

# LEGAL ASPECTS OF THE COMMERCIALIZATION OF SPACE TRANSPORTATION SYSTEMS

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"Earth is the cradle of the mind, but one cannot live in the cradle forever."

- K.E. Tsiolkovsky, *Outside the Earth*, 1898

"Space is clearly the great breakthrough of human knowledge - for centuries to come .... We have a long and undistinguished record of America failing to anticipate the promise and potential of each new age of science, invention and discovery .... [T]he automobile, the steamboat, the locomotive, the airplane, all brought prophecies of doom and gloom. We have learned a lesson we surely do not need to be taught again."

- Lyndon B. Johnson, June 1963

"We are really in a mess."

- Robert Pepin, Chairman of the National Academy of Sciences Committee on Planetary and Lunar Exploration, describing current United States space policy, September 1987

## INTRODUCTION

In January of 1958 the United States (U.S.) launched its first satellite, Explorer I. Over thirty years later, the U.S. is still struggling with the basic direction of its space program. Until recently, governments were viewed as the only entities capable of providing access to space, whether via manned or unmanned vehicles. Ironically, this view was strongly held even in the United States, where private enterprise has always been viewed as the cornerstone of a successful economic system. But a variety of events including the loss of the space shuttle Challenger, [FN1] the subsequent failures of other U.S. launch systems, [FN2] and increased international competition in the commercial launch industry [FN3] sparked long needed changes in this perception and in the U.S. space program.

On February 11, 1988 President Reagan announced a new national space policy including a fifteen-point commercial space initiative which provides a revised framework for U.S. space activities. [FN4] In designating one of the three major components of the new policy as the "creation of opportunities for U.S. commerce in space," [FN5] the President stressed that "United States commercial launch operations are an integral element of a robust national space launch capability." [FN6] The new space policy seeks to encourage the private sector's role in assuring access to space by providing favorable government policies toward commercial launch ventures - short of direct government subsidies - and by requiring federal agencies to procure launch services from the private sector to the fullest extent feasible. [FN7] In addition, the Space Policy reaffirmed limitations on NASA's commercial launch services; NASA will not maintain an expendable launch vehicle system, nor will NASA provide commercial launch services except where the payloads must be maintained, require the unique capabilities of the shuttle, or are required for national security or foreign policy reasons. [FN8] Thus, NASA's

primary focus will be on non-commercial applications of the Space Transportation System (STS) or shuttle program. [FN9]

In addition, the new National Space Policy announced a fifteen-point Commercial Space Initiative to promote a "vigorous U.S. commercial presence in Earth orbit and beyond." [FN10] Specifically in the area of space transportation, a major objective of the Space Policy is "assuring a highway to space." [FN11] In an attempt to promote the development of private launch service companies the Space Policy requires that all federal agencies purchase expendable launch services from the private sector to the "fullest extent feasible." [FN12]

The remainder of the initiative regarding the commercialization of space transportation is the Reagan Administration's proposals for the future, including placing limits on liability which might result from a commercial launch accident, [FN13] consulting with the private sector on the potential construction and use by the Federal Government of a commercial launch range separate from federal facilities, [FN14] and providing government vouchers to research payload owners scheduled on a shuttle flight which could be used to purchase a one time launch on an alternative U.S. commercial launch service vehicle. [FN15]

With this new national space policy, the Reagan Administration hoped to encourage private sector investment and involvement in space activities. [FN16] In the past, volatility in government policy has created an uncertain climate for both the direct involvement of private industry and private investment in space-related activities. As was often pointed out, " what company wants to commit millions of dollars to develop products or technologies that can become useless overnight because of yet another shift in government policy?" [FN17] This new policy is a long overdue step toward creating a favorable environment for the development of the nascent private space transportation industry, a step which is even more significant in light of recent failures in the government-sponsored space program. [FN18]

The new Space Policy follows on the heels of previous attempts by the Reagan Administration to encourage the development of a private sector space transportation industry. [FN19] However, it was not until the space shuttle Challenger disaster focused national attention on the United States' space policy that the importance of commercialization became apparent, and policies began to be adopted to break down the near insurmountable barriers to the entry of private enterprise into this market.

On January 28, 1986, all of America watched and mourned the tragic loss of the space shuttle Challenger. In the months of probing that followed, problems which had been building for years inside the United States' space program surfaced, not the least of which were concerns over the country's complete reliance on the space shuttle system for access to space. [FN20] In 1972, the space shuttle had been singled out to be the sole provider of American civilian launch services (manned and unmanned); the established expendable launch vehicle (ELV) [FN21] systems such as the Atlas and the Delta were phased out. [FN22] NASA had promoted the shuttle "as an all-purpose and ultimately self-financing space truck, and offered to launch commercial satellites aboard the shuttle at far below cost, thereby keeping private rocket companies out of the market." [FN23] However, the prohibitive cost of building, servicing, and launching a shuttle meant that it could never be a commercially viable launch service. [FN24] Still, at the time, questions over the wisdom of the exclusivity of the shuttle program were ignored in the face of mounting political pressures. [FN25]

The loss of the space shuttle Challenger resulted in a backlog of payloads and missions and the loss of all U.S. civilian space launch services [FN26] poignantly illustrated the error of this approach. Estimates suggested the earliest possible resumption of shuttle flights would be mid to late 1988 - a two and one-half to three-year hiatus in U.S. commercial launch operations. [FN27] It was estimated that (given the old shuttle flight schedule) a shuttle downtime of only two years would result in a delay of 21 high-priority Department of Defense (DoD) payloads and cancellation of 35 other shuttle missions. [FN28] This estimate worsened with an additional year delay in the resumption of shuttle flights and a revision in the shuttle flight schedule which slated 14 flights per year rather than the 24 per year scheduled prior to the Challenger accident. [FN29] As a result, it is estimated that between 60 and 100 satellites are in storage awaiting launch or are held up in production. [FN30] These problems suggest a serious deficit in the availability of space launch services.

To better focus the shuttle rebuilding efforts of NASA, on August 15, 1986, President Reagan restricted commercial access to the space shuttle's launch service and announced NASA would "no longer be in the business of launching private satellites." [FN31] This meant that companies wishing to launch private satellites, already facing the shuttle rebuilding and scheduling delays, were now faced with the complete unavailability of a domestic civilian launch service. [FN32] However, this change in NASA policy opened the door for private commercial launch ventures to enter the market.

Recently, a handful of companies - from small start-up ventures like Space Services, Inc., American Rocket Company, Orbital Sciences, and Conatec, to established aerospace giants such as General Dynamics, Martin Marietta, and McDonnell Douglas - have entered the private space transportation market. [FN33] The companies are developing ELVs to provide a cost-efficient method of launching communications satellites and performing materials experimentation in zero gravity. Some of these companies, such as American Rocket Company, are attempting through private financing to design and develop their own vehicles, while others seek to privatize vehicles which they or others developed under Government contract: Martin Marietta and the Titan, [FN34] McDonnell Douglas and the Delta, [FN35] General Dynamics and the Atlas, [FN36] and Conatec and the Black Brant VC. [FN37]

Although contracts are already being signed for use of these launch services, [FN38] the development of a private sector space transportation system will not occur overnight. Even the production of an existing vehicle, like the Atlas, is a time-consuming and capital-intensive venture. General Dynamics, for example, has estimated its investment in the privatization of the Atlas-Centaur would be more than \$1 billion and each vehicle would have a 30 to 36 month lead time. [FN39]

Furthermore, American commercial launch companies are having to face stiff competition from foreign commercial launch systems; [FN40] even the Soviet Union is offering commercial launch services. [FN41] Foreign launch alternatives currently include the Ariane (a product of a European joint cooperative known as the European Space Agency (ESA) and marketed by Arianespace), the Soviet Proton, and the Chinese Chang Zheng.

Arianespace was the first operational commercial space launch service in the world, launching its first commercial payload in May of 1984. [FN42] Under an agreement between ESA and Arianespace, ESA was to develop the vehicles and conduct four test and six production launches. [FN43] Then the responsibility for producing, marketing and launching of the Ariane vehicles was turned over to Arianespace. In the absence of an active space shuttle and the development of an American private sector space transportation industry, Arianespace is the West's only active commercial satellite launcher. Arianespace has had 21 launches as of

March 13, 1988 when it successfully launched two communications satellite payloads. [FN44] Currently, Ariane has orders extending into 1992 for the launching of 43 satellites worth \$2.36 billion. [FN45] It is estimated that Arianespace has captured 50% or more of the international commercial space market. [FN46]

In 1987, Glavcomos, the Soviet space organization, announced that it would provide a commercial satellite launching service on its Proton, and launched their first commercial payload, an Indian remote sensing satellite, on March 17, 1988. [FN47] Although the Soviet launch service is being marketed in the United States, it is unlikely that American satellite payloads will ever fly on the Soviet Proton. To date, the U.S. Government has refused to allow American satellite payloads to be exported for launch on the Proton because of concern over the possible transfer of U.S. technology to the U.S.S.R. [FN48]

As of October 1985, the Chinese are also offering commercial launch services via their Long March vehicle. [FN49] The Great Wall Industrial Corporation, the organization responsible for marketing the service, states that the Chinese launch service costs will be lower than the standard international prices and will allow for special payment schedules, particularly for developing countries. [FN50] The Chinese have signed contracts for two launches of German payloads and are scheduled to launch the first in mid-to late 1988. [FN51]

All of these foreign launch services have been government-sponsored. As a result, American private commercial launch companies find themselves competing with foreign launch systems which have been "favored by supportive governmental participation, policies, incentives and subsidies, [which will impair domestic companies'] ability to compete." [FN52] Governments of competing nations have and will continue to aggressively pursue a policy of nurturing these government-sponsored space ventures in their offering of commercial launch services to the world market. Thus, it is important to the success of the commercial space industry that the United States Government assist and nurture its development, not through direct subsidies, but through a minimal, rational, and consistent regulatory policy.

This comment will analyze the legal and policy aspects of the move toward the privatization of space transportation systems. Initially, it will examine the role of U.S. Government-sponsored space programs, and the development of domestic and international law, policy and regulation affecting commercial space transportation systems. Section II will analyze problems which have developed within the current legal structure, including the role of NASA, liability and insurance issues, intellectual property concerns, and the development of consistent domestic regulations and policies. Section III will examine potential future policies in each of these areas which can serve to encourage and support the development of a private space transportation industry.

## **I. BACKGROUND**

### **A. Role of NASA**

Until recently, NASA was viewed as the only U.S. entity capable of providing launch services to the country. [FN53] NASA was established in 1958 by the National Aeronautics and Space Act for the purpose of generating " a aeronautic and space activities for the welfare and security of the United States." [FN54] NASA was responsible for the development of all aspects of the civilian space program including space transportation research and development, and the development, ownership and operation of space transportation vehicles. [FN55] Private sector aerospace companies bid on NASA promulgated designs and, if awarded the NASA contract, built the specified system or sub-system. [FN56] NASA owned the resulting vehicle and also

maintained responsibility for launching the vehicle. "Launch firms participated in these programs only as government contractors, operating in complete conformance to government program requirements and launch practices." [FN57] In essence, the United States had a nationalized system of space transportation.

NASA, a Government agency dependent upon the political process for the funding of its projects, has had two major development cycles since its creation. In the 1960s, a high priority of the Kennedy Administration and NASA's main objective was to land a man on the moon by the end of the decade. [FN58] This was accomplished on July 20, 1969 with the lunar landing of Apollo 11. [FN59] Additionally, NASA developed unmanned launch vehicles used primarily for the launching of communications satellites. [FN60] During this period, political and popular support ran high for the development of governmental space transportation systems.

With the conclusion of the Apollo program, NASA began looking ahead toward its next project. Unfortunately for the continuity of the United States space program, the political and popular support which fueled the Apollo program waned in the 1970s. NASA had to make various compromises in order to obtain funding from Congress for its space shuttle program. [FN61] The space shuttle was billed as a low-cost project, both in terms of development and operation. NASA projected the shuttle would be virtually self-supporting: [FN62] a high number of flights per year combined with the shuttle's projected low operating costs meant that the income from paying customers launching satellites on the shuttle would cover the cost of the flight. [FN63]

During the development of the shuttle, it was determined that the expendable launch vehicle (ELV) segment of the NASA program should be phased out, and NASA would rely exclusively on the shuttle. [FN64] In 1981, NASA launched the first space shuttle. [FN65] NASA, still under Congressional and public pressure to meet its earlier promises regarding cost efficiency, marketed the space shuttle around the world as a cost-competitive commercial launch service. [FN66] Additionally, NASA contended that the shuttle would eventually be cost-efficient enough to be turned over to the private sector for operation. [FN67] However, the space shuttle never attained the turnaround time required to meet its ambitious flight schedule, [FN68] nor did the operational shuttles prove to be low cost, as previously promised. [FN69] As the costs associated with shuttle launches began to rise, the Government subsidized launch sales heavily on the commercial and international market, [FN70] pricing the launch services so low that the more economical, unsubsidized expendable launch vehicles were unable to compete. [FN71]

After the loss of the space shuttle Challenger in 1986, the role of NASA in space transportation came under intense scrutiny. [FN72] After reviewing the situation, the Reagan Administration announced that in the future the NASA shuttle would not be a provider of commercial space transportation and thus would remain available (except under special circumstances) exclusively to Government payloads. [FN73]

NASA's role was further redefined in early 1988 by President Reagan's new Space Policy. The Space Policy stated, "NASA will continue the lead role within the Federal Government for advancing space science, exploration, and appropriate applications through the conduct of activities for research, technology, development, and related operations ...." [FN74] NASA will also continue to have full responsibility for all non-military Space Transportation Systems (STS) (the space shuttle program). However, NASA will not maintain expendable launch vehicle systems adjunct to the shuttle. In addition, the Space Policy reaffirmed that NASA will provide launch services on the shuttle for commercial payloads only where the payloads need to be on a manned mission, require other unique qualities of the shuttle, or are important for national security. [FN75]

As part of the cutback in the role of NASA in the provision of commercial space transportation, the Space Policy stresses the importance of the continued development of a private sector space transportation industry. [FN76]

## **B. The Commercial Space Launch Act of 1984**

The United States commercial launch industry is regulated by the Department of Transportation's (DOT) Office of Commercial Space Transportation (OCST) under the authority of the Commercial Space Launch Act of 1984 (the Launch Act). [FN77] The Launch Act and the regulations promulgated under it by the OCST serve as the cornerstone of domestic regulation of the private space transportation industry.

The Launch Act proclaimed two objectives for the DOT: 1) to encourage, facilitate, and promote commercial space launches by the private sector, and 2) to develop licensing requirements through consultation with other Government agencies. [FN78]

One of the most important changes which resulted from the Launch Act was the creation of a single Government agency responsible for the regulation of this nascent industry. [FN79] In the early 1980s, small entrepreneurial companies made initial attempts to provide commercial launch services via low-cost ELVs. [FN80] Unfortunately for these first companies there was no single Government agency with the responsibility for regulating the private launch industry, and several Government agencies jumped in to fill the void in areas they perceived to be under their jurisdiction. As a result, private launch companies had to wade through an immense bureaucratic licensing maze created by 17 different Government agencies prior to obtaining government clearance for launch operations. [FN81]

The Launch Act ameliorated this problem by providing the Secretary of Transportation exclusive authority over the commercial space transportation industry and granted the DOT's newly created Office of Commercial Space Transportation (OCST) the authority to establish governing regulations. [FN82] Specifically, the Launch Act and the resulting regulations addressed three substantive areas: licensing and regulation, [FN83] liability insurance requirements, [FN84] and access of private launch companies to Government facilities. [FN85] Each is discussed in detail below.

### **1. LICENSING AND REGULATION**

The first area acted on by the OCST was the licensing and regulation of private sector unmanned launch activities. In 1985, the OCST issued preliminary regulations followed by interim final rules in February, 1986 [FN86] which set forth a two-phase approval process [FN87] for the licensing of commercial launches, [FN88] Mission Review, [FN89] and Safety Review. [FN90] If the applicant satisfies the requirements of these two reviews, a license for the launch is granted. [FN91] This singular agency review has simplified and streamlined the Government licensing procedure by removing the duplicative and lengthy multiple-agency reviews which were previously required to secure approval for commercial launches.

The two reviews conducted by the OCST seek to address "in the most effective and least burdensome manner" [FN92] two areas of federal concern: 1) the efficacy of the proposed safety operations in order to insure safe preparation and launch of the vehicle, and 2) significant issues of national interests, foreign policy interests, and international obligations associated with the launch. [FN93]

The Safety Review covers launch safety procedures (both in flight and on the ground), the proposed launch site (to ensure that off-site persons and property are not exposed to unreasonable risk of harm), the expertise of range safety personnel, and the range safety equipment including flight guidance and control systems, flight termination capability, and vehicle design. [FN94] If the launch site to be used is a Government facility, "safety approval will ordinarily be given once the applicant has been accepted by the range ..." [FN95] assuming that the launch company complies with all safety requirements and procedures of the range. If the proposed launch site is not a government facility, but rather a private launch site, the applicant must demonstrate that it possesses the resources needed for safe preparation and launch of a launch vehicle and any payload to be carried by such vehicle. [FN96] In order to determine if an applicant has met these requirements, the regulations require a "comprehensive" review of the launch safety procedures. [FN97] Obtaining a license for a launch from a non-government site is a far more arduous and time consuming task than is licensing for launch from a federal range. [FN98]

The Mission Review focuses mainly on domestic and international obligations and interests of the United States which may be affected by the launch. [FN99] This review covers all aspects of the launch operation including vehicle characteristics, launch site and flight plan, disclosure of potential hazards posed by the launch, and identification of ownership and nature of the payload. [FN100] Mission approval is granted unless some element of the proposed launch poses a threat to U.S. national security or foreign policy interests, constitutes a hazard to public health and safety or safety of property, or is inconsistent with international obligations of the United States. [FN101]

## **2. LIABILITY AND INTERNATIONAL OBLIGATIONS**

The Launch Act mandates responsibility to the OCST for regulating the liability of private space transportation companies. Specifically, the OCST is to establish liability insurance requirements for commercial launch activities, [FN102] taking into account the parameters of international law [FN103] and the obligations of the United States under such laws. [FN104]

While the Department of Transportation's OCST is charged with setting the liability insurance requirements for private launch activities under the Launch Act, [FN105] to date there has not been any rulemaking initiated by the OCST in this area, although the OCST has stated it is in the process of formulating regulations. [FN106] In the interim, the allocation of risk between the launch facility and the launching company has been left to the contracting parties to resolve. [FN107]

As the OCST begins to establish liability and insurance requirements for commercial launch companies, it has a responsibility to evaluate "significant issues affecting national interest and international obligations that may be associated with a proposed launch." [FN108] Included in this analysis are the international obligations which have been assumed by the United States.

The United States has signed and ratified four treaties that comprise the framework of the international law regulating space-related activities: The Outer Space Treaty of 1967, [FN109] the Space Liability Treaty, [FN110] the Space Rescue Treaty, [FN111] and Space Registration Treaty. [FN112] A fifth treaty, the Moon Treaty, [FN113] sponsored by the United Nations, has not been ratified by the United States or the Soviet Union.

The most important of these treaties is the Outer Space Treaty which serves as the "main base for the legal order of the space environment." [FN114] Subsequent treaties implement and supplement its basic concepts. The Outer Space Treaty provides that all activities in outer space shall be carried out for the benefit of and in the interest of all mankind, and states that outer space is not subject to national appropriation. [FN115] In addition, the Outer Space Treaty sets forth various criterion regarding the exploration and use of outer space, but most significant to the commercial space industry is that the Outer Space Treaty establishes that each nation is responsible for the activities of its governmental and non-governmental entities in outer space. [FN116] A nation is liable if it either "launches a space device," "has it launched," or is the nation "whose territory or installations are used to launch the space devices." [FN117] Thus, the U.S. Government has international responsibility and liability for damage caused by any domestic launch company.

Additionally, under the Outer Space Treaty, governments are required to establish a framework for monitoring private space activities which insures that these private enterprises are not violating international space law. [FN118] Thus, the U.S. Government has an international obligation to monitor its domestic space launch industry.

The Outer Space Treaty was supplemented in 1972 by the Space Liability Treaty. [FN119] Under the Space Liability Treaty, " a launching State is absolutely liable to pay compensation for damage caused by its space object on the surface of the earth or to aircraft in flight," [FN120] and is liable for damage which occurs "elsewhere than on the surface of the earth to a space object of another state or to persons or property on board such a space object..." where fault is established. [FN121] If more than one nation is involved (i.e. a French satellite launched from the U.S. on an American rocket) the two nations are jointly and severally liable. [FN122] The Treaty imposes liability on the "launching State." Thus, even where the entire launch operation, vehicle and cargo, are private, international liability for any damage caused by the launch itself or the object launched falls on the respective governments, not on the private companies. [FN123] The OCST needs to bear in mind the international obligations of the United States in drafting liability and insurance regulations for the commercial launch industry.

### **C. Access of Private Launch Companies to Government Facilities**

As the objectives of the U.S. space program have shifted over the past thirty years, various launch and test facilities developed during the early years of the space program have been abandoned or are rarely used. [FN124] As part of its efforts to support the private launch industry, Congress provided in the Launch Act that excess or unused Government launch property should be made available to private launch companies through lease or sale agreements. [FN125] The Launch Act called for the Secretary of Transportation to "take such actions as may be necessary to facilitate and encourage the acquisition (by lease, sale, transaction in lieu of sale, or otherwise) by the private sector of launch property of the United States which is excess or is otherwise not needed for public use." [FN126]

Due to the various complications involved in securing non-Government facilities for testing and launching of space vehicles, [FN127] and the added complexity of the licensing procedure for launches from private facilities, [FN128] the use of Government facilities is a very attractive option which many private launch companies are pursuing. [FN129] In fact, the importance of reasonable access to Government facilities has been described by those in the industry as a "make-or-break" issue. [FN130]

## **D. The Air Force's Model Expendable Launch Vehicle Commercialization Agreement**

Different Government agencies have responsibility for the different Government test facilities. Each company wishing to utilize Government facilities for testing or launch operations is required to negotiate individual agreements with each of the appropriate Government agencies. For example, Space Services negotiated a contract with NASA in 1985 for use of the Wallops facility, [FN131] American Rocket Company is attempting to negotiate an agreement with the Air Force for use of launch facilities at Vandenberg Air Force Base, [FN132] and Conatec will be negotiating with the Department of Defense (Department of the Army) for use of the White Sands Missile Range. [FN133]

In an attempt to establish a standard contract for the use of any Government facility, the Department of the Air Force drafted the "Model Expendable Launch Vehicle Commercialization Agreement" (Agreement). [FN134] The Agreement sets forth the terms and conditions under which the Air Force will provide property, facilities, goods and services to companies testing or launching commercial expendable launch vehicles. [FN135] The contract is on a cost-reimbursable, [FN136] non-interference [FN137] basis and currently applies to the Eastern Space and Missile Center (ESMC) at Patrick AFB; and Western Space and Missile Center (WSMC) at Vandenberg AFB. [FN138] In the future, the Agreement may become the standard contract to be used by all Government agencies with similar facilities. [FN139] To date, two private launch companies have signed versions of this agreement in order to utilize Government facilities. [FN140]

In general, the Agreement provides that "the Government will make all reasonable efforts to minimize adverse impacts its actions may have on commercial operations and accord commercial users a high degree of stability in conducting their commercial launch business." [FN141] The Agreement raises three areas of particular interest: liability and insurance, protection of intellectual property, and the availability and costs of utilizing Government facilities.

### **1. LIABILITY & INSURANCE ISSUES**

Although the Launch Act gives responsibility to the OCST to establish liability insurance requirements for private launch companies, [FN142] the OCST has yet to act in this area. Therefore, the allocation of the liability risks is left to allocation between the Government entity responsible for the facility and the private company. Initial drafts of the Agreement provided a skewed assignment of liability; [FN143] however, later revisions of the Agreement have attempted to more appropriately balance the liability risks.

The current revision of the Agreement, in moving toward a more balanced approach to the allocation of risk between the private company and the Government, provides that the User (the private launch company) is liable for:

all damage to property of the User, the Government, or their contractors and subcontractors, and all third-party liability, arising out of this agreement, regardless of fault, to the extent of the maximum available insurance for the specific launch except that the User shall not be responsible for damage caused by the intentional misconduct of the Government and the Government's contractors and subcontractors. [FN144]

Prior drafts of the Agreement required the private company to "assume the responsibility for all damage to the

property of the User, the Government, or their contractors and subcontractors, and all third-party liability, arising out of this agreement, regardless of fault" [FN145] and there was no exclusion for liability resulting from the intentional misconduct of the Government or its agents. Under this old language, the commercial operator would have been required to insure for almost unlimited liability for damage to personnel, property, and the environment resulting from the activities of either the company or the Government. The company would also have been required to indemnify the Government for damages resulting from the Government's own willful misconduct. [FN146] Under the current Agreement, the company is responsible for damages which result from its own acts, as well as still being responsible for damage which results from the negligent acts of the Government or its contractors or subcontractors.

Furthermore, the Agreement requires companies to cover their potential liability by obtaining the maximum insurance coverage available at a reasonable price with commercially reasonable terms. [FN147] "The amount of maximum available insurance commercially available ... and what is a reasonable price for such insurance for a specific launch or particular associated activities shall be determined by the Government and its decision on the matter shall be final." [FN148] The term "Government" is defined by the Agreement to be the United States Air Force. [FN149] Thus, the Air Force reserves to itself responsibility for the establishment of the liability insurance requirements for private launch companies.

While the launch company is required to obtain the maximum insurance available in the commercial market, the company's liability is not limited to the amount of its insurance coverage. In the event the Government is unable to recover its full damages from the company's insurance carrier, the Agreement preserves the Government's right to pursue legal claims (under either domestic or international law) against the company for any additional damage incurred. [FN150] Thus, there is no limit on the potential liability a private company could face in either a domestic or an international arena.

In summary, under the current Agreement, the private launch company is liable for damage which results from the negligent acts of the Government or its contractors or subcontractors. In addition, the company is responsible for obtaining an unspecified amount of liability insurance (the maximum amount of insurance available in the commercial market) to cover this liability. And finally, there is no limit on the company's potential liability, especially in light of broad contractual language regarding the distribution of liability.

## **2. INTELLECTUAL PROPERTY CONCERNS**

The Agreement requires the release of certain information to the Government. This raises potential confidentiality concerns for both the launch company and its customers. For example, the Agreement requires that the commercial launch company provide the Air Force with a "quick look technical report" within 48 hours of a launch which would include a brief description of the launch mission, flight events, vehicle performance, and a summary of any safety anomalies. [FN151] In addition, information can be obtained by the Government through various required safety reviews or inspections. The Agreement provides for Government access to the facilities being used by the launch company as well as providing for Government access to "all paper work, system components, sub-system designs, operating/emergency procedures and any other material deemed necessary by the Government." [FN152] This will almost certainly require the release of information regarding the payload. Thus, the terms of the Agreement will also affect potentially sensitive information of both the consumer of the launch services and the launch company. [FN153] Because access to these types of information and data is predicated on the Government's need to insure that the company is in compliance with the safety

provisions set forth in the contract, [FN154] the Agreement limits the information the Government can request to information that is required to confirm the company's compliance with the safety requirements of the contract. [FN155]

In order to protect information which is required to be disclosed to the Government, the Agreement provides that such information or data may be marked by the company as being proprietary and that this type of information will be limited in circulation to those within the Government or its contractors who "have a need to know." [FN156] Disclosure of proprietary information to non-Government personnel is contingent upon their agreement (in writing) to protect the information and/or data they receive from unauthorized use, duplication, and disclosure. [FN157] Additionally, the Agreement states that proprietary information is protected in accordance with the Freedom of Information Act [FN158] and Air Force Regulations. [FN159]

Limitations on access and distribution of proprietary and confidential information, as set forth in the most recent draft of the Agreement, provide more protection to the company's confidential information than previous versions of the Agreement. For example, prior versions of the Agreement would have required private launch companies to "permit the Government to review, use and duplicate all data generated by the User during the launch." [FN160] There were virtually no limitations on the type of information the Government could require the company to produce, and once the information was produced there were no guarantees of protection. Thus, the new Agreement has addressed some of the concerns of the private launch industry in the area of intellectual property protection. [FN161]

### **3. COSTS OF UTILIZING GOVERNMENT FACILITIES**

A necessary aspect of providing a commercial launch service is the ability to establish a price for the launch services. Part of this cost will include expenses for the launch facility. Therefore, the costs associated with utilizing a launch facility and the ability to forecast these costs are of concern to the commercial launch industry. When private companies utilize government facilities, the Agreement calls for the user to reimburse the Government for "all direct costs incurred by the Government in connection with or incidental to the furnishing of goods and services under this Agreement which are deemed by the Government to be proper." [FN162] The Agreement restricts direct costs to those defined in the Department of Defense Directives (DoDD) 3230.3 and 3200.11. [FN163] Direct costs also include the payment for Government personnel which the Government deems necessary to monitor the safety of the launch activities. [FN164] An estimate of the total costs associated with the Agreement is to be provided as an appendix to the Agreement. [FN165]

Payment of costs is completed in two installments. The first payment, which covers the estimated direct costs for the first six months of the Agreement's term, is due ten working days before commencement of the Government's obligation under the Agreement. [FN166] The second payment, which includes the balance of the estimated direct costs, is due 120 days prior to the scheduled launch date. [FN167]

In addition to the direct costs which the company must pay for the use of the Government facilities, the Agreement also requires the company to obtain insurance to cover potential third party and Government liability. [FN168]

### **E. Export Controls**

While not directly regulating the U.S. private sector space transportation companies, export restrictions regulating the ability of domestic satellite operators and researchers to utilize foreign launch services will certainly have an impact on the development of a domestic private launch industry. As discussed above, foreign competition poses a formidable challenge to domestic launch companies, [FN169] and limitations placed on the ability of domestic companies to utilize non-domestic launcher services would certainly benefit the development of domestic launch companies.

The State Department has set up licensing procedures to keep sensitive technology out of foreign hands. [FN170] These procedures have kept U.S. satellite owners from exporting satellites to certain foreign countries, most notably the Soviet Union, for space launch. [FN171] This precludes domestic satellite companies from opting to use the Proton launch vehicle to transport their satellites into orbit. [FN172] The U.S. Government contends this export ban protects against the transfer of advanced American satellite technology, similar to that used in military satellites, to the Soviet Union. [FN173]

Recently, an American firm, Payload Systems, Inc., announced it had signed an agreement with the Soviet Union for the inclusion of American industry experiments on the Soviet Mir space station. [FN174] On February 26, 1988, in what might be viewed as a change in administration policy, the Commerce Department's Export Control Administration granted an export license for the payload. [FN175] In this case, the Commerce Department, and not the State Department, reviewed Payload Systems' export request because the payload, an experiment in protein crystal growth, was not considered to be militarily sensitive. [FN176]

Recently, President Reagan announced the administration's conditional approval of requests for licenses to launch three U.S.-made communications satellites on China's Long March rocket booster. [FN177] The State Department has been considering several such requests for licenses to ship U.S.-manufactured communications satellites to China for launch. [FN178] The satellites are on the list of technologies which are subject to export restrictions, as set forth by the Office of Munitions Control of the State Department. However, unlike the Soviet Union, China is not one of the listed countries for which an export license is prohibited. [FN179] Thus, these licensing requests are reviewed on a case-by-case basis rather than being given routine denials. [FN180] This recent spate of requests for satellite export licenses has prompted a major review of the U.S. policy regarding the issuance of such licenses and the associated issues of technology transfer and unfair launch pricing by foreign launch services. [FN181]

## **II. PROBLEMS**

The basic objective of the recently adopted Space Policy is to assure a vital U.S. presence in, and continuing access to, space. [FN182] A primary factor which has previously limited access to space is the immense costs involved in providing space transportation services. Private enterprise can play a central role in both providing access to space [FN183] and doing so in a cost effective manner. [FN184] This ability has been recognized by both the Reagan Administration and Congress, and both have made the success of the private sector space transportation industry a priority of U.S. domestic space policy. [FN185] Thus, encouragement of the commercialization of the U.S. space launch industry is and should continue to be a major priority of the U.S. space policy. [FN186]

The development of a commercial space transportation industry can be facilitated through the creation of an environment of economic and commercial viability for the industry. This means the removal of barriers that

make it economically unfeasible for private enterprise to enter the space transportation market and an elimination of unnecessary expenses which increase start-up, overhead, and operating costs. In addition, steps should be considered to increase demand for commercial launch services and reduce transaction costs for their use.

As well as encouraging the growth of the space transportation industry, policymakers must balance this objective with considerations of safety and national security as well as assuring compliance with international obligations assumed by the United States. [FN187]

## **A. Role of NASA**

All too often American government and American business have ended up at odds with each other. This has been true of the relationship between NASA and private launch companies where, for the past several years, animosity has been growing. "The primary opposition to privatization of space transportation has come from the headquarters of NASA, [which] until recently [was] the government monopoly in the field." [FN188]

Much of this competitive attitude has been the result of NASA's need to be responsive to Congress, and Congress' increasing demands for commercially competitive programs from NASA. In order to obtain budgetary priority, NASA has been forced to assume conflicting roles in the development of space technology [FN189] and more recently NASA has had to present commercially competitive programs to Congress rather than advanced experimental programs in order to obtain funding. [FN190] As a result, NASA and the private launch industry were put in direct competition with each other.

Given the current state of the domestic launch capability, [FN191] NASA and private launch companies need to work to cooperate, not compete, with each other in the provision of space launch services. Even with a full shuttle schedule, NASA would be unable to meet the launch demands of the current market. [FN192] There is ample room in the current market for both the shuttle and the private launch industry.

A cooperative attitude between Government and industry would not only meet the needs of the marketplace and spur the development of a commercial launch industry, it would also increase access to space through lower costs in space transportation systems. In the past, the Government has assumed the role of owner/operator of launch; NASA contracts with private companies for specified hardware and supporting services. [FN193] For a variety of reasons, [FN194] this approach has driven up the cost of development and use of space transportation vehicles. [FN195] On the other hand, the profit incentive of private industry combined with a reduction in Government overhead should result in lower costs for access to space. [FN196] In order to avoid unnecessary turf battles, facilitate the development of the private launch industry, and reduce the costs associated with space transportation, U.S. space policy should clearly delineate the role of NASA in conjunction with the development of private sector launch companies.

## **B. Liability and Insurance Issues**

In order for private launch companies to be successful in the international market, they must be able to compete effectively against foreign launch services. This presents a problem in the area of insurance and liability; foreign countries which are offering government-sponsored commercial launch services also have government-sponsored third party liability insurance for both launch service providers and users. [FN197] Foreign competitors are thus

able to indemnify their payload customers for very little or no additional cost [FN198] since the sponsoring governments absorb the costs of insuring for liability without passing the costs through to the launching organization. [FN199]

In order to remain competitive, the American launch industry must be able to offer similar protection to its customers and to itself while remaining cost competitive. Thus far, the United States has refused to take a position similar to that of foreign governments of providing indemnification for the private launch industry and its customers, claiming that such action would constitute a "subsidy." [FN200] In general, subsidies have been considered an inappropriate means to promote the commercial launch industry by the Reagan Administration. [FN201]

Because the OCST has not acted on its mandate from Congress to establish the insurance requirements for the commercial launch industry, [FN202] private launch companies have had to rely on contractual provisions such as those of the Air Force Model Agreement to resolve these insurance and liability issues. [FN203]

In drafting a contract for use of Government facilities, the Government agency involved should attempt to balance the competing interests when assigning liability and establishing insurance requirements for users. One priority is the protection of the safety of persons and property which might be affected by such a launch. A second is the need to assure compliance with international treaties. [FN204] A third is the Congress' and the Reagan Administration's high priority on facilitating the commercial development of a private space industry. Policymakers should remember that the manner in which they resolve these liability issues will have a profound impact on the ability of commercial U.S. launch companies to compete in the international marketplace.

While initial drafts of the Model Agreement provided extensive protection against the Government's potential liability and damages (under both domestic and international law) and addressed the Government's interest in protecting public safety, they did not succeed in balancing those interests with the primary objective of the policy behind making Government facilities available to private industry. That policy was the promotion of the development of the commercial space transportation industry. [FN205] Comments from the Commercial Space Transportation Advisory Committee to the Secretary of Transportation (COMSTAC) [FN206] were highly critical of the Air Force's Draft Agreement, and described it as being "extremely one-sided in its proposed assignment of risk, and cost, to commercial launch operators." [FN207] While the Air Force has revised its proposed contract with these complaints in mind and made progress toward a more balanced agreement, the revised version has still not adequately addressed some of the major problems identified by COMSTAC.

## **1. LIABILITY ASSUMED BY THE LAUNCH COMPANY**

One of the problems identified with the Agreement is the quantity of risk which is placed on the private launch company. For example, a private company must assume all liability for damages to the Government or to third parties which result from the negligent acts of the Government and/or its agents. [FN208] It is unclear what interests the Government is attempting to protect with such far-reaching liability provisions. Most of the services to be provided by the Government are routine industrial and technical tasks under the full control of the Government. [FN209] Holding the company responsible for the actions of Government personnel, over whom it has no control, does not foster the interests of safety. Forcing private industry to assume this type of risk is very damaging to growth since companies have to obtain and pay for the additional insurance required to cover potential losses from the negligent acts of the Government. The Government justifies this policy on the basis of

the absolute liability they face under international law for damages which result from the activities of domestic launch companies; the companies' insurance would provide a resource for meeting these obligations. [FN210] However, while it seems reasonable to require private industry to insure against the Government's international liability for damages resulting from the negligence and willful misconduct of the private company, it does not seem reasonable to require the company to insure against the Government's international liability for damages which result from the Government's own negligence. Having the launch company assume risks for the Government's negligence does not promote increased public safety, provide minimal protection to the Government's potential international liability, or promote the objective of encouraging the growth of this new industry.

## **2. QUANTITY OF INSURANCE REQUIRED**

In addition to insuring against the negligence of the Government, private launch companies are required to obtain the maximum amount of insurance which is commercially available at reasonable prices. [FN211] The Air Force has designated itself as the determiner of what is a reasonable commercial rate for this insurance and, under the terms of the contract, its decision is final. [FN212] These contract provisions present two problems. First, the Air Force's unilateral decision that it is the appropriate Government entity to establish insurance requirements for this industry contradicts the Commercial Space Launch Act which expressly grants the authority to regulate this area to the OCST. [FN213] Secondly, by taking the determination of insurance requirements outside of the framework of the OCST and the Commercial Space Launch Act, the Air Force has negated the ability of the industry and the public to appeal the insurance requirements it chooses to establish and forecloses open policy discussions on the appropriate standards to use in setting these requirements.

## **3. COST AND AVAILABILITY OF THE INSURANCE REQUIRED**

One of the problems with imposing this level of liability on the private sector launch companies is that the insurance required to cover the requisite risks is unavailable. Some companies have already reported an inability to obtain insurance quotes on the terms set forth by this Agreement. [FN214] If a company is unable to get a quote in advance of contracting with a customer for a launch, the launch company has to assume the risk of an increase in the price of the insurance necessary to cover its liability during the launch. The Air Force attempted to address this concern by requiring companies to obtain only the maximum amount of insurance available on the commercial market, but this resolves only part of the problem.

Private launch companies must also assume the risk for all liability losses over and above the amount for which they are able to insure. [FN215] Given the limited amount of insurance available, the private launch company must, in essence, "bet the company" with each commercial launch. [FN216]

Obtaining commercial insurance for all types of activities is becoming increasingly more difficult and expensive. With unlimited liability and a requirement that companies obtain the maximum insurance coverage possible, the costs associated with private launchings will be astronomical and may destroy the industry before it has a chance to get off the ground. [FN217] Failure of the OCST and Congress to act in the area of liability and insurance has left the U.S. commercial launch industry financially vulnerable. Consequently, the long-term viability and international competitiveness of the commercial launch industry is uncertain. A more appropriate balance of interests is required.

## **C. Pricing of Facilities and Services**

Another potential concern for the commercial launch industry is the costs associated with the use of Government facilities. Currently, the Agreement calls for the private launch company to reimburse the Government for all "direct" costs incurred by the Government in connection with the Agreement. [FN218] These costs include the expenses incurred while monitoring the company's safety operations; the private launch company is responsible for absorbing these costs. [FN219] One of the problems with this arrangement is that the Government has unlimited discretion to assign personnel to a particular launch operation, but no responsibility to pay for increased overhead. [FN220] While the Government has an interest in assuring that the launch is carried out in a safe manner and that the launch and/or payload does not pose a threat to public safety, the private launch company has an interest in keeping these costs at a minimum.

## **D. Government Priority**

An additional problem confronting commercial launch companies who utilize Government facilities is the fact that the Government retains first priority for use of the facilities even after an agreement has been signed between the Government and the company for use of a particular Government site. [FN221] Launch companies must provide their customers with firm launch dates, but the companies are unable to guarantee the availability of the launch site. Furthermore, there is no limit to the amount of bumping which can occur, and the launch companies are forced to absorb the costs associated with delays which result from the Government's exercise of its priority rights. [FN222]

The launch customers, generally satellite companies with specific launch windows, are aware of this potential and uncontrollable risk facing domestic launch companies and, as a result, are reluctant to contract with these companies in light of the potential costly delays which would result. [FN223] Satellite companies view this potential bumping of private launches as an added risk of using domestic launchers compared to foreign competitors. Domestic launch companies are forced to compensate for this when negotiating launch terms with their customers. [FN224] Without proper oversight, the Government's absolute priority has the potential of seriously impairing the viability of the domestic private launch industry. [FN225]

## **E. Intellectual Property**

In light of the amount of capital investment required to develop a launch vehicle, companies are understandably concerned about retaining intellectual property protection over those aspects of their technology which would be adversely affected by public disclosure. On the other hand the OCST has a mandate from Congress to protect the public health and safety. [FN226] In order to accomplish this objective the OCST must have access to information in those areas concerning public safety. One of the inherent conflicts with the OCST review process and the Air Force Agreement [FN227] is insuring the adequate protection for the intellectual property submitted by either the launch company or the launch customer to the Government while maintaining the agencies' ability to monitor the safety of the operations.

To assist companies in the protection of sensitive information, the OCST regulations set forth guidelines for companies who wish to assure confidential treatment of trade secret and privileged commercial or financial information. [FN228] Information which is so designated will not be disclosed by the OCST unless the OCST determines that "the withholding of such data or information is contrary to the public or the national

interest." [FN229] This standard is too broad and grants too much authority to the OCST in the absence of concerns regarding serious threats to public safety or national security. Certainly, there might be emergency situations in which information obtained by the OCST from launch companies will need to be released, such as where the public safety is immediately threatened. However, the regulations also allow disclosure of information in more than simply emergency or health-threatening situations. For example, they permit the release of information where nondisclosure is contrary to the public or national security interests. Such an over-reaching disclosure policy may have a deterrent effect on the private space industry by failing to supply adequate intellectual property protection to valuable trade secret and proprietary information.

The Air Force Model Agreement provides that information released to non-Government personnel is on a need-to-know basis also conditioned upon the signing of a confidentiality agreement. Private firms will only be required to produce information to confirm the company's compliance with safety requirements. [FN230]

Neither the Air Force Agreement nor the OCST regulations provide for notification of the company prior or subsequent to the release of the information. Thus, the company has an opportunity neither to question the release nor to track the distribution of its proprietary information. In addition, neither the Regulations nor the Agreement provides any protection to the proprietary information supplied to the Government by the launch company's customers. This is a problem because "various inspections of payloads may reveal highly proprietary information of the payload owner ... [and t]here is no procedure for handling such information." [FN231]

## **F. Export Control and International Trade and Competition**

Domestic export controls raise precarious issues for both the domestic launch industry and the satellite industry. Current export controls prohibit U.S. companies from exporting satellites to certain foreign countries for launch. [FN232] The Government claims that this ban on the exportation of satellites to certain foreign countries for launch protects against the transfer of advanced American satellite technology to these countries. Ironically, those calling loudest for the abolition of this policy are in essence those the Government asserts to be protecting -- the U.S. manufacturers of satellite technology who argue that this policy unreasonably limits their access to space. [FN233] In recent hearings before Congress, representatives of the U.S. satellite industry urged the Government to re-examine the export control policy and develop mechanisms whereby "U.S. satellites can be satisfactorily fitted and launched by those foreign launch services without giving away any hard-won technological know-how." [FN234]

The question of whether to license payloads for launch by foreign government-sponsored launch programs raises two concerns: the potential for the transfer of U.S. military sensitive technology and the effect that unfair pricing of foreign launch services has on the domestic launch industry. Thus, while it may or may not be possible to protect satellite technology shipped to the Soviet Union for launch, [FN235] dealing with the fear of Soviet technology espionage would only address part of the issue. Allegations have been made that foreign launch services are involved in unfair trade practices, specifically the illegal dumping of launch services on the international market, and some argue that the U.S. Government should continue to prohibit U.S. companies from utilizing foreign launch services which participate in unfair trade practices. [FN236]

Previous attempts have been made to resolve the claims of unfair trade practices. In May of 1984, Transpace Carriers, Inc. (TCI) [FN237] filed a petition against Arianespace with the Office of the United States Trade Representative alleging Arianespace had engaged in unfair trade practices. [FN238] At the time, a major obstacle

to this claim was the fact that the United States was also guilty of dumping launch services on the world market. [FN239] Thus, in its defense to TCI's charges, Arianespace justified its pricing by stating that its actions were necessitated by competition resulting from subsidies granted by the U.S. to the domestic space shuttle program. [FN240] As a result, TCI's complaint was not pursued by the U.S. Trade Representative. Thus, the U.S. Government's shuttle pricing policy and the resulting barrier to the unfair trade practice action prevented private companies from obtaining a resolution of this issue. During this period, the private sector had to continue to compete against government subsidized launch services, both domestic and foreign.

The potential ramifications of the Government's policy in both the areas of export control and international fair trade will affect the development of the domestic launch industry.

### **III. PROPOSALS**

The Space Launch Act along with the Space Policy comprise the first steps toward the establishment of a coherent and workable commercial space policy. These changes have led to single agency review for commercial launch licensing, the opening up of increased opportunity for commercial launch ventures, and the beginning of a stable domestic policy upon which commercial space ventures can build an industry. However, as previously discussed, there still remain areas of concern and further steps need to be taken to round out a successful policy in the area of commercial space transportation. Areas which need to be addressed are: the role of NASA in the space transportation industry, assignment of liability, insurance coverage, intellectual property protection, details of the use of Government facilities, and international competition and trade.

#### **A. NASA's Role in Space Transportation**

One of the primary concerns of the domestic launch industry is the future role of NASA in the provision of space transportation. A return to the days of competition between NASA and private industry would be disastrous to the nascent space launch industry. NASA's role has already been defined by statute to be developmental and not operational, [FN241] and its future operations should be limited by this crucial distinction. Responsibility for the provision of routine access to space should rest with private sector launch services. NASA should focus its efforts on research areas, keeping America in the forefront of advanced technology development [FN242] with a pass-through of applicable technology to the private sector.

A similar approach was successfully adopted by the National Advisory Committee for Aeronautics (NACA), NASA's predecessor, during the developmental years of the aerospace industry. Established in 1915 to "supervise and direct the scientific study of the problems of flight, with a view to their practical solution," [FN243] NACA was active in research and development for the purpose of fueling the commercial aircraft industry.

Particularly in the late '20s and early '30s, NACA had a solid record of achievement in technology research and development, including a leading role in developing critical technology for commercial and defense aviation. NACA limited itself to basic research in aeronautics and development of new technology; it did not attempt to enter the airline business itself. [FN244]

NACA's goal, which was largely achieved, envisioned private firms utilizing NACA research to build more

effective and competitive aircraft. [FN245] A similar relationship should be developed between NASA and the commercial space launch industry.

The Reagan Administration moved towards restructuring NASA more along the lines of NACA. President Reagan stated:

NASA and our shuttles can't be committing their scarce resources to things which can be done better and cheaper by the private sector. Instead, NASA and the four shuttles should be dedicated to payloads important to national security and foreign policy, and, even more, on exploration, pioneering, and developing new technologies and uses of space. NASA will keep America on the leading edge of change; the private sector will take over from there. Together, they will ensure that our country has a robust, balanced, and safe space program. [FN246]

This redirection of NASA will facilitate the overall advancement of U.S. space technology by providing funds for the development of "areas that promise broad, national benefits that are too diverse and as yet too far from marketability to attract private capital" [FN247] and "areas that provide a sound infrastructure upon which private-sector development can flourish." [FN248] In addition, the removal of NASA from the role of a provider of commercial launch services assists the development of the private launch industry by opening up an economic opportunity for private industry.

Part of this shift in NASA's role includes the transformation of the Government from the purchaser of hardware to the purchaser of services. [FN249] This step is a corollary to the curtailing of NASA's role in the provision of commercial transportation since NASA would no longer maintain low- end launch capabilities. The new national space policy adopts this position by requiring that all Government agencies purchase launch services from the private sector "to the fullest extent feasible." [FN250] NASA has also expressed its intentions to procure launch services from the private sector. [FN251] This, in conjunction with the limited role of the shuttle and NASA in the provision of commercial space transportation, [FN252] is one of the most effective steps the Government could undertake to foster the commercial launch industry. [FN253]

Furthermore, by contracting directly with private companies for launch services rather than for vehicle hardware, the Government and private industry receive a number of secondary benefits. First, by taking this process out of the current "cost plus" contracting mode, private industry (not the Government) is responsible for the business risks associated with a commercial venture. With company profits on the line, private industry will have an increased incentive for the development of more innovative and less expensive ways to implement the technology. Second, private industry will be able to reduce the per unit cost of space transportation vehicles by utilizing a production-line manufacturing process. [FN254] Third, allowing private companies to manufacture and launch ELV's could alleviate much of the red tape currently associated with producing hardware under contract for the Government. [FN255] Therefore, one can anticipate a lowering of costs and a reduction in governmental risk and obligation associated with space travel.

In order to accommodate this shift in responsibility, the Government will need to alter current procurement methods. To illustrate, General Dynamics recently responded to a U.S. Government request for launch services with a submission that included about 9,000 pages of documentation. The entire agreement for provision of the same type of service to Intelsat [FN256] for \$250 million in launch services totaled only 165 pages. [FN257] While Government interests may be well served by requiring extensive documentation, evaluations, and briefings for the development of major new Government-sponsored systems, such as the space station, such a process

should not be required when purchasing a service, especially one the Government has used numerous times in the past. Thus the procurement process should be restructured to allow for more reasonable, business-like transactions.

One potential weakness in this general proposal is that the Government's utilization of private launch services other than NASA could raise a legal question as to the authority of NASA to contract with outside service providers who replace civil servants. However, NASA's ability to replace federal civil service personnel with outside contractors has already been tested in the courts. In *Lodge 1858, American Federation of Government Employees v. Webb*, [FN258] the court held that NASA may go outside of the ranks of the civil service and enter into "contracts . . . or other transactions as may be necessary in the conduct of NASA's work and on such terms as it may deem appropriate." [FN259] Therefore, NASA's use of private launch services should not present any legal problems in this respect, especially in light of the provisions of the Space Policy.

Various satellite manufacturers (i.e. customers of the commercial launch services) have expressed concern over the role that private industry is slated to play in the provision of space transportation services as set forth in the Space Policy. [FN260] There is skepticism that private enterprise will be able to provide the services necessary to support commercial access to space. [FN261] In addition, the industry has expressed uncertainty over the seriousness of the Government's commitment to supporting the commercial launch sector and to the Government's exodus from the provision of commercial launch services. [FN262] However, even these commentators suggest that there is a need for a stable Government policy regarding commercial ELVs. [FN263]

Concurrent with the redirection of NASA to research and development, is the transferring of Government-developed technology to private industry. The National Space Policy, for example, calls for the "timely transfer of Government-developed space technology to the private sector in such a manner as to protect its commercial value, consistent with national security." [FN264] As discussed above, this type of cooperative relationship between government and private industry was one of the keys to the successful development of the aerospace industry.

Two approaches are currently available for private firm access to Government-developed technology: (1) firms may purchase surplus hardware from the Government [FN265] or (2) private firms may manufacture launch vehicles developed under Government contract. [FN266] These approaches provide distinct advantages to private companies, not the least of which is a vehicle which has been through the design and development process and has an established performance record. [FN267] In situations where the company was also involved in the original Government contract, the company may already have trained personnel familiar with the system.

The transfer of transportation systems is just one example of the potential for information exchange between NASA and private industry. NASA currently operates the Office of Commercial Programs which serves as an advocate within NASA for sponsoring commercial space activities, including the access of private ELV companies to NASA facilities. [FN268] This type of program should continue to be encouraged to assist in the funneling of technology from NASA research efforts to the private sector whenever possible.

The new Space Policy has already taken the initial steps toward a more NACA-like relationship between NASA and the private space launch industry. This has been accomplished partially through a refocusing of NASA into research and development, by eliminating NASA's commercial launch operations, by emphasizing the importance of transferring NASA-developed technology to the private sector, by procuring launch services from

the private sector when ever possible, and finally by the designation of the private sector as a major component in the successful advancement of the national space program.

For many private launch companies, this redirection of NASA's role in the space transportation field is critical. [FN269] NASA must follow its new direction and other government agencies must assist in this redirection. Additionally, Congress and the public must recognize that the purpose of NASA is not to create commercial products per se, but to keep America in the forefront of space exploration which includes technological research and development directed toward commercial application.

## **B. Liability and Insurance Issues**

Due to the nascent nature of the American space transportation industry, a policy which addresses both limits on liability and the availability of insurance should be adopted by the Government.

### **1. GENERAL DOMESTIC POLICY**

Several problems have been identified in the area of domestic regulation of liability and insurance for the commercial launch industry. [FN270] The Launch Act grants authority to the Secretary of Transportation to establish insurance levels for private launch companies utilizing Government facilities and requires that operators of launch services obtain liability insurance at the required levels. [FN271] To date, the OCST has not issued regulations in this area. This is an area ripe for action by the OCST. [FN272]

In developing its regulations, the OCST should, at a minimum, address the liability of private enterprises to the Government for damages which result from their use of Government facilities. The establishment of reasonable limits in this area would assist the private launch companies by lowering the costs of obtaining launch insurance, as well as bounding their potential liability. [FN273]

While private launch companies should be held responsible for their own negligence and willful misconduct, the Government should assume responsibility for the negligence and willful misconduct of its employees and subcontractors. Most of the functions to be carried out by the Government are "routine industrial and technical functions in which the Government has every opportunity to maintain full control over its operations." [FN274] Holding the company liable for damages resulting from Government actions will not increase safety if the Government, and not the private company, has control over these operations. Furthermore, placing this type of liability risk on the domestic launch industry will only stifle its growth.

In addition, new regulations should be issued to cap the liability of the launch company for damage to Government property. Such a proposal is set forth in the Space Policy which calls for a limit on the commercial launch operator's liability for damages to Government property to the insurance levels established by the OCST. [FN275] If the property losses of the Government exceed the maximum insured amount, it would waive its right to recover additional losses. [FN276] In the event losses to the Government are less than the insured level, it would waive its right to recover for damages caused by its own willful misconduct or reckless disregard. [FN277] This proposal is similar to agreements between NASA and commercial users of the shuttle. [FN278]

Countering both of these proposals is an argument that holding the Government liable for damages when it is

forced to act to protect the safety of lives and property (for example, during a vehicle test or launch) is unreasonable. [FN279] Because of the importance of these split-second decisions, it is argued, they should not be clouded by concern over potential liability imposed with the gift of hindsight. [FN280] Thus it is suggested that it may be necessary to create an exception to this rule of Government liability in emergency public safety situations. [FN281] While this type of exemption may be necessary to preserve the interests of public safety, in general, the private launch companies' liability should exclude liability for damages which result from acts of negligence or willful misconduct committed by the Government or its agents.

In addition to the potential liability of private launch companies to the Government, there is the problem of the launch company's and its customer's liability to third parties. [FN282] Foreign launch services, against which the domestic launch industry is competing, have Government-sponsored third party liability insurance at little or no added cost which covers both the launch provider and the user. [FN283] To remain competitive, American launch providers must be able to offer similar benefits to their customers and to their own operations.

One potential solution would be for the Government to limit the liability exposure of launch companies to third parties. Such a cap would place a limit on the amount of coverage the company would need to secure for any launch and thus would make it easier for companies to obtain insurance because the insurance companies would have a fixed amount of liability. Moreover, a liability cap would limit the total overall exposure of the company and eliminate the necessity of putting the company on the line for each launch.

The Space Policy endorses a partial cap on third party liability, by suggesting a \$200,000 maximum on noneconomic damages to third parties. [FN284] While this assists the companies by limiting liability for punitive damages, it still leaves the company with unlimited potential liability for non-punitive damages. Recent legislation before Congress proposes a cap on the third party liability of private launch companies equal to the lesser of \$500 million or the maximum liability insurance available on the open market. [FN285]

Adoption of such proposals would not mark the first time the Government has shared third party liability risks with industry. A similar allocation of risk was adopted under the Price-Anderson Act [FN286] to encourage the commercial development of the nuclear power industry in this country. The United States Supreme Court upheld the constitutionality of this limitation on liability noting that such limitations were rationally related to the Congressional purpose of promoting private-sector development in the new area of nuclear power. [FN287] Similarly, it would be within Congress' power to provide for this type of liability limitation to promote the development of the commercial launch industry.

## **2. INTERNATIONAL LIABILITY ISSUES**

Some of the problems in the area of liability and insurance arise because liability under international treaties is greater for the space launch industry than for other industries regulated on an international basis. [FN288] Thus, some commentators have suggested that the U.S. simply repudiate the Moon Treaty and renegotiate the liability provisions of the Outer Space Treaty in order to obtain more reasonable liability standards. [FN289] Such a proposal sounds rash, and an improperly handled repudiation of the Treaty could result in undesirable international ramifications. On the other hand, carefully negotiated modifications to existing treaties may be possible and preferable. The international community, for example, has previously accepted limits on liability in other closely related areas. As a case in point, international air carriers have for a long time enjoyed limited international liability for damage to passengers and luggage as well as damage caused by aircraft to third persons

or property on the ground. [FN290] In addition, while this may be a worthwhile long-term objective to pursue, negotiations in international arenas are notorious for lengthy and unpredictable bargaining phases; it took eight years to negotiate the terms of the Liability Treaty. [FN291] As a result, for the short term, other domestic alternatives, such as those presented above, must be explored.

### **C. Pricing of Facilities and Services**

One of the problems with the current program of providing private industry with access to Government facilities is identifying the costs to be assessed to the user by the Government. [FN292] Government agencies should attempt to assure that private companies are being charged only for the actual cost of the facilities they are using, and not paying for pre-existing government overhead. In other words, private industry should be charged only for the additive cost of their use of the Government facilities. As stated in recent legislation before Congress, such limits might include "the cost that can be unambiguously associated with a commercial launch effort, and would not be borne by the United States Government in the absence of a commercial launch effort." [FN293] In addition, reasonable estimates of the costs to be assessed to private users of Government facilities should be made available, and fixed prices should be provided where feasible. It should be remembered that it was the intent of Congress to assist commercial enterprises when it made these facilities available under the Commercial Launch Act. [FN294]

### **D. Government Priority**

Under the Air Force Model Agreement, the Government retains the right to first priority use of Government launch and test facilities. [FN295] In light of the potential costs associated with the exercise of this priority it is vital that an objective review system be established to assure bumping decisions are made in light of both the interests of national security and the interests of the Commercial Space Launch Act and the Space Policy. The Agreement itself provides for a 90-day intra-Air Force dispute resolution process. [FN296] However, this avenue might not afford adequate protection of the interests in promoting the commercial space transportation industry.

A recent proposal before Congress would call for the preemption of scheduled commercial launches only in cases of "imperative national need" relating to the public health and safety, national security interest, or foreign policy interests. [FN297] The existence of such situations would be determined jointly by the Secretary of Transportation and the Secretary of the Air Force or the NASA Administrator. [FN298] In the event such a determination were made, a subsequent report to Congress justifying the decision would be required. [FN299] This or a similar type of review process should be implemented in order to assure the stable access of private launch companies to Government launch and test facilities.

At a minimum, the Air Force or other Government agency which negotiates contracts with private industry for the use of Government launch facilities should make every effort to assure availability of the services and facilities for which the private company contracted. In addition, the Government should consider completely privatizing certain unused facilities, thus eliminating the potential bumping problems and providing a more stable base for the private launch industry.

### **E. Intellectual Property**

Both the private launch companies and their customers have an interest in maintaining the confidentiality of their proprietary information. Under current OCST regulations, material which is designated by the company as proprietary or confidential or falls under FOIA exemption 4(b) of the OCST, will not be released by the Office unless nondisclosure is contrary to public or national interests. [FN300] However, this standard appears overly broad, especially in light of the fact that there is no notification or appeal process available to the company.

The Commercial Space Launch Act calls for minimal regulatory interference in the activities of private launch companies. [FN301] Therefore the OCST should establish regulations which provide that in the absence of an immediate threat to public safety or national security, government agencies should not release the company's proprietary information. In addition, the company should be provided with notification of the disclosure request and, where time allows, the company should be granted an opportunity to approve or oppose the release of the information. In general, the Government should not be allowed to reproduce or distribute proprietary business or technical data without the express permission of the company. Additionally, this protection should be extended to include information pertaining to the customer's payload.

A similar standard is utilized by NASA with regard to the private users of the shuttle. There the Government has also adopted an attitude of minimal regulation in order to encourage private sector activities in space. As a result, it is NASA's policy not to acquire data unless there is an identifiable need; corporations are only required to supply NASA with enough information such that NASA can verify that the project is for peaceful purposes and that NASA and the Federal Government are in compliance with international and domestic laws. When it does become necessary for NASA to acquire "protected data" it does so under a policy of "restricted rights" "under an express agreement or understanding not to use or disclose it in any way which would compromise it as in [sic] intellectual property right." [FN302]

## **F. Export Control and International Trade and Competition**

Current U.S. export licensing regulations prevent domestic satellite companies from utilizing certain foreign launch services due to the potential for the transfer of U.S. technology. [FN303] Recent calls have been made for a change in this policy. [FN304] This issue is twofold, maintaining the integrity of sensitive technology launched aboard foreign launch services and resolving the claims of unfair competitive practices of foreign launch services. Given the interests in national security and the encouragement of the domestic launch industry, a consistent export policy should be developed to protect both the security of satellite technology and the U.S. private launch industry until unfair trade practices have ceased.

Currently, the Space Policy calls for the U.S. Trade Representative to "consult" and "negotiate" with other countries to "encourage" free trade. [FN305] This is a weak step toward addressing this problem, and it seems to cut short the U.S. Trade Representative's prerogative to bring action against foreign government sponsored launch services for conducting unfair trade practices. With the exclusion of commercial payloads from the shuttle, [FN306] Arianespace's initial line of defense to claims of unfair trade practices has dissolved. [FN307]

On the other hand, it is questionable whether legislation is the best means of addressing the problem of unfair international competition. The private launch industry would still face the difficult task of substantiating its claims, and, even if substantiated, it is unlikely that these claims would be acted upon in time to benefit the industry. A case in point is that of color televisions. In the early 1970s, the U.S. color television industry "was successful in proving that Japanese companies were dumping color television sets in the United States, but by the

time duties were imposed to counter this predatory practice, the domestic industry had already suffered irreversible damage." [FN308] Given the inability of an established industry to successfully utilize this avenue, it is doubtful that a newly emerging industry, such as the private space transportation industry, would be able to survive with this type of strategy. Thus, while legislation has the potential for the long-term control of unfair trade practices, it should not be relied on as the sole method for addressing these concerns.

It is essential in the developing stages of this industry that an even playing field be constructed for U.S. launch companies. The development of a policy addressing this area could involve Government tariffs on the exportation of satellites to foreign countries for launch with the proceeds from these tariffs going into a liability pool to assist domestic launch companies in the insurance and liability area. In addition, assuming the technology transfer problems (where applicable) could be surmounted, a policy could be developed to permit the utilization of foreign launch services only in the absence of comparable domestic services

## CONCLUSION

As the space shuttle program returns to active operations, America must not lose sight of the value of a viable commercial sector space launch industry. The opportunity exists now for the development of new and better American space policy which will result in joint Government and industry cooperation toward the provision of assured access to space. Initial steps in this direction were taken by Congress with the passage of the Commercial Space Launch Act and in President Reagan's National Space Policy. Further encouragement of the development of private sector commercial launch services should be forthcoming from Congress, regulatory agencies, NASA, and the investment community.

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[FN1]. On January 28, 1986, the space shuttle Challenger exploded 73 seconds after lift-off. All shuttle launch operations were grounded indefinitely pending investigation of the cause of the accident. Fixing NASA: As a Tough Report on Challenger is Readied, the U.S. Debates its Space Future, *TIME*, June 9, 1986, at 14.

[FN2]. On April 18, 1986, the second successive failure of the Titan 34D occurred when a Titan exploded at Vandenberg Air Force Base in California soon after launch. On May 3, 1986, the National Aeronautics and Space Administration (NASA) was forced to destroy a Delta rocket carrying a weather satellite after the rocket's main engine failed and the rocket became uncontrollable. Fixing NASA, *supra* note 1 at 14. Additionally, on April 25, 1986, a small research rocket, a Nike-Orion, failed. 1986: A Space Odyssey, *NEWSWEEK*, May 19, 1986, at 62.

[FN3]. As the Markets Related to Space Expand, U.S. Firms Face Stiff Rivals, Study Says, *Wall St. J.*, May 26, 1988, at 8, col. 1. Between January and August of 1986, eleven payloads originally part of the shuttle manifest contracted to launch on Ariane (a joint venture of several European countries) flights. Lead, Follow or Get Out of the Way, *SPACE WORLD*, May 1988, at 12, 13. See also, Soviets, Chinese Book Western Commercial Microgravity Payloads, *AVIATION WEEK & SPACE TECH.*, Feb. 29, 1988, at 22; Commercial Space Industry Stages Major Comeback, *AVIATION WEEK & SPACE TECH.*, Feb. 15, 1988, at 51, para. 8.

[FN4]. The new policy is officially detailed in a National Security Decision Directive (NSDD) which was signed

by the President on January 5, 1988 and is currently not available to the public.

[FN5]. The President's Space Policy and Commercial Space Initiative to Begin the Next Century - Fact Sheet, The White House Office of the Press Secretary, 1 (Feb. 11, 1988) [hereinafter Space Policy].

[FN6]. Presidential Directive on National Space Policy - Fact Sheet, The White House Office of the Press Secretary, 1, 9 (Feb. 11, 1988) [hereinafter Presidential Directive].

[FN7]. Space Policy, *supra* note 5, at 3; Presidential Directive, *supra* note 6, at 10.

[FN8]. Presidential Directive, *supra* note 6, at 9.

[FN9]. *Id.*

[FN10]. Space Policy, *supra* note 5, at 2.

[FN11]. *Id.* at 2-3.

[FN12]. *Id.* at 3.

[FN13]. This includes proposed limits on the private launch companies' liability to third parties for noneconomic injury and their liability to the Government for the damage of government property. *Id.* at 3-4.

[FN14]. *Id.* at 4.

[FN15]. *Id.* at 4.

[FN16]. Presidential Directive, *supra* note 6, at 7, 9; Administrative Message, A Union of Individuals ..., 24 WEEKLY COMP. PRES. DOC. 91, 119 (Jan. 25, 1988).

[FN17]. Grey, Let Private Industry Revive U.S. Space Program, Wall St. J., Sept. 30, 1987, at 3B, col. 3.

[FN18]. See *supra* notes 1-2 and accompanying text.

[FN19]. In 1984, President Reagan called upon NASA and the Department of Transportation to stimulate private sector investment in commercial, unmanned space boosters to "bring into play America's greatest asset -- the vitality of our free enterprise system." Presidential Address, 20 WEEKLY COMP. PRES. DOC. 113 (Jan. 28, 1984).

[FN20]. The presidential commission headed by former Secretary of State William Rogers [hereinafter Rogers Commission] examined the mechanical problems which were the direct cause of the shuttle explosion, as well as

the managerial problems within the NASA organization. See generally, Fixing NASA: As a Tough Report on Challenger is Readied, the U.S. Debates its Space Future, TIME, June 9, 1986, at 14. In addition, steps were being taken to reverse the "disastrous" decision made by the Nixon Administration to use the shuttle as the sole means of civil space transportation. Id. at 16.

[FN21]. An expendable launch vehicle (ELV) is a nonreusable, one-time launch vehicle which generally burns up on reentry in the Earth's atmosphere. The space shuttle orbiter on the other hand, returns to Earth and is refurbished and reused on other flights. Brumberg, Regulating Private Space Transportation, 36 ADMIN L. REV., 363, 366 (1984).

[FN22]. Id.

[FN23]. Isikoff, Marietta to Launch GE Satellites; Deal Establishes Firm as Dominant in Field, Wash. Post, Jan. 27, 1988, at A14, col. 1.

[FN24]. The cost of launching a pound of payload into orbit on the shuttle is estimated to be 20 times higher than originally estimated by NASA. 1986: A Space Odyssey: NASA's Troubles Began When It Changed from Research Lab to Trucking Firm, NEWSWEEK, May 19, 1986, at 62. Furthermore, direct government subsidies for each shuttle flight are estimated to be between \$70 and \$150 million dollars. 1985 NASA Authorization, Vol. II: Hearings Before the Subcomm. on Space Science and Applications of the House Comm. on Science and Technology, 98th Cong., 2d Sess. 823-93 (1984) (statement of Phillip K. Salin); Bennett & Salin, The Private Solution to the Space Transportation Crisis, Federal Privatization Project Issue Paper, at 11, 12 (Reason Foundation, 1987).

[FN25]. Bennett & Salin, The Private Solution to the Space Transportation Crisis, Federal Privatization Project Issue Paper, at 8-10 (Reason Foundation, 1987).

[FN26]. While the loss of the Challenger orbiter technically resulted in the loss of only 25% of the civilian launch capability (one of four shuttles), the grounding of the entire shuttle program, pending extensive modification to the fleet, actually resulted in the complete loss of all civilian launch capability. With the loss of the Delta and the Titan, the U.S. was unable to even put a medium-size payload into orbit. Fixing NASA: As a Tough Report on Challenger is Readied, the U.S. Debates its Space Future, TIME, June 9, 1986, at 14.

[FN27]. Space Shuttle Engine Firing Test Marks Key Step Toward Mission 26, AVIATION WEEK & SPACE TECH., Aug. 15, 1988, at 21.

[FN28]. Assured Access to Space, 1986: Hearings before the Subcomm. on Space Science and Applications of the House Comm. on Science and Technology, 99th Cong., 2d Sess. 22 (1986) (statement of Edward C. Aldridge, Jr., Under Secretary of the Air Force).

[FN29]. Commercial Space Industry Stages Major Comeback, AVIATION WEEK & SPACE TECH., Feb. 15, 1988, at 51 (Advertiser Sponsored Market Supplement).

[FN30]. Id.

[FN31]. President's Statement on the Fourth Shuttle Orbiter and Space Program, 22 WEEKLY COMP. PRES. DOC. 1103 (Aug. 15, 1986).

[FN32]. A subsequent change in policy resulted in a loosening of this restriction and allowed some shuttle-specific payloads access to shuttle launches, but only in the absence of military and government payloads. Thus, in practical terms, this policy change had an insignificant effect on the outlook of commercial satellite companies; they still faced the extended delay of their launch and future inability to utilize the shuttle for commercial payloads. Presidential Directive, *supra* note 6, at 4.

[FN33]. See, State of the Commercial Launch Industry: Hearings Before the Subcomm. on Space Science and Applications of the House Comm. on Science and Technology, 100th Cong., 1st Sess. 163-64 (1987) (statement of Courtney A. Stadd, Director, Office of Commercial Space Transportation).

[FN34]. Martin Marietta has entered into an agreement with the Astro-Space Division of General Electric (GE) to launch 15 GE communications satellites over the next several years. This brings to 19 the total number of satellites committed to launch on the Titan. Space Commercialization Initiative Sparks Concern Among Agencies, Contractors, Daily Report for Executives, (BNA) No. 20 (Feb. 1, 1988).

[FN35]. McDonnell Douglas currently has two contracts for launches of satellites on its Delta booster. Isikoff, Marietta to Launch GE Satellites; Deal Establishes Firm as Dominant in Field, Wash. Post, Jan. 27, 1988, at A1.

[FN36]. General Dynamics has signed an agreement to launch a European telecommunications satellite on the Atlas. *Id.*

[FN37]. The Black Brant VC is a sounding rocket (a suborbital vehicle) which was developed by NASA. State of the Commercial Launch Industry, *supra* note 33, at 23 (statement of Eugene F. Kadar, President, Conatec, Inc.). Conatec is negotiating the launch, in March of 1989, of two microgravity research projects. Government Payloads Dominate Commercial Launch Manifest, AVIATION WEEK & SPACE TECH., July 4, 1988, at 24.

[FN38]. Isikoff, Marietta to Launch GE Satellites; Deal Establishes Firm as Dominant in Field, Wash. Post, Jan. 27, 1988, at A1.

[FN39]. Assured Access to Space, 1986: Hearings before the Subcommittee on Space Science and Applications of the U.S. House of Representatives, 99th Cong., 2d Sess. 76 (Mar. 6, 1986) (statement of Dr. Alan M. Lovelace, Vice Pres. and General Mgr. General Dynamics Corp.); State of the Commercial Launch Industry, *supra* note 33, at 36 (statement of Eugene F. Kadar, President, Conatec, Inc.).

[FN40]. See *supra* note 3 and accompanying text. Additionally, an American company has contracted with the Soviet Union, rather than an American concern, for the transportation of payloads into orbit and for experiments to be conducted in the Soviets' Mir space station. American Company and Soviet Agree on Space Venture, N.Y. Times, Feb. 21, 1988, at A1, col. f. See also As the Markets Related to Space Expand, U.S. Firms Face Stiff Rivals, Study Says, *supra* note 3.

[FN41]. Soviets Offer Three Boosters for Commercial Launch Services, AVIATION WEEK & SPACE TECH., Jan. 12, 1987, at 94.

[FN42]. JANE'S SPACEFLIGHT DIRECTORY, 310 (R. Turnill 2d ed. 1986).

[FN43]. Although in practice, Arianespace took over from the ninth launch. Id.

[FN44]. West European Rocket Puts 2 Satellites Into Orbit, N.Y. Times, March 13, 1988, at 25, col. 1.

[FN45]. Id. at 25; Commercial Space Industry Stages Major Comeback, AVIATION WEEK & SPACE TECH., Feb. 15, 1988, at 51.

[FN46]. Growth, Stability Predicted for Commercial Space Ventures, AVIATION WEEK & SPACE TECH., Mar. 14, 1988, at 108-09.

[FN47]. India's First Remote Sensing Satellite Launched in Soviet Union, Xinhua Gen. Overseas News Serv., Item No. 0317151, Mar. 17, 1988.

[FN48]. Commercial Space Industry Stages Major Comeback, AVIATION WEEK & SPACE TECH., Feb. 15, 1988, at 51. See infra notes 169-81 and accompanying text.

[FN49]. China at the Frontiers of Space Technology, Xinhua Gen. Overseas News Serv., Item No. 0313122, Mar. 13, 1988.

[FN50]. Id.

[FN51]. Chinese Prepare Long March Booster for Launch with German Payload, AVIATION WEEK & SPACE TECH., July 25, 1988, at 26.

[FN52]. Covault, U.S. Space Program Urged to Support International Commercial Competitiveness, AVIATION WEEK & SPACE TECH., Nov. 2, 1987, at 55.

[FN53]. Moreover, governments generally were viewed as the entities capable of providing space transportation services. Ritholz, International and Domestic Regulation of Private Launching Ventures, 20 STAN.J.OF INT'L L. 135 (1984).

[FN54]. 42 U.S.C. §§ 2451-84 (1982).

[FN55]. NASA was given responsibility for all aeronautical and space activities of the United States "except that activities peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the United States (including the research and development necessary to make effective provision for the defense of the United States)" which remained the responsibility of the Department of Defense. 42 U.S.C. § 2451.

[FN56]. Commercial Space Transportation; Licensing Regulations, 53 Fed. Reg. 11,004 (1988) (to be codified at 14 C.F.R. § 400-15).

[FN57]. Id.

[FN58]. Special Message to Congress on Urgent National Needs, 205 PUB. PAPERS 396, 404 (May 25, 1961); Comment, Commerce and Outer Space: A Legal Survey, 37 MERCER L. REV. 1551, 1568 (1986).

[FN59]. JANE'S SPACEFLIGHT DIRECTORY 30 (R. Turnill 2d ed. 1986).

[FN60]. The United States has used several ELVs including, Delta, Atlas- Centaur, Titan, and Scout. Fixing NASA, TIME, June 9, 1986, at 20.

[FN61]. NASA had proposed both a space station and a reusable manned space shuttle, but the administration was only willing to support one of the two projects and so NASA chose to initially seek funding for the shuttle, hoping to later obtain funding for both projects. However, public support for the program was low and as a result NASA sought to acquire the support of the Air Force in the shuttle project, a move which required substantial modifications to the shuttle design. Bennett & Salin, supra note 25, at 8.

[FN62]. Marietta to Launch GE Satellites: Deal Establishes Firm as Dominant in Field, Wash. Post, Jan. 27, 1988, at A1.

[FN63]. Raclin, Going to Work in Space: A Survey of Presently Available Launch Systems, in AMERICAN ENTERPRISE, THE LAW AND THE COMMERCIAL USE OF SPACE, 30, 37 n.23 (1986).

[FN64]. Id. at 53, 64. This policy was reaffirmed by President Reagan on July 4, 1982 when he formally announced the United States policy that "[t]he United States Transportation System (STS) is the primary space launch system for both national security and civil government missions .... The completion of transition to the Shuttle should occur as expeditiously as practical .... Expendable launch vehicle operations shall be continued by the United States Government until the capabilities of the STS are sufficient to meet its needs and obligations." United States Space Policy, 18 WEEKLY COMP. PRES. DOC. 872, 873 (July 4, 1982).

[FN65]. JANE'S SPACEFLIGHT DIRECTORY, 107 (R. Turnill 2d ed. 1986).

[FN66]. NASA Administrator, James Beggs, estimated the commercial revenues produced by the shuttle payloads would offset the cost of the Shuttle operations by 1988 or 1989. Brumberg, Regulating Private Space Transportation, 36 ADMIN. L. REV. 363, 365 (1984).

[FN67]. Id.

[FN68]. In 1976, NASA projected the shuttle would fly 60 missions per year. In 1981 NASA estimated the shuttle would fly 40 missions per year by the late 1980s. Simon & Hora, Return of the ELVs, SPACE WORLD,

Jan. 1988, at 15. Between April 1981 and the end of 1985, the space shuttles flew 24 successful missions. Fixing NASA: As a Tough Report on Challenger is Readied, the U.S. Debates its Space Future, *TIME*, June 9, 1986, at 20 [hereinafter Fixing NASA].

[FN69]. In 1972, when the shuttle program was approved, the estimated cost for the operation of each flight was \$10 million. However, the average cost for each of the 20 flights made by Challenger, Discovery, and Columbia was \$257 million. *JANE'S SPACEFLIGHT DIRECTORY 88* (R. Turnill 2d ed. 1986). NASA space shuttle program was neither low-cost nor reliable, according to Clarence W. Brown, Deputy Secretary of Commerce. Government Faulted for Frustrating Commercial Space Entrepreneurs, *AVIATION WEEK & SPACE TECH.*, Feb. 15, 1988, at 79.

[FN70]. It is estimated that the U.S. Government directly subsidizes between \$70 and \$150 million dollars for every shuttle flight. Bennett & Salin, *supra* note 25, at 11-12.

[FN71]. Government Faulted for Frustrating Commercial Space Entrepreneurs, *AVIATION WEEK & SPACE TECH.*, Feb. 15, 1988, at 79.

[FN72]. Crippled Birds in Search of Wings, *TIME*, Oct. 5, 1987, at 72; Fixing NASA, *supra* note 68, at 14; Putting the Future on Hold, *TIME*, Feb. 10, 1986, at 38.

[FN73]. National Security Decision Directive 254, Dec. 1986, as cited in Bennett & Salin, *supra* note 24, at 13.

[FN74]. Presidential Directive, *supra* note 6, at 4.

[FN75]. *Id.* at 9.

[FN76]. Space Policy, *supra* note 5, at 5.

[FN77]. In February 1984, President Reagan via Executive Order 12,465, designated the Department of Transportation the lead agency within the Federal Government for encouraging and facilitating commercial ELV activities within the private sector. Exec. Order No. 12,465, 49 Fed. Reg. 7211 (1984). Less than eight months later, Congress passed the Commercial Space Launch Act which gave legislative authority to the Department of Transportation's role as the principle oversight agency for the regulation and licensing of commercial space transportation systems. Commercial Space Launch Act, Pub. L. No. 98-575, 98 Stat. 3055 (1984) (codified at 49 U.S.C. §§ 2601-2623 (1984)). The Launch Act is regarded as the authority for the regulation of the industry by the Office of Commercial Space Transportation.

[FN78]. 49 U.S.C. § 2604 (1984).

[FN79]. This solved one of the universal complaints from commentators. See, e.g., Brum berg, *supra* note 67, at 383; Nesgos, International and Domestic Law Applicable to Commercial Launch Vehicle Transportation, *PROCEEDINGS OF THE TWENTY-SEVENTH COLLOQUIUM ON THE LAW OF OUTER SPACE*, 98, 107-08 (1984).

[FN80]. In September 1982, Space Services, Inc. (SSI) successfully launched its ELV, the Conestoga I, a reconditioned government surplus Minuteman I missile. Following closely on SSI's heels was Starstruck, Inc., which in August of 1984 launched the Dolphin, the first privately developed commercial rocket. Raclin, *supra* note 63, at 53 n.91.

[FN81]. Remarks by President Reagan on signing Executive Order No. 12,465 (1984). Pre-launch approvals were required from the Federal Aviation Administration (FAA), the National Aeronautics and Space Administration (NASA), the Departments of State and Defense, the Federal Communications Commission (FCC), the Bureau of Alcohol, Tobacco and Firearms, the Internal Revenue Service, the Material Transportation Board, the Occupational Health and Safety Administration, the Environmental Protection Agency, the Equal Employment Opportunity Commission, and the Department of Transportation, in addition to obtaining an export license and providing notification to the United States Navy, Air Force, and Coast Guard. *Id.*

[FN82]. 49 U.S.C. §§ 2601-2623 (1984).

[FN83]. 49 U.S.C. § 2606 (1984). See *infra* text accompanying notes 86-101 for discussion.

[FN84]. 49 U.S.C. § 2615 (1984). See *infra* text accompanying notes 102- 123 for discussion.

[FN85]. 49 U.S.C. § 2614 (1984). See *infra* text accompanying notes 124- 168 for discussion.

[FN86]. 14 C.F.R. §§ 404-15 (1987). These regulations were finalized on April 4, 1988. Licensing Regulations, 53 Fed. Reg. 11,004 (1988).

[FN87]. These two reviews may be conducted separately or together, at the discretion of the company. Moreover, the OCST must act on an application within 180 days although reviews generally take between 30 and 60 days. State of the Commercial Launch Industry: Hearings Before the Subcomm. on Space Science and Applications of the House Comm. on Science, Space and Technology, 100th Cong., 1st Sess. 166 (Sept. 17, 1987) (statement of Courtney Stadd, Director, OCST). 14 C.F.R. § 413.9(e) (1987).

[FN88]. A launch license is required for a launch of any vehicle inside U.S. territory or a launch outside of the United States by any individual or any corporation, partnership, joint venture, association or other entity organized or existing under the laws of the United States or of any state. 14 C.F.R. § 415.3 (1987).

[FN89]. 14 C.F.R. §§ 415.21-415.25 (1987).

[FN90]. 14 C.F.R. §§ 415.11-415.17 (1987).

[FN91]. 14 C.F.R. § 413.13 (1987).

[FN92]. 14 C.F.R. § 411.3(a) (1987).

[FN93]. 14 C.F.R. § 411.3 (1987).

[FN94]. 53 Fed. Reg. 11,011-012 (1988).

[FN95]. 14 C.F.R. § 411.5(a) (1987).

[FN96]. *Id.*

[FN97]. *Id.*

[FN98]. As distinguished from a filing for a launch from a Government facility, an application for launch from a private site must "identify and evaluate all hazards to public health and safety or to off-site property that may occur during prelaunch, launch or inorbit operations; procedures to be employed to control the hazards identified; qualifications of range safety personnel and other critical personnel responsible for assuring hazard controls; design characteristics of range safety systems (flight and ground) and their effectiveness in assuring a safe launch operation; and any residual risks to public health and safety or to off-site property that may be associated with the applicants' proposed launch operations." A lengthy detailed listing of the information required follows. Licensing Regulations, *supra* note 56, at 11,011-012.

[FN99]. 14 C.F.R. § 411.7 (1987).

[FN100]. Licensing Regulations, *supra* note 56, at 11,012.

[FN101]. 14 C.F.R. § 411.7 (1987).

[FN102]. 49 U.S.C. § 2615 (1984).

[FN103]. 49 U.S.C. § 2620(d) (1984).

[FN104]. 49 U.S.C. § 2615 (1984).

[FN105]. *Id.*

[FN106]. State of the Commercial Launch Industry, *supra* note 33, at 162.

[FN107]. See *infra* notes 142-50 and accompanying text.

[FN108]. 14 C.F.R. § 411.3 (1987).

[FN109]. Outer Space Treaty, Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205.

[FN110]. Space Liability Treaty, Mar. 29, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762, 961 U.N.T.S. 187.

[FN111]. Space Rescue Treaty, Apr. 22, 1968, 19 U.S.T. 7570, T.I.A.S. 6599, 672 U.N.T.S. 119. This agreement supplements the Outer Space Treaty and contains detailed provisions for international cooperation in the rescue and return of astronauts and objects.

[FN112]. Space Registration Treaty, Jan. 14, 1975, 28 U.S.T. 695, T.I.A.S. No. 8480, 1023 U.N.T.S. 15. This treaty imposes a requirement that all states launching objects into space keep a register of such objects and requires the state to notify the United Nations Secretary General of all launches.

[FN113]. Moon Treaty, G. A. Res. 68, 34 U.N. GOAR, Supp. (No. 46) at 77 (1979). This treaty, which has not been ratified by the United States or the Soviet Union, establishes that the resources of the moon and other bodies are the "common heritage of mankind" and exploration should be done in accordance with an international plan which is yet to be established.

[FN114]. C. Christol, *THE MODERN INTERNATIONAL LAW OF OUTER SPACE* 20 (1982).

[FN115]. Outer Space Treaty, *supra* note 109, art. I.

[FN116]. Outer Space Treaty, *supra* note 109, art. VII.

[FN117]. *Id.* The term "space object" includes cargo as well as the space vehicle.

[FN118]. *Id.* at art. VI.

[FN119]. Space Liability Treaty, *supra* note 110.

[FN120]. Citizens of the launching state or other state involved in the launch may not make claims under the Space Liability Treaty. *Id.*, arts. VII, VIII. "Such parties would have to resort to standard national and international avenues for compensation." Note, *International Law of Outer Space and its Effect on Commercial Space Activity*, 11 *PEPPERDINE L.REV.* 521, 542 (1984).

[FN121]. Space Liability Treaty, *supra* note 110, arts. II, IV.

[FN122]. *Id.*

[FN123]. Some lessening of liability is provided to the launching state under article VI which provides that States may be exonerated from absolute liability if it can be shown that the "injured" state contributed to damage by having acted with gross negligence or with intention to cause damage. However, if the launching state is not in compliance with international law, even proof of the other state's willful misconduct will not exonerate the launching state. Thus, if the U.S. were lax in its obligation to authorize and supervise the space activities of non-governmental entities, it would not be entitled to exoneration. "This is a great incentive for states to take their international responsibilities seriously." Note, *International Law of Outer Space and its Effect on Commercial Space Activity*, 11 *PEPPERDINE L.REV.* 521, 541 n.99 (1984).

[FN124]. Licensing Regulations, *supra* note 56, at 11004-005.

[FN125]. 49 U.S.C. app. § 2614 (1984).

[FN126]. *Id.*

[FN127]. One private launch company claims that local regulatory and environmental considerations are so extensive that no private launch company will have an operational private launch facility within the next few years. *State of the Commercial Launch Industry*, *supra* note 33, at 8 (statement of George Koopman, President, American Rocket Co.).

[FN128]. See *supra* notes 86-101 and accompanying text.

[FN129]. Martin Marietta has signed an agreement with the U.S. Air Force for the use of launch facilities at Cape Canaveral. *State of the Commercial Launch Industry*, *supra* note 33, at 108. American Rocket Company is currently utilizing Edwards Air Force Base for its static engine testing program and is negotiating with the Air Force for use of Vandenberg Air Force Base for its launch site. *Id.* at 3-4, 10 (statement of Alan Lovelace, Vice President, General Dynamics Corp.). See also *supra* notes 123-25.

[FN130]. *State of the Commercial Launch Industry*, *supra* note 33, at 8 (statement of George Koopman, President, American Rocket Co.).

[FN131]. *Id.* at 42.

[FN132]. Foley, *Satellite Builders Want Change in U.S. Anti-Proton Policy*, *AVIATION WEEK & SPACE TECH.*, Sept. 28, 1987, at 138.

[FN133]. *State of the Commercial Launch Industry*, *supra* note 33, at 16-17, 24 (statement of Eugene Kadar, President, Conatec, Inc.).

[FN134]. Department of the Air Force, *Model Expendable Launch Vehicle Commercialization Agreement*, Feb. 12, 1988 (Revision One) [hereinafter *Agreement*].

[FN135]. *Id.* at art. I § (a).

[FN136]. The company reimburses the Government for all of the direct costs incurred in its use of the facility. *Id.* at art. XI.

[FN137]. The company's use of the facilities is subject to the Government's right of first priority. Thus, even after the *Agreement* is signed, if the Government needs access to or complete use of the property under contract with the company to meet "national security interests or U.S. government mission requirements," the company is forced to vacate the facilities. The Government is required to use best efforts in notifying the company that it

intends to exercise its first priority option. Id. art. XII, § (b)(1).

[FN138]. Id. at art. III.

[FN139]. The Agreement is viewed by industry leaders as "the vehicle for establishing the terms of access" to national launch and testing sites, and will also be used as the "groundwork type of agreement" for the use of other facilities. State of the Commercial Launch Industry, supra note 33, at 8, 17 (statement of George Koopman, President, American Rocket Co.).

[FN140]. Aldridge, Commercialization, Department of the Air Force, Feb. 17, 1988.

[FN141]. Agreement, supra note 134, at art. II, § 1.

[FN142]. 49 U.S.C. app. § 2615 (1984).

[FN143]. Comments on the Draft U.S. Air Force 'Expendable Launch Vehicle Commercialization Agreement', U. S. Department of Transportation, Advisory Committee to the Office of Commercial Space Transportation, Jan. 1987 at 1 [hereinafter COMSTAC Comments].

[FN144]. Agreement, supra note 134, at art. IV, § (c)(1) (emphasis added).

[FN145]. Department of the Air Force, Model Expendable Launch Vehicle Commercialization Agreement, Dec. 16, 1986, art. IV, § (c)(1) [hereinafter Draft Agreement] (first draft) (emphasis added).

[FN146]. COMSTAC Comments, supra note 143, at 1-2.

[FN147]. Agreement, supra note 134, at art. IV, § (c)(4). Prior versions of the Agreement called for launch companies to obtain "aggregate maximum casualty and liability insurance available on the world market." Draft Agreement, supra note 145, at art. IV, § (c)(4).

[FN148]. Agreement, supra note 134, at art. IV, § (c)(4).

[FN149]. Id. at art. I, § (a).

[FN150]. Id. at art. IV, § (c)(6).

[FN151]. Id. at art. VII, § (a).

[FN152]. Id. at art. V, § (3).

[FN153]. State of the Commercial Launch Industry, supra note 33, at 35 (statement of Eugene Kadar, President, Conatec, Inc.).

[FN154]. Agreement, supra note 134, art. V, § (a)(3).

[FN155]. Id.

[FN156]. Id. at art. VIII, § (b).

[FN157]. Id.

[FN158]. Id. at art. VIII, § (d).

[FN159]. Id.

[FN160]. Draft Agreement, supra note 145, at art. V, § (3).

[FN161]. For concerns of the industry, see generally State of the Commercial Launch Industry, supra note 33.

[FN162]. Agreement, supra note 134, at art. XI, § (a).

[FN163]. Id. at art. III.

[FN164]. Id. at art. V, § (b).

[FN165]. Id. at art. XI, § (c)(1)(a).

[FN166]. Id. at art. XI, § (c)(2)(a).

[FN167]. Id.

[FN168]. See supra notes 142-50 and accompanying text.

[FN169]. See supra notes 40-52 and accompanying text.

[FN170]. House Panel Chief Questions Pact With Russians on Space Payload, N.Y. Times, Feb. 26, 1988, at D19, col. 6.

[FN171]. Requests by American companies for export licenses for satellite launches on Soviet vehicles have been routinely rejected. Id.

[FN172]. Foley, Satellite Builders Want Change in U.S. Anti-Proton Policy, AVIATION WEEK & SPACE TECH., Sept. 28, 1987, at 138.

[FN173]. American Company and Soviet Sign Agreement on Space Venture, N.Y. Times, Feb. 21, 1988, at A32, col. 6.

[FN174]. Id.

[FN175]. House Panel Chief Questions Pact with Russians on Space Payload, N.Y. Times, Feb. 26, 1988, at D19, col. 5.

[FN176]. Id. at D19, col. 6.

[FN177]. U.S. May Launch Satellites on Chinese Rocket Boosters, Oakland Tribune, Sept. 10, 1988, at A6, col. 3.

[FN178]. Foley, U.S. Reviews Policy on Use of Chinese Launcher Following Export Requests, AVIATION WEEK & SPACE TECH., Aug. 1, 1988, at 29.

[FN179]. Id.

[FN180]. Id.

[FN181]. Id.

[FN182]. Presidential Directive, *supra* note 6, at 2, 5.

[FN183]. See generally Presidential Directive, *supra* note 6; Space Policy, *supra* note 5.

[FN184]. See generally Bennett & Salin, *supra* note 25.

[FN185]. Presidential Directive, *supra* note 6, at 1; Space Policy, *supra* note 5, at 1; Commercial Space Launch Act, 49 U.S.C. § 2602 (Supp. 1985).

[FN186]. Presidential Directive, *supra* note 6, at 1; Space Policy, *supra* note 5, at 1.

[FN187]. One of the purposes set forth in the Space Launch Act for the OCST is "to protect the public health and safety, safety of property, and national security interests and foreign policy interests of the United States." 49 U.S.C. § 2602 (3) (Supp. 1985). The Space Policy also calls for the encouragement of commercial use of space that is "consistent with national security interests and international and domestic legal obligations." Presidential Directive, *supra* note 6, at 2.

[FN188]. Bennett & Salin, *supra* note 25, at 25.

[FN189]. Id. at 2-9.

[FN190]. Id.

[FN191]. See supra notes 1-3 & 20-30 and accompanying text.

[FN192]. See supra notes 27-29 and accompanying text.

[FN193]. Grey, supra note 17, at 36, col. 4-5.

[FN194]. There are a number of reasons why Government development is more costly. For example, private Government contractors working on a cost-plus basis have little incentive to lower costs once a contract has been awarded. The paperwork involved with a Government project is immense, and shifts in Government priorities often result in wasted effort in a particular direction. For an excellent discussion of these issues, see generally Bennett & Salin, supra note 25.

[FN195]. This would appear to be a benefit to the private company who could come in and make the product for a lower cost. However, the lower-than-cost selling of the Government's product has precluded this scenario.

[FN196]. See generally Bennett & Salin, supra note 25; Grey, supra note 17.

[FN197]. The French government has provided indemnity to Arianespace and its customers for third party claims which exceed \$63 million. Foley, Satellite Builders Want Change in U.S. Anti-Proton Policy, AVIATION WEEK & SPACE TECH., Sept. 28, 1987, at 138. The Soviet Union has announced that it will offer third party liability coverage for commercial launches on the Soviet Proton. Soviets Will Offer Space Launch Insurance at Competitive Prices, AVIATION WEEK & SPACE TECH., Sept. 28, 1987, at 138.

[FN198]. State of the Commercial Launch Industry, supra note 106, at 31, 122 (statements of Eugene F. Kadar, President, Conatec, Inc. and John F. Yardley, President, McDonnell Douglas Astronautics Co.).

[FN199]. Id. at 11.

[FN200]. Id. at 11-12.

[FN201]. Encouragement of the commercial use of space shall be without "direct Federal subsidy." Presidential Directive, supra note 6, at 2.

[FN202]. 49 U.S.C. § 2615 (Supp. 1985).

[FN203]. See Agreement, supra note 134, at art. I(C).

[FN204]. The Government must be concerned with potential United States' international liability for private

launch operations as well as the Government's responsibility to monitor these activities, both of which are a result of the governing international treaties. See *supra* notes 102-23 and accompanying text.

[FN205]. Nor does it appear that the Agreement has met its stated objective of reasonable and prudent government action that has minimal adverse impact on commercial operations and gives stability to commercial launch operators. Agreement, *supra* note 134, at 1.

[FN206]. COMSTAC is comprised of representatives from private space transportation companies, users of space transportation (e.g. satellite manufacturers and owners), insurance interests, and other industry organizations with interests in space transportation developments.

[FN207]. COMSTAC Comments, *supra* note 143 (cover letter to the Secretary of Transportation).

[FN208]. Agreement, *supra* note 134, at 3. See also *supra* notes 141-50 and accompanying text.

[FN209]. State of the Commercial Launch Industry, *supra* note 33, at 12 (statement of George Koopman, President, American Rocket Co.).

[FN210]. See *supra* notes 109-23 and accompanying text.

[FN211]. See *supra* notes 147-49 and accompanying text.

[FN212]. See *supra* notes 148-49 and accompanying text.

[FN213]. See *supra* note 202.

[FN214]. McDonnell Douglas has not been able to obtain a firm quote from its underwriters who have informed the company that it will only be able to obtain insurance 60 to 90 days in advance of any launch, if the insurance is available at all. State of the Commercial Launch Industry, *supra* note 33, at 122 (statement of John F. Yardley, President, McDonnell Douglas Astronautics Co.). In addition, the ability of companies to obtain more than \$300 million in third party liability insurance on the world market is still in question. *Id.* at 311.

[FN215]. *Id.* at 355.

[FN216]. *Id.*

[FN217]. McDonnell Douglas stated that its costs of obtaining insurance to cover the risks of Government liability plus liability of launch customers plus its own third party liability increases the cost of a launch by 10%. State of the Commercial Launch Industry, *supra* note 33, at 122.

[FN218]. See *supra* note 162 and accompanying text.

[FN219]. Agreement, *supra* note 134, at 8.

[FN220]. State of the Commercial Launch Industry, *supra* note 33, at 34 (statement of Eugene F. Kadar, President, Conatec, Inc.).

[FN221]. See *supra* note 137.

[FN222]. State of the Commercial Launch Industry, *supra* note 33, at 18 (statement of Eugene F. Kadar, President, Conatec, Inc.). The contract states that the Government is not liable for "any costs, including but not limited to consequential damages incurred by third parties, the User, its contractors, or subcontractors as a result of any interruption." Agreement, *supra* note 134, at 13.

[FN223]. State of the Commercial Launch Industry, *supra* note 33, at 210, 324 (statements of Steven D. Dorfman, Vice President, Hughes Aircraft Co. and Thomas C. Natoli, GTE Spacenet Corp.).

[FN224]. *Id.*

[FN225]. *Id.* at 18, 202.

[FN226]. Launch Act, *supra* note 77, at § 2602.

[FN227]. The Air Force and other range operators also have safety responsibilities in light of the OCST's deferral to these organizations in § 411.5(b) of the Licensing Regulations, *supra* note 56.

[FN228]. "Information requested to be treated confidentially must be clearly marked with an identifying legend such as 'Proprietary Information' or 'Confidential Treatment Requested.'" 14 C.F.R. § 413.7(d).

[FN229]. 14 C.F.R. § 413.7(e).

[FN230]. See *supra* note 155.

[FN231]. State of the Commercial Launch Industry, *supra* note 33, at 35 (statement of Eugene F. Kadar, President, Conatec, Inc.).

[FN232]. See *supra* notes 169-81 and accompanying text.

[FN233]. State of the Commercial Launch Industry, *supra* note 33, at 193-238. Cf. *id.* at 237.

[FN234]. Foley, Satellite Builders Want Change in U.S. Anti-Proton Policy, AVIATION WEEK & SPACE TECH., Sept. 28, 1987, at 138.

[FN235]. See, e.g., State of the Commercial Launch Industry, *supra* note 33, at 272, 320.

[FN236]. Additional examples of potential unfair trade practices of foreign launch systems include: two-tier pricing, charging less than actual cost for facilities, services and personnel involved in the production, launch and range operations, providing or arranging financial capital investments or vehicle production or launch services at below-market interest rates, providing export financing of launches at below-market interest rates, government involvement in agreements to purchase foreign goods or services in partial exchange for launch services, and providing more favorable exchange rates for foreign customers than those available in the market. Commercial Space Launch Act Amendments of 1988, H.R. REP. NO. 639, 100th Cong. 2d Sess. 5-6.

[FN237]. TCI was a private space transportation company attempting to privatize the Delta rocket.

[FN238]. The thrust of TCI's claim was that a two-tiered pricing structure was used for Ariane launches which resulted in U.S. customers being charged 25- 33% less than European customers. Robinson and Meredith, Domestic Commercialization of Space: The Current Political Atmosphere, AMERICAN ENTERPRISE, THE LAW AND THE COMMERCIAL USE OF SPACE, NATIONAL LEGAL CENTER FOR THE PUBLIC INTEREST 1, 19 (1986).

[FN239]. In setting prices for commercial shuttle launches, the final compromise incorporated a direct subsidy of commercial shuttle launches by the U.S. Government in amounts between \$70 and \$150 million per flight. Bennett and Salin, *supra* note 25, at 12.

[FN240]. Robinson and Meredith, *supra* note 238, at 19.

[FN241]. 42 U.S.C. § 2451(d) (1982).

[FN242]. See, e.g., State of the Commercial Launch Industry, *supra* note 33, at 211-12 (the development of advanced launch capabilities) (statement of Steven D. Dorfman, Vice President, Hughes Aircraft Co.).

[FN243]. TIME-LIFE BOOKS, SPACE AND MAN 77 (1964).

[FN244]. Bennett & Salin, *supra* note 25, at 3.

[FN245]. Bennett & Salin, *supra* note 25, at 4.

[FN246]. Fourth Shuttle Orbiter and Space Program, *supra* note 31.

[FN247]. Grey, *supra* note 17, at 36, col. 6.

[FN248]. *Id.*

[FN249]. In other words, the Government is purchasing an airline ticket for a person to get between Washington and Los Angeles via a commercial airline, rather than designing, building, and flying an airplane themselves.

[FN250]. Space Policy, *supra* note 5, at 3.

[FN251]. State of the Commercial Launch Industry, *supra* note 33, at 293-94.

[FN252]. Presidential Directive, *supra* note 6, at 9.

[FN253]. Bennett & Salin, *supra* note 25, at 34; State of the Commercial Launch Industry, *supra* note 106, at 19, 57, 65.

[FN254]. Bennett & Salin, *supra* note 25, at 18.

[FN255]. It has been estimated that between 7%-30% of the cost of procurement through the Government system is attributable to excessive Government oversight. State of the Commercial Launch Industry, *supra* note 33, at 256. Cf. *id.* at 293. (NASA views the lack of Government oversight as a disadvantage because the Government must be more dependent upon private industry for mission success.)

[FN256]. Intelsat is an international joint venture which was established in 1962 to provide global satellite communication services.

[FN257]. State of the Commercial Launch Industry, *supra* note 33, at 127 (statement of Richard E. Brackeen, President, Martin Marietta Commercial Titan, Inc.).

[FN258]. 580 F.2d 496 (D.C. Cir.), cert. denied, 439 U.S. 927 (1978).

[FN259]. *Id.* at 510.

[FN260]. State of the Commercial Launch Industry, *supra* note 33, at 217-18 (statement of Otto W. Hoernig Jr., Vice President, Contel ASC).

[FN261]. *Id.*

[FN262]. *Id.* at 218.

[FN263]. *Id.* at 197, 218, 220.

[FN264]. Presidential Directive, *supra* note 6, at 7.

[FN265]. Conatec is currently taking advantage of this opportunity. Conatec will be marketing Black Brant sounding rocket launches, making use of the same hardware used by NASA (although Conatec is targeting the microgravity research market which NASA announced it was leaving in 1983). See *supra* note 37 and accompanying text.

[FN266]. For example, a recent contract between the Air Force and McDonnell Douglas for the upgrading of Delta rockets permits the company to provide commercial launch services using the same rocket design and hardware as the company is supplying to the Air Force. Bennett & Salin, *supra* note 25, at 28. General Dynamics is in the process of privatizing the Atlas Centaur, also developed under a government contract. Assured Access to Space: 1986, *supra* note 39, at 77.

[FN267]. For example, General Dynamics is in the process of privatizing the Atlas Centaur of which over 490 have already been flown. *Id.*

[FN268]. State of the Commercial Space Launch Industry, *supra* note 33, at 297.

[FN269]. State of the Commercial Launch Industry, *supra* note 33, at 19, 54, 57-58, 218; Grey, *supra* note 17, at 36, col. 6.

[FN270]. See *supra* notes 197-217 and accompanying text.

[FN271]. 49 U.S.C. § 2615.

[FN272]. The OCST appears to be in the process of establishing such regulations. State of the Commercial Launch Industry, *supra* note 33, at 11 (statement of George Koopman, President, American Rocket Co.).

[FN273]. See State of the Commercial Launch Industry, *supra* note 33, at 109 (statement of Richard E. Brackeen, President, Martin Marietta Commercial Titan, Inc.).

[FN274]. State of the Commercial Launch Industry, *supra* note 33, at 12 (statement of George Koopman, President, American Rocket Co.).

[FN275]. Space Policy, *supra* note 5, at 4.

[FN276]. *Id.*

[FN277]. *Id.*

[FN278]. "Between NASA and the commercial user most of the foreseeable risks were covered by a no-fault insurance policy that was maintained by the user and named NASA as an insured. For liabilities above the insurance coverage NASA and the user agreed to be responsible for damage to their own property without regard to who caused the damage." State of the Commercial Launch Industry, *supra* note 33, at 121 (statement of John F. Yardley, President, McDonnell Douglas Astronautics Co.).

[FN279]. State of the Commercial Launch Industry, *supra* note 33, at 12 (statement of George Koopman, President, American Rocket Co.).

[FN280]. *Id.*

[FN281]. Id.

[FN282]. See supra notes 197-217 and accompanying text.

[FN283]. See supra notes 197-99 and accompanying text.

[FN284]. Space Policy, supra note 5, at 3.

[FN285]. H.R. 4399, 100th Cong., 2d Sess. (1988).

[FN286]. Price-Anderson Act (amendments to the Atomic Energy Act of 1954), 42 U.S.C. § 2210 (1982).

[FN287]. Duke Power Co. v. Carolina Environmental Study Group, 438 U.S. 59 (1978).

[FN288]. State of the Commercial Launch Industry, supra note 33, at 11 (statement of George Koopman, President, American Rocket Co.).

[FN289]. Bennett & Salin, supra note 25, at 32-33.

[FN290]. Convention for the Unification of Certain Rules Relating to International Carriage By Air, October 12, 1929, art. 22, 49 Stat. 3000, 3006, 137 L.N.T.S. 12, 24. The Convention on Damage Caused By Foreign Aircraft to Third Parties on the Surface, Oct. 7, 1952, 310 U.N.T.S. 181.

[FN291]. Craft, Manufacturers' Liability Under United States Law for Products Used in Commercial Space Activities, 14 J. SPACE L. 113, 120 (1986).

[FN292]. See supra notes 218-20 and accompanying text.

[FN293]. Commercial Space Launch Act Amendments of 1988, H.R. 100-639, at 8, 100th Cong., 2d Sess. (1988).

[FN294]. See supra notes 124-26 and accompanying text.

[FN295]. See supra note 136.

[FN296]. Agreement, supra note 134, at 9-10.

[FN297]. H.R. 4399, 100th Cong., 2d Sess. (1988).

[FN298]. Id.

[FN299]. Id.

[FN300]. See supra notes 151-61 and accompanying text.

[FN301]. See generally Launch Act, supra note 77.

[FN302]. Craft, supra note 291, at 120.

[FN303]. See supra notes 170-81 and accompanying text.

[FN304]. See supra notes 174-81, 233-34 and accompanying text.

[FN305]. Presidential Directive, supra note 6, at 7.

[FN306]. See supra note 31.

[FN307]. In prior actions, Arianespace has claimed that its unfair practices were necessary in light of concurrent U.S. unfair practices with regard to subsidies of commercial payloads on the Shuttle. See supra notes 237-40 and accompanying text.

[FN308]. Noyce & Wolff, High-Tech Trade in the 1980s: The International Challenge and the U.S. Response, *ISSUES IN SCIENCE AND TECHNOLOGY* 61, 68 (1986).