



Statement – May 3, 2004
To the President’s Commission on Implementation of
U.S. Space Exploration Policy

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Thank you for the invitation to testify to the President’s Commission on Implementation of U.S. Space Exploration Policy; I am pleased to be here on behalf of The Planetary Society. The Society very strongly favors the new policy and welcomes the redirection of the U.S. human space flight program to the exploration of other worlds. We are conducting a public campaign, Aim For Mars!, in favor of the new policy – <http://planetary.org/aimformars>

As the largest space interest membership organization on Earth, we try to represent public interest in space exploration. Over many years we have found that the exploration of the unknown is popularly seen as the *raison d’etre* for government support of space, and that conducting space missions in pursuit of answers to fundamental questions about life and human achievement excites the public. The tremendous response to the rovers now exploring Mars is the latest evidence of that excitement. Discovery and adventure are the hallmarks of exploration and we find them at the core of public interest.

We believe that the new policy is extraordinarily well crafted, balancing the public interest in science and exploration with the practical need for changing America’s human space flight program.

The Society is particularly pleased to testify here today on the three main topics of this hearing: public interest, international cooperation and lunar missions.

The new national space policy calls for international cooperation in space exploration. We strongly support that – both on practical grounds of using expertise and capability from around the world, and on public interest grounds. We all remember the plaque on *Apollo 11*, which in many ways has become its legacy, “We came in peace for all mankind.” Poll after poll shows that space exploration is supported as a global venture. That is certainly our experience – an unusually high percentage of our donors come from outside the United States, and our membership (domestically and internationally) has, over the years strongly supported international initiatives with the (then) Soviet Union, in Europe and in Japan. Today, we have an affiliate organization, The Planetary Society of Japan, and you know of our privately funded venture, being conducted with the Russians, to fly the first solar sail spacecraft. This month we are conducting an international workshop in Beijing, China as part of our long co-sponsorship on United Nations/European Space Agency Workshops in Basic Space Science.

Unfortunately, there are strong U.S. government-imposed restrictions on international cooperation, most notably preventing use of the world’s over-supply of launch vehicles.

There are also strong inhibitions to technical cooperation under the International Traffic in Arms Regulations (ITAR). This prevents taking advantage of existing interest and capabilities in other countries, as well as responding to global public interest. Even The Planetary Society, whose activities in space are at the most popular and open level, has to register as an international arms trafficker in order to pursue cooperative projects.

The most immediate issue on the space policy table is what to do about the shuttle and future human space transportation. Last year the Society joined with the American Astronautical Society and the Association of Space Explorers to examine that issue. Our membership has always supported such activity with extra donations, pushing for new opportunities in the exploration of other worlds. The workshop led to some hard-hitting recommendations that included retiring the shuttle as quickly as possible and developing transportation for steps beyond low Earth orbit. Those recommendations are now part of the national policy.

But there are many specifics to decide, especially if the budget savings from the shuttle retirement are to be used for the next steps in policy implementation.¹ The Society has therefore engaged a group of aerospace experts, under the leadership of Owen Garriott and Michael Griffin, to examine the issues of extending human presence into the solar system. Their report should be available in a few weeks. We also have commissioned a Russian report about transportation for human space flight to Mars to capture some of their expertise.

The new space policy clearly identifies Mars as the prime goal for human space exploration. Many previous commissions and top-level reviews of space policy came to the same conclusion. The Mars emphasis in robotic exploration has been clear for years. We are all enjoying the fruits of that now as we “follow the water” on Mars in pursuit of age-old questions about life beyond our planet.² As the only planet with an atmosphere and accessible water, Mars is the only foreseeable destination where human destiny off our planet can be sought. That is why it dominates the public interest in space.

A human mission to Mars, carried out as a peaceful and cooperative international venture of planet Earth, can mobilize and inspire public interest, support and talent -- not just for the current generation, but for those to follow, as well.

But a human mission to Mars is difficult and costly, and neither the technical preparations nor the political groundwork is yet complete. We couple our strong advocacy of human exploration of Mars and the new U.S. space policy with a specific

¹The budget advantages to the country from the new space policy are important, but need better explanation and promotion. Imagine the consequences if the policy is rejected, and NASA is told to return to business-as-usual.

² The Planetary Society was part of the current Mars Exploration Rover mission, with the first privately funded participant in a education and public outreach experiment on a planetary mission. Our Red Rover Goes to Mars program, conducted with LEGO and Society members' support and participation, attracted students from around the world and made them explorers of Mars, along with the fortunate engineers and scientists on the mission.

recommendation that we believe will help with its implementation and take the necessary technical and political steps to Mars.

We propose that an international lunar way-station be considered as a test-bed for future planetary outposts. The way-station is a place for testing surface operations and support infrastructure for a future Mars outpost. It should be developed cooperatively with Europe, Japan, India and China, who all have lunar missions underway or in development now, as well as with Russia and other nations with contributions to make.

There is debate about the value of lunar missions as stepping-stones to Mars. After all, some 24 people (12 in orbit, and 12 on the surface) and more than 60 spacecraft have already explored the moon. There has not been a great deal of scientific interest, and even less public interest, in going back to the Moon in the last 30 years. But the national space policy calls for lunar activities to prepare for Mars and, as noted, Europe, Japan, India and China are all conducting or planning lunar missions. The challenge is to take advantage of all this activity to help move us toward Mars and to avoid getting stalled on the Moon as we have been in Earth orbit.

A lunar-way station might effectively harness the human and robotic resources for sending humans to Mars. It could be a first step in the development of planetary outposts -- systematically emplaced sets of landed elements at given locations on a planetary body, and test the approaches to be used on Mars. A Mars outpost should serve both scientific purposes and help emplace engineering infrastructure needed for human missions. Such early robotic emplacement of dual-purpose infrastructure can increase safety, increase near-term value, decrease costs of the human missions themselves, and increase overall program flexibility and robustness. Our advocacy for Mars Outposts (which began several years ago) has elicited strong support from our membership.

As a test-bed for the Mars outpost many of the same activities could be conducted at the lunar way-station. But those activities would operate only three days, instead of nine months, away from Earth. Certain attributes of Mars cannot be duplicated on the Moon, most notably the use of indigenous resources for propellant and life support. That will have to be simulated or carried out with material brought from Earth.³ Still, conducting experiments on the Moon, while testing robotic exploration vehicles, navigation, communications and power and propulsion systems support, with concurrent scientific investigations, could materially advance Martian mission readiness. Specific examples include navigation and landing with surface rendezvous of different vehicles, and use of communications satellites and data links, as they would be required at Mars.

Building a lunar way-station in parallel with the robotic Mars sample return mission and establishing a Martian outpost would enable interesting technical milestones to be achieved with many opportunities for international involvement and public interaction.

³ It is noted that the use of "lunar resources" to provide life support or to make propellant on the Moon has been frequently referenced in the popular press. We do not believe in that possibility, and think that any use of putative lunar oxygen, water, helium-3, etc. for space exploration is speculative at best. The lunar way-station should not have any requirement for use of lunar resources.

The lunar activities would be publicly interesting, especially if they were conducted in an international venture. But, if they become a detour on the path to Mars, the public interest will be lost.

In closing, let me again reiterate our strong support for the new human space exploration policy. To advance that policy we recommend consideration of an international lunar way-station to prepare the way for human missions to explore Mars; a re-examination of American policies about use of foreign launch vehicles and export control laws inhibiting international cooperation, and the earliest possible retirement of the shuttle while moving ahead with new transportation for exploration beyond Earth orbit. We encourage international cooperation for public interest, and for technical advantages, and intend to raise the lunar way-station idea at our Beijing workshop this month. But all programs in human space transportation must lead, directly, to Mars. The goal of exploring Mars to learn about the origins of life and humanity's potential for a positive future in the solar system can serve as a beacon for peace, cooperation and creative advancement for the benefit of all humankind. This is the public's image of space exploration – let us make it the reality.

BRIEF BIOGRAPHY DR. LOUIS D. FRIEDMAN

Dr. Friedman is a native of New York City. He received a B.S. in Applied Mathematics and Engineering Physics at the University of Wisconsin in 1961, an M.S. in Engineering Mechanics at Cornell University in 1963, and a Ph.D. from the Aeronautics and Astronautics Department at M.I.T. in 1971. His Ph.D. thesis was on Extracting Scientific Information from Spacecraft Tracking Data.

Dr. Friedman worked at the AVCO Space Systems Division from 1963-1968, on both civilian and military space programs. From 1970 to 1980 he worked on deep space missions at the Jet Propulsion Laboratory (JPL) in Pasadena, California. Among the projects he has worked on are: navigation systems analysis for Magellan and for Voyager mission design studies for the Halley Comet Rendezvous-Solar Sail. He was the leader of the post-Viking Mars Program in the late 1970s. He was manager of Advanced Planetary Studies at JPL. Dr. Friedman is the author of more than 20 papers on Navigation, Mission Analysis and Design, and Mission Planning.

In 1978-79, Dr. Friedman was the AIAA Congressional Fellow on the staff of the Senate Committee on Commerce, Science and Transportation. He worked there on Space Policy, Operational Remote Sensing legislation, NASA program oversight and technology innovation on the railroads. He is a member of the American Astronautical Society, the Division for Planetary Sciences of the American Astronomical Society, Sigma Xi and Fellow of the American Association for the Advancement of Science, the British Interplanetary Society and the American Institute of Aeronautics and Astronautics.

In 1979 and 1980 Dr. Friedman originated and was leader of the *International Halley Watch*. He left JPL in 1980 and co-founded The Planetary Society with Carl Sagan and Bruce Murray. He has been Executive Director of the Society since then. The Society is a non-profit, popular society seeking to inspire the people of Earth to explore new worlds and seek other life, through research, education and public participation. It is the largest space interest organization in the world. Dr. Friedman frequently lectures about planetary missions and space exploration programs.

Dr. Friedman is the author of Starsailing: Solar Sails and Interstellar Travel. While at The Planetary Society, Dr. Friedman has worked on proposals for human exploration of Mars and published several papers on this subject. He has also been part of the technical team working on Mars Balloon and Mars Rovers. He has served on a number of space program advisory groups and has been asked to participate in both Congressional and Administration reviews concerning American and Russian space exploration missions.

Dr. Friedman initiated the Red Rover Goes to Mars Project, the first educational experiment on a planetary mission. It is now on Mars with the Mars Exploration Rovers. He is currently the Project Director for *Cosmos 1*, the first Solar Sail Spacecraft.