOND.**

The **PURPOSE OF THE BASE** for the first decade of operations shall be

- **Deployment of a CONDOMINIUM OF LARGE OBSERVATORIES: for Astronomy, Earth and Climate (Sun-Earth) Observations**, including vast distributed aperture instruments and "on board" data processing, management, servicing, repairs and updating of facilities.

DECADAL GOALS: HUBBLE/CHANDRA/COMPTON CLASS FACILITIES 2020, LARGE DISTRIBUTED APERTURE SYSTEMS: 1 KM – 2020, 100 KM – 2025, 1,000 KM + 2030;

- **A Testbed for HUMAN HEALTH issues of sustained long term Space flight, including TELE-MEDICINE**, in a 1/6th g environment to destinations beyond of two years or more duration to assess ‘in situ’ the myriad of issues raised in the Jay M. McDonald report of 2001. To such purpose a two year baseline “on station” rotation schedule is proposed for the astronauts in the 2020 to 2030 decade. **DECADAL GOAL: ASSURED TWO YEAR DURATION SPACE FLIGHT MISSIONS IN TRANSLUNAR SPACE;**

· **A Testbed for “in situ” RESOURCES PRODUCTION AND PROCESSING**, including **TELE-OPERATIONS**, with the objective to maximize lunar production capabilities / minimizing the need for terrestrial supplies and ‘on site manpower through automation, robotics and tele-operations to tap the myriad resources of the Moon and later use on other planets.

DECADAL GOALS: 2020 – 100 MT, 2030 - 1,000 MT;

· **A Testbed for “in situ” ENERGY PRODUCTION TECHNOLOGIES**, including ‘conventional’ **NUCLEAR** and **SOLAR POWER** plants up to entirely novel processes such as **³HE CLEAN FUSION**.

DECADAL GOALS: 2020 – 1 MWE, 2025 – 10 MWE, 2030 – 1 GWE;

· **A Testbed for (CLOSED) ECOLOGICAL/BIOLOGICAL LIFE SUPPORT SYSTEMS (ELSS - CELSS)** for sustaining the twelve astronaut base to decrease the outside (terrestrial) support needed, leading ultimately to resource autonomy and independence.

DECADAL GOAL: ELSS MODULE FOR 12 PEOPLE BY 2020, CELSS MODULES FOR 24 PEOPLE BY 2030;

· **A Testbed for novel SPACE TRANSPORTATION technologies**, including “in situ” **FUELS PRODUCTION** and storage, “**FUEL-LESS**” **TRANSPORTATION** concepts such as Electromagnetic Propulsion, Lunar Elevator concepts, microwave and laser assisted propulsion.

DECADAL GOALS: O/H 100 MT 2020, EMP 2025, SPACE ELEVATOR TO L1 2030;

· Establishment of a **DIGITAL HUMAN KNOWLEDGE ARCHIVE AND LIBRARY “ALEXANDRIA”** to safeguard mankind’s historic, cultural and knowledge base against catastrophic loss such as occurred with the destruction of the Library of Alexandria first by the Romans in the turmoil of establishing the Augustan Empire and later in the seventh century AD with the Muslim conquests.

DECADAL GOALS: STORE ON THE MOON AND MAKE AVAILBLE WORLDWIDE US LIBRARY OF CONGRESS 2020-2030.

In preparation for such deployment the following precursor missions are suggested/required:

· **2008 Remote Sensing missions for site exploration and evaluation** with, amongst others, sub-meter stereo panchromatic and multispectral resolution for topographic mapping of potential Base sites;

· **2012 - Precursor Robotic Site preparation and pre-deployment missions;**

· **2012 + Deployment of 'global' seismic detectors on the Moon** to determine internal geologic structure of the Moon making use of the periodic impact of meteorites and/or sounding experiments using explosives (analogous to oil and gas industry reservoir evaluations).

- **2015 - First Human Lunar Return mission** to the prospective Base Site of **seven days** duration, with site evaluation, prospecting and preparation tasks, including deployment and checkout of robotic systems;
- **2018 - a 90 day extended stay mission at the Base site** with detailed site evaluation, preparation and Base predeployment tasks for the 2020 initial operation of a permanent Base.

It shall be NASA's task to create the “**Interstate Space Highway and Ports**” **infrastructure of requisite Space Transportation and Base Startup, with a statutory right of access and use of that infrastructure at additive (marginal) costs by all who participate in funding technology, projects and risks in accomplishing this historic goal: Jamestown Base – the First Sustained Human Habitat outside Earth in the Solar System by 2020.**

**CRITICAL EARLY PRIVATE AND INTERNATIONAL PARTICIPATION:
A LUNAR EXPLORATION AND ENTERPRISE DEVELOPMENT COMPANY .**

The overriding economic success to-date in Space is communications and the profound revolution Space communications have wrought worldwide: the breakup of ATT, deregulation and competition, breakup of totalitarian empires. Had Space communications become a Government monopoly – or worse – set aside for exclusive military use, the world today would be unrecognizable to us, a world infinitely poorer and totalitarian.

To open Space to enterprise, markets and ultimately sustained autonomous, self-supporting activities a similar institutional innovation is required to assure early industrial, private and international market involvement, in analogy to the East India Company of ages past and of Comsat/Intelsat of the Space Age:

For each of the Technology Testbeds (a.k.a. “Spirals”) listed above, early industry involvement/participation on each of the technology areas shall be mandatory to maximize industry/private inputs and risk taking as well as early, “**pre-operations**” **transfer of technologies and know-how to terrestrial applications and uses. To such purpose the necessary statutory basis already existing under the 1958 Space Act as well as possible enabling amendments thereto shall be enacted to allow NASA to become a reliable partner on long term Space Exploration and Economic Development activities.**

It is proposed that the US Government establish – *ab initio* - as part of this new Space Initiative a **LUNAR ENTERPRISE DEVELOPMENT COMPANY – (“THE JAMESTOWN GROUP”?) to participate and ultimately take on self-sustained operations of the First Human Settlement outside Earth – on the Moon. International participation shall be assured in analogy to Intelsat through the ENTERPRISE GROUP International.**

THE ROLE OF THE ENTERPRISE GROUP is to bring about substantial private sector and through THE ENTERPRISE GROUP International overseas participation on all of the technology components listed for the Jamestown Settlement leading up to 2020 and ultimately full operation of such facilities after 2030.

Each of these Components offers Private Sector Opportunities:

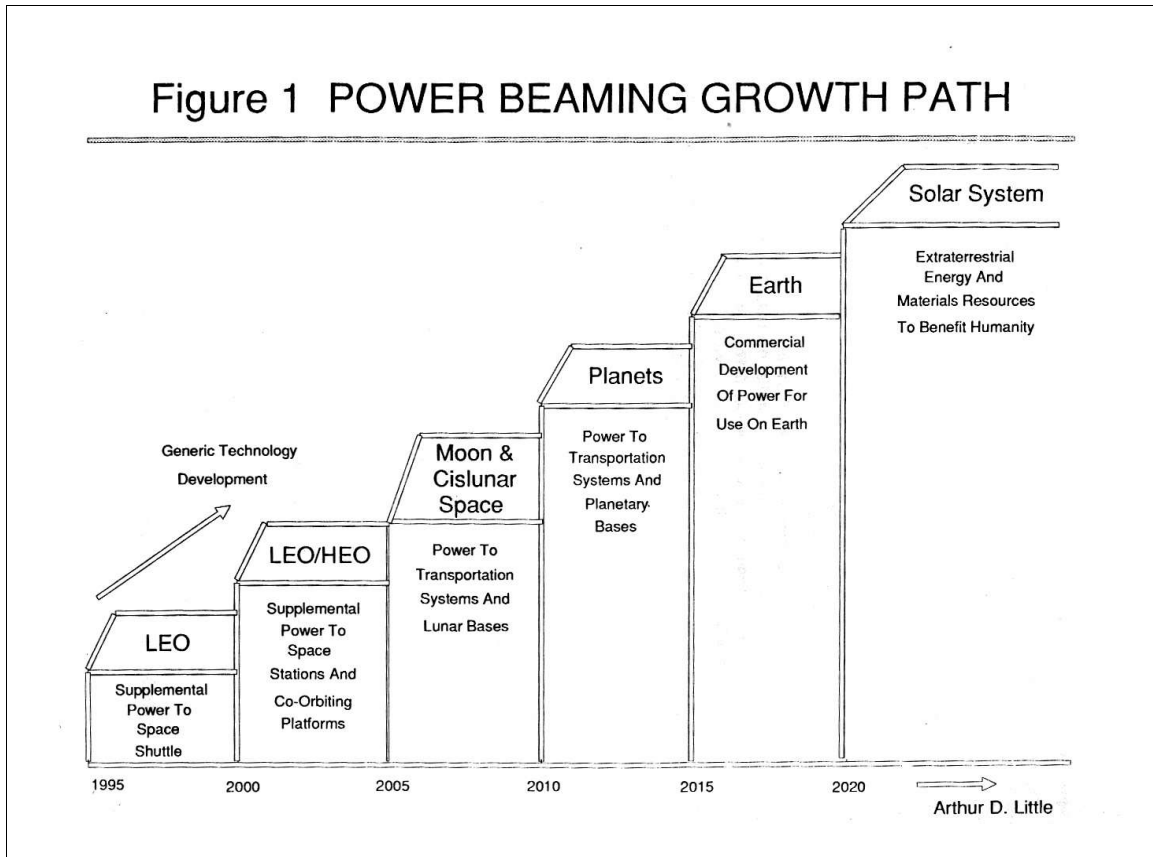
- **NASA/THE ENTERPRISE GROUP develops/provides “additive cost” access rights to any and all infrastructure components**
- **NASA/USG indemnifies for 2005 through 2030 period. The users will pay an insurance premium to THE ENTERPRISE GROUP for such and related insurance issues;**
- **NASA/THE ENTERPRISE GROUP enters into long term co-operation/procurement contracts (services, hardware, RDT&E)**
- **PRIVATE SECTOR PARTNERS have exclusive rights to any intellectual/other property rights**
- **NASA/THE ENTERPRISE GROUP will phase out where Private sector can take over**
- **TIME HORIZON: 2005 - 2030**

During 2005 NASA will establish an off-site entity to define and explore the potential ventures and opportunities for private sector participation by exploring Pro Forma Private Placement Memoranda describing

- the **technologies, potential applications in Space** and in myriad applications thereof on Earth;
- the **NASA activities** scheduled thereto in terms of **funding and RDT&E facilities**, including long term procurement of goods and services from the PPM group;
- the **pro forma financial commitments** expected/promised/explored by industry and the private sector;
- the **exclusive rights** by PPM Groups to all technology, know-how, design and other intellectual property rights by the PPM groups;
- **exclusive ENTERPRISE GROUP Logo marketing rights** in Space and on Earth for the goods and services of the ENTERPRISE GROUP PPM group(s);
- the **expected revenue flows from Lunar and terrestrial applications** thereof to the PPM group;
- the technological and financial **risks and uncertainties**;
- **legal terms and conditions** and **additive cost access rights** to the NASA/US Government Space infrastructure for certified THE ENTERPRISE GROUP PPM group members in the pursuit of their perceived opportunities, In particular this includes access and use of the Space Transportation Systems and facilities infrastructure of USG;
- **“Rules of the Road”** based on the 1958 Space Act as well as the ENTERPRISE GROUP Company enactment statute by Congress under a **“Declaration of Space Rights”** constitution defining free market rules and

approaches to the exploration and development of Space based on US constitutional principles and history.

Just one example of the myriad terrestrial applications of the technology paths (“spirals”) required in the exploration and development of Lunar, Cis-Lunar and Translunar applications is outlined in Figure 1, for Solar Satellite Systems applications outlined by Peter Glaser in 1989:



THE ROLE OF THE ENTERPRISE GROUP INTERNATIONAL is identical to THE ENTERPRISE GROUP Company, now geared to maximizing and structuring international co-operation and participation under identical rules as for domestic partners (“PPMs”) – as long as the international participation is deemed fair and reasonable as to the commitment of funds/risks to each of the technology areas listed above.

Most important, THE ENTERPRISE GROUP INTERNATIONAL shall endeavor on its own to provide a **SPACE TRANSPORTATION “BACK UP” CAPABILITY to US Space Transportation capabilities, so as to provide “real” launch insurance to allow continuity of operations.** A flow diagram of various institutional relations is shown in Figure 2:

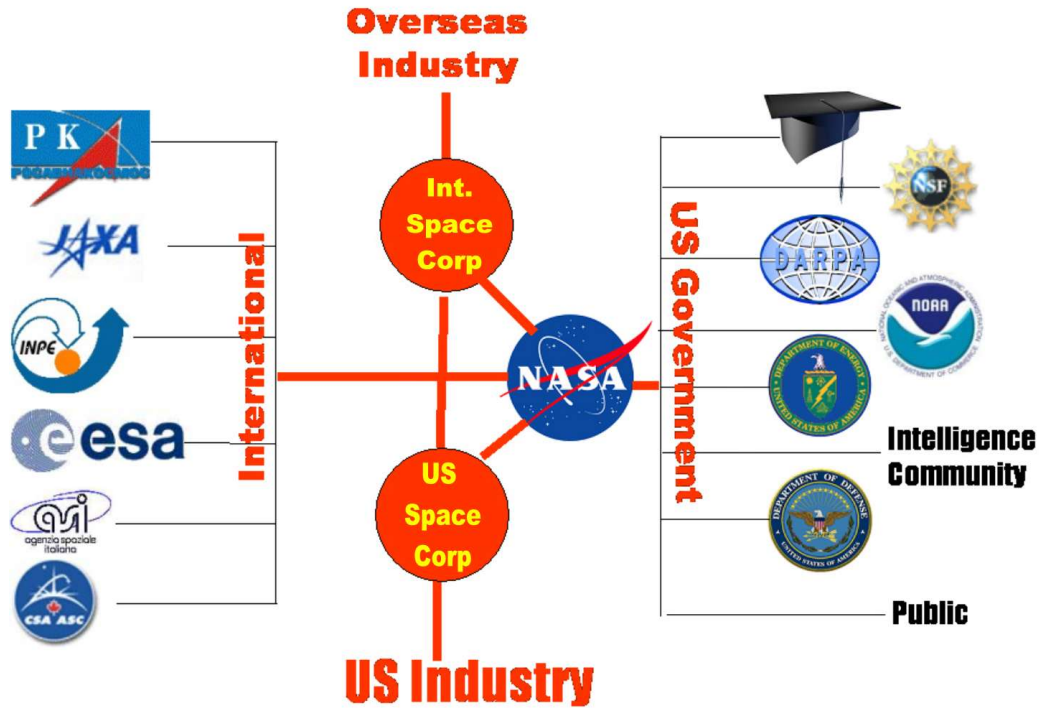


Figure 2: Industry – Government – International Partnerships in implementing a Moonbase of Observatories

Fundamental to THE ENTERPRISE GROUP INTERNATIONAL partnerships is an acceptance of the same Rules of the Road and “Declaration of Space Rights” as for the US ENTERPRISE GROUP PPMs.

QED

- Attachments:
 Rules of the Road
 Declaration of Space Rights

RULES OF THE ROAD

DECLARATION OF PRINCIPLES AND PROPERTY RIGHTS (Legal, Institutional, Space Property and Enterprise Issues)

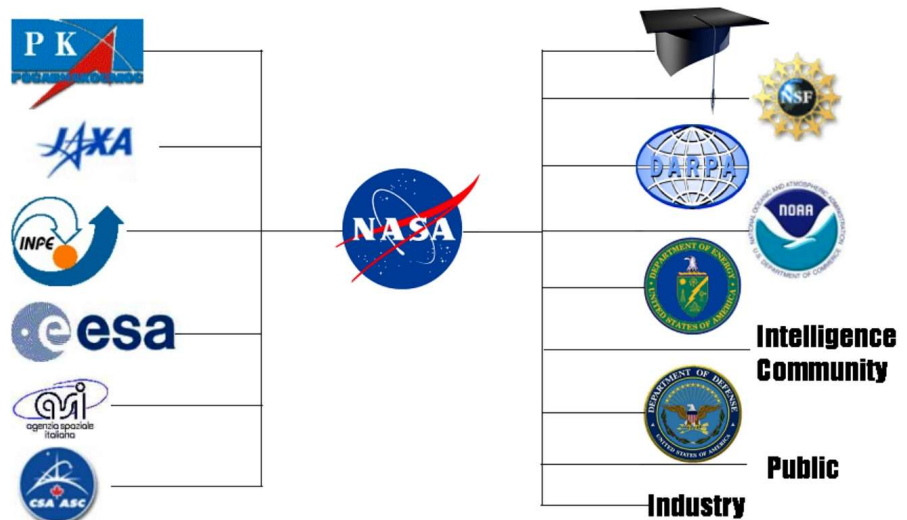
“Wherever possible the private sector [should] be given the task of providing specified services or products in Space, and be free to determine the most cost-effective ways to satisfy those requirements . . .
“

Pioneering the Space Frontier
Report of the National Commission on Space, p. 11
Chaired by Thomas O. Paine
May 1986

The most challenging – and in some ways the most important – part of our renewed journey into Space will be a clear, simple statement of principles that guide U.S. and worldwide policy as to the role of enterprise, risk taking, costs and rewards when pursuing ventures in Space, be these of nations or of private enterprise, of explorers or merchants, of innovators or service providers.

Over the decades an impressive regime of international cooperation in Space exploration and the uses of Space has developed – some through explicit statutory provisions and international agreements, some by explicit or tacit understandings,

some by deliberate non-specificity. In some cases, these practical steps have helped to give appropriate guidance for Space activities. In other cases, various agreements are unenforceable and have little to do with developing a regime that supports the desired role of entrepreneurs, private enterprise and innovative Space exploration.



Space activities have proceeded under defense, civil and industrial sponsorship and direction. The policies have been dominated by defense and civil considerations, rather than the private sector, as reflected by the makeup of the space interagency process summarized in Figure 2. But recently private industry has begun to play a much more significant – and in some cases, a dominant – role in funding the design, deployment and operation of space systems – because that course is profitable. This trend should be encouraged in the proposed effort for NASA to establish a Lunar habitat within a decade, with incentives for entrepreneurs and private enterprise.

Thus, the policies of the past – both the international ‘understandings’ and the interagency practices – need to be reviewed and updated to reflect that new reality. Such a serious updating should conform to the basic principles that have traditionally guided U.S. spirit and practice in exploring new frontiers, including the ideas embodied in the U.S. Constitution.

In formulating such new ‘rules of the road’ for renewed Space enterprise, it is instructive to consider some of the most remarkable passages in human thought, written by a refugee from National Socialism, a guest of British hospitality in London in 1942. Of particular note are the concluding remarks by Friedrich Hayek in his "The Road to Serfdom," written in exile in London on the foundation of free societies. These remarks addressed to his host country, England, on the inherent dangers of totalitarianism, whether national or socialistic or both, are timeless and should be heeded as various U.S. authorities consider the policy issues of Space enterprise today. (pp.177f):¹

"The purpose of this book has not been to sketch a detailed programme of a desirable future order of society. If with regard to international affairs we have gone a little beyond its essentially critical task, it was because in this field we may soon be called upon to create a framework within which future growth may have to proceed for a long time to come. A great deal will depend on how we use the opportunity we shall then have. But whatever we do, it can only be the beginning of a new, long, and arduous process in which we all hope we shall gradually create a world very different from that which we knew during the last quarter of a century. It is at least doubtful whether at this stage a detailed blueprint of a desirable internal order of society would be of much use - or whether anyone is competent to furnish it. The important thing now is that we shall come to

¹ Europeans, including **Hayek**, all too easily overlook that these same ideals were the foundation of the 18th century American revolution and the VIRGINIA DECLARATION OF RIGHTS of 1775 in particular, **drafted by Messrs. Mason and Lee and recognizing the Pursuit of Property Rights** specifically, adopted by Mr. Jefferson a year later in drafting the Declaration of Independence and ultimately included in the U.S. Constitution. The spiritual roots of these ideas can be traced, beyond John Locke, well back to scholastic thought, including the idea of the social contract foundation of all Government powers and the role (preference) of private property over common property. (**Thomas Aquinas, Duns Scotus, and Marsilius of Padua - who would extend the social contract foundation even to matters of theology (c.1270 - 1342)**).

agree on certain principles and free ourselves from some of the errors that have governed us in the recent past. However distasteful such an admission may be, we must recognize that we had before this war once again reached a stage where it is more important to clear away the obstacles with which human folly has encumbered our path and to release the creative energy of individuals than to devise further machinery for 'guiding' and 'directing' them - to create conditions favorable to progress rather than to 'plan progress'. The first need is to free ourselves of that worst form of contemporary obscurantism that tries to persuade us that what we have done in the recent past was all either wise or inevitable. We shall not grow wiser before we learn that much that we have done was very foolish.

"If we are to build a better world we must have the courage to make a new start - even if that means some 'reculer pour mieux sauter'. It is not those who believe in inevitable tendencies who show this courage, not those who preach a 'New Order' which is no more than a projection of these tendencies of the last forty years, and who can think of nothing better than to imitate Hitler. It is indeed those who cry loudest for the New Order who are most completely under the sway of the ideas which have created this war and most of the evils from which we suffer. The young are right if they have little confidence in the ideas that rule most of their elders. But they are mistaken or misled when they believe that these are still the liberal ideas of the nineteenth century, which in fact the young generation hardly knows. Though we neither can wish, nor possess the power, to go back to the reality of the nineteenth century, we have the opportunity to realize its ideals - and they were not mean. We have little right to feel in this respect superior to our grandfathers; and we should never forget that it is we, the twentieth century, and not they, who have made a mess of things. If they had not yet fully learned what was necessary to create the world they wanted, the experience we have since gained ought to have equipped us better for the task. If in the first attempt to create a world of free men we have failed, we must try again. The guiding principle, that a policy of freedom for the individual is the only truly progressive policy, remains as true to-day as it was in the nineteenth century."

Had England only listened to Hayek! Let us not fail in Space, where the stakes, one may dare say, are much larger.

The need to revisit, reformulate and innovate U.S. Space Policy to conform to new opportunities and capabilities is a paramount requirement, not only for the U.S. but for all free market nations worldwide. This is necessary to assure substantial, productive and profitable (i.e. beneficial) uses of the vast investments made to-date by various governments, often with no regard nor incentive as to any practical uses.

What comes to mind is not dissimilar to the situation in the Colonies over 200 years ago. With the opening of the vast new territories West of the Appalachians, who and how should one decide on property and property rights – some abstract entity in distant London or the people who dared to go out and open up these new spaces for civilization? What is needed is an application of these same principles of homesteading and property rights that guided our forefathers then: the **Principles of the U.S. Constitution applied to a Declaration of Independence to and in Outer Space.**

A new Space Doctrine is needed along with any decision to establish the first permanent outpost on the Moon, assuring thereby the High Frontier for Space Enterprise. Critical amongst these principles – which should be established as a matter of statutory rights – are the indicated in the following proposed draft “Statement of Principles of Space Enterprise.”

Obviously this draft Declaration can be improved upon, but the core principles expressed herein have to be part of any such new Declaration – without which Space enterprise for sure will be destined to fail: we might as well burn our Space ships – just as the Chinese bureaucracy did in 1423 and let the ‘barbarians of Space’ visit us.

Absent such a Declaration of Rights: why should we have spent our precious resources to go West into the new territories; why would we have set out for Oregon and the Pacific? Indeed, why now risk our treasure on Space Exploration and Enterprise?

Hopefully, the United States will not repeat the mistake of the Chinese World Empire of the 15th century – and leave the ‘new territories’ to others to explore and develop.

**PROPOSED DRAFT STATEMENT OF PRINCIPLES FOR SPACE
ENTERPRISE**
A Declaration of US Space Property Rights and Independence
(Williamsburg, Virginia)

Whereas the United States has been founded on a set of well understood principles fundamental to the pursuit of property [Virginia Declaration of Rights, 1775] and freedom of man and

Whereas these principles have served the United States and the community of free nations well over centuries past

Whereas, in addition, the very discovery and development of these United States and the Americas were founded on the principles of the freedom of the seas, including the freedom to appropriate land and resources unclaimed or unused by others

The United States hereby declare:

(1) FREEDOM OF NAVIGATION – The new "Sea of Space" shall be open for anyone to navigate in and to undertake whatever enterprise in analogy to the freedom of the seas; the United States shall not agree to or be party to any treaty, policy, regulation or understanding that limits this freedom in whatever form; the United States sees no difference between the Open Seas of Earth and the 'Open Seas' of Space and hence no new principles have to be invented or agreed to that would limit such freedom of navigation and enterprise - for whatever purpose.

(2) THE RIGHT TO PRIVATE PROPERTY – Private property is fundamental to the pursuit of enterprise, investment, exploration and freedom of man, be it on Earth or in Space; the United States shall not agree to or be party to any treaty, policy, regulation or understanding that limits any proprietary rights of land, resources, services, data or other economic and intellectual goods in Space or derived from Space. In particular, the United States want to re-affirm that nothing in the 'Outer Space Treaty' prohibits or contradicts full private property rights by any citizen of Earth, nor any and all uses of such property for whatever private or public gain. This all the more so as 'private property' is the foundation of all free societies and has existed throughout known history at least since the inception of agriculture 5,000 or more years ago. On the other side 'national property rights' are a rather recent artifact promoted by the French revolution, giving rise to 'nationalism' and 'socialism' with a concurrent notion that such 'nations' are free to steal or infringe on any such private property. The devastating consequences of these artifacts, when combined, were seen in the 20th century. Specific provisions in the Constitution of the United States prohibit any 'taking' of such

private property by government(s) without due compensation, nor can the United States be any party to a treaty or agreement that directly or indirectly were to THE ENTERPRISE GROUP to such a 'taking'.

Again, the United States see no difference between activities of free man on Earth and in Space for whatever purpose, and in particular reaffirms the right to private property of any and all means in the pursuit of exploration, science and commerce to be inalienable and fundamental to such freedom.

To the extent that the United States de-facto or unwittingly may have been a party to different understandings and treaties, these shall henceforth be declared null and void to the extent that they infringe on such property rights.

(3) SPACE HOMESTEADING RIGHTS – To foster the early and broadest possible exploration of Space and use of its vast resources the United States hereby proclaim Space Homesteading rights whereby - in analogy to the principles that opened the vast reaches of the United States to development for the benefit of their people and world markets.

The United States will recognize the appropriation of any surface and underlying mineral and resource rights by anyone on the Moon or on any other Celestial body, with the size of homesteading rights to be determined for each of these bodies separately. Asteroids and Space debris can be appropriated in *toto*.

Such Homesteading rights are granted to any person that takes physical possession of such surface or object, himself or through ventures financed by him at his risk and benefit. The proprietary rights have to be exercised through use within 99 years or revert to unclaimed Space status.

Lands and resources claimed as private property in Space under the Homesteading principle by US persons shall be subject to the rights and obligations of the United States constitution.

(4) LOW COST ACCESS TO SPACE FOR PRIVATE ENTERPRISE – Based on the principle that Government is formed to serve the individual, his rights, pursuit of freedom and property, the United States Government will henceforth make available at additive costs any facilities, services, hardware and intellectual Government rights in the pursuit of private U.S. Space enterprise.

By 'additive costs' are meant the costs added by each specific private activity to Government Space program, project or facility costs, and proven by Government to have been added by those specific activities to any one annual government budget appropriation. Similar access will be granted to any other free market nation that grants similar rights and access to its facilities and which participates in significant co-operative programs in Space with the United States.

(5) COMPETITION – Earth and Space are best served by open competition of ideas and enterprise in free markets, so that the best may succeed. Consonant with this premise the people of the United States will pursue their goals and interests in Space as they see fit: ‘anticipatory’ regulations, license requirements, laws and other provisions that stifle enterprise in open markets serve no purpose.

Nor is the exploration and use of Space served by 'co-ordinated' or co-operative programs for the sake of co-operation, if such programs deterred or stifled competition and enterprise by any nation and its people. After all, Spain and Portugal did not set out jointly to open the world for Europe. And the Soviet Union did not set out jointly with the United States to launch the first satellite or the first man into Space. Nor did President Kennedy set out to put man on the Moon and return him to Earth by the end of the 1960's jointly with the Soviet Union. Duplication - if any - is a low price to pay for enterprise and freedom in Space.

(6) EXERCISE OF RIGHTS AND CLAIMS – Consonant with the positive principles of international law, the United States shall claim and recognize property rights in Space only to the extent that such rights are vested in persons that control or provide services, resources, land or goods anywhere in Space. The United States will not recognize any claims or rights based on abstract, theoretical notions of others that would infringe in any way on free enterprise by the United States or any other Space faring nation or person of mankind, or other civilizations yet to be encountered.

We cannot foresee the ingenuity that companies, established or entrepreneurial, will bring to the building of new industries in the 21st century based on the Highway to Space. Nor can we know the individuals whose names will rank with Douglas, Boeing, Sikorsky, and the other pioneers of the aeronautical industry. But looking back for analogies, we know that one of America’s heroes, Charles Lindberg, practiced the skills of piloting in heavy weather, prior to his Atlantic crossing, by flying the U.S. mail.

Pioneering the Space Frontier

Report of the National Commission on Space
Dr. Thomas O. Paine, Chairman, 1986, p. 21

