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THE ADVENT OF A NEW ERA OF COMMERCIAL SPACE TOURISM AND ASSOCIATED LEGAL ISSUES

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ABSTRACT

Space tourism has seen rapid growth in the last few years, particularly in the area of the development of suborbital aerospace planes by private entities. As the technology and environment to realize space tourism has advanced, the need for establishing a legal framework has become pressing. The US has taken a lead in formulating rules applicable to space flight, however, the legal regime governing space flight is not yet adequate. Uncertainties exist as to the application of informed consent and the reciprocal waiver of liability amongst concerned parties of the commercial space flight. The paper discusses the legal framework surrounding space flight with an emphasis on liability aspects and examines the key issues that need further consideration for improvement.

INTRODUCTION

The 2004 successful launch and return of Spaceship One, the first manned flight achieved by a private sector in the US, gave an impetus to commercial space tourism. Private entities that have entered into this commercial space business started to develop launch vehicles for suborbital flight, ascending to an altitude of 100km and return, but without reaching Earth orbit. Several companies, including Virgin Galactic and Space Adventures, plan to start their space flight services in two to three years time. Orbital vehicles that reach and/or proceed beyond Earth orbit, as well as space hotels for a few day stay in outer space, are also being planned in the future. Whilst space trips to the International Space Station within governmental frameworks are on a decline, a private enterprise space tourism industry is emerging. Vigorous competition amongst the different companies developing manned rockets and attracting increasingly number of customers for space flight services signify the advent of new age of commercial space tourism. The traditional cost hurdles have been lowered and a door for space tourism is opened to wider population.

However, space flight is by nature risky and potentially accrues significant loss to concerned parties in case of accident. It is important to gain an understanding of the current legal regime of allocation of risks of accidents associated with commercial space

flight. International space law is not tailored to address the issue of space tourism, however, domestic legislation on commercial space flight has been formulated in the US. This paper examines the liability regime associated with commercial space flight and discusses the inadequacies in the current legal regime established by the US domestic legislation.

INTERNATIONAL SPACE LAW

International space law does not refer specifically to space tourism, but creates norms and an overall framework of rights and obligations in which space tourism to be conducted. The *Corpus juris spatialis*, consisting of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies[1], the 1968 Agreement on the rescue of astronauts, the return of astronauts and the return of objects launched into outer space[2], the 1972 Convention on International Liability for Damage Caused by Space Objects [3], the 1974 Convention on Registration of Objects Launched Into Outer Space[4] and the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies[5] endorse rules that regulate and promote space activities, which include commercial space tourism. The 1967 Outer Space Treaty serves as a foundation for all space activities. It establishes the critical rule that the exploration and use of outer space can be conducted freely, but States bear international responsibility for national activities whether such activities are conducted by governmental or non-governmental entities, and the latter requires authorization and continuing supervision by the appropriate State party to the treaty[6]. As a result of this, States have to comply with the international obligations associated with the space activities conducted by actors under their jurisdiction including those engaged in space tourism business. As a specific obligation, amongst others, the obligation to undertake international consultation in case of potential harmful interference to space activities of other States [7] is particularly relevant to space tourism, as the launch and operation of an orbital rocket or a space hotel may affect the operation of other satellites as well as International Space Station. The Rescue Agreement, the Registration Convention, and

[1] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 27 Oct 1967, 610 *UNTS* 205. [Hereafter: Outer Space Treaty]

[2] Agreement on the rescue of astronauts, the return of astronauts and the return of objects launched into outer space (1968), 672 *UNTS* 199.

[3] Convention on International Liability for Damage Caused by Space Objects, 29 Nov 1971 24 *UST* 2389. [Hereafter: Liability Convention]

[4] Convention on Registration of Objects Launched Into Outer Space, 12 Nov 1974 28 *UST* 695. [Hereafter: Registration Convention]

[5] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies,(1979) 18 *ILM* 1434.[Hereafter: Moon Agreement]

[6] Article VI of Outer Space Treaty

[7] Article IX of Outer Space Treaty

the Moon Agreement are all relevant to space tourism in certain aspects, such as the return of a space object and personnel in distress; the registration of space object reaching and proceeding beyond Earth orbit; and the exploration and use of the Moon. Whilst these issues are all worthy of attention, this paper is primarily focused on the liability aspects associated with the space tourism, and therefore, examines only the Liability Convention.

Liability Convention

The Liability Convention imposes upon the launching State to pay compensation for any damage caused by a space object. The damage covered under the Convention includes "loss of life, personal injury or other impairment of health, or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations"[8]. There is no limit on the amount of compensation that launching State is obliged to pay in case of damage. Under the Liability Convention, two different bases of liability are applied to distinct locations to which damage is caused. Absolute liability is applied to the damage brought about on the surface of the Earth and to aircraft in flight[9] whilst fault-based liability is applied to damage that occurs in outer space[10].

Overall, the Liability Convention sufficiently address rules in different settings and circumstances which could correspond adequately to situations envisaged for manned space flight. The Convention is not applicable to the damage caused within a launching State and puts such cases in the hand of national law e.g. the 2003 Disintegration of Space Shuttle Columbia. If space hotels and/or orbital vehicles collide in outer space, just like the collision of two satellites in orbit that occurred in February 2009, the damage will be determined on the basis of fault of concerned launching States. On the other hand, if a hotel or commercial manned vehicle falls on the ground of non-launching State, the launching State would be held absolutely liable. If there is more than one State jointly conducts a space flight, they are jointly and severally liable for the damage [11], hence, the Liability Convention is prepared to address cross-border operations as well as operations by multinational companies engaged in space tourism. The Launching State may be exonerated from absolute liability only in case where " damage has resulted either wholly or partially from gross negligence or from an act or omission done with intent to cause damage on the part of a Claimant State or of natural or juridical persons it represents"[12]. Since the obligation of the launching State to pay unlimited amount of

[8] Article I(a) of Liability Convention
[9] Article II of Liability Convention
[10] Article II of Liability Convention
[11] Article V of Liability Convention
[12] Article VI of Liability Convention

compensation under Liability Convention places severe burden upon governments, coupled with the international responsibility over the activities of commercial actors, the necessity for proper legislation had been particularly pressing in US.

US DOMESTIC LEGISLATION ON SPACE FLIGHT

The US was quick to respond to the success of Spaceship One and formulated domestic law applicable to commercial space flight in a short period of time. The US Federal Aviation Authority(FAA) of Department of Transportation were delegated responsibility to authorize and monitor the activities of authorized entities in accordance with the obligations under Article VI of the Outer Space Treaty and Congress drafted the Commercial Space Launch Amendment Act in 2004[13]. The Final Rule Human Space Flight Requirements for Crew and Space Flight Participants[14] were released in 2006, which came into force in 2007. A whole process of rule-making was achieved just in three years.

Overview

In terms of liability, the FAA Final Rule basically establishes three things: 1) to regulate actors under the US jurisdiction 2) to clarify the responsibility assumed by parties involved in commercial space flight 3) implements a reciprocal waiver of liability and bars concerned parties to sue one another.

The FAA's Rule on Space Flight regulates the commercial space flight operator through issuing permits and licenses and imposes upon the licensee or permitee a set of obligations, including financial obligations. In particular, it clarifies the allocation of risks between the concerned parties for different types of claims. A commercial flight operator must obtain insurance, or have to demonstrate adequate financial capacity, just like entities launching satellites: for potential third party claims for death, bodily injury, or property damage, licensed entity must cover $500,000,000 or the maximum liability insurance available on the world market at a reasonable cost[15]. As to potential claims by the US government for damage or loss to government property, the licensee must demonstrate insurance or financial responsibility with cover of $100,000,000.

If the third party claims against the licensee exceeds the amount of insurance, the US government then pays up to the amount of $1,500,000,000[16]. Furthermore, the US

[13] Commercial. Space Launch. Amendments Act of 2004, Public Law 108-492, Dec. 23, 2004. [H.R. 5382]

[14] The Final Rule Human Space Flight Requirements for Crew and Space Flight Participants, 71 Register 241(Dec. 15, 2006) Hereafter:FAA's Rule on Space Flight

[15] 14 CFR §440.9 (b)(3)(2006)

[16] Id. §440.19(a)

government is responsible for property damage it sustains, and for bodily injury, including death or property damage sustained by its own employees resulting from licensed activities, regardless of fault[17].

However, the FAA's Rule on Space Flight is silent as to insurance/claims related to the damage to space flight participants, including death. Neither the space flight operator nor the US Government is obliged to pay for damage associated with the space flight participant. Indeed, such risk is born by the space fight participant himself and hence it is up to the flight participant to obtain insurance for himself.

The Stance of Space Flight

Commercial space flight is positioned as 'adventure travel' rather than a transportation service [18]. In contrast to international transportation by air where certain liability is accepted by a carrier[19], no compensation scheme and measure of protection to space flight participant is provided by FAA's Rule on Space Flight. The responsibility for space flight is assumed by a space flight participant himself. Not only the stance is explicitly stated, it is enforced through thorough disclosure of risks and obtaining written consent from the flight participant. The FAA's Rule on Space Flight states that "...*before* receiving compensation *or* agreeing to fly a space flight participant, an operator must inform each space flight participant *in writing* about the risks of the launch and the reentry vehicle type" [20]. Amongst the list of things to be disclosed to each flight participant are: "participation in space flight may result in death, serious injury or total or partial loss of physical or mental function; the US government has not certified the launch vehicle and any reentry vehicle as safe for carrying crew or space flight participant" [21]; and the safety record of all launch or reentry vehicles. Flight participants are informed of the fact that thus far approximately 4% of those who have flown to space lost their lives[22]. Then, the flight participant is given the opportunities to ask questions they may have with regards to the flight[23]. Finally, space flight participants must provide in writing that "the space flight participant understands the risk, and his or her presence on board is voluntary"[24], and

[17] Appendix to Part 440, Part 2, 3(b)

[18] See 70 Federal Register 249, 77269. FAA expressly states that the CSLAA characterization of " Space Flight Participant...signifies that someone on board a launch vehicle or re-entry vehicle is not a typical passenger with typical expectation of transport, but someone going on an adventure ride." Cited in *Study on Informed Consent for Spaceflight Participants*, Document Number: APT-CFA-230-0001-02F p.7.

[19] See 1929 Warsaw Convention for the Unification of Certain Rules Relating to International Transportation by Air

[20] 14 CFR §460.45 (a) (2006)

[21] Id §460.45(b)(c)

[22] See *Study on Informed Consent for Spaceflight Participants*, Document Number: APT-CFA-230-0001-02F p.22.

[23] 14 CFR §460.45(f) (2006)

[24] *Id.*460. 45 (f)(2)

then sign. This process is so called 'informed consent'.

Informed Consent as a type of liability disclaimer

The concept of Informed Consent derives from the medical practice that a patient fully understands the risks involved in the treatment and accepts such treatment on those terms. By nature, informed consent serves as a type of 'liability disclaimer'. It gives an operator certain protection against liability for damage associated with inherent risks of the treatment[25]. Indeed, the FAA's Rule on Space Flight Participant makes clear the stance of a space flight participant by stipulating that the "Space Flight Participant shall be responsible for Bodily Injury, including Death, Property Damage sustained by the Space Flight Participant resulting from licensed and permitted activities, regardless of fault." In short, what happens to the space flight participant during the flight is fully at his/her own risk. It is silent as to the responsibility of concerned parties vis-à-vis a space flight participant. Therefore, no liability for damage incurred to a space flight participant is assumed by the commercial space flight operator and/or US Government.

Reciprocal Waiver of Liability

The FAA's Rule on Space Flight establishes that parties directly and indirectly involved in a commercial space flight implements the reciprocal waiver of liability[26]. The reciprocal waiver of liability applicable to launch of a space object is extended further to crews and to space flight participants for a commercial space flight[27]. Hence, the regime of reciprocal waiver of liability covers US Government, any of its agencies, its contractor, sub-contractors, space flight operator(licensee or permitee), its contractor and subcontractor, customer, its contractor and subcontractor, crew members and space flight participant. The inclusion of the reciprocal waiver of liability is a natural measure taken in attempt to minimize the cost of accident as it is not too uncommon that a lawsuit arises amongst the concerned parties following a launch failure. The only party who are left outside the circle of reciprocal waiver of liability is the damaged third party.

Analysis of the Characteristic and Inadequacies of FAA's Rule on Space Flight

Examining the FAA's Rule on Space Flight, one can analyze that it is much more protective toward the space flight operator than to the space flight participant. It minimizes the risks associated with potential

[25] See *Study on Informed Consent for Spaceflight Participants*, Document Number: APT-CFA-230-0001-02F, p. 4.

[26] See 14 CFR §440.17 (2006) Reciprocal waiver of claims requirements

[27] 14 CFR §440.17 (e)(f)(2006)

litigation and lets the flight participant bear the financial burden. Indeed, the risks are not equally allocated between the operational side and service recipients as a flight participant bears all the risk for the flight. It is clearly tilted towards encouraging commercial space flight. This feature overlaps with the trend seen during the early age of aviation industry where the law had served to achieve the purpose of protecting and promoting the nascent business. It was reflected in a set of legislation addressing international air transport that emerged in the early days of flight that characterized in placing limitation of liability of air carrier[28] and later on such limitation was relaxed in the interests of passenger[29].

Whereas the rule is made favorable for a space flight operator, there are also loopholes and uncertainties. Informed consent is not applicable to damage arising out of fault [30], therefore does not give protection to operator in such cases. The principle of informed consent by way of the FAA final rule on commercial space flight intends to require waiver claims in all circumstances. The stance of government is disclaiming liability as it makes clear in the FAA rule that the US government does not certify that the launch vehicle is safe. It is possible that the vehicle may not have undergone a sufficient number of test flights to reach the high standard of safety. It is conceivable that the damage may be caused for example by the faulty design of a spacecraft, negligent inspection of vehicle or human error of a pilot. In reality, the space flight operator may be held liable for damage caused by their negligence if an action is brought.

Whilst the liability scheme established by the FAA's Rule on Space Flight is prepared for claims brought by the third parties for damage physically caused by space object, uncertainties exist as to claims that may be brought by third parties not physically damaged but affected negatively by the damage incurred to flight participants. Indeed, litigation following the launch failure is often not associated with physical damage but mainly economic loss[31].

Given the fact that the mortality rate of those who proceed to space flight is 4%, loss of the space flight participant is conceivable. In such cases, it is not the flight participant himself or herself that would bring action against the commercial space flight operator, but affected third parties who

[28] See for instance Article 22 of Convention for the Unification of Certain Rules Relating to International Transportation by Air

[29] See Article 21 of Convention for the Unification of Certain Rules for International Carriage by Air, Montreal 1999

[30] See *Study on Informed Consent for Spaceflight Participants*, Document Number: APT-CFA-230-0001-02F, p. 4.

[31] See for instance *Martin Marietta v. INTELSAT*, Civil Action number MJG90-1840, US District Court, Maryland, *Appalachian Insurance Co. vs. McDonnell Douglas s,* 214 Cal ap 3d 1, 262 Cal Reporter 716 (Cal Ap Fourth District 1989).

have not signed the contractual waiver. They could be , for example, an insurance company from which he or she purchased his life insurance or his employer or employees. The chances of such persons bringing action are not zero. This could be a loophole and may pose risks to the commercial flight operator as well as the US government.

CONCLUSION

In these ways, the FAA's Rule on Space Flight intends to minimize the financial burden upon the commercial space flight operator and thus protects the fledging industry. It succeeds to the extent that it has not destroyed the burgeoning business through burdensome regulations and continues to attract new comers. On the other hand, the FAA's Rule on Space Flight has a room for improvement. One must recognize that there is inadequacy in the liability scheme endorsed by the current FAA's rule and the need for further clarification and elaboration. Most of all, a balance has not yet been established between the protection of right and interest of space flight participant and the protection and promotion of industry. After the establishment of FAA's Rule on Space Flight, a flight participant still faces high risks.

Whilst space flight is not yet for the general public at large, it has the high potential for commercial growth. Even if space flight is not perceived as a transportation service at present, as the industry enlarges, it is likely to become closer to a mean of transportation. Then, increased number of passengers would fly to space and accordingly the need for their protection enhances. Foreseeing such trend, it is important to consider the need for improvements with regards to safeguarding rights and interests of space flight participants and incorporating appropriate measures into the international legal framework. In that sense, one can conclude that the legal regime on space flight is still at the early stage of evolution.