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LEGAL ASPECTS OF SPACE RISK MANAGEMENT:

THE ALLOCATION OF RISKS AND ASSIGNMENT OF LIABILITY IN COMMERCIAL LAUNCH SERVICES

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ABSTRACT

This thesis examines the way legal space risks are managed in commercial space transportation provided by major carriers, such as, NASA, the US private launch sector, and Arianespace, as well as in the system envisaged for Australia. Its purpose is to show that even if all systems tend to provide a favorable risk allocation scheme to the space launch industry, there are several alternatives for the telecommunications satellite operators. It also attempts to show that, even if all these risk sharing regimes have been modeled after NASA's, there are certain important differences, which stem from the different political objectives of each of the countries where these carriers are inserted.

To Florencia and Milton

RÉSUMÉ

La présente thèse a pour objet l'étude des systèmes des risques juridiques spatiaux dans les services de transport spatial commercial données par les principales compagnies du secteur : la NASA, les compagnies privées américaines, Arianespace et le système conçu pour l'Australie. L'objectif est de démontrer que même si tous les systèmes tendent à donner un schéma favorable d'allocation des risques à l'industrie de transport spatial il y a des possibilités pour les opérateurs de télécommunications par satellite. On voudrait prouver aussi qu'il y a des différences importantes entre les systèmes d'administration des risques même si tous ces systèmes dérivent de celui de la NASA. Ces différences répondent aux divers objectifs politiques de chaque pays où les compagnies de transports spatiales appartiennent.

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A special note of gratitude goes to Florencia, my wife, and Milton, my son, for their endless love and patience as well as to my family in Buenos Aires, who has been deprived of Milton's presence.

PREFACE

This thesis is the result of a thorough and rigorous research carried out at McGill's Institute of Air and Space Law under the supervision of Professor Ram Jakhu.

Like any other work, this paper also profits from an array of past experiences and events. In this sense, this research work has been influenced by a professional and academic life devoted almost exclusively to Space Law. Thus, all my previous studies, my lectures at the Argentine National Institute of Air and Space Law, the work for my clients in almost all sectors of the space industry and my prior research endeavors, in particular my doctoral dissertation at the Catholic University of Cordoba, my first book on Commercial Space Law and several articles published in many specialized journals, have all contributed to shape the final outcome of this thesis.

To comply with a requirement of the Faculty of Graduate Studies and research the publications quoted below – written by the candidate as sole author- should be expressly mentioned.

- "Risk Management in Commercial Launches" (1997) Space Policy.
- "Turnkey Launch Agreements" (1999) Outer Space Newsletter.
- Commercial Space Law: International, National and Contractual Aspects (Buenos Aires: Ediciones Depalma, 1997).

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INTRODUCTION

Due to the kind of technology used and the characteristics of the Outer Space environment, commercial space activities entail high risks to persons and property both part and foreign to the commercial space venture. At present, it is estimated that one out of twenty launches fail.[1] This fact alone qualifies the space transportation as an ultrahazardous activity. Thus, risk management, i.e., the process for identifying and addressing loss exposures of all kinds, has turned out to be of utmost importance in the space industry.

In the commercial space launch sector the risk-allocation system, in particular the management of legal space risks, has become quite rigid and highly standardized, which gives little room for negotiation, even if this may, in certain cases, lead to unfair or impractical situations.

The purpose of this research is to explore the way the so called legal space risks are managed in space transportation provided by major carriers, such as, NASA, the US private launch sector, and Arianespace, as well as in the system envisaged for Australia - a country that has not yet an established space launch industry - with the view toward analyzing the common elements and the evolution of these risk-allocation systems.

The pivotal hypothesis is to show that even if all systems tend to provide a favorable risk allocation scheme to the space launch industry, there are several alternatives for the telecommunications satellite operators. We will also attempt to show that, even if all these risk sharing regimes have been modeled after NASA's, there are certain important differences, which stem from the different political objectives of each of the countries where these carriers are inserted.[2]

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[1] Van Fenema, H. P., *The International Trade in Launch Services. The effects of U.S laws, policies and practices on its development* (Leiden: H. Peter van Fenema, 1999).

[2] In a previous thesis carried out at the Catholic University of Cordoba, we showed that the launch carrier industry, especially the US private sector, needed the removal of competition and a favorable

In the first chapter we will concentrate on the analysis of the concept of space risk, its main classifications and the main features of risk management. The second chapter deals with the international legal framework applying to space transportation and the third one is devoted to the domestic regulatory regimes. In the fourth one we examine the structure and main characteristics of the launch contracts, focusing on risk allocation clauses. We also analyze the turnkey launch agreement as a risk management alternative to the standard launch services agreement. In each of the following chapters we will examine the risk allocation system applying to launch services provided by NASA, the US private sector and Arianespace, as well as the system conceived in Australia. Finally, we will summarize the conclusions made throughout the thesis.

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risk management system to operate. J. Hermida, *Norms governing launch services by NASA and commercial US private companies*, (LL.D. Thesis, Catholic University of Cordoba, Doctorate of Laws Thesis 2000) [unpublished] [hereinafter "Launch Services"].

CHAPTER I

SPACE RISKS

A. DEFINITION AND CLASSIFICATION OF SPACE RISKS

From a strictly legal standpoint we can define space risks as the uncertainty regarding losses derived from a space activity. Put differently, space risks represent the exposure to losses faced by an organization engaged in the exploration or exploitation of Outer Space. Space risk is a category within the general concept of risk[3] and it may be characterized as pure, objective, dynamic and diversifiable[4].

Several classifications of space risks have been proposed by various authors. First, Pamela Meredith and George Robinson have categorized space risks as (i) political, (ii) market, (iii) technical, (iv) damage to property and personnel, and (v) third party liability[5]. According to these authors, political risks refer to the possibility of changes in the governments, in the government policy, and even in the legislation related to a space activity. Political space risks are increased when a government is not only a regulator of, but also a participant in space activities, which occurs -either directly or indirectly- in almost all spacefaring countries[6]. In his work on the management of space risks, Kurland identifies foreign government embargoes of shipments of essential high technology components, withdrawal of requisite regulatory approvals or other changes in government policy as the main political

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[3] The concept of risk has been studied extensively by risk management theory. It is considered as an uncertainty regarding loss. J. Trieschmann, R. Gustavson & G. Sandra, *Risk Management & Insurance*, 9th ed. (Cincinatti: South Western College Publishing, 1995) at 4. The risk management approach is geared to quantify or assess the risk with the aim to predicting the likelihood of its occurrence on scientific grounds. However, our objective is not the analysis of the assessment and prediction of the reiteration of risks. We will focus rather on the way risks are managed in commercial space launches, particularly on the norms which regulate such risks.

[4] C. A. Williams, Jr., M. L. Smith, & P. C. Young, *Risk Management & Insurance*, 7th ed. (New York: McGraw-Hill Inc., 1995) at 9.

[5] P. L. Meredith & G. S. Robinson, *Space Law: A Case Study for the Practitioner* (Dordrecht, Martinus Nijhoff, 1992) at 249 [hereinafter "Case Study"].

[6] *Ibid.* at 250.

factors which may cause devastating consequences on a company involved in the space launch business.[7]

Market risks take place because of unpredictable changes in the markets or because of unforeseen changes in the studies of economic feasibility made before the commencement of the space endeavor. In the space industry, market risks exist whether there is an existing demand for such services or whether the project attempts to develop a new market.[8]

Technical risks refer to the uncertainty owing to the use of innovative high technology used for the space vehicle and for the payloads in an environment of unfavorable characteristics. One of the most significant responses to face technical risks is the redundancy principle, i.e., several elements in a space object, whether satellite or vehicle, have similar functions so when one is out of order the space object can continue to operate through the other elements which have the same function.[9]

The concept of property and personnel risks means the possibility of damage to the participants' space objects (space vehicle in case of the launch company or payload in case of the customer) and to the participants' personnel resulting from the launch activity. Third party liability risks refer to the possibility of damages caused to persons and property unrelated to the operation[10].

In our opinion, since both property and personnel risks and risks to third party liability generate the same consequence, i.e., the obligation to compensate damages, and have the same origin and nature, we prefer to categorize these two types of space

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[7] O. M., Kurland, "The New Frontier of Aerospace Risks", (1993) Risk Management at 36.

[8] "Case Study", *supra* note 5 at 257.

[9] J. Hermida, "Transponder Agreements", (1996) 24 J.Sp.L. at 35.

[10] "Case Study", *supra* note 5 at 250.

risks within only one category called legal risks[11]. Thus, legal risks constitute one subcategory of space risks, which represent the exposure to situations susceptible to generate liability, particularly the obligation to compensate damages.

Bender, in turn, following a classification outlined by the US Department of Transportation proposes to divide legal space risks in: (i) risks among participants or first-party risks, (ii) second-party risks and (iii) third party risks[12].

First party risks imply the possibility of damages to the participants' space objects, i.e., the space vehicle in case of the launch company or the payload in case of the customer, and to the participants' personnel resulting from the launch activity. Additionally, in our opinion, these risks may be subdivided according to the origin of damages which may be caused. Thus, they include both foreign and own risks. The former refer to damages which the launch carrier causes to its customer and similarly damages which the customer causes to the carrier. First party own risks are risks of damages which may be suffered by a participant in the launch service to itself. For example, these risks would encompass the risk of damage which the launcher may cause to the space vehicle or its personnel and risks of damages to the satellite caused by the customer. Due to the fact that participants in space launch services have treated these types of first party risks differently we propose to subdivide these risks in the outlined subcategories.

Second party risks constitute risks to certain related entities which, although they do not participate directly in the space activity, are all the same exposed to some risks. For example, in the case of launches carried out by Arianespace, these are basically risks to the French government, CNES, the European Space Agency and ESA's member states, originated in particular because of the use of launch facilities and related range services and because of the consequences derived from

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11 J. Hermida "Risk Management in Commercial Launches", (1997) Space Policy 13 at 145 [hereinafter "Risk Management"].

international Space Law liability norms. For the purpose of differentiating between the sources of liability which this class of risks may generate, we propose to subdivide these risks into the following categories: (i) international liability risks, and (ii) property risks.

The former are risks derived from international Space Law liability norms. Indeed, as analyzed below, the Space Treaty[13] imposes international responsibility on states for national activities in Outer Space carried out by governmental agencies or by non-governmental entities. Additionally, in the event of activities carried out by an international organization, responsibility falls on both the international organization and by the States Parties to the Treaty participating in such organization. The Convention of Liability[14] renders the launching State, i.e., the state which launches or procures the launching of a space object; or from whose territory or facility a space object is launched absolutely liable for damage caused by its space object on the surface of the earth or to an aircraft in flight. Therefore the launching state and the international intergovernmental organization which conducts space activities may be held internationally liable for damages caused by the launch carrier or by its customer. Thus, international liability risks refer to those risks which may arise from the application of these international norms which impose liability to entities which do not directly carry out the launch.

Property risks are basically risks to the owners of the launch facilities and related range services. In general, these are governments, governmental entities, such as the US Air Force, or international intergovernmental organizations, such as the European Space Agency. These risks also encompass the possibility of damages to entities which do not own the facilities but which hold certain rights, generally the

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[12] R. Bender, *Space Transport Liability: National and International Aspects* (The Hague: Martinus Nijhoff, 1995) at 208.

[13] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, January 27, 1967, 610 U.N.T.S. 205, 18 U.S.T. 2410, T.I.A.S. No. 6347, 6 I.L.M. 386, [hereinafter "Space Treaty"].

[14] Convention on the International Liability for Damage Caused by Space Objects, March 29, 1972, 961 U.N.T.S. 187, 24 U.ST. 2389, T.I.A.S. No. 7762 [hereinafter the "Liability Convention"].

right of use, assigned to them by the owners through an agreement or other legal instrument.

Third party risks refer to the possibility of damages caused to persons and property thoroughly unrelated to the operation. These may include, for example, persons and property that did not participate in any manner in the space launch, such as the victims of the Long March accidents in the mid 1990's.[15]

As mentioned above, we are only concerned with legal space risks. Therefore, all aspects related to political, market and technical management of space risks are beyond the scope of our research.

B. SPACE RISK MANAGEMENT

Space risk management is a process for identifying and addressing loss exposures of all kinds. Owing to the risks which any commercial space activity implies, risk management has achieved considerable significance in this volatile industry. Space risk management involves the executive functions of planning, organizing, leading and controlling the factors associated to risk exposure by an entity engaged in commercial space endeavors. As in most activities, risk management in commercial space transportation entails basically the following elements: (i) risk identification, (ii) risk assessment, (iii) risk control, and (iv) risk financing.

In the commercial space launch sector the risk-allocation system, in particular the management of legal space risks, has become quite rigid and highly standardized. It differs from other sectors because the risk management process is highly regulated, which allows practically no possibility of deviating from the system stemming from

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[15]V. Kayser, *Legal Aspects of Private Launch Services in the United States*, (LL.M., Thesis, McGill University, 1991) [unpublished], at 136 [hereinafter "Private Launch"]. In January, 1995 Long March went through the most serious setback of its history when it exploded 50 seconds after lift-off, causing six deaths and twenty-three injured people. One year later, on February 14, 1996, Long March exploded again after lift-off, killing -pursuant to official reports- four bystanders. J. C. Anselmo, Joseph C., "West Tells China to Come Clean", (1996) *AW&ST*, Feb. 26 at 68.

such regulation. This regulation arises from (i) the legislation and international agreements and (ii) the contracts. For launch services provided by NASA, these regulations are embodied mainly in the NAS Act of 1958 and regulations issued by NASA itself. For the US private sector, the main aspects of the risk-allocation system have been adopted in the 1988 Amendments to the Commercial Space Launch Act and by regulations issued by the Secretary of Transportation and the Federal Aviation Administration. For Arianespace, these regulations are embodied in agreements executed at the national and Agency levels.[16]

Launch services agreements, which tend to be quite similar among the different launch services providers, as they have all been modeled after the NASA launch service contracts used at the beginning of the 1980's, generally present a rigid risk management approach, characterized by the transfer of risk to the user and by the launcher's limitation of liability. This fact in practice means that space launch services agreements give little room for altering the risk-allocation and the liability-assignment system contained in such agreements.

It can thus be gathered that the management of legal risks in space launch activities is limited to the prescriptions of the law and the provisions of the contracts, which are neither easily nor frequently modified by the participants even if they may, in certain cases, lead to unfair or impractical situations.[17]

From the perspective of the customer of the launch services, when evaluating the risks associated with a launch, it considers the following issues: (i) launch vehicle qualification, i.e, whether it is a proven vehicle with a solid track record of successful launches, (ii) back up vehicles, i.e., whether there are suitable back up vehicles in the

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[16] These include the Declaration by Certain European Governments Relating to the Ariane Launcher Production Phase signed by states participating in the Ariane production phase, VOL.II-BIS/G02V; the Convention between ESA and Arianespace signed May 15, 1981, ESA/C(81)11; the Agreement between the French Government and the European Space Agency on the French Guiana Space Centre, signed May 5, 1976, ESA/LEG/069; and the Agreement on ESA's Launch Site and Associated Facilities at Kourou signed May 19, 1976, ESA VOL.II/E05, among many others.

[17] "Risk Management", *supra* note 11 at 145.

event that the primary launch vehicle develops a problem, e.g. if Ariane 44 LP may be used as a back up in case Ariane 5 runs into developmental problems, and (iii) programmatic schedule risk[18]. As can be gathered, the risk analysis made by the customer leads to a conclusion of whether to hire a certain launch company or not, for as outlined above, it has little room for negotiating a different risk-sharing approach.

C. ELEMENTS USED IN THE MANAGEMENT OF SPACE RISKS

In light of the foregoing analysis, we must examine the elements used in the management of space legal risks in commercial space launch services. Consistent with our conclusion that legal space risks are a subcategory of risks, all elements and techniques available in the risks management field are in principle applicable to the management of space risks. However, as noted above, the distribution of risks and assignment of liability in space launch services are subject to a strict regulation, which allows a narrower margin for their application.

Legal space risks in space launch services are thus allocated among the participants by means of a complex system of reciprocal waivers of liability, indemnification granted by the states, commitments to obtain insurance, limitations of liability, sole contractual remedies in the event of default, *obligations de moyens*, and exclusion of liability clauses, among other legal instruments. Reciprocal waivers of liability constitute the milestone of this system. By means of these waivers of liability (wrongly called interparty since they involve other participants unrelated to the contract between the carrier and the customer), each party agrees to be responsible for any damage which it sustains as a result of damage to its own property and employees, whether the damage is caused by the carrier, the customer or other customers involved in the space transport operations. Usually, this is complemented by the obligation imposed on all parties to the contract to include

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[18] L. Millstein, "How does an Operator Manage Risks in a Commercial Satellite Project?", (International Bar Association Conference, 6 November 1997) [unpublished].

similar waivers of liability in their agreements with their contractors and subcontractors, so that each will assume its risks and will not sue the other participants.

The combination of interparticipant waivers of liability and insurance provisions, together with the other instruments chosen for risk allocation and assignment of liability (state indemnification, liability limitations in the contracts, attribution of the status of obligations of means to the obligations of the carrier, sole contractual remedies in the event of default, and exclusion of liability clauses) makes the risk allocation and assignment of liability in space launch agreements a complex system with well-defined characteristics and important financial consequences for the outer space industry.

The use of these legal instruments varies substantially according to each kind of space launch carrier. However, they all stem their origin to the system created by NASA when it was the only carrier that offered commercial launch services.

CHAPTER II

THE INTERNATIONAL LEGAL FRAMEWORK OF SPACE TRANSPORTATION

A. GENERAL PRINCIPLES

International Space Law, created during the cold war through the search for the minimum consensus between the then world superpowers, does not contain any rule which specifically refers to space transportation. Thus, the legal framework for space transportation arises mainly from domestic laws, which we will analyze in the following chapter. However, space transportation as any other space activity is governed in the international sphere by the International Space Law treaties and conventions. Thus, all principles that govern the exploration and exploitation of Outer Space in general are applicable to space transportation. Additionally, there are other issues of international nature, which have not yet been addressed by the *Corpus Juris Spatialis*, such as the right of passage over states and the legal nature of the so called space planes, among many others.[19]

Therefore, we will now concentrate on the analysis of the principles of International Space Law which are most relevant for space transportation and consequently for the management of space legal risks arising from this activity.

1) Freedom of exploration and use

According to article II second paragraph of the Space Treaty, Outer Space has been declared free for exploration and use by all States, without discrimination of any

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[19] In 1979 COPUOS Legal Sub-committee considered the need to develop a treaty of principles on the use of space transport. However, this issue was abandoned the following year. A/34/20/79 at. C. Q., Christol, *The Modern International Law of Outer Space* (New York: Pergamon Press, 1982) at 815.

kind. In light of the above consideration, this freedom extends to space transportation activities. However, the freedom principle has a clearly defined purpose in the Space Treaty and, therefore, it may not be used as a justification for arbitrary or illegal activities.[20]

This freedom of exploration and use applies to every individual and entity and not only to states, although the latter are the direct beneficiaries of this right.

2) **Common Interest**

During the negotiation of the Space Treaty, it was feared that the principle of freedom of Outer Space exploration would lead to a situation of monopoly in favor of the United States and the Soviet Union, which were then the only space powers with capacity and means to explore the Outer Space. That fear decreased with the adoption of the consensus on the common interest clause. According to Tatsuzawa, the common interest principle forms a counterpart to the principle of freedom of Outer Space, and imposes reasonable restrictions on the latter so as to avoid the abuse of rights. It sets a general goal from which the States must not deviate in their space activities. Space transportation, as well as any other activity, is in conformity with this principle, provided it contributes in a general sense to the social welfare even if their main purpose is the obtainment of profits.[21]

3) Non-appropriation

Article II of the Space Treaty embodies the non-appropriation principle, which establishes that "outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or

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[20]G. P. Zhukov & Kolossov, *International Space Law* (New York: Praeger, 1984) at 42.

[21]K. Tatsuzawa, "The Regulation of Commercial Space Activities by the Non-governmental entities in Space Law" (1998) 31 Proceedings of the 31st. Colloquium on the Law of Outer Space at 343.

occupation, or by any other means." This principle is highly relevant for commercial space activities, since it precludes the possibility of appropriation of Outer Space and celestial bodies by means of private property. This fact does not imply the non-existence of private property in Outer Space. On the contrary, in accordance with article VIII of the Space Treaty, the ownership of space objects, even those built in outer space, does not change while such objects are in outer space. Thus, for example, a launched vehicle owned by a private space launch carrier launched into outer space pursuant to the international provisions in force will still be owned by that carrier and that carrier's rights will be recognized by all the states and non-governmental entities.

Additionally, the principle of non-appropriation is not absolute and it does not imply the disregard of certain rights on some areas of outer space, e.g., the right to use a specific orbital position (as long as the rules of International Law are observed), the right to use a specific area where a space station is built, or the space vehicle's right to its trajectory[22], among others. The legitimate exercise of these rights of use implies the recognition of a sort of *de facto* ownership, which does not seem to contradict the true spirit of the non-appropriation principle, which actually aims at avoiding sovereignty claims by states in outer space and celestial bodies[23].

4) Peaceful Activities. Application of International Law

Although this principle is of fundamental importance in the political sphere it does not add much to the legal framework of space transportation activities. Nonetheless,

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[22] The right to the trajectory is a concept created by the Argentine Space Law school, which applies to any space vehicle. Ferrer held that "if a spacecraft registered in the National Registry set forth by article II of the Registration Convention, duly informed to the Secretary General of the United Nations pursuant to the provisions of article IV of said convention, flies through outer space in the orbit which has been informed to the United Nations Registry, in accordance with the requirements of article IV first paragraph item d) of such Convention, creates an *erga omnes* obligation to respect its trajectory, which impedes any interference." Ferrer finds the foundations of the right to the trajectory in the principles of International Space Law, particularly in the second part of article I of the Space Treaty, which establishes that Outer Space will be free for exploration and use. M. A. Ferrer(h)., "El derecho a la trayectoria", (1997) 13 Proceedings of the 13th Colloquium on the Law of Outer Space, at 160.

[23] L. Peyrefitte, *Droit de l'espace*, (Paris: Précis Dalloz, 1993) at 50.

it is important to highlight that the Space Treaty prescribes that only the moon and other celestial bodies must be used exclusively for peaceful purposes, where the establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on celestial bodies are strictly forbidden. Thus, the Treaty does not require that activities carried out elsewhere in outer space be exclusively peaceful. The Space Treaty merely states that the activities must be carried on pursuant to international law and in the interest of maintaining international peace and security.

5) International responsibility and liability

Article VI of the Space Treaty attributes international responsibility to states for national activities in outer space carried on by governmental agencies or by non-governmental entities, assuring that national activities are carried out in conformity with the provisions set forth in the Space Treaty.

Additionally, article VII of the Space Treaty prescribes that each State Party to the Treaty that launches or procures the launching of an object into outer space and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the moon and other celestial bodies.

The issue of international liability of states, which has a fundamental influence on space transportation activities and the management of the risks connected with launch services, will be dealt with below in further detail.

6) Authorization and continuing supervision

Article VI provides that the activities of non-governmental entities in outer space, including the moon and other celestial bodies, will require authorization and

continuing supervision by the appropriate state. The Space Treaty does not determine the way in which the authorization must be granted. Therefore, every state is free to implement the system of permits for space activities.

7) Jurisdiction and control over space objects

Article VIII provides that a state party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body.[24] In other words, the legislation of the state of registry, including criminal, labor and any other kind of laws, may be applied to space objects and its personnel. This jurisdiction may be partially waived in favor of another state by means of agreements on this matter. For instance, the State of Registry may agree on the enforcement of the legislation -or a legislative area- of another state participating in a space activity.

8) Registration of space objects

The space vehicle must be registered in the registry of the launching state. In effect, as an elaboration of article VIII of the Space Treaty, the Registration Convention prescribes that "when a space object is launched into earth orbit or beyond, the launching State shall register the space object by means of an entry in an appropriate registry which it shall maintain. Each launching State shall inform the Secretary General of the United Nations of the establishment of such a registry."[25] The registration of the object in the national registry of the launching state transforms such state in the state of registry, and thus, absent an agreement to the contrary[26], the

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[24]This principle has been adopted as a consequence of the abolition of the sovereignty in space. A. A. Cocca, "Prospective Space Law", (1998) 26 J.Sp.L. at. 52.

[25]Registration Convention, article II 2.1.

[26]In the case of a joint endeavor, a state of registry may reach an agreement with the rest of the launching states for the application of a certain area of the law of a state other than the state of registry.

laws of such state will be applicable to both the space object so registered and the personnel on board it.

9) Neutrality of ownership rights

By virtue of this principle, proprietary rights on a space object in outer space enjoys the protection given to such object by the State of Registry. International Space Law remains neutral on the extent and nature of the ownership of said space object.[27]

10) Return of space objects

The principle of return of space objects applies to space transportation. According to this principle, whenever a space object is found beyond the limits of the state of registry it is to be returned to that state, which, will upon request, furnish identifying data prior to returning the object to the state of registry.[28] Additionally, all norms dealing with rescue and return of astronauts and return of space objects are also applicable to space transportation. In this line, the concept of astronaut, which has not been defined includes all persons on board a space vehicle.[29]

11) International cooperation

Cooperation was conceived as a means toward perfecting peace and it soon became a necessity for implementing expensive space projects. This principle has been considered to be a legal obligation, which conditions the lawfulness of every space activity.[30] However, as stated by Miklódy international cooperation is simply *an*

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[27] This principle, which is of fundamental importance for commercial activities, constitutes the basis of the intellectual property regime of creations and inventions in outer space.

[28] It is evident that this principle as conceived in the Space Treaty refers only to space objects found on Earth. The treatment to be given to space objects found in outer space may not be possibly inferred from its wording.

[29] H.Quizi, "Review of Definitional Issues in Space Law in the Light of Development of Space Activities" (1991) 34 Proceedings of the 34th. Colloquium on the Law of Outer Space at 33.

[30] A. A. Cocca, "Preface", in J. Hermida, *Commercial Space Law: International, National and Contractual Aspects* (Buenos Aires: Ediciones Depalma, 1997).

obligatio de contrahendo and not an unconditional duty. Furthermore, no state may impose upon another one the subject and the terms of cooperation in one or another area and cooperation may only be the result of bilateral and multilateral agreements.[31] In our opinion, cooperation only constitutes a necessity and a beneficial advantage but it may never be deemed as an obligation whose non compliance triggers off the illegality of the activity.

12) Avoidance of harmful contamination

According to article IX, all space activities have to be conducted so as to avoid harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter. Provisions contained in this principle are rather vague. For example reference to harmful contamination may appear to suggest that non harmful contamination is allowed. Similarly, reference to the phrase adverse changes is not altogether clear. This principle refers only to harmful contamination of the Earth. It thus seems to permit contamination of Outer Space.

13) Free exchange of information

The Space Treaty mandates states to inform the Secretary General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of the nature, conduct, locations and results of space activities. With respect to commercial activities carried out by private sector companies, the obligation of these companies is just to inform the state which has jurisdiction on them, which in turn has to inform the Secretary General and the general community.[32]

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[31]M. Miklódy, "International Cooperation. A Legal Obligation in the Law of Outer Space?", (1983) 26 Proceedings of the 26th Colloquium on the Law of Outer Space at 231.

[32]This principle has been one of the objectives of the US diplomacy which advocated for a broad exchange of information. However, it faced intense objection from the outset on the part of the Soviet Union, the result being a compromise that information should be shared to the extent feasible and

14) Free access

Article XII, together with articles I and II, assures free access to all celestial bodies and provides means for assuring each party that the other parties are living up to the provisions of the treaty. It requires that all stations, installations, equipment and space vehicles will be open to representatives of all other state parties to the treaty on a basis of reciprocity.

B. LIABILITY

As this work is concerned with the risks of having to compensate damages derived from space launch services, it is useful to examine in greater detail the main aspects of international liability, even if it has been extensively written about this topic. We will thus focus on risk allocation aspects of the international liability system and other aspects, such as procedural ones, will be left aside or reviewed very briefly.

Responsibility and liability issues play an important role in commercial space activities. Even if there has never been a successful third party claim for damages resulting from American and European operations, the potentiality of the success of any such claim presents all participants involved in the space launch, and not only the carriers, with considerably high risks.

1) The Liability Convention

Created at the peek of the cold war, the main objective of the Liability Convention is to provide a legal framework for the full compensation of damages caused on Earth by the spacefarers as a consequence of their activities in outer space. In other words, the Convention provisions have not been conceived to deal with commercial

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practical on only certain aspects of space endeavors. Committee on Foreign Relations, United States Senate, Treaty on Outer Space, 90th Congress, First Session, March 7, 13 and April 12, 1967,

activities. Nonetheless, they govern international liability cases and are thus of central importance for the commercial space transportation sector. According to Dimitri Maniatis, the Convention is based on two outdated factual premises: (i) the greatest risks posed by space activities are to non-participants, and (ii) states are the principal space participants. Therefore, the system addresses the problem of allocating responsibility for damage caused by space objects from the perspective of state responsibility for the activities of national entities rather than private liability.[33]

2) Liability Systems

The Liability Convention adopted an absolute liability standard, i.e., objective liability, where the victim does not have to prove the defendant's fault, without any monetary limits, for damages caused by its space object on the surface of the earth or to an aircraft in flight. Additionally, for damages which take place elsewhere than on the surface of the earth by (i) a space object of a launching State, and (ii) persons or property on board such a space object, the Convention adopted a subjective standard, where evidence of negligence is required (article III). As in the case of objective liability, article III claims are not subject to any monetary limitations.

3) Liable entities

Consistent with article VII of the Space Treaty, the Convention attributes international liability for damage caused by governmental and non governmental entities to the so called launching states. This represents a deviation from general international law, for normally states are not responsible and/or liable at international level for the acts of its private citizens.[34] In effect, each State Party to the Treaty that launches or procures the launching of an object into Outer Space and each State Party from whose territory or facility an object is launched, is internationally liable for

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(Washington: U.S. Government Printing Office, 1967) at 42.

[33]D. Maniatis, "The Law Governing Liability for Damage Caused by Space Objects: From State Responsibility to Private Liability", (1997) XXII Ann. Air & Sp. L. at 373.

[34] I. Brownlie, *Principles of Public International Law,* 2d ed. (Oxford: Clarendon Press, 1973) at 421.

damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the moon and other celestial bodies. Note that the Convention extends the meaning of the term "launching" to include attempted launchings.

4) Definition of damages

Article I of the Convention defines the term "damage" as 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. As may be clearly seen, the concept of damage has a very broad scope in the Convention. The negotiating history supports the foregoing assertion. In this respect, it is worth pointing out that while debating on the inclusion of nuclear damage in the field of the Convention, the United Kingdom representative before COPUOS Legal Sub-Committee held that the definition of damage was to be construed broadly.[35] The same interpretation was held by Aldo Armando Cocca in the session of June 29, 1971, who stated that "the [draft] Convention recognized the actual and potential rights of the victims in connection with all kinds of damage, including nuclear damage."[36] Two years earlier Italy had also reached a similar conclusion.[37]

5) Protected entities

The Convention aims at protecting (i) States, (ii) individuals and legal entities, (iii) international organizations, and (iv) the property of said persons and entities.

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[35] A/AC.105/C.2/SR.94 at 51.
[36] A/AC.105/C.2/SR.167 at 123.
[37] A/AC.105/C.2/L.63.

6) Joint and several liability

The Convention prescribes that there is joint and several liability for damages caused when a space object is jointly launched by two or more states. In such case, the launching state which has paid compensation for damage is entitled to claim the proportional corresponding amounts to other participants in the joint launching. Thus, all launching states are equally liable for compensation unless they reach an agreement for a different division of liability.[38]

The Convention also establishes joint and several liability for damage caused to third parties. In this regard, it prescribes that in the event of damage caused elsewhere than on the surface of the earth to a space object of one launching State or to persons or property on board such a space object by space objects of two other launching States, these two States become jointly and severally liable with respect to damage caused to said third State. According to the general provisions of the Convention if the damage has been caused to the third State on the surface of the earth or to aircraft in flight, their liability to the third State is absolute, whereas if the damage has been caused elsewhere their liability will be based on the fault of either of the first two States or on the fault of persons for whom either is responsible. In all these cases the burden of compensation for the damage has to be apportioned between the first two States in accordance with the extent to which they were at fault; if this may not be established, then the burden of compensation has to be apportioned equally between them.

According to Bin Cheng, this provision does not appear to be applicable to the State which from the ground or from an aircraft causes the space object of another state to fall, thereby causing damage to the space object of a third State in Outer Space as to an aircraft or property of said third State on the surface of the Earth. The second State, if without fault would not be liable either to the space object of the third State, but would incur absolute liability towards the State of the damaged

aircraft and the third State on the surface of the Earth. The international responsibility of the first State would have to be based on article VI of the Space Treaty.[39]

Article V of the Convention expressly attributes joint liability for any damage caused by two or more States when they jointly launch a space object. It is possible under the Convention for participants in a joint launching to conclude agreements regarding the apportioning among themselves of the financial obligation in respect of which they are jointly liable. These agreements, however, may not impair the right of a state sustaining damage to seek the entire compensation due from any or all of the launching States. Also, in the absence of said agreement, the State which has paid compensation for damages is entitled to present a claim for indemnification to other participants in the joint launching. It is worthy of note that article V neglected to include the procuring State, which pursuant to the definition of article I is also deemed to be a launching state, among those which may be jointly liable. In our opinion, the definition of article I and the general principles of joint liability established in the Convention lead to the unquestionable conclusion that a procuring state is to be regarded as a participant in a joint launching, and thus subject to joint liability in terms of article V of the Convention. In this respect, Carl Q. Christol wonders exactly what degree of activity qualifies a procuring State as such. He concludes that this question has been left open in the Convention and that therefore it can only be decided in each specific case of damage arising from a space endeavor involving two or more States.[40] As pointed out by the US Senate Committee on Aeronautical and Space Sciences, it is not clear in the Convention whether a State would fall within the category of procuring State if its only connection with a space

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[38]B. A. Hurwitz, *State Liability for Outer Space Activities* (Dordrecht: Martinus Nijhoff, 1992) at 39.
[39]B. Cheng, *Studies in International Space Law* (Oxford: Clarendon Press, 1997) at 330.
[40]Christol, *supra* note 19 at 115.

activity is a minor experiment aboard the spacecraft, or if it supplied only a small component in the spacecraft booster or it just sent a technical observer.[41]

7) Exoneration

The Convention foresees the possibility of the exoneration from absolute liability. In effect, article VI .1 "establishes that exoneration from absolute liability shall be granted to the extent that a launching State establishes that the 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". Paragraph 2 of the quoted article sets forth that "no exoneration whatever shall be granted in cases where the damage has resulted from activities conducted by a launching State which are not in conformity with international law including, in particular, the Charter of the United Nations and the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies".

Exoneration under the Convention may be total or partial depending on the participation of the claiming State. Forkosch questions the fact that there is no standard to determine when negligence should be considered gross and wonders how an omission could be considered to be "with intent" to cause damage. In our opinion, these issues are not exclusive of Space Law and have satisfactorily been answered in other fields of law.[42]

8) Applicable Law. Full compensation

The core of the Liability Convention is the full compensation standard imposed on the launching state, which has to restore the person, natural or juridical, state or

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[41]Committee on Aeronautical and Space Sciences, Report on Convention on International Liability for Damage Caused by Space Objects, Analysis and Background Data, 92d. Congress 2d. session 44, (Washington: Government Printing Office, 1972) at 29 [hereinafter "Committee Report"].

international organization on whose behalf the claim is presented, to the condition which would have existed if the damage had not occurred.[43]

The Convention has not adopted any domestic law to govern the recovery of damages. It actually has opted for International Law and the principles of justice and equity, which solves the problem that may arise from the fact that damages are not fully compensated, with the extent given by the Convention, in every domestic law system.[44]

9) Non applicability

The Liability Convention does not apply to: (i) nationals of the launching State, and (ii) foreign nationals who participated in the operation of that space object. According to Bin Cheng, the first exception is an application of a basic principle of International Law which refrains from dealing with relations between a state and its nationals, and the second one is an application of the principle *Volenti non fit jura* .[45] In the 1967 session, Herbert Reis, US representative before COPUOS, stated that the second exclusion was designed to exempt the launching state from liability for foreign observers who accepted invitations to take part in or observe a launching or recovery. According to Reis, these persons could be considered to have assumed any risk entailed. He stressed, however, that this exclusion did not imply that the

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[42]M. D. Forkosch, *Outer Space and Legal Liability* (Dordrecht: Martinus Nijhoff, 1982) at 48.

[43]Proposals have been made to advance from the system of absolute liability towards total responsibility. While the former leads to the mere compensation of damages, the latter implies a double penalty, both economic and juridical, because of the deep ethical contents it entails. A. A. Cocca, "From Full Compensation to Total Responsibility", (1983) 26 Proceedings of the 26th Colloquium on the Law of Outer Space at 157.

[44]This led Carl Q. Christol to affirm that "the virtue of Article 12 was that it avoided a multiplicity of inconsistent and conflicting municipal outlooks in favor of a coherent and cohesive international standard." Christol, *supra* note 19 at 116.

[45]B. Cheng, "Convention on International Liability for Damage Caused by Space Objects", in N. Jasentuliyana & R. K. Lee, eds., *Manual on Space Law* (New York: Oceana, 1979) at 101.

launching state might not pay compensation: it might be paid, for example, under article VII of the Outer Space Treaty.[46]

10) Dispute Settlement

The Convention establishes that the first method to resolve a dispute between states is negotiations through diplomatic channels. In the event that a settlement is not reached within one year from the date on which the claimant state notifies the launching State that it has submitted the claim, the parties concerned may establish a Claims Commission. It is to be composed of three members, one appointed by the claimant state, another appointed by the launching state. The third member, who will act as the chairman, is to be chosen by both parties or by the Secretary General of the United Nations in the event claimant and defendant may not reach an agreement. The weakest aspect of the Convention is the fact that the awards of the Claims Commission are not legally binding. In effect, the decision is final and binding only if the parties have so agreed. Otherwise, the Commission only renders a final and recommendatory award, which the parties are to consider in good faith. However, it must be noted that as the result of the obligation to consider the award in good faith, introduced in the text of the Convention by the Argentine representative, the decision of the Claims Commission is not altogether empty of content.

It is also worth noting that article X prescribes that a claim for compensation for damage may be presented to a launching State not later than one year following the date of the occurrence of the damage or the identification of the launching State which is liable. The second paragraph of this article introduces the possibility of presenting a claim beyond the one-year period if a state does not know of the occurrence of the damage or has not been able to identify the launching state. In these circumstances the claim may be presented within one year following the date on which the state learned of the aforementioned facts; however, this period may in no event exceed one year following the date on which the state could reasonably be

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[46] A/AC.105/C.2/SR.77 at 5.

expected to have learned of the facts through the exercise of due diligence. Finally, the last paragraph allows the presentation of the claim even beyond such periods when the full extent of the damage is not known. In such event the claimant state is entitled to revise the claim and submit additional documentation after the expiration of such time-limits until one year after the full extent of the damage is known. In other words, partial claim of damages is permitted, provided the full extent of damages is unknown. Thus a claim may be filed each time new damages arise from the same event.

Unlike other fields of international law, the Convention does not require the prior exhaustion of any local remedies for the presentation of a claim for compensation to a launching State. Additionally, there is nothing in the Convention that prevents a claimant from pursuing a claim in the courts or administrative tribunals or agencies of a launching State. It is thus necessary to inquire which domestic laws would be applicable. While every nation has its own methods for choosing the law applicable to a specific case, the following methods are the most common ones: (i) lex loci delicti, i.e., the law of the place where the tort occurred, this could be the law of the State which has jurisdiction on a space object pursuant to article VIII of the Space Treaty, (ii) lex fori, i.e., the law of the forum where the case is brought, and (iii) the law of the state having the greatest interest, i.e., the law of the State with the closest connection to the incident.[47]

11) International Organizations

With the exception of articles dealing with ratification, amendments, withdrawal and review of the Convention, references in the Convention to states also applies to any international intergovernmental organization which conducts space activities if the organization declares its acceptance of the rights and obligations in the Convention and if a majority of its members are parties to the Convention as well as the Outer

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[47]G. H Reynolds & R. P. Merges, *Outer Space, Problems of Law and Policy* 2d ed. (Boulder: Westview Press, 1997) at 299.

Space Treaty. All such state members are to take all appropriate steps to ensure that the organization makes such a declaration. If an organization is liable under the Convention, it and its members who are parties are jointly and severally liable provided that any claim is first presented to the organization and it has not paid within six months the amount agreed or determined to be due. Any claim on behalf of an organization which has made such a declaration is to be presented by a member which is also a party to the Convention. There is no principle or rule of international law whereby a group of states can, by international agreement, impose legal obligations on an international organization without the acquiescence of that organization. Although the Outer Space Treaty has provisions to make it applicable to international organizations, such entities would not be legally bound by it without their acceptance of it.[48]

12) Effect on other treaties

Article XXIII prescribes that the Convention has no effect on other treaties so far as relations between parties are concerned and that states can enter into treaties reaffirming, supplementing or extending its provisions. In effect, existing or subsequent treaties, whether bilateral or multilateral, which may cover the same subject, or any Outer Space activity, are not affected by the Convention as to the rights between the parties spelled out in it. For example, according to the Committee on Aeronautical and Space Sciences United States Senate, the Convention would have no effect on the relationship of liability between the state parties to INTELSAT Agreement, which provides that neither INTELSAT nor any of the signatory states, nor any employee or agent acting within their scope of authority will be liable to one another for the unavailability, delay or faultiness of telecommunications services.[49]

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[48] "Committee Report", *supra* note 41 at 39.

[49] *Ibid.* at 40.

CHAPTER III

THE NATIONAL LEGAL FRAMEWORK OF SPACE TRANSPORTATION

A. LEGAL FRAMEWORK GOVERNING THE SPACE SHUTTLE

1) NASA's Purpose

NASA was created at the outset of the Space Age as an immediate response to the launch of Sputnik by the Soviet Union. In 1958 the US Congress passed the National Aeronautics and Space Act,[50] and dissolved the inefficient National Advisory Committee for Aeronautics. The main purpose of the NAS Act is to contribute toward the preservation of the role of the United States as a leader in space science and technology. This objective has shaped NASA's current system of distribution of risks and assignment of liability. In effect, since NASA has the statutory mandate to preserve the US preeminent position in space rather than to seek profit or to implement a commercial space launch industry, it has implemented a risk allocation provision which fosters the use of the Space Shuttle, thus achieving its institutional *raison d'être.*

However, throughout its history, NASA has interpreted this mandate differently and the risk allocation scheme, as well as the role of the Space Shuttle has varied substantially.[51] At present, Space Shuttle services are rendered only for the transport of payloads which require the unique capabilities of the Space Shuttle or which are important for either national security or U.S. foreign policy purposes. Contrary to a general belief, the Space Shuttle services may be used to provide

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[50] 42 USCA § 2451.

[51] Launch Services, *supra* note 2.

commercial services[52]. However, it is essential that these services not compete with those of the US private launch industry. Anyway, at present NASA's particpation in the commercial launch services market is negligible compared with established launch services providers.

2) NASA's early policy

From the creation of the Space Shuttle program NASA followed a reimbursement policy for commercial launch services rendered through the space transportation system. These reimbursements to NASA by industry did not cover development costs. However, this was a conscious policy aimed at encouraging the uses of space, looking for an economy of scale return in the future.[53] Otherwise, NASA would have had to charge at least ten times more, which would have expelled its customers to Arianespace or other launch providers. These practices were not only followed with American companies, but also with foreign governments and entities.

Another feature of the US policy regarding the Space Shuttle was that all government payloads had to be launched on that system. This maximized the Shuttle's launch frequency and also allowed NASA not to charge actual costs. Up to the inception of the Space Shuttle program expendable launch vehicle manufacturers generated most of their revenues from military, intelligence, and scientific payloads.

3) NASA's new policy

NASA space launch policy for the space transportation system underwent a major change with the Challenger accident in 1986. This fact brought certain practices to an end, such as the use of the Shuttle for the launch of many telecommunications satellites and other commercial endeavors. In effect, as mentioned above, the Space

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[52] 14 CFR § 1214.101

[53] N. C. Goldman, *American Space Law International and Domestic* (Ames: Iowa State University Press, 1988) at 136.

Shuttle may be used only for those missions which do not directly compete with the US private sector launch industry. This new policy has boosted the commercial private industry and in this way, NASA understands that it achieves its main statutory mandate, i.e., to contribute to the US leadership in space.[54]

4) General features

NASA currently conforms to the following general outlines for Space Shuttle flights providing services to non-U.S. Government reimbursable customers, which includes commercial U.S. and international corporations and most foreign governments.[55]

5) Types of services

Payloads, at the request of the customer, may be transported in single (i.e., dedicated) or shared flights. The price of the former is obviously higher. There are three basic types of services: (i) standard, (ii) optional, and (iii) rendezvous.

Standard services are agreed to by NASA and the customer in the launch agreement. In general, these services include: (i) a standard launch from the Kennedy Space Center on a date and at a time selected by NASA within the scheduling constraints specified in the launch agreement, (ii) transportation of the customer's payload in the orbiter cargo bay in a location selected by NASA, (iii) one day of single-shift on orbit mission operations, (iv) a crew made up of five persons: commander, pilot, and three mission specialists, (v) orbiter flight planning services, (vi) one day of transmission of payload data to a compatible receiving station, (vii) deployment of a free flyer, (viii) NASA support of selected payload design services, (ix) pre-launch payload installation and verification and orbiter compatibility testing, and (x) NASA payload safety reviews.

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[54] Launch Services, *supra* note 2.

[55] 14 CFR § 1214.

Optional services, if agreed upon, may include the following: (i) use of Extended Duration Orbiter (EDO) capability or other mission kits to extend basic orbiter capability, (ii) extravehicular activity (EVA), (iii) transportation to orbit of all or a part of the customer's payload in other than the orbiter cargo bay, (iv) unique payload/orbiter integration, (v) payload mission planning services, other than for launch, deployment and entry phases, (vi) additional time on orbit, (vii) flight of payload specialists, and (viii) transmission of payload data via a Direct Data Stream.

A rendezvous mission involves the rendezvous of the Space Shuttle orbiter with an orbiting spacecraft for one or more of the following purposes: (i) retrieval and return to Earth of the orbiting spacecraft or part thereof, including a spacecraft earlier deployed on the same Space Shuttle flight, (ii) exchange of a spacecraft delivered to orbit on a particular Space Shuttle mission for an already orbiting spacecraft and return of such spacecraft to Earth, and (iii) revisit of an orbiting spacecraft for purposes such as re-supply, repair, re-boost, or inspection.

Mission operational requirements and associated optional services charges for both dedicated and shared rendezvous services are negotiated on a case by case basis.

B. LEGAL FRAMEWORK GOVERNING ARIANESPACE LAUNCH SERVICES

In the 1970's, Europe felt the need to have its own launch capacity in order to be able to compete with the United States and the Soviet Union. Otherwise, European satellites could be easily put aside by the carriers of these states or be subject to unbearable restrictions[56]. The development of a launch industry in Europe originated with France, which in the early 1960's had started a launch program called "Diamant." This program carried out thirteen successful launches in its almost ten years of existence. Soon after the discontinuance of this program, Europe, led by France, embarked on the most successful launch program ever: the Ariane. This

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[56] E. Vitt, "The Ariane Launcher Programme" in K. H. Böckstiegel & M. Benkoe eds., *Space Law: Basic Legal Documents* (Dordrecht: Martinus Nijhoff Publisher, 1985) at D.II.1.1

space vehicle proved to be highly reliable and efficient. Today, from a commercial perspective, it is the most profitable in the world launch marketplace[57].

1) Development phase: Institutional framework

In 1972 at the initiative of France during the European Space Conference, European states agreed to implement a European space launch program. The decision to carry out this program was made on July 31, 1973, together with the decision to create only one European Space Agency and dissolve the two existing ones -ELDO and ESRO- which up to then had proved incapable of offering a coherent space policy. Members of the European Space Conference decided that in order not to delay the beginning of the project, they should insert it within ESRO's legal framework, and then ESRO would transfer it to the European Space Agency.

Thus, the "Arrangement between certain European Governments and the ESRO concerning the Execution of the Ariane Launcher Programme" was signed on September 21, 1973[58]. Under the terms of this agreement, the participating states committed themselves to carry out the first phase of the program. The program had two main objectives. The first one was to give Europe a capability on its own at the beginning of the 1980's for placing in orbit geostationary satellites developed within the framework of the Organization of the European states. The second objective was to define the launcher and to organize its production in such a way so as to achieve an economically competitive production cost, which was estimated at 51 million French francs (excluding taxes and at 1 January 1973 prices) assuming two launches per year and reasonable grouping of orders[59]. The program comprised a second phase which would have as its objective the production of the launcher and which would be decided later.

A Program Board, composed of representatives of the participant states was responsible for the program, which had to take all decisions in conformity with the

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[57] A. H. Mutti, "Contrato de transporte espacial" (1986) Revista del Instituto Nacional de Derecho Aeronáutico y Espacial at 74.

[58] Arrangement between certain European Governments and the ESRO concerning the Execution of the Ariane Launcher Programme" signed 21 September, 1973, ESA Basic Documents Vol. II, Section G2a, Paris, 1977.

[59] To this cost must be added the cost of transport to Guyana, of propellants and of the launch team, amounting to an estimated figure of 12 million French francs in the same conditions.

Arrangement, in particular to: (i) control the implementation of the program, especially the development phase, defined on the basis of reports prepared by CNES and presented to the Program Board by the Director General of the Organization; (ii) monitor the overall performance of the launcher and the quality assurance provisions specific to the program, prepared by CNES, on the basis of reports prepared by CNES and presented to the Program Board by the Director General of the Organization; (iii) be kept informed of the distribution of work among the various participant states and, during the execution of the development phase of the program, act as the appeal body if a participant wished to object to a choice of contractor made by CNES; (iv) approve the launcher flight qualification report submitted by CNES; (v) lay down the terms and conditions for participation in this phase of the program by States that were not members of the Organization, in conformity with the provisions of the Arrangement; (vi) ensure that the Organization established efficient coordination with the potential users of the launcher and define the launcher and the payloads interface specifications.

The Organization, acting on behalf of the participants, was the owner of the elements of the Ariane launcher, of the facilities and equipment acquired for its development, and of the launching facilities produced within the framework of the program. Additionally, participants that owned facilities that could be used for the purposes of the Ariane program undertook to make them available on financial conditions limited to marginal cost reimbursement. These elements, facilities, and equipment had to be made available to the participants acting in the framework of their own program or of a program of the Organization, insofar as this did not interfere with their use for the purposes of the Ariane program.

The French space agency, *Centre National d'Etudes Spatiales* (CNES), was entrusted with the execution of the program. It was further stipulated that it should enter into an agreement with ESRO in order to define the provisions to govern the relationship between both organizations regarding the Ariane Project. This agreement, called the Agreement Between ESRO and CNES (France) Concerning the Execution of the Ariane Launcher Program[60], was signed on February 7, 1974 and went into effect retroactively on December 28, 1973. This legal instrument sets the functions of CNES, among which the following stand out: (i) the technical and

[60] Agreement Between ESRO and CNES (France) Concerning the Execution of the Ariane Launcher Program signed 7 February, 1974, ESA-HRS 16.

financial management of the Ariane Launcher program, (ii) the definition and implementation of the organization of the industry in accordance with the geographical distribution of work, and (iii) the selection of the industrial contractors in charge of developing the different aspects of the project.

The election of CNES as the only program director intended to avoid the dispersion of industrial efforts known in the European past. CNES, in turn, had to award the direction of the industrial work to a French corporation formerly called *Aérospatiale*, which had to work with French contractors and with contractors of other countries.[61]

After the creation of the European Space Agency, the Ariane program was transferred to this agency, and it was registered within the legal framework of the ESA optional programs (together with Marecs - Marisat - and the Spacelab). The main function of ESA with respect to the Ariane program was to control the role of CNES and the contractors' work.

Regarding the distribution of the contracts related to the different phases of the Ariane program, the policy of just return ("*juste retour*") has been followed. This policy has been set in Annex V of the European Space Agency Convention[62], which regulates ESA's industrial policy and elaborates on the general characteristics outlined in article VII of the Convention. According to the just return principle, preference for the award of contracts must be granted to the member states participating in a program in proportion to their contributions. For that purpose, a return coefficient is stipulated for each state. This coefficient is defined as the ratio between the percentage share of all contracts awarded among all member states and each state's total percentage contributions.

2) The Production Phase

The constitutive documents of Ariane's development phase, mainly the Ariane Agreement of September 21, 1973[63], did not foresee in detail the legal scenario of the

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[61] Vitt, *supra* note 56. *Aérospatiale* partially merged with Alcatel and joined Matra to form the Aerospatiale Matra group in 1999.

[62] Eurpean Space Agency Convention. ESA Annual Report 1975, Annex X.

[63] Arrangement between certain European Governments and the ESRO concerning the Execution of

production phase. In effect, it simply prescribed that the Program Board had to establish the elements necessary for the decision by the participants to proceed to the production phase of the program. Those participants that had declared that they were interested in taking part in the production phase had to conclude a new Arrangement setting out the content of that phase, the financial arrangements for its execution and the work distribution. The latter had to be, as far as possible, identical to that defined in respect of the development phase. It also encouraged the participants to keep in being, during the production phase, the industrial facilities set up during the development phase, and it urged them to refrain from hampering the use of these facilities.[64]

The French government engineered the legal framework of the Ariane production phase and prepared a Declaration to govern the aspects of the future organization of the production of the Ariane and the commercialization of its launch services. This Declaration, entitled Declaration of Production, entered into force in April 14, 1980[65]. It is considered an act of international law.[66]

According to the Declaration, the participants decided to entrust an industrial structure, Arianespace, with the execution of the Ariane launcher production phase. The objective of this production phase was to meet the launch requirements of the world market subject only to the following conditions: (i) that it should be carried out for peaceful purposes in conformity with the ESA Convention and the Outer Space Treaty, and (ii) that ESA and the participant states should have priority over third party customers. Arianespace was thus assigned the manufacture, marketing and launch of the Ariane launchers.

The Declaration also sets the basis for the future relationship between ESA and Arianespace. In this respect, for the production or the launch of Ariane, ESA was encouraged to make available to Arianespace, free of charge: (i) the facilities, equipment and tooling acquired within the framework of the Ariane development and

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the Ariane Launcher Programme" signed September 21, 1973, ESA Basic Documents Vol. II, Section G2a, Paris, 1977.

64 M. Couston, *Droit Spatial Economique* (Paris: SIDES, 1994) at 177.

65 Declaration by Certain European Governments Relating to the Ariane Launcher Production Phase signed by states participating in the Ariane production phase, VOL.II-BIS/G02V.

66 M. Bourély, "La Production du Lanceur Ariane", (1981) VI Ann. Air & Sp. L. at 293.

promotion phases and (ii) the intellectual property rights deriving from the development and promotion phases. Additionally, the participants invited ESA to assist Arianespace in the promotion of the Ariane launcher export activities, especially in approaching other international organizations and to do its utmost to provide Arianespace with the assistance required with regard to industrial quality surveillance and price surveys. ESA was also urged to conclude a convention with Arianespace to implement the provisions of the Declaration and to organize their relations and specific conventions relating to the Ariane upgrading programs. The latter would have to lay down the detailed technical, contractual and financial arrangements governing the subsequent use by Arianespace of those upgradings. ESA, in turn, adopted a resolution approving the principles contained in the Declaration, i.e., the transfer of the production to Arianespace and the functions entrusted to the Agency.

The participants also requested Arianespace to enter into the following commitments: (i) to observe the principle of peaceful purposes as embodied in the ESA Convention and the Outer Space Treaty, (ii) to respect the geographical distribution of industrial work among the participating states from the development and promotion phases, (iii) to have technical and financial responsibility for maintaining in good operational order the assets made available to it, (iv) to restrict the use of the rights and data made available to it to the requirements of the launcher production, (v) to undertake to pay ESA for the use of the CSG and a fee for each sale, (vi) to give priority to ESA and the participating states over third party customers, (vii) to emphasize the European and multicultural character of the development and production of the Ariane launcher, (viii) to reimburse the French Government within a ceiling of 400 million French francs per launch, the amount of any damages it may be required to pay, (ix) to practice a pricing policy taking into account international competition, and (x) to take cognizance of the Declaration through the Board of Directors.

3) The Guiana Space Centre (CSG)

Ariane vehicles are launched from the Guiana Space Centre, located in Kourou, French Guiana, which belongs to CNES. On the basis of an agreement with the French government, the European Space Agency has the rights to use the Guiana Space Centre facilities and to build other installations necessary for the Ariane

launcher, which are called Ensemble de Lancement Ariane (ELA) and are owned by the European Space Agency, which in turn supplies them to Arianespace.[67]

The Guiana Space Center, located near the equator, offers exceptional geographic conditions, allowing the launchers to benefit from the rotation of the Earth and to avoid expensive operations to reach the equatorial orbit, necessary for the placement of satellites in geostationary orbit. Likewise, its location towards the East and North facilitates the launches to polar orbits.[68]

4) Agreement on the use of the CSG

On May 5, 1976 the French government and ESA executed an agreement regarding the use of the CSG[69]. The purpose of the Agreement is to define (i) the terms under which the CSG will be placed at the disposal of the Agency and its Member States by the French Government with a view to its use for their respective programs, and the French Government's obligations towards the Agency in the event of the CSG being used by a non-member State; and (ii) the rights and obligations of all the parties to the Agreement.

According to article 3 of the Agreement, the French Government guaranteed the Agency and its Member States free access to and use of the CSG facilities for the purpose of their programs and undertook (i) to give the Agency priority in the use of the CSG for its programs; (ii) to give priority, after the Agency's priority, to the requests of the other Member States of the Agency for their own programs; (iii) to ensure that the use of the CSG by States that are not members of the Agency, or by their nationals, is not such as to entail a risk for the execution of the programs of the Agency or of its Member States; (iv) to continue to grant, subsequent to 1980, the priorities mentioned above, if the Agreement is extended or renewed in conformity with the provisions of Article 14.

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[67]M. Bourély, "Space Law and the European Space Agency", *Space Law, Development and Scope*, edited by Jasentuliyana N., Praeger, 1992 at 95.

[68]C. Baudin, "Un tableau historique du programme Ariane et des solutions juridiques", (1995) 83 ESA Bulletin at 88.

[69] Agreement between the French Government and the European Space Agency on the French Guiana Space Centre, signed May 5, 1976, ESA/LEG/069.

The French Government is responsible for operating the CSG, its maintenance, the renewal of its facilities, and its management. In order to fulfill its obligations regarding these facilities, it has to make the best use of the funds made available by the Agency. In this respect, the government undertook, in particular, to render the CSG compatible with the Ariane program requirements. For all these purposes, the French Government designated CNES as the authority responsible for the execution of the agreement.

This agreement, which covered the 1975-1980 period, was extended and partially modified by a protocol dated February 6, 1981. The last agreement between the Agency and the French government was executed on November 29, 1993 and will be in effect until December 31, 2000[70].

5) Agreement on ESA's Launch Site and Associated Facilities at Kourou

The relations between the French Government and the Agency concerning the Agency's launch site and associated facilities situated within the CSG are part of a special agreement signed on May 19, 1976[71]. Its object is to determine the relations between the French Government and the Agency and the rights and obligations with regard to the Agency's launch site and associated facilities situated at Kourou and intended for the activities and programs of the Agency. This base, established within the perimeter of the CSG, comprises movable and fixed assets of a base, which had been constructed for ELDO's launch vehicles, of which the Agency enjoys unrestricted use, and movable and fixed assets erected or acquired by the Agency and of which it is the owner. The French government guarantees the Agency and its personnel unrestricted access to the base and unrestricted use of the base for the purposes of the Agency and of its Member States. This is free of charge for ESA. The operational use of the base requires use of the facilities, equipment and human and material resources of the CSG. The conditions for such use are defined in the CSG Agreement analyzed above.

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[70] ESA VOL.II-AR/GA2.

[71] Agreement on ESA's Launch Site and Associated Facilities at Kourou signed May 19, 1976, ESA VOL.II/E05.

The French government has to take all necessary steps to apply in Guyana ESA's privileges and immunities. In particular, items imported by the Agency or on its behalf which are needed for carrying out its activities and programs are exempt from all customs duties and taxes specific to the *Departement de la Guyane.*

6) Arianespace

The states participating in the European Space Agency entrusted Arianespace, a corporation created in 1979 for this purpose, the commercialization of launch services. Arianespace is a private enterprise organized under the laws of France, whose main shareholders are CNES, 41 aerospace manufacturers and engineering companies from 12 European countries and 11 Banks.[72] The European Space Agency is charged with controlling the activities of Arianespace through the participation in the decision making process, and has the possibility of issuing a consultative vote in the shareholders meetings and meetings of the board of directors as well as reviewing the documents submitted to the shareholders and directors of Arianespace.

All these features of the program have made Arianespace the indisputable leader in space launch services, currently holding 60% of the world's commercial launch market. This has allowed Arianespace to obtain contracts to provide its launch services to the most important world customers, including the biggest American corporations. Arianespace has opened a branch in Washington and another office in Tokyo to promote its launch services.[73]

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[72]G. Lafferranderie & P. H. Tuinder, "The Role of ESA in the Evolution of Space Law" (1994) 22 J.Sp.L. at 103.

[73] More information on Arianespace can be found at <http://www.arianespace.com>.

C. LEGAL FRAMEWORK GOVERNING US PRIVATE SECTOR LAUNCHES

1) First regulatory steps

Since the National Security Decision Directive No. 94 issued in May, 1983, the US government initiated a regulatory process of the commercial space launch industry, which turned out to be unsuccessful, for it failed to provide a beneficial risk-allocation system for the private sector launch providers. Indeed, the launch industry took off only when in 1988 the Congress approved a mechanism which allowed it to transfer significant risks to both the user and the government itself.

In 1983, the then president Ronald Reagan announced his decision that NASA refrain from using expendable launch vehicles ("ELV"), thus encouraging the private sector to offer ELV space launch services directly to the customers. This decision materialized the Republican President's policy of promoting private sector's investments in Outer Space. However, the decision did not prove to be an efficient instrument to carry out the proposed objective. In part, this is due to the fact that the conditions under which NASA offered the Space Shuttle services were so advantageous for the user that commercial entities, both national and international, and foreign governments preferred to continue to fly their payloads on board the Space Shuttle.[74]

This policy was further developed with the adoption of (i) the Executive Order 12465 of February 24, 1984, whereby the Department of Transportation was designated as the lead agency in commercial space launch activities, (ii) the National

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[74]The Space Shuttle services were offered at prices well below the costs. In other words, the government subsidized national and international private corporations, as well as foreign governments. Pursuant to National Security Decision Directive 254, NASA's price policy would not be modified until fiscal year 1988, when NASA would gradually begin to increase the rates to recover the costs.

Policy on the Commercial Use of Space of July 20, 1984, which provided certain tax benefits to the space sector, and (iii) the Commercial Space Launch Act of 1984, which simplified the launch licensing procedure and which we analyze below in greater detail.

Although all these legal measures intended to promote the industry, they did not succeed in fostering commercial launch providers to offer their services to the users. As mentioned above, the reasons of this failure derive, basically, from (i) the fact that these legal measures did not include a risk management system which could allow launch companies to transfer risks and to limit the liability, which under national and especially under International Space Law constitutes a rather onerous burden, and (ii) the conditions under which NASA offered the Space Shuttle services, which impeded the private space launch operators to compete with the Administration.

With the view toward obtaining a change in the US policy, the commercial launch industry lobbied for the enactment of new legislation which included a favorable risk allocation procedure. In this line, the activities carried out by the American Institute of Aeronautics and Astronautics (AIAA) are worth commenting, not only because of the influence which it had over the Congress, but also for the quality of the document where it set its position on this issue.

Indeed, in the document denominated "Commercial Space Transportation Risk Allocations and Insurance, Position Paper",[75] the AIAA proposed the following measures, recognizing that most of them required legislative actions:

- The commercial space launch provider should obtain, at reasonable cost, liability insurance coverage to the limits of the probable maximum injury and/or damage to third parties and to government property at no cost to it.

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[75]AIAA, "Commercial Space Transportation Risk Allocations and Insurance, Position Paper" (1988) 16 J.Sp.L. at 110.

- All launch participants should accept reciprocal cross-waivers of claims
- The US Government should provide some appropriate form of the prescribed limits of liability insurance at reasonable cost.
- The US Government should self-insure its property losses above the prescribed maximum insurance coverage available at reasonable cost.

It is to be noted that the AIAA's proposal was based upon the system used by NASA since the beginning of the 1980's[76]. Additionally, it is worth pointing out that the document reflects the concerns of the launch industry about the conditions of the insurance market during the five-year period preceding the issuance of the position paper. In effect, due to the failure of almost all the world space launchers, on the one hand, underwriters were reluctant to provide insurance to the launch industry and, on the other, the rates had increased so considerably that launchers were unable to transfer the costs to the price, for if they did so, users would turn to other space launch providers, especially to Arianespace, which offered subsidized rates. It must be highlighted that this situation is likely to occur again due to the characteristics of the space insurance market and the technical conditions in which space launch services are rendered.[77]

Taking into account the stagnation of the space launch industry, in 1988 Congress amended the Commercial Space Launch Act to include a compulsory risk management system in every launch agreement executed by the launch provider, thus finally permitting the industry to emerge and to compete more fairly with its foreign counterparts.

The other impediment faced by the industry was also solved in the late 1980's. As a consequence of the Challenger accident, the President prescribed that the Space Shuttle would only be used for those payloads which require the unique

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[76] D. E. Cassidy, "Allocation of Liabilities Between Government and Private Sector and Implications on Insurance for Space Commercialization", (1990) 33 *Proceedings of the 33rd Colloquium on the Law of Outer Space*, at 27 [hereinafter "Allocation of Liabilities"].

characteristics of the NASA Space Transportation System. Put differently, this decision meant that NASA accepted only satellites which could not be launched on private ELVs and thus refrained from competing with the US private launch sector.

2) The Commercial Space Launch Act of 1984

The US private sector launches are mainly regulated by the Commercial Space Launch Act enacted in 1984 and subsequently amended.[78] The purpose of the Act is to "encourage the United States private launch vehicles and associated launch services by simplifying and expediting the issuance and transfer of commercial launch licenses and by facilitating and encouraging the utilization of government-developed space technology." In effect, since the adoption of this act, the U.S. private launch sector has had the possibility of offering space transport services directly to its customers. However, as mentioned above, the US private sector only actually started to provide launch services on a regular basis only after the adoption of the 1988 Amendments and NASA's decision to cease competing with the Space Shuttle. The Act is based on the premise that the development of commercial launch vehicles and associated services would enable the United States to retain its competitive position internationally.

The Act structures the authorization and supervision of space transport by means of a system of licenses needed both to carry out space launches as well as to operate launch sites. Thus, in the United States, participation in space launch activities is forbidden without the pertinent license issued by the American government. Furthermore, no U.S. citizen or corporation may operate launch vehicles or launch sites outside the United States unless duly authorized by a license issued or transferred according to the provisions of the Commercial Space Launch Act. In

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[77] J. Hermida, "El Contrato de Seguro Espacial" (1995) La Ley at 1 [hereinafter "El Contrato"].
78 49 U.S.C. Subtitle IX, ch. 701--Commercial Space Launch Activities, Secs. 70101-70119, formerly the Commercial Space Launch Act of 1984 (CSLA), as amended (49 U.S.C. App. 2601-2623) [hereinafter CSLA].

order to implement this system, the Federal Congress vested the Secretary of Transport with powers to act as the competent authority of the act.

3) Situation prior to the Act

Before the enactment of the Commercial Space Launch Act, the industry faced absurd bureaucratic obstacles while procuring the authorization of space launches. For example, the 1982 request for the launch of Conestoga required the consent of several agencies, including the Bureau of Alcohol, Tobacco and Firearms. Thus, the Commercial Space Launch Act abrogated the authority of all agencies other than the Department of Transportation, with the exception of the Federal Communications Commission which requires authorization for the launch of communications satellites governed by the Communications Act of 1934 and Secretary of Commerce authorization for the activities governed by the Land Remote-Sensing Commercialization Act.

4) Licenses

The Commercial Space Launch Act structures the authorization and supervision of space transport by means of a system of licenses needed both to carry out space launches, as well as to operate launch sites.

5) Launches within the US territory

With respect to launches made within the United States, as mentioned above, the Act establishes that any person must obtain a license to launch a space vehicle.[79]

6) Launches outside the US territory

All US citizens or legal entities, including entities organized in foreign jurisdictions which are controlled by US citizens or entities require a license to operate launch vehicle outside the territory of the United States[80].

7) Launches in a foreign country

The Act prescribes that all US citizens and entities organized or existing under the laws of the United States of America or any state of the USA are to obtain a license when launching a vehicle or operating a launch base in a foreign country, provided there is an agreement between the United States government and the foreign country where the United States government has jurisdiction over the launch.[81]

8) Other Launches

The Act also foresees the possibility of launches made both outside the US and outside the territory of any foreign nation. In this case, any entity organized or existing under the laws of a foreign nation where the controlling interest in such entity is held by a US citizen or entity is required to obtain a license from the USA. The objective of this regulation is to prevent US entities from setting a corporation abroad and launching vehicles from the high seas, the inner space or even from Outer Space. According to the Act, this provision is not applicable when there is an agreement in force between the United States and a foreign nation which provides that such foreign nation exercises jurisdiction over the launch vehicle.[82]

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[79] 49 USC Section 70104 (a) (1).
[80] 49 USC Section 70104 (a) (2).
[81] 49 USC Section 70104 (a) (4).

9) License procedure

The license procedure consists of four phases (i) submittal of application, (ii) safety review, (iii) mission review and (iv) issuance of license. The double review allows the government to control the two areas which concern it most, i.e., public security and public health through the safety review, and national security and foreign policy interests through the mission review[83].

10) License Application

The application must be in writing and filed to the Office of the Associate Administrator of Space Transportation (FAA) and must contain: (i) general requirements of applicant, (ii) information related to safety review, (iii) information related to mission review, and (iv) information related to payload determinations.[84]

11) Safety review

The safety review which leads to the safety approval is, together with the mission review, the most important stage of the license procedure. Its purpose is to determine that the proposed launch will not endanger the public safety of the United States. Thus, four aspects are mainly examined: (i) the launch site, (ii) the quality procedures, (iii) personnel and (iv) the vehicle equipment.[85]

12) Mission review

Mission review plays a residual role. In effect, all aspects of the launch not covered in the safety review are examined in this stage. As noted before, it aims verifying that

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[82] 49 USC Section 70104 (a) (3).

[83] P. L. Meredith, "A Comparative Analysis of United States Domestic Licensing Regimes for Private Commercial Space Activities", (1989) 32 Proceedings of the 32nd Colloquium on the Law of Outer Space at 377 [hereinafter "Licensing Regimes"].

[84] 49 USC Section 70105.

the launch abides by the national security and foreign policy interests and the international obligations of the United States. According to the definition given in the regulations, mission review is the procedure for identifying significant issues affecting United States national interest and international obligations that may be associated with the proposed launch.[86] As pointed out by Michael Straubel, the vagueness of the concepts used in the mission review process, namely "national security or foreign policy interests of the United States" is too open-ended, thus making advanced space activity planning very difficult in some instances.[87] Information provided for this review should include the following: (i) the launch range, (ii) the number of launches planned and the targeted schedule, (iii) a general description of the launch vehicle, identifying the ELV contractors and manufacturers, (iv) a general description of the launch trajectory and ground track, including overflight of land masses and the sequence of major events from liftoff to payload impact for suborbital missions, or delivery on-orbit, (v) the orbital mission, (vi) the owner/operator of the payload, (vii) the payload function, (viii) whether the payload is US. Government owned, or licensed by another government agency, such as the FCC or NOAA, and (ix) any materials involved in this mission that could pose a unique hazard to the public.[88]

The most important element in the mission review is the examination of the payload. The procedure differs whether the satellites are subject to a specific authorization regime, such as the ones foreseen for telecommunications and remote sensing or whether the payload does not have such a regime. With respect to the former, the Commercial Space Launch Act does not suppress or modify the authority granted to the FCC or NOAA. Thus, the Office of Commercial Space Transportation requires that telecommunications satellites have obtained a license from the Federal

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[85] 14 CFR § 415.

[86] 14 CFR § 415.21.

[87] M. Straubel *United States' Regulation of Commercial Space Activity* (LL.M., Thesis, McGill University, 1989) [unpublished], at 30.

[88] National Transportation Safety Board, Special Investigation Report, NTSB/SIR-93/02, February 9, 1993.

Communications Commission before starting the mission review procedure. The same applies to remote sensing satellites, which must have obtained the license from the National Oceanic and Atmospheric Administration. For the rest of the space objects, including foreign and US payloads there is a specific procedure for the obtainment of the mission review approval, where the Secretary has ample authority.

As emphasized by Valérie Kayser, the regulations provide that mission approval is granted unless some element of the proposed launch poses a threat to US national security or foreign policy interest, constitutes a hazard to public health and safety or safety of property, or it is inconsistent with international obligations of the United States. According to Kayser, this provision seems to put the burden of proof on the Office of Commercial Space Transportation and the applicant is not to demonstrate that its mission and the payload complies with all requirements.[89]

13) Issuance of license

The issuance of the license constitutes the last phase of the license procedure. Satisfactorily fulfilled the previous steps, the Secretary must verify compliance with the National Environmental Policy Act and examine the environmental impacts of the proposed launch. If the projected launch activity abides by the NEPA requirements, then the Secretary of Transportation will issue the license.[90] The denial, suspension, revocation and modification of a license is subject to administrative and judicial review.

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[89] "Private Launch", *supra* note 15 at 99.

[90] 42 U.S.C. 4321, et seq. Applicants may be required to provide additional information concerning the environmental effects of a proposed launch activity when any of the following cases exists: (a) proposed new launch sites not covered by existing environmental documentation; (b) a proposed new launch vehicle with characteristics falling measurably outside the parameters of existing environmental documentation; (c) proposed launches from established sites involving vehicles with characteristics falling measurably outside the parameters of the existing environmental impact statement covering those sites; (d) A proposed payload that may have significant environmental impacts in the event of a launch accident; (e) other factors as determined by OCST.

14) The Commercial Space Launch Act Amendments of 1988

The 1988 Amendments to the Commercial Space Launch Act introduced a system for the allocation of risks and assignment of liability between private participants and the government, and also between private participants themselves. This system, which permitted the US private industry to offer services at a competitive cost, is fully analyzed below in chapter VI.

D. LEGAL FRAMEWORK GOVERNING LAUNCHES IN AUSTRALIA

Australia enacted a quite comprehensive domestic space law framework, which became effective in December 1998. As arises from the Explanatory Memorandum accompanying the Bill introduced to the Australian Parliament, the purpose of the Space Activities Act is to permit Australia to attract foreign companies to set launch facilities in its territory and waters, while meeting its obligations assumed under the International *Corpus Juris Spatialis*[91].

Unlike the United States or France, Australia does not have a launch carrier industry. Therefore, its domestic regulatory framework has not been conceived to protect the local space launch provider sector, but rather to encourage foreign companies to establish space launch facilities in Australia and its territorial waters. Thus, as will be analyzed below, the whole system embodied in the Australian Space Activities tends to provide a favorable scenario for launch facility operators.

1. Licensing regime

The Australian Space Activities Act instrumented a two-level authorization approach consisting of licenses and permits, which has been envisioned to compete with a more burdensome US licensing system. In effect, the Australian authorities analyze the technical and safety considerations only once at the license level. Thus, the

analysis for the launch permit, i.e., the authorization to actually carry out the launch, basically deals with insurance requirements, trajectory and type of payload. As we have just examined, the US system requires the verification of all the requirements for the issuance of the license in each launch or launch series.[92]

2. Space Licenses

The Act prescribes that all persons require a space license to operate a launch facility in Australia and for each kind of launch vehicle proposed to be used. The Act also foresees the scenario where the operation of the launch facility or the launch vehicle has been licensed by a foreign state, in which case the foreign license holders must seek an exemption certificate from Australian authorities. Australian nationals engaged in launch operations abroad are also subject to the obtainment of Australian authorization.

A company or individual seeking a space license to operate a launch facility or for a particular kind of space vehicle must demonstrate the following to the Australian authorities: (i) competence to operate the launch facility and the launch vehicle, (ii) compliance with environmental approvals, (iii) financial capacity to construct and operate the launch facility, (iv) the improbability of substantial damage to the public health, public safety and property, (v) non interference with Australia's national security, foreign policy or international obligations, and (vi) compliance with the criteria, if any, prescribed in the regulations.

Space licenses are issued for a specific period, which may extend up to twenty years, a feature unseen in other launch licensing systems.

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[91] Space Activities Bill 1998, Explanatory Memorandum, p. 1.

[92] M. E. Davis & R. J. Lee, "Financial Responsibility and Government Indemnities for Commercial Space Launch Activities - The Australian Approach", (1999) 50 Proceedings of the 50th Colloquium on the Law of Outer Space at 3 [hereinafter "The Australian Approach"].

3. Return of space objects

The Space Activities Act also establishes the need to seek authorization for the return of both national and foreign space objects. The former need either a launch permit or an exemption certificate whereas the latter requires authorization.

4. Launch permits

After the obtainment of the space license for the launch facility and the launch vehicles the next step is the issuance of a space permit for a particular launch. The Act establishes that Australian individuals and entities engaged in space activities in Australia are required to seek a launch permit from the Space authorities both for launch operations within Australia and abroad. Foreign entities and individuals are to obtain a launch permit for launch activities within Australia.

Launch permits may be issued if the person seeking the permit (i) holds a space license, (ii) is a corporation, (iii) is competent, (iv) has satisfied all the insurance/financial requirements established under the Act, and (v) complies with all the criteria prescribed by the regulations. For the issuance of the permit, competent Australian authorities must be satisfied that the probability that the launch may cause substantial damage to public health, safety or property is low, and that the space object does not contain a nuclear weapon or other weapon of mass destruction.

The financial and insurance conditions, by far the most significant of all the requirements, are analyzed below in greater detail. Suffice it to mention here that the launch permit procedure in practice deals almost exclusively with these requirements, for all other requisites are generally covered during the application for the space license.[93]

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[93] *Ibid.*

CHAPTER IV

LANCH SERVICES AGREEMENTS

A. MAIN CHARACTERISTICS AND ELEMENTS OF SPACE LAUNCH AGREEMENTS

1) Concept and denomination

This contract, indistinctly referred to as space transport contract[94], launch agreement[95] and launch services agreement[96] may be characterized as the understanding between the carrier and the user whereby the carrier, in exchange for a price, undertakes to render several services and to make its best efforts to place the user's payload in an orbit in Outer Space by means of a manned or unmanned launch vehicle. As arises from our characterization, the launch services agreement may include related activities to the launch itself, such as extravehicular activities, which are negotiated on a case by case basis.

2) Uniformity

An analysis of launch services agreements executed by different launch providers indicates that they are very similar. In effect, launch carriers around the world have adopted the agreements used by NASA in the early 1980's when it offered launches on a commercial basis practically without competition. This uniformity transcends any legal and political regime. Thus, these agreements have proved to be efficient not

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[94]M. A. Ferrer(h), "Actividad comercial en el espacio" (1988) Revista Latinoamericana de Derecho de la Navegación Marítima y Aeronáutica at 168 [hereinafter "Actividad Comercial"]; Mutti, *supra* note 57 at 73.

[95]Bender, *supra* note 12 at 235; "Case Study", *supra* note 5 at 316; S. White, S. Bate & T. Johnson, *Satellite Communications in Europe: Law and Regulation* (London: FT Law & Tax, 1996) at 358.

[96]G. V. D'Angelo, *Aerospace Business Law* (Westport: Quorum Books, 1994) at 121; W. Thomas, "Launch Service Contracts", 29 ESA Bulletin at 6; H. L. Van Traa-Engelman, *Commercial Utilization of Outer Space* (Dordecht: Martinus Nijhoff Publishers, 1993) at 282; "Allocation of Liabilities", *supra* note 76 at 23; P. Nesgos, "Commercial Space Law: Practical Examples Relating to Contracts, Insurance and Finance", (1994) 37 Proceedings of the 37th Colloquium on the Law of Outer Space at 308.

only in civil and common law jurisdictions, but also in the socialist system.[97] These contracts have also been practical enough to be adapted to the needs of different launch providers, including Long March.[98]

3) Inequality

One of the most important characteristics of these agreements is that the strongest part is, at least up to now, the launch provider. In effect, these agreements are drafted by the carrier and the role of the user, in general, is limited to suggesting modifications which do not alter the main provisions of the agreement.[99] However, the more important the user is and the more satellites it intends to launch the stronger its negotiating position is.

4) Nature

For Mutti, who wrote in 1986, the nature of the obligations of the carrier are *obligations de moyen* as opposed to *obligations de resultat.*[100] To Léopold Peyrefitte, the analysis of the nature of the agreement has to differentiate between the services provided by expendable launch vehicles and reusable ones, such as the Space Shuttle.[101] In the first case, the contract between the carrier and the user must be categorized as an ordinary business contract, whose object is the provision of certain energy and several services aimed at placing an object in Outer Space. Since the object of the contract is not the carriage of the payload from one site to a certain orbit the nature of the agreement does not fall within the category of transportation agreements in strict sense. With regard to launches on board reusable vehicles, the French author understands that in light of the characteristics of these vehicles, which may take objects and people to and from Outer Space, there are more elements which permit to assimilate its nature to that of transportation contracts.

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[97]T. L. Masson Zwaan, "The Martin Marietta Case or How to Safeguard Private Commercial Space Activities" (1992) 35 Proceedings of the 35th Colloquium on the Law of Outer Space at 239.

[98]Bender, *supra* note 12 at 7.

[99]"Case Study", *supra* note 5 at 307.

[100]Mutti, *supra* note 57 at 73.

[101]L. Peyrefitte, *Droit de l'espace* (Paris: Précis, Dalloz, 1993) at 102.

Mireille Couston considers that the nature of these agreements is cooperational and promotional although she sees that they present some distinctive features.[102] George D'Angelo arrives at the conclusion that these contracts constitute high technology agreements, with certain provisions which render them unique. These include the characteristics of the obligations of the carrier. In this sense, D'Angelo stresses that they constitute services for which fulfillment the carrier makes its best efforts.[103]

From the examination of the agreements and the opinion of the commentators we may conclude that space launch contracts are services agreements, where the carrier must carry out certain activities and no performance result is part of the bargaining negotiation. For example, under French law,[104] Arianespace launch agreements have been categorized within the scope of section 1779 of the French Civil Code, which governs industry and services leases, thus stressing the *obligations de moyen* as one of its central features.[105]

5) Parties

The parties to the contract are the launch services provider, also called carrier, and the user or customer. As can be gathered, there is no consignee since the payload is not delivered to anyone, but rather placed in an orbit. Even if the parties to the contract are only the carrier and the user, it has to be borne in mind that this agreement forms part of a complex series of transactions.

Several entities are involved in these transactions, which may be referred to as participants. These include the manufacturer of the payload, the contractors and subcontractors of both the launch services provider and the user and the government. In the case of launches provided by Arianespace, the European Space Agency and its member states are also involved. The role of each of these entities varies

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[102]Couston, *supra* note 64 at 241.

[103]D'Angelo, *supra* note 96 at 125.

[104]Peyrefitte, *supra* note 101 at 104.

[105] Unlike the air transport contract where the carrier assures the result of the obligations, i.e., the transport of persons or goods to an agreed upon destination, the promise of the space carrier lies merely in the use of its best efforts to place the payload in the agreed upon orbit, which implies that in case of failure of the launch, Arianespace may not be held liability unless the customer proves Arianespace's fault. Couston, *supra* note 64 at 245.

substantially. However, as analyzed below, they may be all exposed to liability derived from the launch activities.

6) Structure of space launch services agreements

The launch services agreements usually have a standard contractual structure. Generally, NASA contracts consist of three main parts. The first one, which is the most important one, contains the provisions applicable to the launch itself. The second one, which may not be present in all agreements, governs the rights and obligations relating to each party in case of a replacement launch. Finally, the last part of the contract contains the general rules applicable to both types of launches. Contracts used by other launch providers contain only one part and the provisions regarding the replacement launch are incorporated in the contract.

Below is the standard structure of the launch services agreements, followed by our analysis of the main provisions. Where contracts vary depending on the carrier we explicitly analyze the differences.

- Recitals
- Definitions
- Services to be provided
- Termination of launch services
- Program of launches
- Delays
- Adjustments to the launch program
- Priority
- Price
- Price adjustment
- Method of payment
- Replacement launch
- Reimbursement option
- Representations and warranties
- Reciprocal waivers of liability
- Third party insurance
- Limitations of liability
- Force Majeure

- Disclaimer of liability for representations and warranties
- Proprietary data treatment
- Industrial and Intellectual Property, including patents
- Compliance with governmental authorizations
- Compliance with export permits
- Post launching actions
- Termination
- Arbitration
- Applicable law
- Assignment
- Notifications
- Language
- Entire Agreement
- Entry into force
- Confidentiality

7) Services to be provided

The first substantial clause deals with the services to be provided by the carrier to the customer. In these clauses the parties set the type and amount of launches and the characteristics of the agreed services. The launch services provider promises to use its best efforts to place a satellite in the agreed orbit in Outer Space. This best efforts principle is defined in space transport agreements generally as "Diligently working in a good and workman-like manner, as a reasonable, prudent manufacturer of launch vehicles and provider of launch services."[106]

The carrier also agrees to carry out other related services, which generally include the provision for the compatibility of the payload with the space vehicle, the preparation of the vehicle/payload interfaces, the appointment of a mission coordinator responsible for the coordination of all financial matters and the launch schedule, and a technical manager to coordinate technical activities with the user.

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[106]Launch Services Agreement between Martin Marietta Corporation and INTELSAT, N° MMC-CTS-87-001 INTEL-629, quoted by Masson Zwaan, *supra* note 97 at 247.

In turn, the user generally undertakes to deliver the payload to the launch site, to assure compatibility of the payload with the launch vehicle, to comply with international law, to obtain all required permits and authorizations, to register the satellite according to international and domestic registration provisions and to secure the pertaining frequencies before the ITU.

8) Program of launches

One of the provisions which entails most controversies is the one dealing with the launch date. The launch date is set by the carrier and the customer through mutual consent. However, in case of disagreement, it is fixed unilaterally by the carrier. In any case, the launch services provider reserves the right to change the launch date and set a new one at the earliest date as long as possible. In contrast, the customer has fewer possibilities to modify the launch dates and this is always penalized with fines which may go up to 18% of the price paid for the launch services.

In NASA contracts, the parties include in the agreement a "planned launch date", which marks the beginning of the "launch period", generally consisting of ninety days. About a year before the "planned launch date", the carrier and the user agree on the date for payload delivery and set the "firm launch date", which is usually fixed within the first part of the "launch period". In case of shared flights and should the customers not agree on the launch dates, only the carrier will fix such dates, trying to meet the needs of all the parties. As in all other launch services agreements, NASA has the right to change the definitive launch date and set a new one within the "launch period".

9) Priority

In space launch services provided by US companies, where the launch is made from US sites, it is set forth that the launch is to abide by the United States government launch policy, which implies that a payload of the government has priority over any other commercial space object. In contrast, Arianespace does not include in its agreements any clause regarding governmental priority over the customer's satellite. However, according to the commitments undertaken between France and ESA, European payloads have priority over non European ones.

10) Risks

The most important clauses are certainly the ones embodying the risk management system. Although we will analyze them deeply in the next chapters, it is worth schematizing now the main provisions.

In NASA launch service agreements, it is stipulated that certain liability risks arising from services rendered by the carrier and its contractors and subcontractors are distributed between the customer and the carrier in accordance with contract specifications. In order to determine the allocation of risks, the term "liability" is defined as payments made pursuant to international treaties, judgments by courts of competent jurisdiction, administrative and litigation costs, and, after consultation with the user, settlement payments. The term damage is defined as any bodily injury to or death of any person, damage to or loss of any property, and loss of revenue or profits, or other direct, indirect or consequential damages arising therefrom.

Under NASA launch services agreements the customer is obliged to obtain, at its own cost, an insurance policy protecting the customer, the carrier, its contractors and subcontractors and the launching state from any third party liability for damage resulting from the performance of the launch agreement during the "risk period". Such period starts for the customer at the moment when the physical attachment of the payload to the space vehicle takes place. It is also agreed that the risk period ends for the customer after the payload has been launched and when the vehicle lands without causing any damage to third parties, or in case the payload is subject to jettison when it impacts the Earth without causing any damage. Should damages be caused to third parties, the risk period ends immediately after all such damage occurs.

In NASA contracts, the insurance amount and its terms and conditions will be agreed between the customer and the carrier at reasonable costs according to the availability of insurance in the world market. Such insurance will not be required for an amount higher than a certain sum of money.

In performing their respective obligations, the customer and the carrier take their property and their employees to the launch site, and such property and employees have contact with property and employees of other possible users of the launch vehicle. Thus, with the purpose of simplifying the allocation of risks, NASA makes its customers include in their contracts a no-fault, no- subrogation interparty waiver of liability. Thus, if the carrier's property is damaged during the launch operations, the carrier undertakes to be responsible for that damage and agrees not to bring a claim against or sue any customer. Likewise, the customer assumes its own risks and waives its right to make a claim against the carrier.

Additionally, the parties represent that it is their intention that the interparty waivers of liability be interpreted broadly so as to achieve the intended objectives. Another characteristic of these clauses is that each party undertakes to include similar waivers of liability in each agreement it executes with its contractors and subcontractors. Should one party not observe this provision in its contracts, it will have to hold the other party harmless from the contractors or subcontractors' liability claims. Also, the customer is required to waive its right to make any claim against the carrier and its contractors and subcontractors for damage caused by the delay, suspension, non-performance or improper performance of the launch and related services, except for costs and liquidated damages.

For the cases of damages not expressly foreseen in the agreements, the carrier's liability, or the liability of the launching state in the event the carrier is a governmental entity, towards the customer and vice versa will be limited to direct damages and will not include any loss of revenue, profits or other indirect or consequential damages.

In Arianespace agreements, first each party undertakes to bear all losses and damages to property and bodily harm to its employees and agrees to a no-fault, no subrogation, interparty waiver of liability, thus waiving the right to make any claims

against the other party. Additionally, Arianespace procures an insurance policy in the amount of 400,000,000 French francs, paid by the customer, to protect both parties and other entities related to the launch service against third party liability. In the 1980's Arianespace started to offer relaunch/refund warranties in response to concerns about the availability of adequate insurance capacity. Relaunch/refund warranties are usually offered for a portion of the price. However, in the case of the Ariane V program they are included in the original launch price. Relaunch/refund warranties have been adopted by Arianespace's competition and are now a widely used device in the space transportation worldwide market.[107]

Contracts used by the US private launch sector, contain the clauses and other elements dealing with the allocation of risks and limitation of liability, which materialize and complement the risk management provisions prescribed by the Commercial Space Launch Act and the ensuing regulations. These are fully analyzed in chapter VI.[108]

11) Sole Contractual Remedies

As analyzed earlier, the replacement launch provision generally included in some agreements is considered as the sole remedy for a failed launch, i.e., in the event the launch provider does not succeed in carrying out the launch as contractually agreed, the only action which the user has is a second launch without any charge.

12) Further Limitations of Liability

Although quite ample, the reciprocal waivers of liability do not cover any possible damage which may arise from a launch operation. Therefore, space transportation agreements prescribe that for those damages not expressly foreseen in the contract,

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[107] P. Nesgos, "Trends in the Acquisition and Financing of Space Projects: Insurance Implications', 8th Assicurazioni Generali International Conference on Space Insurance, Venice, March 30-31, 1995 at 3 [hereinafter "Trends in the Acquisition"].

[108] The main contractual risk allocation elements used in addition to the provisions of the Commercial Space Launch Act and its regulations are basically: (i) the adoption of the "best efforts principle", (ii) the inclusion of sole contractual remedies in the event of default, and (iii) further limitations and exclusions of liability.

the carrier's liability towards the customer -and vice versa- are limited to direct damages and will not include any loss of revenue, profits or other indirect or consequential damages. Therefore, in the event of a loss not included in the waivers, the liability of the launch provider -or the user for that matter- is circumscribed only to direct damages which such loss may cause.

13) Termination

A launch services agreement may generally be terminated by any party in case certain events take place, such as lack of payment of user, or inability of the carrier to provide the launch services. Also, both the carrier and the customer may terminate the agreement without any reason subject to certain penalties. If the customer decides to terminate the agreement in the event of a default of the carrier, the latter will have to reimburse the customer the price of the launch, excluding the associated services. In this respect, it must be remembered that satellites manufactured to be launched in a specific vehicle must undergo substantial modifications to be adapted to another carrier. Costs reimbursed by the carrier in the event of termination seldom include the costs of this adaptation.

14) Other clauses

Other clauses deal with patent and data rights, provisions regarding exchange of documents and information, registration obligations concerning the payload, the governing law and procedures for the resolution of disputes, among other equally important clauses. These clauses do not usually present many differences with standard clauses included in complex commercial contracts used in other industries.

Governing law is always the law of the state of the launch provider or any other law or standard chosen by the carrier. The jurisdiction under which controversies will be resolved is also elected by the carrier. It must be taken into account that courts in many states of the USA have already resolved cases involving space launch agreements. In NASA contracts, disputes are reviewed by the Associate Administrator, Office of Space Transportation Operations, who will attempt to resolve it. If the Associate Administrator is not successful within sixty days of receiving the notice of claim, any party may file a written appeal to both the NASA Administrator and the President of the user, who will have to jointly arrive at a

solution. This solution is final and conclusive. However, if after consultation with the user NASA determines that the lack of resolution of a matter in dispute will adversely affect the launch date or will adversely impact the timely preparation of the launch, the user will perform the matter in dispute in the manner determined by NASA within the framework of the launch agreement and without prejudice to the matter in dispute. In Arianespace contracts, controversies are first settled amicably by the parties. Failing this, they are submitted to an arbitration tribunal in accordance with the conciliation and arbitration rules of the International Chamber of Commerce.

B. TURNKEY LAUNCH AGREEMENTS

As outlined above, space launch providers impose clearly unfavorable conditions to their customers, especially concerning the distribution of risks and assignment of liability as well as launch delays and changes. Therefore, turnkey launch contracts constitute an alternative to standard launch agreements. By means of these agreements (usually referred to as In-orbit Delivery Satellite Purchase Contracts) the customer, generally a telecommunications company, hires the satellite manufacturer for both the construction and the launch of a satellite. However, this one-stop shopping obviously implies a higher price for the customer[109].

As in any other turnkey contract, in these agreements the manufacturer assures a final result and undertakes to perform a series of obligations. The manufacturer further assumes the risks resulting from the different phases of the agreement until the ultimate purpose is achieved, i.e., the beginning of the operation of the satellite in orbit. For this purpose, the manufacturer executes a single contract with the customer and then subcontracts with other companies part of the phases needed for the achievement of the obligations assumed with the customer. These contracts may include the following phases: (i) satellite manufacture, (ii) construction of ground facilities and equipment, (iii) technical assistance and training of human resources, and (iv) launch.

The first substantive section of the agreement generally defines the scope of work undertaken by the manufacturer. Although these agreements vary depending on

[109] J. Hermida, "Turnkey Launch Agreements" (1999) Outer Space Newsletter at 13.

the characteristics and needs of the customer, the manufacturer usually agrees to design, construct, test, arrange for launch, arrange for insurance and deliver a satellite in orbit. This obligation of the manufacturer is complemented with the obligation to supply and deliver the ground control segment, i.e., the ground facilities necessary for tracking, telemetry and command of the satellite and the other equipment and services connected with these obligations. The manufacturer further undertakes to provide all personnel, material, services and facilities necessary to perform its obligations under the agreement and to provide technical assistance and personnel training. The technical characteristics of the satellite, as well as the other equipment, are generally described in a schedule to the contract.

The customer pays a firm, fixed price, which may be inclusive or exclusive of taxes, for the full performance of the work undertaken by the manufacturer. There is usually a break down of this price for the purpose of reimbursement in the event of a failure to deliver the satellite. However, it bears emphasizing that the customer contracts with the manufacturer the delivery of the satellite and related equipment ready for commercial operation and pays a price which is comprehensive of all the manufacturer's obligations.

The delivery date constitutes an essential condition of this agreement. Therefore, the parties agree on a date for each of the items to be delivered under the agreement, i.e., the control ground segment -if required by the customer-, the construction of the satellite itself and the delivery in orbit. In general, delivery is deemed to take place for each item when the goods or services provided for by the manufacturer have met the criteria for acceptance and have in fact been accepted by the customer. For example, acceptance of the launched satellite is confirmed after a successful launch verification that it has been placed in the agreed orbit and orbital position and that it has not suffered any substantial damages. If the satellite experiences certain partial damages which diminish the life of the satellite calculated in terms of transponder years, then the satellite may be accepted only as a satisfactorily operating satellite, provided it has a minimum of transponder years determined by the parties. In this case, the price of the contract will be reduced proportionally. If, on the contrary, the satellite suffered a total loss or it is deemed to have suffered a complete loss it will remain the manufacturer's property. Should the customer wish to use the satellite then the parties will negotiate a price for it.

Acceptance of the control ground segment is relatively easier and presents fewer conflicts. It is also made after inspection by the customer and if it finds it not to comply with the technical conditions set out in the agreement, the customer generally grants a period for the manufacturer to remedy the defective aspects of the earth station. If it does not, then the manufacturer may be subject to penalties and ultimately to termination of the agreement. The latter, however, is rather unusual.

As part of the obligation of the contractor, it will have to pass title of each item to be delivered to the customer, including the satellite. Thus, the contractor represents and warrants that it will deliver good title to all property and to all items that will become the property of the customer free from any claim or encumbrance, including those arising out of the performance of the work.

The key issue with respect to title and risk is the moment when they are passed from the customer. As mentioned above, title to each item passes to the customer upon acceptance. As far as the satellite is concerned, the risk of loss passes to the customer upon successful completion of in-orbit testing or on the risk transfer date, which is generally a period of time ranging from 120 to 180 days after the launch, provided the satellite has not been considered a total loss. The risk of loss or damage for the control ground segment passes to the customer upon preliminary acceptance. In the event of partial losses, the contract usually contemplates a price reduction. This is generally implemented by dividing the agreement in two phases. The first one starts after the successful injection of the satellite to the nominal orbital position and ends with the acceptance. Phase two starts after the end of the first phase and lasts until the end of the specified mission life. As regards Phase 1, if the satellite has between a certain number of transponder years and the minimum amount so as not to be considered a total loss, then the satellite is accepted by the customer as a satisfactorily operating satellite, provided it meets all the requirements specified in the In-Orbit Acceptance Schedule. In this case, the contractor will have to reimburse an amount proportionately to the price for the satellite. Generally, however, the contract price reduction may not exceed a certain percentage of the whole price. If the satellite is accepted or accepted as satisfactorily operating, the contractor warrants the satisfactory operation of the satellite for a period extending from the acceptance up to a certain time, usually ten to twelve years. If at any time during the warranted phase the communications capacity of the satellite falls below a certain amount calculated in transponder years and the failure or deterioration is proven to be

permanent the contractor has to refund to the customer a proportionate contract price reduction. In both phases if failures are caused by force majeure or by the customer's non compliance with its own obligations, then the price reduction will not apply. Similar solutions apply in the event of late delivery of the satellite and control ground segment. However, in order to avoid more serious consequences the customer usually inspects the work of the manufacturer and verifies if it is complying with the agreed schedule.

As far as the obligations of the customer are concerned, it is evident that the most important one is the payment of the price. Nonetheless, it also undertakes to perform some other obligations, mainly to obtain certain permits and authorizations necessary for the constructor to perform its duties. If by reason of the customer's failure to obtain these permits the customer is delayed in completing the work before the delivery date, the customer has to grant to the contractor an extension of the time for the completion of its obligations. Needless to say that the customer always bears the costs and consequences in the program derived from that extension.

In case of total loss of the satellite the contractor has to deliver in-orbit a replacement satellite. This obligation also arises in the event of a constructive total loss. It is generally considered that a constructive total loss takes place when it can be determined by telemetry, data in orbit tests or other evidence that manifests itself at any time from intentional ignition until the risk transfer date, that the effective communications capacity is or is expected to be less than a certain period of time calculated in terms of transponder years or the satellite fails to meet the criteria spelled out in a schedule to the contract. The replacement satellite is usually subject to certain conditions. In effect, it will have to have identical technical performance to the original satellite and the contractor is obliged to provide the replacement satellite at the specified orbital position not later than a certain agreed upon date. The contractor usually includes a clause in the agreement stating that in consideration of the manufacturing, testing, launching, and arrangement for risk management or insurance for the new satellite it will be entitled to receive the insurance proceeds for the loss of the first satellite. As put forward by Peter Nesgos, this clause may bring about important conflicts with the banks or other entities which provide financing for the satellite[110]. Additionally, any insurance proceeds for the second satellite are

[110] "Trends in the Acquisition", *supra* note 107 at 4.

payable to the customer. However, the manufacturer is released from all obligations. Indeed, the customer is not even entitled to claim price reductions to the replacement satellite.

The area of greatest risk for a satellite manufacturer in a turn-key arrangement is with respect to its warranty of the performance of the satellite. They generally support their warranties with launch and initial operations insurance. The most judicious approach for the manufacturer is not to warrant the performance of the satellite but to undertake to assist its customer in obtaining launch insurance. In this case, the manufacturer would include an amount for launch insurance in its contract price assuming a premium rate. Generally, the manufacturer agrees that at a certain time before launch and in consultation with its customer it will cause its broker to place launch insurance in an amount determined by the customer, based on the availability of coverage, at the most favorable rate. If the actual rate is higher than the assumed rate, the amount is inadequate or the terms and conditions are unfavorable, then the customer bears the risk.[111]

As in other turnkey contracts, indemnity clauses also play an important role in turnkey launch agreements. Thus, the manufacturer undertakes to hold the customer harmless and indemnify it against any and all claims, actions and expenses in connection with the Agreement and against all actions or omissions of the manufacturer, its directors, officers, employees, contractors and subcontractors. Usually, the customer intends to include a provision regarding the possibility of appointing its own legal counsel, and other advisors, and to follow whatever strategy it deems appropriate. The costs of hiring these professionals are also included within the scope of the indemnity.

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[111] *Ibid.*

CHAPTER V

DISTRIBUTION OF RISKS AND ASSIGNMENT OF LIABILITY IN NASA SPACE LAUNCH AGREEEMENTS

NASA created a system where first-party risks are distributed through reciprocal waivers of liability extending over the so called risk period, second-party risks may be assumed by NASA and third-party risks are distributed on a two-layered basis, where the customer assumes the risk of loss through insurance up to a certain amount and NASA absorbs the risks from that limit upwards through government indemnification.

Absent this system, NASA and all Space Shuttle users would be exposed to unlimited liability based on the concepts of negligence or absolute liability. Consequently, they would face exorbitant insurance - casualty and property - policy premiums, which would prevent many firms from engaging in space exploitation activities.[112]

A. FIRST PARTY RISKS

In space launch services provided by NASA, first party risks, which encompass both foreign and own risks as previously analyzed, are distributed through a system of reciprocal waivers of liability which extend over a certain period of time referred to as risk period. Reciprocal waivers of liability originated in the first launch services agreements executed by NASA and they were later incorporated in the Code of Federal Regulations.[113]

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[112]G. Mossinghoff, "Managing Tort Liability Risks in the Era of the Space Shuttle" (1979) 7 J.Sp.L. at 122 [hereinafter "Managing Tort"].

[113] 14 Code of Federal Regulations Chapter V § 1214.113. This reads as follows "The U.S. Government will assume no risk for damages to the customer resulting from certain activities conducted under the launch agreement or to third parties resulting from launch related or on- orbit operations. The customer will be required to agree to be bound by a cross-waiver of liability among the customer, other customers, related entities and NASA for all activities under the launch agreement. The customer will also be required to purchase third-party liability insurance covering launch and on-orbit operations in an amount deemed appropriate by NASA." Notice that the regulations do not determine the scope, the extent, conditions or duration of the reciprocal waivers of liability. It only mentions the general purposes sought by the use of this legal instrument. Therefore, the waivers have their actual regulation in the launch services agreements. In effect, as recognized by NASA in its

1) Purpose

The purpose of the reciprocal waivers of liability is twofold: first to limit the claims that might arise from a launch, and second to minimize the need to obtain insurance to protect against claims which may otherwise derive from the launch. In effect, under a reciprocal waiver of liability a party is precluded from making a claim, whether judicial, administrative or otherwise, to the other party or parties to the reciprocal waiver of liability agreement. Despite some accidents involving the Space Shuttle vehicles, the number of lawsuits filed has been quite insignificant, which indicates, at least so far, that this scheme has proven to be fairly efficient. As regards the second objective, since a participant in a Space Shuttle launch is not responsible for damage caused to the other participant (foreign first party risks) there is no need to obtain insurance against these risks. This clearly places the carrier in an advantageous position vis-à-vis the user, for a carrier is more likely to cause damage to its customer rather than the customer to the space launch provider.

2) Waivers of liability

Due to the importance of the contractual clause dealing with the distribution of first party risks it is worth quoting it literally:

> "In carrying out this Agreement, the User and NASA will bring to a United States Government installation used for STS Operations their property and employees. The property and employees of each party will be in proximity to the property and employees of each other and of other users of the Space Transportation System. To simplify the allocation of risks among NASA and all users of the Space Transportation System and to make the use of the Space Transportation System feasible for the use and exploration of outer space by all potential users, **the parties agree to a no-fault, no-subrogation interparty waiver of liability, under which each party agrees to be responsible for any Damage which it sustains as a result of Damage to**

Launch Service Agreement these liability risks are distributed between the customer and the carrier in accordance with the contract specifications.

> **its own property and employees involved in STS Operations during such operations, which damage is caused by NASA, the User or other users involved in STS Operations** during such operations, whether such Damage arises through negligence or otherwise. Thus, if NASA's property, while involved in STS Operations, is damaged by the User or another user, NASA agrees to be responsible for that Damage and agrees not to bring a claim against or sue any user. Similarly, if any user's property, while involved in STS Operations, is damaged by NASA or another user, the user whose property is damaged agrees to be responsible for that Damage and agrees not to bring a claim against or sue NASA or another user. It is the intent of the parties that this inter-party waiver of Liability be construed broadly to achieve the intended objectives."*114*

The central element of this clause is precisely that each party assumes its own risks derived from the space launch operations, for which purpose, each party waives its right to file any claim for the damage which the other party -or other parties in the event of shared missions - may cause to it.

3) Damage

These waivers of liability encompass a wide spectrum of damages, which are defined in the agreements as "any bodily injury to or death of any person, damage to or loss of any property, and loss of revenue or profits or other direct, indirect or consequential damages arising therefrom". Furthermore, the referred contractual clause makes it clear that damages arising through negligence or other recovery theory are included in the waivers. In effect, since the waivers are considered no fault, they operate, for example, even if the damage caused to the user is caused by NASA's fault or negligence. Although there are no precedents regarding actual NASA waivers of liability, the existing case law derived from US commercial

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114"Launch Agreement (Sample) Between the United States of America and Satellite Business Systems for Launch and Associated Services" (June 17, 1980), [unpublished] Article V. Emphasis added.

launches appears to indicate that damages which are caused through gross negligence or willful misconduct are not covered.[115]

4) Absence of subrogation

Additionally, as the waivers are of the no-subrogation type, no entity or person may substitute the party which suffered a loss. In effect, if, for example, the user's payload is damaged during the period covered under these waivers an insurance company that compensated the user for the loss so suffered may not place itself in its insured's position and sue the carrier. Notice that some conflict may arise if the user fails to disclose in the insurance agreement that the insurer may not subrogate the user and claim NASA to recover any sum paid by the insurance company to the user.

5) Period

The reciprocal waivers of liability encompass damages which are caused during the Space Transportation System Operations, referred to as STS Operations in the agreements. They begin with respect to a particular employee or a particular payload or related tangible personal property when the user and NASA sign a launch services agreement and that particular employee, payload or property arrives at a United States government installation or boards or is placed on board a United States government vehicle for transportation to a US government installation or boards or is placed on board the Space Shuttle. These operations end when the last of the events enumerated below is completed. These events are with respect to a particular employee when the employee (i) leaves a US government installation, (ii) the Space Shuttle or (iii) a US vehicle which transports the employee from a US government installation or the Space Shuttle. With respect to the payload or other property not deployed or jettisoned this period ends when the property (or payload) is removed from (i) a US government installation, (ii) the Space Shuttle or (iii) a US vehicle which transports it from a US government installation or the Space Shuttle. In the event that the payload is deployed or jettisoned, after the payload impacts the Earth or if the payload is retrieved by the Space Shuttle the risk period ends (i) when the Space Shuttle is removed from a United States government installation, (ii) the Space

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[115]S. Gorove, *Cases on Space Law*, (Mississippi: Journal of Space Law, Inc., 1996) [hereinafter "Cases"].

Shuttle or (iii) a US vehicle which transports it from a US government installation or the Space Shuttle.

6) Extended waivers of liability

The language of the quoted contractual clause required the user to assume first party risks and it only precluded it from making a claim against NASA and other users. However, nothing in that clause prevented the user from filing a claim against a third party. The user was also free to make a claim against the government's contractors and NASA could also file lawsuits or other claims against the user's contractors. Additionally, in the absence of an express consent given in writing by the employees of the user the waivers of liability did not bar lawsuits by these employees against the government for personal injury or damage to property. As put forward by Bender, this clause in its original version simply made the user and the carrier responsible for their respective losses and the damages to their respective personnel.[116]

Therefore, as can be gathered from the testimony of Robert Wojtal - NASA counsel - offered in the cases Appalachian Insurance. v. McDonnell Douglas Corp.[117] and Lexington Ins. Co. v. McDonnell Douglas Corp.[118] the clause as originally drafted, was considered a narrow clause, for it only encompassed (i) the two parties to the contract (NASA and the user), (ii) the other users and (iii) third parties that brought their property to the government launch installations at NASA's express request. According to NASA's counsel testimony in December 1982, Robert Wojtal realized that these waivers of liability did not protect the contractors and subcontractors. Therefore, he drafted an extended waiver of liability, which has been so far used by NASA and was immediately adopted by all other carriers. According to Robert Wojtal, the new language used in the extended waivers, together with a flow down provision which required the user to extend the waiver to its contractors and subcontractors at every tier provided protection against lawsuits filed by NASA

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[116]Bender, *supra* 12 note 212.

[117]Appalachian Insurance. vs. McDonnell Douglas Corp., 214 Cal. App. 3d 1, 262 Cal. Rptr. 716 (Cal. App. 4th Dist. 1989).

[118]Lexington Ins. Co. vs. McDonnell Douglas Corp., No. 48-17-13 (Cal. Super. Ct., May 23, (1990).

or other users in the same mission[119]. However, following Robert Wojtal's testimony, in order to assure that the user may still keep its right to sue its own contractors and subcontractors for breach of contract, warranty or negligence, an exception to the flow down clause was inserted, which expressly contemplated this situation.[120]

As already pointed out, this new language of the reciprocal waivers of liability was used for the first time in the launch services agreement between NASA and Western Union and has since been incorporated in all other launch services agreements. This new version of the waivers read as follows:

> "NASA and the Customer (the parties) will respectively utilize their property and employees in STS Operations in close proximity to one another and to others. Furthermore, the parties recognize that all participants in STS Operations are engaged in the common goal of meaningful exploration, exploitation and uses of outer space. In furtherance of this goal, the parties hereto agree to **a no-fault, no- subrogation interparty waiver of liability, pursuant to which each party agrees not to bring a claim against or sue the other party or other customers and agrees to absorb the financial and any other consequences for Damage it incurs to its own property and employees as a result of participation in STS Operations during Protected STS Operations,** irrespective of whether such Damage is caused by NASA, the Customer or other customers participating in STS Operations, and regardless whether such Damage arises through negligence or otherwise. Thus, the parties, by absorbing the consequences of damage to their property and employees without recourse against each other or other customers participating in STS Operations during Protected STS Operations, jointly contribute to the common goal of meaningful exploration of outer space."

In turn, the flow-down prescribes the following:

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[119] P. D. Bostwick, "Liability of Aerospace Manufacturers: MacPherson v. Buick Sputters into the Space Age", (1994) 22 J.Sp.L. at 80.

[120] "Cases", *supra* note 115 at 106.

"The parties agree that this common goal will also be advanced through extension of the inter-party waiver of liability to other participants in STS Operations. Accordingly, the parties agree to extend the waiver as set forth in Subparagraph 3.b. above to contractors and subcontractors at every tier of the parties and other customers, as third party beneficiaries, whether or not such contractors or subcontractors causing damage bring property or employees to a US Government Installation or retain title to or other interest in property provided by them to be used, or otherwise involved, in STS Operations. Specifically, the parties intend to protect these contractors and subcontractors from claims, including products liability claims, which might otherwise be pursued by the parties or the contractors or subcontractors of other customers. Moreover, it is the intent of the parties that each will take all necessary and reasonable steps in accordance with Subparagraph 3.e. below to foreclose claims during Protected STS Operations, under the same conditions and to the same extent as set forth in Subparagraph 3.b. above, except for claims between the Customer and its contractors or subcontractors and claims between the United States Government and its contractors and subcontractors."

As can be observed from the quoted clauses, the first one does not vary substantially from the so called limited waiver of liability. Thus, for example, the concept of Protected STS Operations does not differ from the one used in the previous clause and the change of the term "user" by "customer" does not alter the meaning of the provision. However, the flow down provision does entail a truly wider scope of the waivers, which are extended to cover all contractors and subcontractors of both the user and the carrier. Otherwise, under the previous language, a user, who could not bring a claim against the carrier and the other users, could file lawsuit against the contractors and subcontractors of the other party. Thus, for example, if a satellite was not placed in the agreed orbit because of a failure of the space vehicle, the satellite owner was entitled to sue the contractors and subcontractors of the carrier that manufactured the component that caused the failure. Therefore, the goal of avoiding lawsuits and reducing costs was not fulfilled.

It must be pointed out that under this extended version of the reciprocal waivers of liability there is no restriction whatsoever for each party to sue its own contractors and subcontractors. In effect, as already highlighted there is an express exception to the obligation to absorb risks which applies to damages that the contractors and subcontractors at each party's tier may cause to their principals, i.e. the user may sue, for example, the company which manufactured a component part of the satellite or the carrier may sue a company that constructed part of the space vehicle or one that rendered services related to the launch[121]. Aside from problems which may arise from the existence of contractors and subcontractors that may act both for the user and the carrier, this extension of the reciprocal waivers of liability tends to achieve the above analyzed objectives.

B. SECOND PARTY RISKS

In the event of launch services rendered by a carrier which is a state agency, such as NASA, second party risks may be somehow subsumed within the risks of the other two categories - first or third. However, there is an express provision in the NASA Act which refers to these risks. In effect, when NASA analyzed and implemented Section 308 of the NASA Act, it held that even if it was not anticipated that NASA would use its appropriated funds to protect the US government from liability, NASA understood that the statutory provision was broad enough to permit the protection of US government property other than NASA's if its Administrator determined that this would be desirable and appropriate in any particular case.[122] Therefore, NASA has statutory authority to protect other US government property, such as, for example, a US Air Force base used for the launch of a Space Shuttle, against damages which NASA and the user may cause to it.

This norm, which has undoubtedly a protective character, implies that NASA may assume second party risks of the users. In our opinion, the objective of this provision is the same as the general objective of the whole NASA system of distribution of risks and assignment of liability, i.e., to reduce the risks which the user faces in a space launch so that NASA may attract as many customers as possible, thus fostering US leadership in space transportation. In the event that

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121 "Allocation of Liabilities", *supra* note 76 at 28.

122 NASA, Sectional Analysis of Section 308 "Insurance and Indemnification", paragraph 2.

NASA does not make use of this faculty, second party risks will be treated as third party. In effect, in this case, the property of the United States government will be considered as property belonging to a third party. Therefore, any damage to US property other than NASA's will have to be compensated as if the US government were an unrelated third party.

C. THIRD PARTY RISKS

Third-party risks are distributed on a two-layered basis, where the customer assumes the risk of loss through insurance up to a certain amount and NASA absorbs the risks from that limit upwards through government indemnification. This policy was implemented through the amendment to the NASA Act and immediately followed in NASA's space launch services agreements.

1) First layer: third party liability insurance

1. a. Section 308

In 1979 at NASA's request the US Congress enacted specific norms to materialize a new distribution of risk policy for Space Shuttle services.[123] The core of this legislative reform consists of the amended section 308 of the NASA Act.[124] In light of the importance of this provision it is worth quoting its relevant parts:

> "Sec. 308. (a). The Administration is authorized on such terms and to the extent it may deem appropriate to provide liability insurance for any user of a space vehicle to compensate all or a portion of claims by third parties for death, bodily injury, or loss of or damage to property resulting from activities carried on in connection with the launch, operations or recovery of the space vehicle. Appropriations shall be reimbursed to the maximum extent practicable by the users under reimbursement policies established pursuant to section 203 (c) of this Act."

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[123]B. Johnson, "Spacecraft Insurance" (1986) *FICC Quarterly* at 259.

[124]Public Law 96-48, August 8, 1979, section 6 (b), (93 Stat. 348). According to section 6 (c) of the Act, this amendment became effective on October 1, 1979.

1. b. Liability insurance

As can be gathered from the quoted section, the user assumes the risks of damage against third parties through liability insurance. It assumes not only the risks of damage it may cause to third parties, but also damages which NASA may produce. This liability is nonetheless capped at the amount of the insurance. This amount represents the highest amount which is considered likely to be claimed by third parties in the event of an accident.

It could be construed from the above quoted norm that the acquisition of third party liability insurance is facultative for the user, i.e., it may opt to acquire insurance or resort to any other alternative mechanism of risk management. Even if from a strictly legal standpoint this insurance is not compulsory,[125] in the contracts NASA obliges the users to obtain at their exclusive cost an insurance policy for all damages against third parties which may arise in connection with the launch agreement[126]. Thus, in practice, the obtainment of liability insurance has become imperative. In effect, except for certain exceptional circumstances arising under Section 308 as analyzed below no payload may be uninsured against third party liability.

1. c. Insurance exemptions

It is NASA's opinion that the general rule under subsection (a) is that NASA must require users to pay for an equitable share of third party liability insurance obtained through NASA. However, NASA could, at its exclusive discretion, exempt certain users, for example, small self-contained payloads, from the requirement of obtaining insurance or paying for it.[127] Note, however, that this criterion does not expressly arise from the regulations enacted by NASA itself.[128] Commentators have interpreted that NASA's right to exempt users of insurance obligations may only be

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[125] "El Contrato", *supra* note 77 at 1.

[126] The obligation to obtain this kind of insurance is not expressly contemplated as such in the Act. However, it has been construed that this obligation arises from the Act and the quoted analysis made by NASA and by the contractual practice arisen from NASA's launch services agreements. "Allocation of Liabilities", *supra* note 76 at 25; "Managing Tort", *supra* note 112 at 121; P. Nesgos, "International and Domestic Law Applicable to the Commercial Launch Vehicle Transportation", (1984) 27 Proceedings of the 27th Colloquium on the Law of Outer Space at 106 [hereinafter "International and Domestic Law"].

[127] NASA, Sectional Analysis of Section 308 "Insurance and Indemnification".

[128] 14 CFR V § 1214.113.

used for certain scientific experiments[129], or for universities or other research institutions[130]. In our opinion, there is nothing in NASA's sectional analysis of § 308 that indicates that this right may not be used for users which pursue a commercial project[131]. Aside from this exception, as mentioned above, all users are required to obtain liability insurance against third party claims.

1. d. Acquisition of insurance

Following section 308, NASA may obtain insurance in the international insurance market for several Space Shuttle missions based on a projected schedule. In this case, NASA is the acquirer of such insurance, and the satellite owner then purchases the insurance from NASA for its particular mission. NASA is in a better condition than the satellite owners to negotiate the purchase of the insurance, for it may acquire several insurance policies for various Shuttle missions at the same time. Additionally, NASA tends to hire insurance when the insurance market presents reasonable conditions.[132] In this respect, "NASA does not act as insurer but rather as an agent purchasing liability insurance as it becomes available and providing that coverage to customers as needed."[133] This has been considered to be the nucleus of the Section 308 regime.[134] For the purchase of such insurance, Congress authorized NASA to use appropriated funds available to NASA for this project or even for any other one. However, NASA is required to seek reimbursement of the appropriation used, to the maximum extent practicable, from users under general Shuttle reimbursement policies established pursuant to section 203 (c) of the NASA Act.[135]

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[129] Johnson, *supra* note 123 at 261.

[130] "Managing Tort", *supra* note 112 at 121.

[131] J. Hermida, *Commercial Space Law: International, National and Contractual Aspects* (Buenos Aires: Ediciones Depalma, 1997) at 14 [hereinafter "Commercial Space"].

[132] NASA, Sectional Analysis of Section 308 "Insurance and Indemnification", paragraph 2.

[133] Johnson, *supra* 123 note at 261.

[134] *Ibid.* at 262.

[135] 42 USCA § 2451. This section 203 (c) consists of three subsections which regulate NASA's functions in a broad and general manner. For example, NASA is entitled to issue regulations and resolutions, hire employees, acquire, build and operate any kind of property, sell, lease and dispose in any manner of personal property and real estate, and execute any kind of contracts, agreements and arrangements with any individuals and entities. In effect, the faculties assigned to NASA by Congress are quite ample and they permit the possibility of disposing of any property of NASA at any or no price. Section 203 (c) and reference to the requirement to obtain reimbursement only to the maximum practicable extent have led NASA to understand that it has wide faculties to enter into any kind of agreement with the users with respect to said reimbursements. Thus, NASA may charge the users a fixed price for the insurance based on an estimate of the cost of insurance, the number of Space

1.e. Insurance cap

Additionally, the liability insurance which the user must obtain to protect NASA and certain contractors for damage against third parties are subject to a cap. In effect, NASA in general demands that the insurance coverage be extended only up to US$ 500,000,000. This amount was calculated taking into account that the construction value of the Space Shuttle was approximately US$ 1,000,000,000 and that NASA generally carried two payloads in each Shuttle mission.[136] This limit to the liability insurance implies a certain benefit to the user, for otherwise it would be obliged to pay considerably high amounts of money to insure all possible risks, the cost of which would be quite difficult to pass on to the customers of the services rendered by the user of the Space Shuttle.

2) Second layer: state indemnity

2. a. Government indemnification

Risks in the second layer of this category are absorbed by NASA through state indemnity. This layer extends as from the amount of the liability insurance upwards without any limit. This second layer is also regulated in Section 308 of the NASA Act. Again it is convenient to quote the relevant part of this section.

> "(b) Under such regulations in conformity with this section as the Administrator shall prescribe taking into account the availability, cost and terms of liability insurance, any agreement between the Administration and a user of a space vehicle may provide that the United States will indemnify the user against claims (including reasonable expenses of litigation or settlement) by third parties for death, bodily injury, or loss of or damage to property resulting

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Shuttle flights and users to be protected by the insurance policy and other relevant factors or even agree to finance the price of the insurance in several payments at an interest rate below that prevailing in the financial market or even without any interest.

136"Allocation of Liabilities", *supra* note 76 at 25.

> from activities carried on in connection with the launch, operations of recovery of the space vehicle, but only to the extent that such claims are not compensated by liability insurance of the user: *Provided*, That such indemnification may be limited to claims resulting from other than the actual negligence or willful misconduct of the user".
>
> Additionally, subsection (c) of Section 308 prescribes that:
>
> "(c) An agreement made under subsection (b) that provides indemnification must also provide for:
> (1) notice to the United States of any claim or suit against the user for death, bodily injury, or loss or damage to the property; and
> (2) control or assistance in the defense by the United States, at its election, of that suit or claim".

As can be observed from the quoted provision, the United States assumes through government indemnification the risks for damages which both the user and NASA may cause as a result of the space launch activities. It must be pointed out that unlike the US private sector system state indemnification is optional, i.e., NASA has ample faculties to grant this indemnification or not.[137] However, in practice NASA has always granted this governmental indemnification to almost all Space Shuttle users.[138]

2. b. Damage

By virtue of this indemnification, the United States acting through NASA holds the user harmless for damages which it may cause to third parties. These damages include death, bodily injury, loss and damage to property of those third parties. From this enumeration, it is not clear whether they include indirect and consequential damages, such as loss profits. It is our understanding that in light of the meaning of the term property recognized by the US Courts reference to property of third parties

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[137]NASA, Sectional Analysis of Section 308 "Insurance and Indemnification", paragraph 3.
[138]Johnson, *supra* 123 note at 262.

should encompass the loss profits that they may suffer for loss profits as well as other indirect damages[139].

2. c. Period

As we have seen, the governmental indemnity goes from the amount of the insurance upwards without any limit. With respect to the temporal extension, it embraces all activities carried out in connection with the launch, operations or recovery of the space vehicle. In other words, like in the liability insurance, state indemnity includes the whole "Risk Period". Thus, for the user state indemnity begins with the first physical attachment of the payload to the orbiter and ends after launch of the payload on the landing of the Space Shuttle in the event that there have been no damages to third parties. If the payload is jettisoned, the risk period ends when it impacts to Earth without causing damage to third parties. If third parties are damaged, the risk period ends immediately after all such damage occurs.

As can be observed, the extension of the state indemnity, both with respect to the amount and time, is quite broad. Thus, it can safely be concluded that it is the state that actually assumes the higher third liability risks.

2. d. NASA's contractors and subcontractors

The main problem which arose from the extent of the state indemnification refers to its applicability to NASA's contractors and subcontractors. They play a fundamental role not just for the carrier but also for the user. With respect to NASA, the contractors and subcontractors supply important equipment and services for the construction and maintenance of the space vehicle and services related to the launch itself. Thus, they are exposed to claims which third parties may file for damage caused by the space vehicle. Therefore, contractors and subcontractors are reluctant to do work for NASA unless some arrangement is made to protect them against third party claims, in particular those that are above the limits of reasonable obtainable insurance.[140]

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[139]Labberton v. General Cas. Co. of America, 53 Wash.2d 180, 332 P2d at 250; Davis v. Davis, Tex Civ. App., 495 S.W.2d at 607; Hoffman v. Kinealy, Mo., 389 S.W.2d at 745; Cereghino v. State By and Through State Highway Commission, 230 Or. 439, 370 P.2d at 694.

[140]"International and Domestic Law", *supra* note 126 at 106.

The relationship between the contractors and state agencies, such as NASA, is governed by the Federal Acquisition Regulation System,[141] which does not contemplate expressly the characteristics of launch services operations. Thus, NASA's contractors had to absorb all the liability for damage which their participation may cause to third parties, whether through the provision of services or the component part of the space vehicle.

In 1983 NASA adopted a specific norm to govern the relationship with its contractors in the space field,[142] which incorporated their main concern. In this respect, due to its clarity it is worth quoting the speech made by Kenneth J. Brown, Division Counsel for Boeing Aerospace, in a meeting of the American Bar Association which took place in Atlanta in July of that same year:[143]

> "NASA's recent implementation of Public Law 85-804 provides that the US government will hold harmless and indemnify the contractors and their subcontractors from claims by third persons for death, personal injury or loss of, or damage to, or loss of use of property and loss of, or damage to, or loss of use of property of the contractor and the government. The claims must arise out of defined, unusually hazardous risks and must not be compensated for by insurance. Additionally, loss of profit is specifically excluded as well as claims caused by the willful misconduct or lack of good faith on the part of certain contractor managers."

Since the enactment of this law, NASA has demanded contractors to acquire liability insurance to protect against damages which their services or component parts may cause to third parties. NASA, in turn, undertakes to reimburse the price of the insurance paid by said contractors, provided that its cost is reasonable and to provide indemnification for damages which exceed the insured amount.[144] According to Brown, this law did not create a risk-free environment for Space Shuttle contractors.

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[141] 48 CFR Chapter 1, Parts 1-99

[142] P.L. 85-804.

[143] E.J. Finch, Jr. & A. L. Moore, *Astrobusiness: A Guide to the Commerce and Law of Outer Space* (New york: Praeger, 1984) at chapter V.

[144] "Allocation of Liabilities", *supra* note 76 at 25.

However, it eliminated the worst-case-scenario damages by allowing the contractors to transfer those damages not covered by the insurance to the government.[145]

This law applies exclusively to the NASA's direct contractors and not to the subcontractors, i.e., those whose services are hired not by NASA directly but by NASA's contractors. It must further be pointed out that NASA may not make any payment under the government indemnification regime of Section 308 until the Administrator certifies that the amounts to be paid, whether to the user or the contractor, are fair and reasonable. Even if there has been no claim so far it is our opinion that this measure may cause some problems since it is NASA that must determine the reasonability of the amounts it itself must pay. In this respect, it must be added that in order to face payments for claims made by third parties NASA may, at its election, use any funds available for research and development activities or funds appropriated specifically for such indemnification purposes.

[145]Finch, *supra* note 143.

CHAPTER VI

DISTRIBUTION OF RISKS AND ASSIGNMENT OF LIABILITY IN THE US PRIVATE SECTOR LAUNCH INDUSTRY

A. FIRST PARTY RISKS

First party risks are allocated through a system of mandatory reciprocal waivers of liability. These waivers of liability, which have been modeled after the ones used by NASA, represent legislatively mandated contractual indemnification obligations of each private participant, and its contractors and subcontractors, vis-à-vis the other private participants, as well as its contractors and subcontractors.

In order to avoid claims among the different participants in a space launch, and as a condition to the issuance of the license, commercial launch providers are required to "enter into reciprocal waivers of claims with their contractors, subcontractors and customers, as well as the contractors and subcontractors of such customers involved in launch services, by virtue of which **each party to each such waiver agrees to be responsible for any property damage or loss it sustains or for any personal injury, death of, or property damage or loss suffered by its own employees resulting from activities carried out under the use of the license.**"[146] As can be observed from the quoted provision, the waiver of liability requires that each party, as well as its contractors and subcontractors, (i) be responsible for damages it sustains, and (ii) refrain from making claims against the other party, and its contractors and subcontractors.[147]

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[146] 49 USC §2515

[147] P. Meredith, "Risk Allocation Provisions in Commercial Launch Contracts", (1991) 34 IISL at 267

1) Purpose and objectives

According to the text and of the 1988 Amendments, the purpose of this provision is (i) to limit the total universe of claims that might arise from a launch, and (ii) to eliminate the necessity for all the parties to obtain property and casualty insurance to protect against such claims.[148] With respect to the first of the objectives sought by the 1988 legislator, as the reciprocal waivers promulgate the assumption of risks by each participant they act as a deterrent of claims. Indeed, by virtue of this legal prescription each participant is precluded from its right to sue the entity casuing the damage[149]. The scope of this provision does not encompass all events which may originate damages arising from a space launch. Moreover, even within the covered events not all claims are precluded. However, the waivers have proved to act as an effective hindrance of lawsuits.

As regards the second of the objectives sought by the legislator, the waivers of liability foster the obtainment of insurance –or another form of risk management- by the users to protect against their own first party risks, for they may not afford to lose their payload without recouping at least part of their investment. However, since neither the launch carrier nor the customer is liable for damages it may cause to each other, the obtainment of insurance to protect against foreign first party risks becomes thoroughly unnecessary.[150]

Therefore, in our opinion, the actual objective of the reciprocal waivers of liability consists of providing the launch industry with a system that permits it to convey risks to the customers. In effect, notwithstanding the alleged objectives of the Act, the main purpose of these waivers is to give the launch services provider the possibility

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[hereinafter "Risk Allocation"].

[148]Commercial Space Launch Act Amendment of 1988, Report of the Senate Committee on Commerce, Science and Transportation on H.R. 4399, SR 100-593, Oct. 7, 1988, US Government Printing Office, Washington, 1988, at 14 [hereinafter "Senate Report"].

[149]Risk Allocation", *supra* note 147 at 267.

[150] In this respect, the waivers executed by private entities are intended to relate only to risks normally covered by insurance or self-insurance.

of not having to compensate damages it causes to its customers and its contractors and subcontractors. In practice, this operates as an exclusion of liability. The rationale of this legal provision is that the launch provider transfers to the user the damages the latter may suffer as a consequence of a failed launch or any other event, whether attributable or not, to the launcher. Even if at the same time, the user transmits the launch operator the risks which the operator might sustain as a result of the user's conduct, in practice this hypothesis is extremely unusual. Consequently, the waivers act only as a mere scheme enabling the transfer of risks from the launch operator to the user of the space transport services. This exclusion of liability constituted the only viable alternative for the emergence of the US private launch industry at the time of the enactment of the 1988 Amendments to the Commercial Space Launch Act.

2) Types of claims

With respect to the damages covered by the waivers of liability, apart from damages to the employees, these waivers encompass the obligation to assume only property damage and losses. It may thus be concluded that indirect damages and consequential damages are outside the scope of the waivers.[151] As regards the damages to the employees, the Act circumscribes these damages to the cases of personal injury, death, and property damage or loss. To Peter Nesgos, the concept of personal injury must be construed exclusively as bodily injury.[152] We disagree with Nesgos, for when the legislator intended to restrict this concept to cover only bodily injuries she did so specifically as, for example, in the case of governmental indemnity. Therefore, in our opinion, the reciprocal waivers of liability include not only bodily injuries but also other non bodily damages, such as mental trauma, nervous shock, mental anguish, and psychic trauma.[153] Additionally, the FAA in its Final Rule adopted on

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[151]Risk Allocation", *supra* note 147 at 268.

[152]P. Nesgos, "Recent Developments in Risk Allocation of Concern to the US Commercial Space Launch Industry and the Insurance Community", (1989) Assicurazioni Generali, Fifth International Conference on Space Insurance at 16 [hereinafter "Recent Developments"].

[153]For an analysis of these concepts in the aviation industry see, Georgopoulos v. American Airlines South Wales, 1993, T.T. Burnett amd Winifred Burnett v. Trans World Airlines, Inc United States

October 26, 1998 clarified that the term "bodily injury means physical injury, sickness, disease, disability, shock, mental anguish, or mental injury sustained by any person, including death", thus putting an end to any other possible construction of this term.[154]

3) Contractual rights

According to Peter Nesgos, literally read, the language used in section 16 (a)1(c), which requires each party to agree to be responsible for any property damage it sustains, means that the space launch provider is prevented from offering any form of launch risk guarantee against damages of the payload. For Peter Nesgos, the US private launch industry is at a competitive disadvantage vis-à-vis foreign competition, especially Arianespace.[155] It is Nesgos' standpoint that the Act should have established that the claims between any direct contracting party may not be affected. In our opinion, the remark put forward by Peter Nesgos is correct in the sense that a literal interpretation of section 16 (a)1(c) of the Act is possible. However, we share Valerie Kayser's view that an analysis of the purpose of the legislator leads to the conclusion that such literal construction was not envisaged by the 1988 legislator.[156] In effect, nothing forbids the launch services provider to offer guarantees or other alternative remedies, such as a replacement launch provision or any other contractual solution in the event of a launch failure. In this respect, it is worth quoting the Senate report produced in connection with the deliberations of the 1988 Amendments to the Commercial Space Launch Act, which reads as follows: "The required waivers are not intended to prevent or encumber enforcement of the private entities' contractual rights and obligations".[157]

District Court of New Mexico, 1973, Rosman et al v. Trans World Airlines, Inc. New York Court of Appeals, June 13, 1974, Husserl v. Swiss Air, United States District Court, Southern District of New York, 1975, Eastern Airlines, Inc. v. Floyd et al. Supreme Court of the United States, April 17, 1991.

[154] DEPARTMENT OF TRANSPORTATION Federal Aviation Administration 14 CFR Part 440 Financial Responsibility Requirements for Licensed Launch Activities. Final rule, October 26, 1998 [hereinafter "Final Rule"].

[155] "Recent Developments", *supra* note 152 at 16.

[156] "Private Launch", *supra* note 15 at 158.

[157] "Senate Report", *supra* note 148 at 14.

It is our interpretation of this statement made by the US Senate that if in the launch services agreement a party, e.g., the carrier, undertakes to carry out certain actions the waivers of liability do not affect such contractual obligations. In other words, in such case the user is not precluded from making a claim against the carrier demanding the enforcement of these contractual remedies. Any interpretation to the contrary would render moot all the obligations assumed in the contract, even the launch itself, because the user would be prevented from making any claim. This is certainly not the purpose sought by the 1988 Amendments.[158] In effect, according to the legislative history of the 1988 Amendments, the waivers among the private participants are envisioned to foreclose the possibility of claims for personal injury and property damage only, since these were believed to be the risks usually covered by the insurance then available. Therefore, the waivers are not intended to preclude contractual actions.

4) Instrumentation

According to the FAA Regulations, the launch services provider, its customer and the US government must enter into a tripartite reciprocal waiver of claims agreement in standardized form approved by the FAA.[159] In practice, however, the parties may introduce some drafting changes, which may not alter the substance of the standardized form. This tripartite agreement instruments all the waivers of claims and assumptions of responsibility under the three categories of risks.

The agreement is signed by the licensee, the customer and the Federal Aviation Administration of the Department of Transportation, on behalf of the United States Government. The substantive part of the agreement includes the waiver and release of claims, a provision on the Assumption of Responsibility, an Extension of

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[158]There are other legal possibilities for the parties, especially the carrier, to limit the actual enforceability of their contractual commitments, which are analyzed below. However, it is worthy of note that the waivers of liability do not aim at that purpose. Therefore, they may not be used as a way to limit or exclude the contractual obligations of the party.

Assumption of Responsibility and Waiver and an Indemnification obligation. Under the first substantive clause, the licensee waives and releases claims it may have against the customer and the United States, and against their respective contractors and subcontractors, for property damage and for bodily injury or property damage sustained by its own employees, resulting from licensed launch activities, regardless of fault. Similar clauses are included for the customer and the United States.[160]

Under the assumption of responsibility clause, the licensee and the customer undertake to be responsible for property damage each sustains and for damages sustained by its own employees regardless of fault. As a result of this assumption of liability, the launch carrier and the customer must each hold harmless and indemnify each other, the United States, and the contractors and subcontractors of each party. A fundamental clause of the agreement deals with the obligation of both the licensee and the customer to extend the requirements of the waiver and release of claims, and the assumption of responsibility, hold harmless, and indemnification to its contractors and subcontractors respectively.

B. SECOND PARTY RISKS

Risks to the government property are distributed in a two-layered basis, where the private launch operator assumes the risk of losses through a system of insurance or self-insurance up to the amount of the maximum probable loss, and the government absorbs the risks from that limit upwards through the so called waivers of liability.

1) First level: Insurance or self-insurance

The Commercial Space Launch Act obliges launch operators to obtain liability insurance or to demonstrate financial responsibility in an amount sufficient to

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[159] 14 CFR Ch. III, Section 440.17(c).

[160] As will be analyzed below the government's waiver applies to the extent that claims exceed the amount of insurance or demonstration of financial responsibility required for distribution of third party risks.

compensate the maximum probable loss from claims against any person filed by the United States for loss of or damage to property of the United States resulting from activities carried out under the license in connection with any particular launch.

1.1 Beneficiaries of insurance or demonstration of financial responsibility

The beneficiaries of the insurance or the demonstration of the financial responsibility are the United States, its agencies, contractors and subcontractors, personnel and the customer of the launch licensees, and its personnel, without any cost to the United States.

1.2. Maximum probable loss

According to the US Senate report of October 7,1988, the determination of the maximum probable damage must closely correspond to the actual value of the property and facilities of the US government. Therefore, the legislator understood that the government must be protected as completely as possible so as to ensure that the damages caused to the facilities be repaired through the proceeds of insurance.[161] The limitations included in the 1988 Amendments are based on the best assessment received by the Committee of a maximum probable loss to US property. The biggest vehicle of the commercial fleet existing at the moment of the research carried out for the Committee, was Titan III, manufactured by then Martin Marietta. The worst accident of this vehicle had caused damages to two launch bases, which were out of use for 9 months. Total losses for this accident amounted to US$ 60,000,000. Therefore, it was felt that requiring a limitation of US$ 100,000,000 was reasonable.[162] During the first years of commercial space launch activities following the enactment of the 1988 Amendments the Commercial Space Transportation Office determined that the maximum probable damage averaged US$75,000,000 to US$ 80,000,000 for expendable launch vehicles such as Delta, Titan and Atlas Centaur

[161] "Senate Report", *supra* note 148.

[162] The Committee also received an assessment of the US Air Force estimating that the maximum

launched from Cape Canaveral, Florida and US$ 100,000,000 for vehicles which make suborbital launches from White Sands, New Mexico.[163] However, the highest amount of the insurance to be obtained -or the financial responsibility to be demonstrated- may not exceed $100,000,000 or the highest amount of liability insurance available, at a reasonable cost, on the world market in case the same is lower than $100,000,000. Thus, as analyzed below, in certain cases the government may assume a certain degree of risks included within the concept of maximum probable loss.

Currently, the determination of the maximum probable loss is done pursuant to Appendix I of the Final Rule, which contains information requirements that a launch carrier must submit to the FAA. This information includes (i) general information regarding the description of the mission, the launch vehicle, the payload and the flight termination system, (ii) pre-flight processing operations, (iii) flight operations and (iv) post-flight processing operations[164].

The maximum probable loss does not cover all the damages which may arise in a launch, but only those which may take place in the majority of accidents related to space launches. It was the opinion of the Committee that it would be contrary to the public interest of the United States to permit a launch from governmental bases without requiring an adequate insurance regime that protects the assets of the United States. Even if aware that due to the fluctuations of the market it may not be possible to obtain insurance against the US property in an amount sufficient to achieve the maximum probable risk standard, the Committee understood that such circumstances were infrequent and that the damages that may occur which exceed the insurance will be almost insignificant. In such cases, the Committee understood that the Department of Transportation should require the licensee proof of financial responsibility in an amount that covers the difference between the available insurance coverage and the

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probable loss could be of around US$ 300,000,000.

[163] "Allocation of Liabilities", *supra* note 76 at 28.

[164] "Final Rule", *supra* note 154.

maximum probable loss. If even so, this combination between insurance and financial responsibility are still insufficient, the Committee was of the opinion that the Secretary should have discretionary authority to nonetheless issue the license. It can be gathered from the above, that there are certain risks to US government property which are assumed by the US government itself, rather than the space launch carrier.

1.3 Adjustment of Amounts

The 1988 Amendments establish that: "Within 6 months after the date of enactment of the Commercial Space Launch Act Amendments of 1988, and within each 12-month period thereafter, the Secretary shall review the amounts specified in paragraph (1) (A) (I) (B) (I), and shall submit a report the Congress, which, if appropriate, contains a proposed adjustment to such amounts to conform with altered liability expectations and availability of insurance on the world market. Such proposed adjustment shall take effect 30 days after the submission of such report. "

2. Second level: reciprocal waivers of liability

The United States, its agencies, contractors, and subcontractors involved in launch services are obliged to enter into reciprocal waivers of claims with the commercial launch provider, its contractors, subcontractors and customers, as well as the contractors and subcontractors of such customers, by virtue of which each party to each such waiver agrees to be responsible for any property damage or loss it sustains or for any personal injury to, death of, or property damage or loss sustained by its own employees resulting from activities carried out under the license. In effect, like for first party risks, the 1988 Amendments structured a system of reciprocal waivers of liability between the public and private sector participants. However, as pointed out above, these waivers only apply to the extent that the claims exceed the amount of property insurance or demonstrated financial responsibility required as a condition of the license. In the event that the launch provider has opted to obtain insurance, the

government will directly receive the proceeds of such insurance policies that are paid following an accident that causes damage to the government property.

In this respect, in order to best analyze this issue it is worth quoting section Sec. 70112 of the TITLE 49--TRANSPORTATION SUBTITLE IX--COMMERCIAL SPACE TRANSPORTATION CHAPTER 701, formerly known as the Commercial Space Launch Act, which reads as follows:

> "The Secretary of Transportation shall make, for the Government, executive agencies of the Government involved in launch services, and contractors and subcontractors involved in launch services, a reciprocal waiver of claims with the licensee or transferee, contractors, subcontractors, and customers of the licensee or transferee, and contractors and subcontractors of the customers, involved in launch services under which each party to the waiver agrees to be responsible for property damage or loss it sustains, or for personal injury to, death of, or property damage or loss sustained by its own employees resulting from an activity carried out under the license. The waiver applies only to the extent that claims are more than the amount of insurance or demonstration of financial responsibility required under subsection (a)(1)(B) of this section. After consulting with the Administrator and the Secretary of the Air Force, the Secretary of Transportation may waive, for the Government and a department, agency, and instrumentality of the Government, the right to recover damages for damage or loss to Government property to the extent insurance is not available because of a policy exclusion the Secretary of Transportation decides is usual for the type of insurance involved."

2.1. Beneficiaries of the waivers of liability

As can be observed from the quoted section, the general requisite is that each private sector participant waives its right to make claims to public sector participants, and these in turn are to waive their rights to sue the private sector participants. According

to the classification made by Daniel Cassidy, the carrier, all its contractors and subcontractors and customers, as well as their contractors and subcontractors should be included within the scope of this provision.[165] The chain of private participants is limited by their involvement in the space launch. Even if there are clear cases which do not offer any doubt whether they should be included in the waivers of liability there are other ones which are less clear. Thus, for example, when the user is a satellite telecommunications company this company, the manufacturer of the satellite, the manufacturers of the satellite components, whether these make the components at the request of the manufacturer (contractors) or at the request of an entity which the manufacturer hired for the manufacture of a component (subcontractors), are among the entities which the government is obligated to enter into reciprocal waivers with. Also included are the manufacturer of the space vehicle, when it is not the carrier itself, the manufacturers of the component parts of the vehicle, both under a direct contract with the manufacturer and with the contractors, and the satellite ground transport company which carries the satellite from the manufacturer's premises to the launch base, whether under a contract with the launch carrier, manufacturer or user.

However, the situation is not quite clear with respect to, for example, the firms that manufactured and sold machines for the construction of a component part of the satellite or the space vehicle, the users under a transponder agreement, or the marketing firms hired for the sale of the satellite or transponders. The regulations adopted on October 26, 1998 by the FAA intend to shed some light on this issue, by defining the term "customer" as "the person who procures launch services from the licensee, any person to whom the customer has sold, leased, assigned, or otherwise transferred its rights in the payload (or any part thereof) to be launched by the licensee, including a conditional sale, lease, assignment, or transfer of rights, any person who has placed property on board the payload for launch or payload services, and any person to whom the customer has transferred its rights to the launch

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165"Allocation of Liabilities", *supra* note 76 at 27.

services".[166] From this definition, it appears that at least some of these situations would be included within the definition of customer.

The success of the system of the waivers of liability is achieved when all participants, even those indirectly related, agree to be bound by the waivers. Otherwise, the objective sought by the Act may be seriously affected[167].

2.2. Type of claims

The extent of the waivers of liability encompass loss of and damage to property of the United States and personal injury, death, or damage to or loss of property sustained by the employees. Like in the waivers of liability among the private sector entities, the issue of the possibility of filing claims to enforce contractual remedies has arisen. This may take place, for example, in the event that the Air Force or NASA undertakes to offer certain alternatives in cases of breach of the arrangement to provide space launch facilities. In this regard, the same conclusions apply, i.e., nothing in the statute precludes the exercise of such rights and obligations.

2.3. Public sector entities and employees

Another salient aspect of these provisions is that the public sector entities are not required to enter into reciprocal waivers of liability among themselves. Thus, for example, the Air Force may sue a contractor which caused damages to a federal range. Additionally, according to the FAA rules of October 26, 1998, the US government employees are not required to waive their claims under the reciprocal waiver of claims agreement. Therefore, any injured employee is free to elect to seek compensation from a negligent launch participant from whom he or she does not work or to exercise a labor claim against his or her employer[168].

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[166] "Final rule", *supra* note 154.

[167] "Private Launch", *supra* note 15 at 158.

2.4. Government's contractors and subcontractors

It is also worthy of note that with respect to public sector participants, the Government acting through the Secretary of Transportation enters into the waiver of liability agreement on behalf of its contractors and subcontractors, who do not therefore sign this agreement. As explained in the Final Rule of October 26, 1998, the FAA "views Government contractors and subcontractors as third-party beneficiaries of the reciprocal waiver agreement and the Government is responsible for protecting their interests."[169]

The implication of the waiver of liability for claims entered into by the US government on behalf of its contractors and subcontractors is that the Government assumes the risk of their property damage exceeding the amounts of the insured policy. According to the FAA, the Government manages this risk in a twofold way: "First, the licensee is required to obtain property insurance covering damage or loss to property of Government contractors and subcontractors involved in licensed launch activities, in addition to Government-owned property. Second, Government contractors and subcontractors must also maintain insurance for their property, the cost of which is charged to the Government as an allowable cost. In the event Government contractor property is damaged, the Government would look first to the licensee's property policy for coverage in order to relieve financial risks to the Government. The contractor's insurance would cover the second tier of risk up to policy limits. In both instances, the risk of loss above statutorily-required insurance is borne by the Government."[170]

2.5. Beginning of waivers. Payment of insurance proceeds

As mentioned above, the waivers of liability with respect to the public sector participants begin to operate, in principle, when the damages exceed the amount of

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[168] "Final Rule", *supra* note 154.
[169] *Ibid.*

the insurance or the demonstration of financial responsibility. In this regard, the compensations paid by the insurance companies go directly to the United States as a condition to the license. The same applies in the case of self-insurance. If the carrier opts for demonstrating financial responsibility all the damages must be faced directly by the carrier which must compensate the government. Only when the insurance proceeds have been exhausted or the amounts of the demonstrated financial responsibility have been exceeded does the government assume the damages to its property by virtue of the waivers of liability.

2.6. Assumption of all risks by the government: policy exclusions

Additionally, in situations where the scope of property insurance coverage available is limited by policy exclusions, such as war risk, workers' compensations, radio wave interference or environmental hazards, the amended Act permits the government to extend the waiver of claims to those excluded areas. In effect, the Secretary of Transportation is entitled to execute, on behalf of the United States and any of its agencies, waivers of liability in the event that there is no insurance coverage available on account of exclusions deemed usual in the market. This practice implies that in these cases the government assumes all the damages, i.e., from the first dollar without any limit. For example, this would be the case of damages to government launch facilities caused by a space launch provider attacked by a missile or another weapon during a war. In such case, the damages would be entirely assumed by the government since they were not covered by the insurance. It must be pointed out that the assumption of these risks is not mandatory for the United States. The Secretary of Transportation has been empowered with amply discretionary authority to decide, after a consultation process, whether or not to assume liability on behalf of the United States in cases of insurance exclusions. While we understand that this provision is both necessary and beneficial for the launch industry, we are of the opinion that the language used in the Act is detrimental for those launch providers that opt to self-insure the risks instead of resorting to obtain insurance in the market.

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[170] *Ibid.*

2. 7. Damage to Government employees

The question of claims for damage caused to government employees is analyzed below under third party liability risks. It suffices now to recall that from a strictly literal reading of the 1988 Amendments, this kind of damage should be covered by the waivers of liability. However, the FAA decided otherwise.

C. THIRD PARTY RISKS

Third party risks are allocated between the private launch provider and the government on a horizontal basis, consisting of three layers. In each of these layers, either the government or the launcher assumes the risks.

In the first layer, risks are absorbed by the private space launch provider through insurance or demonstration of financial responsibility in an amount sufficient to compensate the maximum probable loss, which has been capped at $ 500,000,000 or at the maximum liability insurance available on the world insurance market at a reasonable cost.[171] Risks in the second layer are assumed entirely by the government through a payment of claims provision generally referred to in the literature as indemnification up to the amount of $ 1,500,000,000. Finally, the third layer includes all claims above the upper limit of the that indemnification and is the exclusive responsibility of the launch provider.

1. First layer: Third party liability insurance or demonstration of financial responsibility

As a condition to the issuance of the license to carry out launch services, according to the text of section 16(a)(1)A, of the 1988 Amendments the carrier is obliged to:

[171]Since in practice the Department of Transport specifies liability insurance to cover a period which can be shorter than the period involving activities carried out pursuant to the license, under certain conditions government indemnification may apply to the first dollar of claims. D.E., Cassidy,

"1.When a license is issued or transferred under this chapter, the licensee or transferee shall obtain liability insurance or demonstrate financial responsibility in amounts to compensate for the maximum probable loss from claims by

A. a third party for death, bodily injury, or property damage or loss resulting from an activity carried out under the license; [...]

2.The Secretary of Transportation shall determine the amounts required under paragraph (1)(A) and (B) of this subsection, after consulting with the Administrator of the National Aeronautics and Space Administration, the Secretary of the Air Force, and the heads of other appropriate executive agencies.

3.For the total claims related to one launch, a licensee or transferee is not required to obtain insurance or demonstrate financial responsibility of more than

A. i.$500,000,000 under paragraph (1)(A) of this subsection; [...]

B. the maximum liability insurance available on the world market at reasonable cost if the amount is less than the applicable amount in clause (A) of this paragraph."

1.1. Philosophy of the 1988 Amendments

As can be observed from the quoted article, the 1988 Amendments maintained the obligation that the carrier have third party liability insurance as prescribed in the Commercial Space Launch Act of 1984. The original text required the carrier to have insurance in an amount considered sufficient by the Secretary of Transportation to carry out launch services taking into account international obligations assumed by the United States. However, the 1988 Amendments introduced radical changes to third party insurance requirements. These changes reflect the underlying philosophy of the acts. The purpose of the 1984 Act was merely to simplify the procedures for the application and obtention of a license, without giving any protection to the commercial space launch industry. The 1988 Amendments were geared to implement a favorable system of distribution of risks and assignment of liability for the launch carriers.

"Insuring Space Launch and Related Risks", (1991) 34 Proceedings of the 34th Colloquium on the

1.2. Self insurance

The 1988 Amendments permit the launch carrier to opt between a third party liability insurance and the demonstration of financial responsibility, i.e., self-insurance or any other risk management alternative. The possibility to resort to self-insurance is a response to the space insurance market conditions prevailing in the 1980's.

1.3 Maximum possible loss vs. maximum probable loss

The limitation of the insurance to be obtained to the maximum probable loss was also a response to the insurance market conditions existing at the time of the enactment of the 1988 Amendments. In this respect, damages arising from a space launch may be classified in possible and probable. The former refer to the highest possible damages which an extraordinary and quite unlikely accident may cause. These might include, for example, damages to the entire population of a city. The actual maximum possible damages exceed the insurance -and self-insurance- capacity, at least at reasonable costs, existing in the world space insurance market. On the other hand, the probable damage is that ordinary damage which may occur in most of the accidents related to space launches. The maximum probable damage refers to ordinary accidents which may originate maximum losses. Under normal insurance market conditions, probable damages may be insured at reasonable costs.

As pointed out by Valérie Kayser, the lack of definition of maximum probable damage in the Act and the ambiguity of the concept vest the Secretary of Transportation with ample discretionary powers to determine the maximum probable damage. This situation presented a possible source of problems for the industry, for the Act does not specifically foresee the possibility of challenging this determination before the Courts. [172]

Law of Outer Space at 390 [hereinafter "Insuring Space"].

[172] "Private Launch", *supra* note 15 at 154.

1.4. Assessment of maximum probable damage standard

At the time of the enactment of the 1988 Amendments there was no consensus on a method to assess the probable damages from a launch operation. Therefore, the legislators opted to adopt the limit of US$500,000,000 which was the amount required by NASA for the insurance of payloads carried by the Space Shuttle.[173] There is, however, a dual limitation. First the insurance may not exceed US$ 500,000,000. Then there may be a second limitation in the event that the Secretary of Transportation determines that the maximum available liability insurance coverage in the world market is less than that US$ 500,000,000.

1.5. Beneficiaries of insurance

The beneficiaries of the insurance are: (i) the United States Government, its executive agencies and personnel, contractors, and subcontractors of the Government and (ii) private sector participants, such as contractors, subcontractors, and customers of the licensee and the contractors and subcontractors of the customer.

The inclusion of the US government may not generate any cost to the United States. Therefore, the carrier may not charge a price to the government. Additionally, in our opinion, the carrier may not even deduct this cost from federal income tax purposes. Notice, however, that the Internal Revenue Code does not prohibit as such this deduction.

[173] NASA required US$500,000,000 for a single payload and US$ 750,000,000 in the case of multiple payloads.

1.6. Government employees

In the rule issued by the Federal Aviation Administration on October 26, 1998 the government personnel must now be considered third parties. Therefore, their claims are to be included in the launch carrier's liability policy, where they should be named as additional insureds. Previously, risks to government employees were considered by the industry as second-party risks and thus covered by the government indemnification. This meant that the government assumed responsibility for losses sustained by their own employees through the reciprocal waiver of liability. As we have seen, these waivers operate as from the amount of the maximum probable loss, which may not exceed US$ 100,000,000 or the highest amount of liability insurance available. Now, under the new regulation, since they are considered third parties, the government will only assume the risks for their employees as from the maximum probable loss for third party claims, which may not exceed US$ 500,000,000 or the maximum liability insurance available and only up to US$ 1,500,000,000. This clearly shows that the industry is deprived of a protection which it used to enjoy. Notice, however, that the Government would continue to be responsible for employees' claims in the event of a policy exclusion considered usual for the type of insurance in question.

1.7. Employees of Governments' contractors and subcontractors

The FAA also determined that employees of government contractors and subcontractors should also be considered third parties, like United States personnel. In this respect, the Agency stated that: "Although Government contractors and subcontractors are private entities not subject to the restrictions of appropriations laws, the agency maintains that it is appropriate to accord to those employees the same status as Government employees for this limited risk management purpose and require that the licensee's liability policy respond to claims of Government personnel.

The waiver requirement set forth in the statute provides that the Government waives claims "for" or "on behalf of" its contractors involved in launch services. In doing so, the Government takes on additional responsibilities to safeguard the interests and rights of those entities that perform launch services, at the behest of the Government, in support of commercial operations. For this reason, Government contractors and subcontractors should not be required to accept additional liability or insurance obligations when they perform services in support of commercial launch operations under contract to the Government. Although Government contractors and subcontractors could obtain insurance to cover a contractual indemnification obligation, they are not currently required to do so. Thus, costs incurred in obtaining this additional coverage would likely be passed through to the Government as allowable and allocable costs. Rather than incur additional costs or risks, the agency has determined to maintain its current practice of requiring that the liability policy obtained by the licensee under the CSLA respond to claims of Government contractor and subcontractor employees".[174]

1.8. Private participants' employees

Risks of each private participant's employees continue to be considered first party risks and thus assumed by each such participant by means of the reciprocal waivers of liability. The private participants are free to determine the most appropriate risk management technique to face these risks.

1.9. Assumption of risks by the government: license period and policy exclusions

The United States, acting through the Department of Transportation assumes the payment of the claims made by third parties against the carrier, its customers, and contractors and subcontractors of both, provided that these do not exceed US$ 1,500,000,000. However, in certain cases, the risk assumed by the government is higher. In effect, in practice, the Secretary of Transportation establishes a license

[174] "Final Rule", *supra* note 154.

period which is lower than the insurance coverage period therefore in certain cases, the government indemnity may apply as from the first dollar claimed by third parties.[175] The US government may also assume the entirety of the claims in case of usual and standard exclusions in the insurance policy[176].

1.10 Discrimination against self-insurers

In our opinion, even if this provision is very important for the industry in light of the usual exclusions in third party liability insurance, it appears to discriminate against those launchers that are able to demonstrate financial responsibility alternative to third party liability. A possible solution would be to offer the same possibility to these launchers. Under this proposal, where the launch carrier that opted to demonstrate financial responsibility would have enjoyed the assumption of the damages by the government had it resorted to insurance that launch provider should also benefit from the government's assumption of the damages.

This provision, which is of significant importance for the industry, should not act as a motivation for insurance companies to create new exclusions. For this reason, the assumption of these damages is merely optional for the United States. Thus, in such cases the Secretary of Transportation may refuse to provide for the payment of the excluded claims.

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175 "Insuring Space", *supra* note 171 at 390.

176 The text of the Act establishes that: "To the extent insurance required under section 70112(a)(1)(A) of this title is not available to cover a successful third party liability claim because of an insurance policy exclusion the Secretary decides is usual for the type of insurance involved, the Secretary may provide for paying the excluded claims without regard to the limitation contained in section 70112(a)(1)."

2. Second level: government indemnity

The second level of the third-party risk system is made up of government indemnity[177]. It constitutes the central element of the system of distribution of risk and assignment of liability between the private sector launch industry and the government. This materialized one of the concerns of the launch industry. The government thus shares with the private sector the risks which may arise from a commercial space launch.

2.1. Requirements for assumption of risks

The government is directed to assume only successful claims. This does not mean that the government pays only for claims which obtained a final and binding decision from the courts. The government also assumes the claims which have been finally settled and the legal fees and other related costs. In certain cases, as analyzed above, the government may also assume claims without recognizing the threshold of the maximum probable loss.

2.2. Procedure for indemnification

It is worthy of notice that the legislative amendments introduced in 1988 do not explicitly mandate indemnification of launch participants. Actually, they simply design a procedure whereby Congress may enact legislation to appropriate the funds

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177 The relevant part of the Act establishes that "To the extent provided in advance in an appropriation law or to the extent additional legislative authority is enacted providing for paying claims in a compensation plan submitted under subsection (d) of this section, the Secretary of Transportation shall provide for the payment by the United States Government of a successful claim (including reasonable litigation or settlement expenses) of a third party against a licensee or transferee under this chapter, a contractor, subcontractor, or customer of the licensee or transferee, or a contractor or subcontractor of a customer, resulting from an activity carried out under the license issued or transferred under this chapter for death, bodily injury, or property damage or loss resulting from an activity carried out under the license. However, claims may be paid under this section only to the extent the total amount of successful claims related to one launch—

A. is more than the amount of insurance or demonstration of financial responsibility required under section 70112(a)(1)(A) of this title; and

necessary to face the exceeding claims. However, according to the competent regulatory authority, "the 1988 Amendments represent an undertaking by Congress to allocate to the United States Government the risk of certain losses ... in excess of third party claims."[178]

The legislative amendments introduced in 1988 include a complex procedure to make the payments of claims assumed by the government through the government indemnity. In this respect, the payment must be subject to: (i) notice to the Government of a claim, or a civil action related to the claim, against a party included in the government indemnity, i.e., the launch services provider, its contractors and subcontractors, and its customer and the contractors and subcontractors of the customer, for death, bodily injury, or property damage, (ii) participation and assistance of the Government, at its choice, in the defense of the claim or action; and (iii) approval of the Secretary of Transportation of any part of a settlement to be paid out of appropriations of the government.

Additionally, the Secretary may withhold payment of a successful claim if she determines that the amount is not reasonable when it has not been the object of a claim finally decided by a court of competent jurisdiction. In our opinion, this provision is not fair, since the United States has the duty to participate in the lawsuit or assist the defense of the participant whom it has granted the indemnity to. In effect, if the United States government participated in an extrajudicial settlement it may not then allege that the settlement is unreasonable.

The Secretary of Transportation is obliged to conduct a survey of the causes and extent of damage when the claims arising from one launch are likely to exceed the amount of required insurance or demonstration of financial responsibility. In that case, the Secretary must submit to the Congress a report on the results of the survey.

B. is not more than $1,500,000,000 (plus additional amounts necessary to reflect inflation occurring after January 1, 1989) above that insurance or financial responsibility amount."

[178] 14 CFR Part 440 Financial Responsibility Requirements for Licensed Launch Activities. Notice of Proposed Rulemaking, July 25, 1996.

Additionally, within 90 days after a court determination indicates that the liability for the total of claims related to one launch may be more than the required amount of insurance or demonstration of financial responsibility, the President, on the recommendation of the Secretary, must submit to the Congress a compensation plan which (i) outlines the total dollar value of the claims; (ii) recommends sources of amounts to pay for the claims; and (iii) includes legislative measures required to carry out the plan if additional legislative authority is needed.

2.3. Maximum amount for each occurrence

According to the wording of the Act as originally enacted no compensation plan for a single event or incident may exceed the aggregate of $1.500.000.000. We disagree with the language used in the quoted provision. In effect, in the -unlikely- case of collision of two launch vehicles covered by licenses issued by the Department of Transportation, the liability of the United States is US$ 1,500,000,000 for the total of the claims for each of the issued licenses, even it they originate from the same event. In such case, the US government liability would amount to $3,000,000,000 with respect to both licenses. Thus, in the Final Rule adopted by the FAA on October 26, 1998, the FAA clarified that "the policy limits apply for each occurrence and that for each occurrence the limits apply to the total of claims that arise out of licensed launch activities in connection with any particular launch."[179]

2.4. Willful misconduct

Finally, it must be pointed out that the Secretary of Transportation may not provide for paying a part of a claim for which death, bodily injury, or property damage or loss results from willful misconduct by the licensee.[180] There is no indication whatsoever with respect to gross negligence of the launch carrier. Thus, in principle,

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[179] "Final Rule, *supra* note 140.

[180] The Act does not define the concept of willful misconduct.

successful third party liability claims arising from gross negligence should be absorbed by the US government.

3. Third level: Carrier's Assumption of Maximum Possible Loss

The third layer includes all claims above the upper limit of the government indemnification, i.e., US$ 1,500,000,000 over the amount of prescribed third party liability insurance, and constitutes the exclusive responsibility of the launch provider. Risks above the US$ 1,500,000,000 level are considered possible but extremely improbable. These risks are thus referred to as maximum possible losses or catastrophic losses.

It must be pointed out that the likelihood of any incident that would produce claims in excess of $1,500,000,000 is very remote. Actually, there has never been a successful third party claim in the history of the US Space program.[181]

Thus, in practice the government assumes the most burdensome role in the risk allocation system established in the 1988 Amendments. Furthermore, this system also provides the certainty to the launch operators that they will not be exposed to unlimited liability, which enables the US private-sector launch carriers to compete in better conditions with European and other foreign launchers.

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[181] "Senate Report", *supra* note 148 at 17.

CHAPTER VII

DISTRIBUTION OF RISKS AND ASSIGNMENT OF LIABILITY IN ARIANESPACE SPACE LAUNCH AGREEEMENTS

A. FIRST PARTY RISKS

First party risks are assumed by each party by means of reciprocal waivers of liability. These are always included in the launch services agreement and trace back their origin to the reciprocal waivers of liability first adopted by NASA. They are generally drafted as follows:

> "Each Party shall bear any and all loss of or damage to property and any bodily harm (including death) and all consequences, whether direct or indirect, of such loss, damage or bodily harm, (including death), and/or of a Launch Mission failure and/or of a Satellite Mission Failure, which it or its Associates may sustain that arises in any way in connection with this Agreement, or the performance of this Agreement. Each Party irrevocably agrees to a no-fault, no subrogation, interparty waiver of liability, and waives the right to make any claims or to initiate any proceedings whether judicial, arbitral, administrative on this account against the other Party or that other Party's Associates for any reason whatsoever.
>
> Each Party agrees to bear the financial and any other consequence of such loss, damage or bodily harm (including death), and/or of a Launch Mission failure and/or of a Satellite Mission Failure, which it or its Associates may sustain, without recourse against the other Party or the other Party's Associates.
>
> In the event that one or more Associates of a Party shall proceed against the other Party and/or that Party's Associates as a result of such loss, damage or bodily harm (including death), and/or of a Launch Mission failure and/or of a Satellite Mission Failure, the first Party shall indemnify, hold harmless, dispose of any claim, and defend, when not contrary to the governing rules of procedure, any liability and expense, including

> attorneys' fees, on account of such loss, damage or bodily harm (including death), and/or of a Launch Mission failure and/or of a Satellite Mission Failure and shall pay all expenses and satisfy all judgments and awards which may be incurred or rendered against that other Party and/or its Associates."

As can be gathered from the quoted clauses of the agreement, these waivers of liability consist of (i) a general assumption of risks by each party, (ii) the assumption of the consequences of those risks, (iii) a consequent waiver of rights to make a claim for liability, (iv) a waiver for the consequences of the losses suffered, and (v) an indemnification or hold harmless provision in case of actions filed despite the waiver.

The objectives sought by the reciprocal waivers of liability are basically to limit the claims that might arise from a launch, and to eliminate, or at least reduce, the necessity to obtain property and casualty insurance to protect against claims which may otherwise derive from the launch. These objectives are also the same ones sought by NASA and the US private industry for the implementation of the US first party risk- distribution system.[182] Like in the US systems, the reciprocal waivers of liability act as a mechanism for the transfer of first party risks to the customers, thus exempting the launch provider from damages which it causes. In practice, this is translated as an exclusion of liability, which constitutes an exception to the fault principle of the French civil law. This principle clashes against the principle of the "benefit from space activities," which is a pragmatical doctrine that has been advocated for by commentators since the 1980's and has been adopted in several areas of Space Law and not just in space transportation. This principle states that "the parties to an activity in outer space, who stand to benefit from that activity shall share some of the risks of that activity." According to Paul Larsen the participants in space activities may enjoy more benefits from outer space activities if they assume responsibility for damage that they may cause to the other parties involved in that same activity because litigation and insurance costs are saved.[183] This principle has also been put forward by Argentine Space Law scholar Manuel

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[182]"Risk Management", *supra* note 11 at 145.

[183]P. B. Larsen, "Cross Waivers of Liability", (1992) 35 Proceedings of the 35th. Colloquium on the Law of Outer Space, 1992 at 91.

Augusto Ferrer.[184] It must be borne in mind that this principle or the system of reciprocal waivers of liability for first party risks do not in any way imply a limitation of liability to damages suffered by persons or property that are unrelated to the launch, for this, at least in the international sphere, would contradict the mandate of the Liability Convention.[185]

The scope of the reciprocal waivers of liability are quite broad, for they include (i) damage to property, (ii) bodily harm, (iii) death, (iv) all their consequences, (v) Launch Mission failure, and (vi) Satellite Mission Failure. The waivers of liability used in Arianespace launch services agreements also cover contractual losses. In effect, they include Launch Mission failure, i.e., the impossibility of placing the satellite in the agreed upon orbit due to problems caused by the space vehicle or the launch itself, and Satellite Mission Failure, i.e., risks of causing damage to the satellite which may impede it to attain the intended orbit or operate successfully in it.

As mentioned above, the reciprocal waivers of liability comprise a no-fault, no subrogation, interparty waiver of liability, and an indemnification provision in the event that a claim is nonetheless filed. The former implies that neither party may make any claims or initiate any proceedings not only judicial but also arbitral or administrative based on any reason or event connected to the agreement. Since the waiver is a no fault- type the parties may not allege fault on the other party to base a claim. It is not clear, however, whether a party to an Arianespace agreement could file a claim based on willful misconduct or even gross negligence (*faute lourde*). A non-subrogation waiver means that a third party, mainly the insurance company or a financial institution which, for example, provided funding to the payload, may not place itself in the parties' position and make a claim to the party causing damage based on the rights assigned to it.

The indemnification provision for claims filed despite the restriction of the waivers of liability stems from the fact clauses that have as object the exoneration of

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[184]"Actividad Comercial", *supra* note 94 at 169.

[185]A. A. Cocca, "The Principle of Full Compensation in the Convention on Liability for the Liability for Damage Caused by Objects Launched into Outer Space", (1972) 15 Proceedings of the 15th Colloquium on the Law of Outer Space at 92.

responsibility when there are bodily injuries are prohibited under French Law.[186] Therefore, in the event that, for example, employees of the customer suffer physical damages or even death they or their heirs could file a claim before the French courts, which would be admitted despite the waiver of liability contained in the launch services agreement. In such case, the launch carrier could be condemned to pay damages to said employee or their heirs. If so, the carrier could, in turn, recover damages so paid from its customer by invoking the indemnification and hold harmless provision of the agreement.

The reciprocal waivers of liability encompass both Arianespace and its associates and the satellite owner and its associates. The term associate is defined as the personnel, the contractors and subcontractors of the launch company and the satellite owner. Therefore, in the event of an accident triggered off by a component of the satellite Arianespace would be precluded from making a claim against its customer contractor or subcontractor that manufactured the part which caused the accident. At the same time, if an accident causes damage to the satellite and the cause of such accident is found to be a device in the Ariane the satellite owner may not bring a claim against Arianespace's contractor or subcontractor that produced said device.

This liability-waiver scheme is further complemented by obliging each party to the agreement to make its contractors and subcontractors execute reciprocal waivers of liability so that they will also be banned from filing claims in the event of an accident. This is generally drafted in Arianespace launch services agreement as follows:

> "Each Party obligates itself to take all necessary and reasonable steps to foreclose claims for loss, damage or bodily harm (including death) by any participant in the launch activity. Each Party shall require its Associates to agree to a no-fault, no subrogation, inter-party waiver of liability and indemnity for loss, damage or bodily harm (including death) its Associates sustain identical to the Parties' undertaking under this Article ... of the Agreement..."

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[186] E. Loquin, "La gestion contractuelle des risques de l'exploitation commerciale de l'espace", in P. Kahn, ed., *L'Exploitation commerciale de l'espace: droit positif, droit prospectif*, (Dijon: Litec Credimi, 1992) at 173.

This so called flow-down waiver of liability was adopted by Arianespace after NASA's extension of their waivers of liability. While it is clear that each party to the agreement is obliged to avoid claims made by other participants, mainly contractors and subcontractors, to the other party and to execute waivers of liability so that they will not sue the other party, it is not clear whether a party may sue its own associates. This possibility which is not forbidden in the United States systems would seem banned by the wording of the flow-down provision, which differs slightly from the ones used by NASA and US private sector companies.

B. SECOND PARTY RISKS

As examined above, second party risks are risks to certain related entities which, although they do not participate directly in the space launch, are all the same exposed to some risks. These risks may be divided into risks derived from international Space Law liability norms called International Liability Risks and risks to the owners or other right-holders of the launch facilities and related range services. The latter are called Property Risks.

1. International Liability Risks

Second party international liability risks involve Arianespace, the European Space Agency, its member states and the French government. They refer to the possibility of these governmental and supra-governmental entities' being considered launching states and therefore liable pursuant to the Liability Convention. These risks are distributed on a two-layered basis, where Arianespace assumes liability up to 400,000,000 French francs through insurance and the French government bears all liability claims above that level by means of governmental indemnification.

1.a. First layer

Participants in the Production Declaration requested Arianespace to undertake to reimburse the French Government within a ceiling of 400 million French francs per

launch, the amount of any damages it may be required to pay in case of damages caused by launches rendered by Arianespace to third parties to such launches.[187]

This assumption of liability by Arianespace is implemented through a reimbursement of costs to the French government for compensation it may have paid in the event of proceedings initiated for damages caused by Arianespace to third parties if the French government, ESA or its member states were considered launching states and thus held liable for said damages. In this case, Arianespace does not have to pay directly to the victims but has to refund the French government any compensation actually paid by it to third parties or to ESA or its member states if the Agency or its members paid a compensation to the victims of the accident if they were deemed launching states.

As arises from the quoted paragraph of the Production Declaration, Arianespace's obligation to reimburse is capped at 400,000,000 French francs. This again represents the approximate value of the Space Shuttle when NASA first drafted its risk-sharing system. The cap on the reimbursement has been set on a per launch basis. Thus, even if, for example, Ariane carries two payloads in a single launch which causes damages to third parties, Arianespace will still have to reimburse up to 400,000,000 French francs.

It is worthy of note that the Declaration is silent as to whether the compensation which Arianespace has to reimburse may include reasonable attorneys' fees or only actual compensation paid to the victims. In our opinion, since there are no restrictions or limitations in the text of the Declaration it is reasonable to hold that attorneys' fees should be considered included within the obligation to reimburse. Thus, for example, if a launch service provided by Arianespace causes damages to foreign persons thoroughly unrelated to the launch and a judgment is passed condemning the French government and ESA, together with its members, to pay compensation in the amount of 200,000,000 French francs and court costs and attorneys' fees of 50,000,000 French francs, Arianespace should reimburse the French government 250,000,000 French francs.

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[187]Declaration by Certain European Governments Relating to the Ariane Launcher Production Phase signed by states participating in the Ariane production phase, VOL.II-BIS/G02V, article 3.8.

There is no procedure for the reimbursement of the compensation. Neither is there a term. We understand however that Arianespace should refund the compensation to the French government immediately or at least as soon as practically feasible. Another important aspect which is worth highlighting is the fact that the Declaration does not expressly deal with the kind of claims paid by the French government which Arianespace has to reimburse. In this regard, the Declaration does not foresee, for example, whether the compensation paid by the French government that triggers off Arianespace's reimbursement obligations must arise from a final and definitive judgment or if, for example, the French government may or may not settle a claim in any amount and seek reimbursement from Arianespace.

Although the Arrangement for the development phase signed on September 21, 1973 which structures the legal framework for the development of the Ariane launcher under the auspices of ESRO and later ESA, is not part of the system of distribution of risks and assignment of liability for Arianespace launch services, it is worth examining the main characteristics of its risk management provisions. Since ESA owns the elements of the Ariane launcher, the facilities and equipment acquired for its development, and the launching facilities, it may be held liable pursuant to the Liability Convention, for it may be considered to be a launching state. Thus, article XIV of the Arrangement establishes a mechanism for the assignment of liability. According to this article, the participants have undertaken to indemnify the Agency in respect of any obligation it may incur in the event that its international liability is involved as a result of execution of the development phase of the program. For example, in the event that the Ariane program caused damages to third parties during its development stage, any claim that ESA had to pay would actually be satisfied by the participants. In practice, this mechanism operates as indemnification provided by the participant states to non participants. Also, the arrangement spells out that any compensation for damage received by the Organization with respect to the development phase of the program had to be credited as an income to the annual program budgets.

1.b. Second layer

According to the Production Declaration, in the event of a claim made by the victims of damages caused by Ariane launches, the French Government will be responsible

for the payment of any damages that may be awarded.[188] This assumption of liability implies a governmental indemnification granted by the French state, which has been loosely modeled after NASA's indemnification. The quoted article of the Production Declaration is silent as to the floor and ceiling of this governmental indemnification. However, a thorough analysis of the Declaration indicates that since Arianespace is obliged to face all claims up to 400,000,000 French francs through insurance, the indemnification granted by the French government operates in practice as from that level upwards. Additionally, since there is no cap it may be concluded that the French government has assumed to indemnify the maximum possible loss, i.e., all claims which may arise from the launch regardless of the aggregate amount and their likelihood of occurrence. Therefore, Arianespace assumes liability for what is considered maximum probable loss, i.e., 400,000,000 French francs, and the government assumes the potential but extremely unlikely maximum possible loss.

According to Lafferranderie, the beneficiaries of the indemnification are the member states of the Agency, whether or not they participate in the production phase of the Ariane.[189] We disagree with Lafferranderie, for there are no limitations regarding beneficiaries in either article V.1 or elsewhere in the Declaration. In effect, the article in question simply puts forward that the French government will have to bear the compensation of damages. This commitment should be construed as benefiting all entities which the Declaration addresses to. Consequently, the assumption of liability made by the French government includes not only ESA's member states, but also ESA itself and Arianespace.

2. Property risks

Arianespace uses goods which are property of ESA, such as the *Ensemble de Lancement Ariane*, goods and properties of CNES, such as the technical and logistical means of the Guiana Space Centre and the services of CNES at the CSG. Therefore, any launch service provided by Arianespace may potentially cause damages to CNES and ELA.[190] In order to distribute this category of second party

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[188]Declaration by Certain European Governments Relating to the Ariane Launcher Production Phase signed by states participating in the Ariane production phase, VOL.II-BIS/G02V, article 4.1.

[189]G. Lafferranderie, "Responsabilité juridique internationale et activités de lancement d'objets spatiaux au CSG", (1994) 80 ESA Bulletin at 58.

[190]*Ibid.*

risks the entities involved have executed a series of documents aimed at creating an adequate risk management scenario, which is analyzed below.

2.a. ESA and Arianespace

ESA and Arianespace signed a Convention on May 15, 1981[191] - extended on September 24, 1992 - which aimed at putting into practice the principles of the Production Declaration. The Convention establishes risk-distribution provisions for two hypotheses: (i) damages caused by Arianespace to ESA and (ii) damages caused by ESA to Arianespace.

With respect to the former, Arianespace is held liable for all damages caused by it or third parties to the goods of ESA (or to participant states) that have been at its disposal. In effect, whenever Arianespace causes damages to the Agency's launch site it will have to assume liability and pay for all damages it produces. This is also true with regard to damages caused by third parties to the Agency. Within the meaning of the Convention, a third party would include Arianespace's customer and CNES, among others. Thus, in event that the satellite causes damages to the Agency's launch facilities Arianespace will assume the risks vis a vis the Agency. In order to manage these risks assumed by Arianespace, the launch carrier takes out insurance and passes the cost of this insurance to its customers. This insurance covers what Arianespace considers is the maximum probable loss that ESA may suffer in a launch: 400,000,000 French francs. Therefore in the launch services agreement Arianespace includes the following language in the clause dealing with insurance requirements, which is fully analyzed below. Suffice it here to quote the relevant part of this clause. It generally reads as follows:

> Arianespace shall, for the Launch, take out an occurrence basis type insurance policy at Customer's cost to protect itself and Customer against liability for property and bodily harm which Third Parties may sustain and which are caused by the Combined Space Vehicle or part thereof. In said insurance policy the natural and corporate bodies hereafter shall be named as assured: "..."

[191] Convention between ESA and Arianespace signed May 15, 1981, ESA/C(81)11.

> 4. The European Space Agency "E.S.A.", but only in its capacity as owner of certain facility and/or outfits located in the Centre Spatial Guyanais in Kourou and made available to Arianespace and/or C.N.E.S. for the purpose of the preparation and the execution of the launches."

Notice that this insurance policy is included within the general insurance policy which Arianespace takes out. In that insurance Arianespace has to extend the protection to ESA for damages to its facilities but there is no need to acquire a new and separate policy to cover these risks. This, nonetheless, increases the price of the policy for the customer, which is ultimately forced to assume through this insurance the cost of holding ESA harmless for the damages it, Arianespace or CNES may cause to ESA.

With regard to the damages caused by ESA to Arianespace, the launch services provider has agreed to assume these risks and bear all damages. Indeed, it renounced to make any claims to ESA for damages it may suffer which are caused to it by the use of the goods of the Agency.

C. THIRD PARTY RISKS

Third party risks are distributed in Arianespace launch services agreements in a two-layered basis. In the first level Arianespace requires the customer to assume the risks up to the amount of 400 million French francs through insurance taken by Arianespace and paid for by the customer. In the second level, the French government provides full indemnification to pay all claims above 400 million French francs.

1. First layer: Insurance

Due to the importance of this clause in Arianespace the agreement, it is worth quoting the language generally used by the French carrier:

> "Arianespace shall, for the Launch, take out an occurrence basis type insurance policy at Customer's cost to protect itself and Customer against liability for property and bodily harm which Third Parties may

sustain and which are caused by the Combined Space Vehicle or part thereof. In said insurance policy the natural and corporate bodies hereafter shall be named as assured:

1. The government of France

2. The Centre National d'Etudes Spatiales "C.N.E.S." and any launching state as per Convention of March 29, 1972 related to the international liability damage caused by spacecraft.

3. The auxiliaries of any kind, whom Arianespace and/or the C.N.E.S. would call for in view of the preparation and execution of the launching operations.

4. The European Space Agency "E.S.A.", but only in its capacity as owner of certain facility and/or outfits located in the Centre Spatial Guyanais in Kourou and made available to Arianespace and/or C.N.E.S. for the purpose of the preparation and the execution of the launches.

5. The firms, who have participated in the design and/or in the execution and/or who have provided the components of the Launch Vehicle, of its support equipment including propellants and other products either liquid or gaseous necessary for the functioning of the said Launch Vehicle, their contractors, subcontractors and suppliers.

6. Customer and Third Party Customer(s) of Arianespace on whose behalf Arianespace executes the launch services as well as their co-contractors and subcontractors.

7. When they act in the scope of their activities, the Officers and Directors, the legal representatives, the Managing Director, the employees, agents, as well as the interim staff employed by Arianespace or by the Assured mentioned in hereabove Paragraph 1 to 6 (included).

Said insurance coverage shall come into effect as of the day of the Launch, and shall be maintained for thirty-six (36) months or for so long as all or part of the

Combined Space Vehicle remains in orbit, whichever period is shorter.

The insurance policy shall be taken out in the amount of 400,000,000 French francs."

1.a. Purpose

As can be seen in the above quoted clause, it is Arianespace that undertakes to procure the insurance to protect from third party liability, but it is the customer that actually has to pay for it. The reason for this mechanism lies in the fact that the space insurance industry has proven to be quite volatile. Indeed, space insurance is a "specialty line and only a relatively small community within the totality of the insurance industry is actively involved in providing insurance for space launches."[192] In the early 1980's right before the risk allocation system for Arianespace was conceived the space insurance industry suffered a number of serious losses due to launch failures and the loss of payloads.

1.b. Acquisition of insurance

In light of these characteristics of the space insurance market, it is believed that if Arianespace directly negotiates the premiums for its customers with the insurance companies it may obtain better prices than if satellite operators individually intend to procure space insurance. This is especially so in the case of start up, small companies or companies from developing countries with little experience negotiating with the space insurance industry. Additionally, this is beneficial for all satellite companies in the event of a crisis of the space insurance market, which, as analyzed above, may occur somewhat frequently. Unlike NASA, Arianespace has no authority to waive the cost of the insurance to certain entities which may find it harder to obtain insurance, either because of their financial situation or because of market conditions.[193]

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[192]"Senate Report", *supra* note 148.

[193]"Commercial Space", *supra* note 131 at 206.

1.c. Type of insurance

The kind of insurance contemplated in the launch services agreement is an occurrence type, i.e., that insurance which requires notice of a reportable occurrence to the insurer as soon as practicable. Within the meaning of insurance an occurrence is an incident which is sufficiently serious to lead the insured to believe that it might give rise to a claim for damages covered by the policy.

1.d. Damage

The insurance has to protect against liability for property and bodily harm which may be suffered from third parties. Although not always expressly mentioned in the launch services agreement, it is obvious that liability for death also has to be covered by the insurance. Under the quoted section of the agreement, liability, which should be covered in the insurance, is that caused by the combined space vehicle, i.e., the Ariane, the payload assist module, and their parts.

1.e. Beneficiaries

Apart from certain entities, such as the French government, CNES or ESA fully analyzed within the category of second party risks, the insurance policy has to include as insured Arianespace, the customer, companies which participated in the design, execution or companies that provided certain components to the launch vehicle, and the contractors and subcontractors of the customer and Arianespace. It is worth recalling that contractors and subcontractors are protected against claims which may be filed against them on the grounds of the product liability theory.

Although not specifically mentioned, suppliers of the customer should also be named as insured. Indeed, the agreements generally establish that the suppliers of the launch company should be included in the insurance policy. However, we understand that the spirit of this provision extends to all suppliers of component parts of the satellite. In effect, we are of the view that the concept of supplier is included within the meaning of the phrase "contractors and subcontractors".

According to the quoted article, the insurance will also include as additional insured the officers, directors, legal representatives, managing director, employees,

agents and interim staff of Arianespace and the customer and their contractors and subcontractors. In order to be covered by the policy these people must have acted in the scope of their activities at the time of the occurrence of the accident which caused damages. It is to be noted that this does not act as a life insurance for these people. Actually, it protects them from liability claims made by third parties.

1.f. Period

The effective period of the insurance coverage commences with the launch and ends at the earlier of the end of the thirty-sixth month as from the launch or as long as a part or all of the combined space launch vehicle is in orbit.[194] Controversies may arise for the determination of the moment when the space vehicle, or rather a component part, ceases to be in orbit. Since a part of a launch vehicle, or any other space object for that matter, may remain in outer space for years it is sometimes difficult to determine the moment when the insurance coverage has ended. Following Mireille Couton, if the satellite causes damages to a third party once the insurance policy has expired, the customer will have to face these damages. Indeed, for example, in the event that an accident occurring after the thirty-sixth month period where debris from the satellite cause damages to a third person on Earth the customer will have to compensate these damages. In our opinion, however, the customer will only have to pay for damages up to 400,000,000 French Francs, for the governmental indemnification covers any claim above that amount.

1.g. Insurance cap

The insurance requirements have been capped at the amount of 400,000,000 French francs. In effect, Arianespace has to hire an insurance policy of only 400,000,000 Ff. According to a statement made by Douglas A. Heydon before the US House of Representatives, the historical basis for Arianespace's requiring the customer to obtain 400,000,000 French francs coverage is simply that when Arianespace began writing its first contracts the only model available was NASA. At that time, in the

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[194] The definition of launch becomes of utmost importance. In general, launch is defined as the intentional ignition of the engines. In other contracts launch is defined to start with the first launch intent. P. Nesgos, "Lessons Learned in Negotiating Space Contracts", (1993) Seventh Assicurazioni Generali Space Insurance Conference at 3.

1970's, NASA required a coverage of US$ 100,000,000. The French Franc was four to the dollar, which equaled 400,000,000 French francs. [195]

2. Second layer: Government indemnification

Claims for third party liability which exceed 400,000,000 French francs are assumed by the French government through indemnification. In effect, following NASA's distribution of risks and assignment of liability system, in the event of a claim by a third party filed against the user Arianespace takes full responsibility for these risks and agrees to cover its customers. In turn, the French government has undertaken to hold Arianespace harmless from all these claims exceeding 400,000,000 French francs.[196]

As in the NASA system, governmental indemnification constitutes a fundamental risk-sharing instrument aimed at protecting Arianespace's customers for claims above the level of insurance. Through this indemnification the customer is relieved from the risks of having to face claims above 400,000,000 French francs. This indemnification does not presently cost a single Franc to French taxpayers, for the government will only have to make a payment in the event of a catastrophic accident, which is rather unlikely to occur.

D. OTHER RISK-DISTRIBUTION MECHANISMS

The interrelationship between certain entities related somehow with the launches provided by Arianespace also leads to situations that may generate liability. These entities, mainly the French government, CNES and the European Space Agency, also engineered a risk-distribution approach among themselves. Although this does not expressly or exclusively relate to Arianespace launch services, we are of the opinion that it is worth examining it.

195Subcommittee on Space Science Applications of the Committee on Space Science and Technology, US House of Representatives, 100th Congress 2nd Session, February 16, 17, 1988, US Government Printing Office, 1988 at 285.

196Thoma, *supra* note 96 at 50.

1. The Guiana Space Centre (CSG)

As previously analyzed, the European Space Agency has the rights to use the Guiana Space Centre facilities, which belong to France. These rights were conferred to the Agency in an agreement known as Agreement on the Use of the CSG[197], which also authorized the construction of the ELA. It also granted the Agency and its Member States free access to the CSG facilities for the purpose of their programs.

This Agreement contains specific risk sharing provisions to govern the assignment of liability which may arise from the exercise of the rights and obligations of the agreement. In this regard, the Agency agreed to indemnify the French government in respect of any claim for any damage suffered by a Member State of the Agency or a third-party State, or by one of their nationals, arising from the execution of a program of the Agency at the CSG or from other activities carried out by the French government on behalf of the Agency under the agreement, except from gross negligence, or a deliberate act or omission, on the part of a servant or agent of the French government. In effect, the European Space Agency agreed to assume liability and hold the French government harmless of any damage that may occur on account of a program of the Agency, such as the development of a new version of the Ariane or the construction of new equipment for the ELA.

The French government must inform the Agency of any claim it received. The Agency has to join in the proceedings and substitute itself for the French government, provided this is permitted by the applicable law. For these purposes, the Agency must advance the funds needed for payment of the compensation due by the French government, if it so requests. If the French government has paid the amount of compensation for which it was held liable, the Agency has to refund the whole of that amount to it. The Agency is exempted from having to indemnify the French government in the event of damages caused to a Member State, to a third-party state, or to one of their nationals, as a result of the execution at the CSG of activities and programs other than those of the Agency.[198]

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[197] Agreement between the French Government and the European Space Agency on the French Guiana Space Centre, signed May 5, 1976, ESA/LEG/069.

[198] Compensation for any damage suffered by the Agency as a result of CNES activities or by CNES as a result of the Agency's activities carried out within the framework of the agreement has to be determined in accordance with a special protocol between the Agency and CNES.

In accordance with a decision taken by the ESA Council at its 6th Session on 26 February 1976, the expenditure incurred either by the Agency or by the French government in respect of the repair of any damage suffered by a Member State or a third-party State or their nationals will be charged to the states participating in the program in question, pro rata to their financial contribution to said program, on the date of the damage or on the date of the termination of the program, if the damage occurs after that date.

2. Agreement on ESA's Launch Site and Associated Facilities at Kourou

The relations between the French Government and the Agency concerning the Agency's launch site and associated facilities situated within the CSG are part of a special agreement signed on May 19, 1976[199]. In the event that the French government incurs international liability as a result of the execution on the base of an activity or program of the Agency requiring the use of the facilities, equipment and human and material resources of the CSG, compensation for any damage resulting from such activity or program will be made in accordance with the provisions of Article 13 of the CSG Agreement, i.e., the Agency will indemnify the French government for any damage except for gross negligence, or a deliberate act or omission, on the part of a servant or agent of the French government.

In the event that the Agency incurs international liability as a result of the execution on the base of activities or programs of the Agency which do not require the use of the facilities, equipment and human and material resources of the CSG, the Agency will be liable for any damage arising from such activities or programs. All issues related to liability contemplated in the agreement will be governed by French law, subject to the privileges and immunities of the Agency.

In order to carry out an efficient indemnification, the Agency will release the French government from any obligation invoked against it, and in particular from any indemnity, in the event of damage caused to third parties which arises out of the Agency's activities or programs.

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[199] Agreement on ESA's Launch Site and Associated Facilities at Kourou signed May 19, 1976, ESA VOL.II/E05.

Apart from third party liability claims, the agreement contemplates a risk-distribution mechanism for first party risks, whereby both ESA and CNES undertake to assume incurred damages. Indeed, the Agency or CNES, as the case may be, will bear the cost of compensation or any damage suffered by persons in its service as a result of the activities referred to in the agreement even if the responsibility lies with the other party or with persons in its service, unless, however, the damage results from gross negligence on the part of the other party.[200]

[200]The preceding provisions will apply in the same way to any damage that persons in the service of the Agency or of CNES, as the case may be, may cause to the material, equipment or facilities of the other party.

CHAPTER VIII

DISTRIBUTION OF RISKS AND ASSIGNMENT OF LIABILITY IN AUSTRALIAN LAUNCH SERVICES

A. FIRST PARTY RISKS

In accordance with the objective sought by the legislator, the Space Activities Act does not contain any provisions dealing with the allocation of risks between the space launch carrier and its customer. It does, however, contain a general authorization so that the implementing authority may make regulations in relation to the waiver of some or all of the rights of persons connected with a launch, including their employees, contractors and subcontractors.[201]

Therefore, in principle and absent the introduction of specific regulations, the customer is free to negotiate with the launch carrier any scheme to distribute these risks. However, in our opinion, the negotiating power of the launch services provider and the characteristics of the launch market will in practice give little room for the customer to obtain a risk management approach substantially different from the ones used in the US private sector or by Arianespace.

Nonetheless, it bears noting that the above considerations apply to customers of space launch services providers which do not qualify as US nationals according to the Commercial Space Launch Act. In effect, if the launch carrier may be considered a US national, it will have to abide by the first party risk regulations contained in US law. Also, if the launch carrier is a national of another state which has similar extraterritorial regulations, the customer of that carrier will be constrained to the first party risk allocation scheme contained in the legislation of its state of nationality.

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[201] Space Activities Act 1998: No. 123, 1998, Part 4 Division 1, 65.

Thus, even if Australian law is silent with respect to the distribution of risks and the assignment of liability between the launch carrier and its customer, the risk management approach for the customer, in practice, will not deviate radically from the ones followed in other jurisdictions.

B. SECOND PARTY RISKS

The Australian Space Act deals exclusively with the so called International Liability Risks, for the Commonwealth does not directly own or operate launch facilities and related range services. Therefore, the legislator has been concerned mainly with establishing a risk allocation regime for the liability which Australia may face as a result of its obligations assumed under International Law.

Thus, the Act established a two-tiered risk distribution system, where the carrier must hire insurance or demonstrate financial responsibility up to the maximum probable loss and the Australian government assumes all the liability exceeding such maximum probable loss threshold.

1. First layer: Insurance or Financial requirements

For a launch or return authorized by an Australian launch permit, as well as for a return authorized under section 43, the holder of the permit must insure the Commonwealth against any liability that it might incur under international law. The total insurance for each launch or return must be the amount of the maximum probable loss of damages to third parties caused by the launch or return.

Like the US Commercial Space Launch Act Amendments of 1988, the Australian Space Act adopted the maximum probable loss standard as the cap for the first layer of second party risks. However, unlike the US regime the Australian system does not expressly foresee a monetary cap to the maximum probable loss standard. Nor does it take into account the amount of liability insurance available on

the world market. However, according to Michael Davis, Australia provides less demanding insurance requirements than the US. Davis predicts that Australian authorities will use the same MPL assessment methods, but since Australian territory is significantly less inhabited than the US, any MPL determinations in Australia will probably result in a considerably lower amount[202]. It is also worthy of note that the Act has especially authorized the possibility of introducing through regulations a different method for determining a minimum amount for insurance purposes.

Instead of obtaining insurance, the holder of the permit may opt to show direct financial responsibility for the launch or return. This possibility, modeled after the US Commercial Space Launch Act Amendments of 1988, allows the permit-holder to self-insure against the risks or resort to other risk management strategies, such as group risk retention or the acquisition of bonds, among many other alternatives.

The liability period for each launch of a space object is the period of 30 days beginning when the launch takes place. In our opinion, the language used in the Act may trigger certain controversies, for it is sometimes difficult to determine when a launch takes place. However, it is expected that the regulations will provide a precise definition of the commencement of the liability period. Note that this period is the same for carriers that acquire insurance and for those that opt to self insurance.

2. Second layer: Government assumption

The Australian government assumes all damages exceeding the amount of the insurance or financial responsibility which the launch operator must obtain or demonstrate. There is no limitation for the assumption of these risks by the government so Australia will be assuming all risks above the maximum probable loss threshold. Notice also, that the Australian Act does not foresee the cases of exclusions in insurance policies. So in principle, the government may never assume

[202] "The Australian Approach", *supra* note 92 at 5.

damages which are below the maximum probable loss determination, even if it is not actually covered by the insurance policy obtained by the launch operator.

C. THIRD PARTY RISKS

Third party risks are also allocated between the launch operator and the government on a horizontal basis, consisting of two layers. In the first one it is the launch operator that assumes all risks up to the amount of the insurance requirement. In the second layer the government assumes all risks

1. First layer: Insurance or Financial requirements

The provisions governing insurance requirements for second party risks also apply to third party liability risks. Thus, the launch operator must acquire liability insurance to protect against any compensation for damage to third parties that the launch may cause. The total insurance for each launch or return must be the amount of the maximum probable loss of damages to third parties caused by the launch or return, which is governed by the same provisions applying to second party risks. The liability period is also the same as in the case of government risks.

The launch operator may acquire a separate policy from the one protecting the Commonwealth or may take out a single policy that insures itself against third party liability and the Commonwealth for second party risks. Additionally, the launch operator may opt to show direct financial responsibility instead of hiring third party insurance.

Consistent with the international Space Law treaties and convention, the Australian Space Act establishes that the responsible party for the launch, defined as the holder of a permit for launches authorized by Australian authorities, is liable to pay compensation for any damage the space object causes to a third party on Earth or as a result of damage to aircraft in flight. The Australian Act also exonerates liability

in the case of gross negligence of the third party and when the conduct that the third party engaged in was with the intent to cause damage. With respect to damages to other space objects, the responsible party is liable to the extent that the damage is due to its fault. The Australian Act also contains provisions establishing federal jurisdiction for actions dealing with liability and establishes statute of limitations compatible with those adopted by the Liability Convention. However, it neglected to consider the cases of standard exclusions in insurance policies which the US Commercial Space Launch Act does.

2. Second layer: Government assumption

The second layer of third party liability risks closely follows the model of the second party risks. The Australian government assumes all damages beyond the amount of the insurance or financial responsibility which the launch operator must obtain or demonstrate. Unlike the regime established under the United States Commercials Space Launch Act, there is no cap to the government's undertaking to assume third party risks and thus the Australian government even absorbs the maximum possible losses. However, in the case that the damage results from a breach of any of the conditions to the launch permit or the relevant space license the government's assumption of the third party liability risks does not operate and the launch operator is solely responsible against third parties. The same applies when the damage arises from a conduct engaged in by the launch operator with intent to cause damage and from its gross negligence.

CONCLUSIONS

An analysis of the different risk-sharing systems has shown that even though all of these systems tend to provide a viable mechanism for the space launch carrier there are several options and alternatives for the satellite operators. Thus, for example, in NASA launch services, the combination of the liability insurance regime and the state indemnity contemplated in Section 308 constitutes an advantageous solution for the user with respect to third party risks. In Arianespace services, even if the first party risk sharing system is more comprehensive than the US ones and consequently less favorable for the customer, the third party regime presents a very advantageous situation for the customer, especially because of the low levels of liability insurance required.

Additionally, even if these systems have all been modeled after NASA's they present important differences, which derive from the fact that these systems are a response to the objectives of the general space policy of each country having jurisdiction on these carriers and not a mere response to the needs of the launch industry. Thus, NASA and Airianespace systems pursue the maintenance of the US and French (European) leaderships in space respectively and the Australian regime intends to attract foreign companies to a establish launch facilities industry in Australia. It is true that, as we have analyzed above, in the late 1980's it was the express purpose of both the US Congress and the Reagan administration to provide the US private sector launch industry with a regime that permitted it to transfer a significantly high degree of risks to its customers and the government. But, even so, this system –undoubtedly the one which affords the industry with the highest standard of protection- has been evolving quite dramatically.

Similarly, with the introduction of a free replacement launch for the Ariane V services in the event of failure of the first launch, Arianespace has also undergone changes which tend to provide the customers with a better risk management situation. All these changes indicate that the industry is experiencing a process of reallocation of risks away from the customer and the government toward the launch carrier itself.

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