

## A GENERAL CONVENTION ON SPACE LAW: LEGAL ISSUES ENCOUNTERED IN ESTABLISHING LUNAR AND MARTIAN BASES

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### ABSTRACT

In this century we can expect nations and groups of nations to send astronauts to the Moon and Mars for exploration and the development of permanent bases. China, Japan, Russia, the European Space Agency and the United States have already announced they will mount expeditions to the Moon and, later, to Mars. During the planning stages, numerous legal issues will arise; they must be resolved despite the lack of guidance from international treaties enacted over three decades ago that were not drafted to provide guidance to private business interests and governments intent on constructing permanent bases on the Moon and Mars. A General Convention on Space Law must be convened to address critical issues of interest to governments and private businesses undertaking the great adventure to the planets. This paper briefly presents arguments favoring a general convention and then discusses four of the many significant legal issues that must be addressed, resolved or

clarified by the general convention in drafting a comprehensive treaty on Space Law and its regulation: (1) Lunar and Martian base real property rights; (2) The body of law to be enforced at the base; (3) Environmental restrictions on lunar and Martian surface and subsurface activity; and (4) Worker safety concerns and the availability of insurance coverage for hazardous activity while in orbit, traveling in space and on the surface of the Moon and Mars.

The last three decades of space development activity have taught us that nations and private businesses must work together when undertaking expensive, long duration space-based enterprises. The foundation of all future activity by man in space must be based upon relevant laws and regulations providing practical answers and guidance to those undertaking the final adventure. A general convention on Space Law can provide the laws and regulations so needed – indeed, establishing a pathway for future space development and habitation.

## INTRODUCTION

Is a general convention on space law needed? In short, the answer is Yes! A consortium of nations, either in league with each other or through the auspices of the United Nations, must invite other interested nations to convene a general convention for the purpose of negotiating a comprehensive space law treaty. The new treaty must internally incorporate or incorporate by reference the most desirable provisions found in the more significant international space-related conventions and treaties, such as: Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (“Outer Space Treaty”), of 1967; Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched Into Outer Space, of 1968; Convention On International Liability For Damage Caused by Space Objects, of 1972; Convention on Registration of Objects Launched Into Outer Space, of 1975; and Treaty Governing the Activities of States on the Moon and Other Celestial Bodies (“Moon Treaty”), of 1979.

The general convention must address the practical concerns of governments as well as private businesses that will venture together into outer space in the decades to come. The treaty must deal with practical business concerns now; it must also look into the future and address selected, anticipated concerns that our collective experience in space has taught us will arise. The delegations, therefore, must be selectively composed of academics, delegates from each nation’s space

industry, and governmental/agency representatives.

There exist significant concerns about calling a general convention: a treaty might take years to negotiate and ratify; unless the treaty includes an enforcement mechanism along with a consensus that it be applied, it would have little chance of ultimate success; defining many of the basic space law terms would entail lengthy negotiations covering a long period of time; introducing new or amended protocols (“protocol” is defined as a supplementary international agreement) would be the better way to include new provisions due to the lengthy negotiations and ratification required for creating a new treaty.

The concerns expressed above are well-founded based upon past space law treaty negotiations. Nevertheless, a general convention must be called to reexamine the existing space law treaties and conventions and to draft new provisions that provide legal guidance for governments and private businesses that venture to the Moon, Mars, asteroids and other planets in the years ahead. The new treaty must be broad in scope; it must be capable of being revised and updated periodically, due to new developments and scientific changes; it must have flexibility by permitting nations to enter into interim agreements, memoranda of understanding (as with the International Space Station project); it must agree upon the technical standards that will apply to all treaty nations; it should include a “code of conduct” for guidance; it must provide clear definitions of the terms used in the treaty; a new organization must be created to foster the planning and

development of international space travel and planetary utilization, similar in some respects to the International Civil Aviation Organization (the ICAO was created under Article 44 of the Convention on International Civil Aviation or “Chicago Convention”, of 1944) – upon activation, the new organization would promulgate standards and recommended practices applicable to travel in space (especially for tourists, visitors and workers), regulate the locations of lunar and Martian bases and the utilization and removal of planetary natural resources. The new treaty must address property ownership issues of concern to both governments and private businesses planning on constructing lunar and Martian bases for commercial and scientific purposes; regulate space traffic patterns and the removal of offensive space objects and space debris endangering free passage from the surface of Earth to the surrounding planets; address environmental concerns regarding usage of planetary resources and other related concerns; address the acceptable commercial uses of outer space and reinforce the use of outer space for non-destructive military activity (although military services will undoubtedly play a role in the development of outer space and the planets due to the funding they are receiving by governments of this era); and, address ways in which to protect intellectual property rights developed in Earth orbit, in outer space and on planetary bodies. Other significant legal issues must also be addressed and resolved.

The specific legal issues to be addressed must be clearly enunciated, studied and agreed upon by all delegates well in

advance of the convention’s opening. In many cases, study papers will be exchanged by the nations to clarify the issues to be addressed. Every effort must be made to set a comprehensive agenda that meets the needs of the participants while encouraging the convention delegates to move forward toward the creation of a treaty.

Convening a general convention on space law was suggested in 1998 by the United Nations, through its Committee on the Peaceful Uses of Outer Space (“COPUOS”).<sup>1</sup> Since that time there has continued a need for a broad codification of space law but there has been little incentive for nations to convene to address the myriad legal issues. Until recently, most nations had no plans to venture to the Moon or Mars. However, with new nations such as China, Japan and India entering into the space environment, the need for codification is all the more apparent.

Unless a general convention on space law is convened and the difficult issues addressed, those few nations that have orbited a human being in space, Russia, the United States and China, will have to negotiate and enter into interim agreements and memoranda of understanding with each other to resolve those difficult legal issues while going forward with plans to establish bases on the Moon and, later, Mars. Those space faring nations and businesses within those nations will not patiently wait for the international community to address the pressing issues.

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<sup>1</sup> United Nations, Report of the Committee on the Peaceful Uses of Outer Space, UN Doc. A/53/20 (1998)

We next discuss four of the significant legal issues that must be addressed at a general convention on space law.

### LUNAR AND MARTIAN BASE REAL PROPERTY RIGHTS

The convention must reexamine and determine anew whether a nation or a private business will have the right to own and use a defined portion of the lunar and Martian surface and subsurface. Under the 1967 Outer Space Treaty, Article II, neither the Moon nor any other celestial body is "... subject to national appropriation by claim of sovereignty, by means of use or occupation or by any other means." If nations and private businesses within those nations cannot claim some degree of ownership – for example, by lease from an international authority or for outright ownership for a period of years, there will be little incentive to establish bases for exploration, the development of new products and for resource extraction. Although Article IV of the Outer Space Treaty permits the use of any equipment or facility necessary for peaceful exploration of the Moon and other celestial bodies, the right to exclusively occupy a section of the surface real estate or to mine the subsurface within a defined area must be granted to provide the incentive to raise the large sums of money that will be required.

No specific references are made to the Moon Treaty of 1979 that espoused the "common heritage of mankind" doctrine. Although the Moon Treaty provides more guidance on the establishment and operation of a lunar base, few nations have ratified the treaty. National interests and the need for man to possess

an interest in the land being developed, have conspired to put the Moon treaty "on hold" until circumstances warrant a reexamination of the principles enunciated.

"Utilization of the Moon's resources – be it removal of Moon rocks and taking other samples or the implementation of techniques to extract oxygen from the lunar soil - is not in question; such scientific and life-support activities would be permissible under the legal provisions of the Outer Space Treaty. It is the national appropriation of the Moon [and Mars] as sovereign territory belonging to some polity of Earth that is unacceptable. As the direct consequence, the legal status of the Moon [and Mars] was transformed from a condition of *terra nullius* (i.e., vacant land that belonged to no one and therefore was available to claim by anyone) to that of *res extra commercium*, the status of legally not being susceptible to any possibility of national appropriation. For the present, therefore, effectuation of national sovereignty on the Moon [and Mars] performance has been eliminated from legitimate consideration (Adams, 1968; Bhatt, 1968; Christol, 1982; Williams, 1981; DeKanozov, 1975)." <sup>2</sup>

Scholars have disagreed about the so-called non-appropriation doctrine espoused in the Outer Space Treaty. Alan Wasser argued in his paper, *How To Make Privately Funded Lunar Settlement Possible* that "...because of the Outer Space Treaty, the U.S. cannot claim sovereignty, or grant land ownership in space, but it could commit,

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<sup>2</sup> W.W. MENDELL, ed., LUNAR BASES AND SPACE ACTIVITIES OF THE 21<sup>ST</sup> CENTURY 743 (1985)

in advance, to grant legal recognition to a claim made by those who are first to establish a privately funded settlement, of private ownership of a very large tract of land around their base.”<sup>3</sup> In contrast to Wasser’s argument is that of C.W. Jencks who believes that “By extension, states [can] not license private parties, particularly their own nations, to appropriate privately that which cannot be appropriated publicly.”<sup>4</sup> Some question whether the non-appropriation doctrine should be abrogated and abandoned. “The abrogation of the non-appropriation doctrine would enable states to claim sovereignty over various land masses, mineral deposits and other resources...authorize and/or enforce rights of private ownership and development or such assets.”<sup>5</sup>

An international Moon and Mars development authority can be established by treaty to control and oversee the use and distribution of lunar and Martian surface and subsurface real estate. Such authority could lease to both governmental agencies and private businesses well-defined plots of real estate to be operated exclusively by the entity for research, industrial development, for power generation, for base residential purposes, for recreational housing and entertainment and other purposes deemed necessary. Some degree of privacy must be accorded the persons and entities

<sup>3</sup> R. Tumlinson, ed., *Return to the Moon II*, Proceedings of the 2000 Lunar Development Conference 139 (2000)

<sup>4</sup> C.W. Jencks, *SPACE LAW 201* (1965)

<sup>5</sup> Sterns, Stine and Tennen, *Preliminary Jurisprudential Observations Concerning Property Rights On the Moon and Other Celestial Bodies In The Commercial Space Age*, Proceedings of the Thirty-Ninth Colloquium On The Law of Outer Space, 53 (1997)

occupying plots of lunar and Martian real estate, despite the dictates of Article XII of the Outer Space Treaty that permits inspections of “All stations, installations, equipment and space vehicles on the moon and other celestial bodies...” by representatives of other States Parties.

Another form of the development authority to oversee international activities on the Moon is the INTERLUNE CONCEPT, proposed by Christopher C. Joyner and Harrison H. Schmitt in their paper entitled, *Extraterrestrial Law and Lunar Bases: General Legal Principles and a Particular Regime Proposal (Interlune)*.<sup>6</sup> The Interlune concept is modeled on INTELSAT, considered by the authors to be “...a successful model of a high-technology management system that meets the legal, operational, and self-interest constraints attendant to international operations in space.”<sup>7</sup>

The importance of having some form of legal control or ownership over the area of the lunar surface to be used cannot be overemphasized. Humans seek control over real estate on which they reside and work. History has taught us that land grants from kings helped settle the New World. Later, the Northwest Territory was an assured success due to the government granting parcels of land to those willing to settle and farm in the new territories. And even later in California, Colorado and Alaska, miners exercised control over their mining claims in order to protect their right to exclusively mine gold and silver. Such is the reality that must be fully considered by the nations meeting to

<sup>6</sup> W.W.MENDELL, *id.* at 741-749

<sup>7</sup> *Id.* at 745

negotiate a new space law treaty. It is better for the nations to face the reality that humans need (or believe they need) to be in control of their environment and surroundings before they can effectively reside and work in that environment. It has been said that "...Where man has gone, man has changed. ...The process may be as chaotic and dynamic as the European conquest of the New World, or it may be as orderly, regulated and bureaucratic as the joint investment of Antarctica by the countries of the world."<sup>8</sup>

Paul D. Spudis has suggested that "Extracting products from the Moon to sustain life and operate in space will be one of the principal tasks of a lunar return. The early use of lunar resources is likely to be limited to materials that require little processing or handling."<sup>9</sup> Spudis believes the production of oxygen for rocket fuel and life support is likely to be the first large-scale operation to be undertaken on the Moon. He believes that "We need operational experience to learn which process is the easiest and most efficient."<sup>10</sup> Next, Spudis suggests that "The next most likely activities would be making building materials (ceramics and bricks) for permanent establishments and installations and extracting solar wind hydrogen from the soil."<sup>11</sup> Next, radiation shelters would be constructed and the "...construction of a network of surface roads linking various outposts and installations would be a high priority."<sup>12</sup> Extracting hydrogen from

the lunar soil "...would require a large-scale operation for the production of significant amounts of this material."<sup>13</sup> Since the creation of the Outer Space Treaty in 1967, numerous insightful papers and articles have been written by international scholars, attorneys and political figures commenting on the current state of lunar ownership and offering suggestions encouraging nations and private businesses to undertake scientific and commercial (for-profit) activities on the Moon. Some have suggested treaty language.<sup>14</sup> The same can be said of Mars although it has not yet received as much specific attention as the Moon. Delegates assembling to negotiate a new space law treaty are encouraged to delve into the repository of insightful solutions offered in the papers and articles to glean the most practical suggestions. Do we retain the non-appropriation doctrine "as is" or do we modify it to permit some limited form of ownership of lunar and Martian real estate? It is suggested that modification by means of using a licensing authority is required to encourage private international commercial interests to venture into space and establish bases.

The purpose of this section is not to propose a specific solution to the non-appropriation dilemma – should it be decided that governments and private/commercial businesses are permitted to control and use specific parcels of lunar and Martian real estate – but to set forth a few ways in which to

<sup>8</sup> Paul D. Spudis, *THE ONCE AND FUTURE MOON* 239 (1996)

<sup>9</sup> *Id.* at 237

<sup>10</sup> *Id.*

<sup>11</sup> *Id.*

<sup>12</sup> *Id.*

<sup>13</sup> *Id.* at 238

<sup>14</sup> White, W., "Proposal For A Multilateral Treaty Regarding Jurisdiction and Real Property Rights in Outer Space," *Proceedings of the Forty-Third Colloquium on the Law of Outer Space*, 245-253 (2000)

control public and private use of planetary real estate and the resources found there.

#### THE BODY OF LAW TO BE ENFORCED AT THE BASE

The delegates to the space law convention must also decide what body of law will be enforced at the lunar and Martian bases. "The ultimate goal of establishing human settlements on the moon and Mars must be accompanied by a legal system to govern its inhabitants. It cannot be imagined that this system will emerge as a mature and well defined structure with the advent of the first settlers of these celestial bodies. It will grow, probably in defined stages, as the extraterrestrial community itself becomes institutional. From the outset of the first manned base on the moon, questions of jurisdiction, dispute resolution, rule making and enforcement, and remedies must be considered and decided."<sup>15</sup>

Under the 1967 Outer Space Treaty, jurisdiction over personnel and property belongs to the registry state. However, this principle should not be allowed to prevail because many crew members and settlers will come from a variety of nations each of which could claim some degree of jurisdiction over its nationals. An argument can be made favoring the use of the domestic law of the nation that initially explores the lunar surface if the crew members are from the same nation; however, if international crews establish bases it will be necessary to determine

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<sup>15</sup> DeSaussure, H. and Ulrich, M.S., "Transition of Control and Jurisdiction Over Space Settlements," *Proceedings of the Thirty-Fourth Colloquium on the Law of Outer Space*, 55-56 (1991)

what law will apply to resolve civil and criminal disputes arising at the bases. Given difficulties in transportation, most of the disputes will have to be resolved at the base rather than sending the complaining parties back to their nations of origin. Some disputes will be resolved by means of mediation or arbitration and the most serious by trial before a judicial body or appointed judge.

As base development begins, legal structures familiar to the base occupants will need to be in place and their use required. However, as the bases, their crews and settlers mature, it would be "...unrealistic to assume that settlers will accept a situation wherein they do not share in the decision-making mechanisms for the internal functioning of the community. Manifestly, the determination of applicable law must consider the alternative that a permanent space settlement will have the need for new law, unique unto itself."<sup>16</sup>

The delegates to the international space law convention must determine the means by which civil and criminal disputes are to be resolved. "A fundamental dilemma is how to reconcile earthly notions of jurisdiction and control, based largely on territoriality and nationality, with the new vista of lunar and Martian settlements, where notions of state sovereignty and territorial acquisition have been outlawed."<sup>17</sup> Without clear rules to govern the conduct of the base crews and settlers, a form of "frontier justice" will eventually prevail. During the early stages of base development, a base commander will need to be

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<sup>16</sup> Sterns, Stine and Tennen, *supra* at 59-60

<sup>17</sup> DeSaussure and Ulrich, *supra* at 56

appointed to oversee operations. The commander should be given the authority to act as a judge for certain civil and petty criminal matters, such as a military commander who would have the power to convene a court martial for a member of the military services. Appropriate pre-mission training would be required. More serious civil and criminal offenses should be tried before a specially trained judge and crew member, with a backup member available. Basic procedure for conducting hearings and trials must be available to the judges. Due to the small number of crew members that will construct the first bases, jury trials will not be feasible.

As the bases develop in size and complexity, and the crews, then settlers, enlarge the population of the bases, the law and procedure must change. The space law treaty must lay the legal and procedural foundation for the changes that will be needed. Changes in the law and procedure will later be undertaken based upon the experiences of the crews and base settlers. The treaty need only anticipate such changes will be necessary and provide a pathway for them to occur. The delegates would be wise to recall the lessons learned by eighteenth century European colonial powers that attempted to closely control and tax the colonies in the New World only to have them revolt and eventually become independent. It is likely such a scenario will repeat itself when colonies are created on Mars, given its more remote location in our solar system.

The delegates must decide whether the international authority, created primarily to deal with property and other related administrative concerns, should be

granted jurisdictional control over the crews and settlers and be responsible for administering and enforcing the law. "In order to prevent the diversity and conflicts of legal regimes which proliferate on earth, and to provide for a unitary law for space inhabitants, an international supervisory agency is needed now."<sup>18</sup> Possible supervisory agencies are: (1) a trusteeship system under the supervisory power of the United Nations to prepare and bring the lunar and Martian settlements to the stage of self-governance; (2) an international corporation or corporations for development of lunar or Martian bases under an international body having broad supervisory authority; or (3) joint or multiple commands over occupied areas whereby multilateral agreements between participating states would set forth the parameters of jurisdiction and settle legislative, judicial, and enforcement authority among the parties.<sup>19</sup>

Legislating for the inevitable transition from a controlled base to an independent and self-sufficient base will be the most challenging for the delegates who must look into the future and anticipate events based upon our history here on Earth.

#### ENVIRONMENTAL RESTRICTIONS ON LUNAR AND MARTIAN SURFACE AND SUBSURFACE ACTIVITY

Protection of the lunar and Martian environments is of crucial importance to all who journey there in the centuries to come. The delegates to the space law convention must scrutinize the extant treaty provisions to determine how best to strengthen them in light of base

<sup>18</sup> DeSaussure and Ulrich, *supra* at 57

<sup>19</sup> *Id.* at 57-58



development and mineral exploitation that will follow the early bases. "Most of the existing provisions seem to be vague, abstract and general and may not even adequately protect the terran and near-earth environments. Other obligations seem to be too narrow for a broad application."<sup>20</sup>

The 1967 Outer Space Treaty, Article IX, obligates State Parties to conduct exploration of the moon and other celestial bodies "...so as to avoid harmful contamination...and where necessary, ...adopt appropriate measures for this purpose." "[D]eleterious environmental consequences could occur from the introduction of terrestrial contaminants to celestial environs, or from the placement or return of extraterrestrial materials to the Earth or inhabited facilities. The potential for catastrophic injury to natural environs and indigenous life is substantial."<sup>21</sup>

There is little doubt that base occupants will contaminate the environment around them. Chemical rocket motor exhausts will contribute to the contamination. Gasses emitted from the mechanical equipment used to construct the base, carbon dioxide from the exhaled breath of the crews living in the base habitats and other gases will contaminate the thin atmosphere. Base inhabitants will have to deal with the "processing of human

waste, recycling of life support materials on the Moon and utilization of in-situ resources for life support."<sup>22</sup> "The utilization of resources from the Martian environment to support the exploration effort could have a dangerous impact on the Martian eco-system."<sup>23</sup> Given the need to use resources to generate oxygen for the base and propellant for the chemical rocket engines that will be used in the early stages of base development, some damage to the environment is inevitable.

The first bases on the Moon and, later, Mars must undertake scientific studies to determine whether activities to come will degrade the environment. With a nearly non-existent atmosphere, the Moon will be the first planet to be studied. Studies (such as the environmental impact study) should be submitted to an international scientific body to determine the potential damage that may be caused by continued human activity. Should the nations involved be permitted to make their own findings and act upon them or should the studies be submitted to an international body, created by the space law treaty, to make the final determination as to whether a given activity will be permitted on the Moon or Mars? Zoning and land use regulations are a part of everyday life in many nations on Earth. Should they also be promulgated by treaty for use on the Moon and Mars?

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<sup>20</sup> Hintz, M., "Environmental Aspects of Settlements On The Moon and Mars- Planetary Protection," *Proceedings of the Thirty-Fourth Colloquium on the Law of Outer Space*, 59 (1991)

<sup>21</sup> Sterns, P.M. and Tennen, L.I., "Legal Aspects of Settlements on the Moon and Mars: International Legal Infrastructure and Environmental Considerations," *Proceedings of the Thirty-Fourth Colloquium on the Law of Outer Space*, 96 (1991)

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**WORKER SAFETY CONCERNS AND  
AVAILABILITY OF INSURANCE  
COVERAGE FOR HAZARDOUS  
ACTIVITY**

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<sup>22</sup> P. ECKART, ed., *THE LUNAR BASE HANDBOOK* 379 (1999)

<sup>23</sup> Sterns and Tennen, *supra*. at 60

Nearly all aspects of early travel to the Moon and Mars will be considered hazardous. Given the likelihood of death or serious injury to crews and loss of expensive equipment, launching from the Earth to orbit and then landing on the Moon or Mars, living and working in the hostile environment, facing cosmic radiation, and other space hazards of which we now know little, there exists the possibility that health and life insurance will be unavailable to the families and crew members. The space law treaty provisions can enable the private, worldwide insurance and reinsurance companies to provide a variety of coverage to workers and their families at an affordable price. How can this be accomplished within the provisions of the treaty? Is it by providing a reliable space law regime, a safe means by which to accomplish each mission or by providing useful information to the insurance carriers to help them in assessing risk and, thus, the premium to be charged?

Looking after safety concerns of crews and, later, workers and visitors will be a primary concern of governments and private companies. It is anticipated that medical care and psychological services will be provided at the bases since the patient would be at least three days away from medical care.<sup>24</sup> “[T]he provision of facilities for the diagnosis and treatment of all potential medical problems would be prohibitively complex and expensive.”<sup>25</sup> Further, significant psychological concerns must be dealt with; the “...human system is very dynamic and usually experiences a great deal of change in attitude, behavior, performance, and health over the course

of a mission. Latent stress factors such as extended confinement, separation from traditional social support systems, sensory tedium, high social density and tedium, sleep shifting and loss, low error tolerance and the absence of familiar comforts have a cumulative effect on the psychological health, well-being and performance of the individual crew members and total crew functioning.”<sup>26</sup>

Delegates intent on drafting a new treaty will need to reexamine the liability provisions of the Convention on International Liability For Damage Caused By Space Objects of 1972. Under the provisions of the Convention, each launching State is responsible for its nationals. The treaty establishes a standard of absolute (or strict) liability for damage on the land, on the sea, or in the air caused by space-related activities; however, it does not deal specifically with the issue of private enterprise in outer space.<sup>27</sup> Simple negligence or fault is no defense. Under Article III of the Convention, only when the damages occur in space between two spacefarers does the fault or negligence standard become the measure of liability for space-based accidents.<sup>28</sup> In Article XIV, the Convention provides for the establishment of a Claims Commission that seeks to expedite the claims process for persons and companies with unsettled claims but issues non-binding decisions. However, the process is rather complex and should be simplified especially for claims arising while

<sup>26</sup> *Id.* at 392

<sup>27</sup> Hurwitz, B.A., “Liability for Private Commercial Activities In Outer Space,” *Proceedings of the Thirty-Third Colloquium on the Law of Outer Space*, 37 (1990)

<sup>28</sup> See, Nathan C. Goldman, *AMERICAN SPACE LAW: INTERNATIONAL AND DOMESTIC* 80-82, (2<sup>nd</sup> ed. 1996)

<sup>24</sup> P. ECKART, *supra* at 391

<sup>25</sup> *Id.* at 391

working and residing on the Moon or Mars.

Deaths arising from hazardous space related activities have been dealt with in the case of United States astronauts, especially in the Apollo I launch pad fire, in the 1986 explosion of the space shuttle Challenger and the 2003 disintegration of the shuttle Columbia. It was noted in the Challenger civil cases filed in court by two of the families that product liability negligence (malfunctioning O-ring) was one of the primary concerns; no liability convention or space law made provision for dealing with such issues. Families of the other astronauts had to file claims under the Federal Employee Claim Act (covering only federal/military employees). The family of Christa McAuliffe, the only civilian, had to file a lawsuit to seek recovery.<sup>29</sup>

Space tourism was not contemplated by the 1972 Convention but nevertheless deserves the attention and consideration of the delegates to the convention; they must be accorded protection against the negligence of private launch service providers. The space station visits of Dennis Tito, the first officially acclaimed space tourist, and Mark Shuttleworth, a non-professional cosmonaut, are worthy of note since they were not truly cosmonauts or astronauts.<sup>30</sup> The day of the official government-sponsored tourist has finally arrived but personal liability insurance

protecting them and their families remains in a state of uncertainty. However, until the piloted launches of the X-Prize contestants, no private individual employed by a private company has been subject to possible death during launch let alone in orbit or on the surface of the Moon.

The subject of health insurance for space workers has received little attention in space law literature, except as it relates to liability issues in general. The time has arrived to address these issues. Most of the states within the United States and other nations have enacted workers' compensation laws to compensate persons injured on the job. Many private companies provide health insurance for employees and their dependents. Will such laws be engrafted into international space law or will treaty language facilitate the creation of such coverage for the employees embarking on dangerous work assignments? No extant treaty provision contemplates health insurance coverage for the space worker. But for private companies to entice workers from all nations to participate in hazardous space activities, they must provide the workers and their families with adequate, reasonable health and liability insurance protection. Delegates to the space law convention can facilitate the creation of health and life insurance coverage by private insurance carriers for future space workers by considering the needs of those companies and soliciting their direct involvement in the treaty drafting process.

## CONCLUSION

Given the political reality of the times in which we live, we find that few nations have an active space program and

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<sup>29</sup> Hurwitz, *supra* at 38; See also, Glenn H. Reynolds and Robert P. Merges, *OUTER SPACE, PROBLEMS OF LAW AND POLICY* 308 (2<sup>nd</sup> ed. 1997)

<sup>30</sup> Jakhu, R. and Bhattacharya, R., "Legal Aspects of Space Tourism," *Proceedings of the Forty-Fifth Colloquium on the Law of Outer Space*, 119-120 (2002)

national laws governing space activities; and only three nations have thus far launched astronauts into orbit and have the potential of landing on the Moon or Mars in the foreseeable future. Now is the time to conduct the preparatory work for calling a convention rather than waiting until a lunar landing has occurred. If an international space law treaty is to become a reality, given the many difficulties in reaching a consensus on the issues, voting delegates must be limited by requiring that they come from nations having active space programs that will directly participate in some manner in the lunar and Martian landings. Other interested nations

should be encouraged to be observers at the convention since they may be active participants in future conventions to amend the treaty. By limiting the delegations to the first convention, there is a better chance that a consensus will be reached and a viable treaty created.

Are we prepared to move forward now, while we have ample time, or will we procrastinate in undertaking this difficult task until compelled by circumstance to do so?