

Who's the Captain Kirk of this Enterprise?: Regulating Outer Space Industry Through Corporate Structures*

The purpose of the Inner Station, as I've explained, was to act as a refueling, repair and transfer point for spaceships, both outgoing and incoming. For this job, it was necessary to be as close to the earth as possible The Meteorological Stations, on the other hand, had to be a fair distance out so that they could "see" as much of the earth as possible A good deal of astronomical work was also carried on in these stations Beyond the Met Stations, fifteen thousand miles up, circled the biology labs and the famous Space Hospital. There a great deal of research into zero-gravity conditions was carried out, and many diseases which were incurable on earth could be treated.¹

INTRODUCTION

United States commercial space policy² objectives, combined with advances in technology, provide private enterprise the opportunity to industrialize and exploit outer space. While private enterprise currently operates communications satellites³ and expendable launch vehicles

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¹ A. CLARKE, ISLANDS IN THE SKY 81-82 (1952).

² The United States space policy seeks to strengthen national security and maintain leadership in space. Obtaining economic and scientific benefits through space exploitation and expanding domestic private sector investment in civilian space also are important objectives. Finally, the space policy promotes international cooperation with other states to maintain the freedom of space for activities enhancing the world's security and welfare. Fact Sheet Outlining United States Space Policy, 2 PUB. PAPERS 894 (1983) (President Reagan's speech delivered July 4, 1982) [hereafter United States Space Policy].

³ The private sector has operated communications satellite systems since the creation of the Communications Satellite Corporation (Comsat) in 1962. See Communications Satellite Act of 1962, 47 U.S.C. § 701(c) (1982). For a discussion of Comsat, see *infra* notes 86-104 and accompanying text.

(ELV's),⁴ rapid growth of new business activities is imminent.⁵ The national space policy fosters this development by committing the government to "provide a climate conducive to expanded private-sector investment and involvement in space activities."⁶ President Reagan furthered space utilization by directing the National Aeronautics and

⁴ The Commercial Space Launch Act of 1984 encourages the commercialization of expendable launch vehicles (ELV's). See Commercial Space Launch Act, Pub. L. No. 98-575, 1984 U.S. CODE CONG. & AD. NEWS (98 Stat.) 3055 (to be codified at 49 U.S.C. §§ 2601-2623). Private launch systems will complement the National Aeronautics and Space Administration's (NASA) Space Shuttle program and strengthen the United States space transportation capabilities. J. Dorn, Remarks at the National Space Club meeting (Sept. 26, 1984) (available at Office of Commercial Space Transportation, U.S. Department of Transportation).

ELV's carry payloads to low Earth orbit, as does the Space Shuttle, and from there payloads are deployed to higher orbits. For example, a communications satellite is usually deployed to geosynchronous orbit, 22,300 miles/36,000 kilometers above the Earth's equator. Satellites in geosynchronous orbit travel at a speed matching the Earth's rotation so that objects appear stationary to an observer on Earth.

Examples of different types of ELV's include: Dolphin and Constellation (Starstruck, Inc.); Conestoga (Space Services, Inc.); Phoenix C/E (Pacific American Launch Systems, Inc.); Delta (Transpace Carriers, Inc.); Atlas-Centaur (General Dynamics/Convair); Titan 34D (Martin Marietta Aerospace); and Excalibur and Sea Dragon (Truax Engineering, Inc.). *Commercial Launch Vehicles*, COMMERCIAL SPACE REPORT, June 1984. See *infra* note 6.

⁵ See *infra* notes 10-12 and accompanying text for a discussion of potential space station industries.

⁶ See United States Space Policy, *supra* note 2, at 896. The Commercial Space Launch Act, enacted Oct. 30, 1984, incorporates the national space policy objectives by promoting commercialization of ELV's. Commercial Space Launch Act, Pub. L. No. 98-575, 1984 U.S. CODE CONG. & AD. NEWS (98 Stat.) 3055 (to be codified at 49 U.S.C. §§ 2601-2623). The Act streamlined a previously unwieldy process by requiring a lead agency to regulate the licensing of private launches. *Id.* Prior to this legislation a private launch company needed approvals from NASA, the Federal Communications Commission (FCC), the Federal Aviation Administration, and the Bureau of Alcohol, Tobacco, and Firearms. *Space Commercialization: Hearings Before the Subcomm. on Space Science and Applications of the House Comm. on Science and Technology*, 98th Cong., 1st Sess. 60 (1983) (Statement of David Hannah, Jr., Chairman of the Board, Space Services Inc. of America).

The following space-related bills were proposed during the 98th congressional session: S. 955, 98th Cong., 1st Sess. (1983) (promoting scientific and technological research and the development of space commercialization); S. 560, 98th Cong., 1st Sess. (1983) (authorizing and regulating private launches of space objects); S. 3013, 98th Cong., 2d Sess. (1984) (applying United States tax and custom laws to space produced products); H.R. 478, 98th Cong., 1st Sess. (1983) (implementing national space policy objectives); H.R. 1011, 98th Cong., 1st Sess. (1983) (providing encouragement and necessary regulation for commercial space development); H.R. 5975, 98th Cong., 2d Sess. (1984) (applying United States tax and tariff laws to space produced products).

Space Administration (NASA) to develop a permanently staffed space station for scientific, commercial, and industrial activities.⁷ The success of NASA's Space Shuttle Program⁸ makes a permanently staffed facility, as illustrated in the above outer space scenario, a realistic possibility within the next decade.⁹ Regarded as the next step in commercializing space, the space station will be used by various companies engaged in research or materials processing.¹⁰ Pharmaceuticals, crystals, and metal alloys are targeted as the first products to be manufactured commercially in outer space.¹¹ Benefiting from zero-gravity conditions, these materials processing areas will produce purer products and yield higher profits than if manufactured on Earth.¹²

⁷ State of the Union Address, 20 WEEKLY COMP. PRES. DOC. 90 (Jan. 25, 1984). The space station will orbit the earth and be comprised of a core of modules, platforms and freeflyers, both staffed and unstaffed. *See generally* OFFICE OF TECHNOLOGY ASSESSMENT, CIVILIAN SPACE STATIONS AND THE U.S. FUTURE IN SPACE (1984); Note, *Authority of the Space Station Commander: The Need for Delegation*, 6 GLENDALE L. REV. 73 (1984).

⁸ The Space Shuttle is a reusable launch vehicle that functions primarily as a transportation system. *See generally* Sloup, *The NASA Space Shuttle and Other Aerospace Vehicles: A Primer for Lawyers on Legal Characterization*, 8 CAL. W. INT'L L.J. 403 (1978). In 1984, the Shuttle demonstrated its value to orbital space operations by repairing a scientific satellite (Solar Max) in space during one mission and retrieving two errant communications satellites (Palapa B-2 and Westar 6) in another mission. *See Rounding Up the Runaways*, TIME, Nov. 26, 1984, at 22.

⁹ *See* OFFICE OF TECHNOLOGY ASSESSMENT, *supra* note 7, at 143. The Space Shuttle will transport materials necessary to construct the space station and ferry people to assist with the station's assembly. *Id.* at 55-56. One contractor estimates that five or six shuttle flights will be necessary to establish a space facility. Once established, the Shuttle will continue to service space station needs by delivering equipment and supplies. *Id.* at 143-45.

¹⁰ Booz, Allen & Hamilton, Inc., Report to NASA pursuant to contract NASW-3775 on space station commercial user development (Jan. 20, 1984) (available at NASA-Ames Research Center, Moffett Field, California). Booz, Allen & Hamilton identified potential nonaerospace users and translated the users' needs to space station capabilities. Potential materials processing activities include producing drugs through electrophoresis, manufacturing organic crystals and iridium crucibles, and purifying metals.

Biological and medical research includes experimenting with monoclonal antibodies for cancer treatments, developing bone replacements, and developing biologically active membranes for prosthetics and process catalysts. *See* SPACE BUSINESS NEWS, SPACE PROCESSING, PRODUCTS AND PROFITS 1983-1990 (1983) [hereafter SPACE BUSINESS NEWS] (summarizing commercial opportunities in space); *Broad Spectrum of Businesses Involved in Space Commercialization*, AVIATION WK. & SPACE TECH., June 25, 1984, at 62-63 (listing private space businesses).

¹¹ *See* SPACE BUSINESS NEWS, *supra* note 10, at 37.

¹² Commercial benefits from materials processing in space are great since zero-grav-

Although the President and Congress strongly encourage entrepreneurial activity in outer space, United States obligations to the international community limit unbridled private development. Existing multilateral space treaties¹³ impose responsibilities on the United States government for private sector activities in outer space. Continual supervision and control over launched space objects, protection of the Earth and space environments, and international cooperation exemplify United States treaty obligations. While the space treaties draw the parameters for an international space regime, states¹⁴ must define individual methods for compliance.¹⁵ Therefore, implementing national space policy goals within the confines of United States international obligations will require continual federal regulation of private enterprise in outer space. Congress must address space regulatory issues to ensure

ity conditions eliminate convection currents that damage crystal growth and impair chemical and biological purification processes on Earth. One estimate assesses worldwide sales at over \$20 billion annually for newly developed or improved drugs manufactured in space. *Id.*

¹³ The United States is a signatory to the four major multilateral space law treaties: The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, *opened for signature* Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205 [hereafter Outer Space Treaty]; Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, *opened for signature* Apr. 22, 1968, 19 U.S.T. 7570, T.I.A.S. No. 6599, 672 U.N.T.S. 119 [hereafter Rescue and Return Agreement]; Convention on International Liability for Damage Caused by Space Objects, *opened for signature* Mar. 29, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762 [hereafter Liability Convention]; and Convention on the Registration of Objects Launched into Outer Space, *opened for signature* Jan. 14, 1975, 28 U.S.T. 695, T.I.A.S. No. 8480 [hereafter Registration Convention].

The United States probably will not sign the remaining treaty, the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 34 U.N. GAOR Supp. (No. 20), U.N. Doc. A/3420 (1979) [hereafter the Moon Treaty]. The United States believes that the Moon Treaty may limit exploitation of the moon's natural resources. Exploitation may be limited because states have different interpretations of the "common heritage of mankind" and "equitable sharing of resources" provisions of the Moon Treaty. For further discussion of this controversy, see Dula, *Free Enterprise and the Proposed Moon Treaty*, 2 Hous. J. INT'L L. 3 (1979); Galloway, *Issues in Implementing the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, PROC. TWENTY-THIRD COLLOQUIUM ON LAW OF OUTER SPACE 19 (1981); Menter, *Commercial Space Activities Under the Moon Treaty*, 7 SYRACUSE J. INT'L L. 213 (1980). Another criticism of the Moon Treaty is that it potentially interferes with trajectories to the moon and other celestial bodies. Glazer, *1979 Annual Meeting: Space Commerce and the Space Shuttle, It's Development; Legal, Scientific and Practical Implications*, 21 JURIMETRICS J. 92, 94 (1980).

¹⁴ The use of the term "state" refers to nation-state.

¹⁵ 1 MANUAL ON SPACE LAW 35 (N. Jasentuliyana & R. Lee eds. 1979).

that private space activities comply with United States treaty obligations.¹⁶

This Comment explores the federal regulation of private space industry through corporate structures¹⁷ as a solution to the conflict between treaty obligations and commercial space policy objectives. Part I examines multilateral treaty obligations that compel federal regulation of private space development. Part II analyzes three corporate structures that allow for varying degrees of federal control over a corporation's internal organization and external business activities.¹⁸ In addition, these structures — wholly government owned corporations, quasi-public corporations, and the traditional incorporation model — are applied to the outer space scenario. Finally, part III examines regulation through federal agencies and recommends appropriate policy guidelines for congressional consideration.

I. INTERNATIONAL CONSTRAINTS ON OUTER SPACE DEVELOPMENT

The multilateral space treaties outline the states' responsibilities for national and private activities in outer space. Each state, however, must determine its own procedure to comply with the treaty obligations.¹⁹

¹⁶ Legal scholars have already proposed theories on the appropriate substantive and procedural laws governing persons living in outer space. Astrolaw, an evolving area of the law, examines dispute resolution in space through nonadversarial methods. Long-term isolation and the confinement of spacefaring necessitates new developments in the legal system. See generally Note, *Dispute Resolution in Space*, 7 HASTINGS INT'L & COMP. L. REV. 211 (1983); Kang, *The New Frontier for Legal Profession - Astrolaw*, San Francisco Examiner, Jan. 31, 1984, at 1, col. 2.

¹⁷ Examining industry regulation through corporate structures is necessary because the "corporation is a key institution in contemporary society and in the American free enterprise profit system." H. HENN & J. ALEXANDER, LAWS OF CORPORATIONS AND OTHER BUSINESS ENTERPRISES 1 (1983). This Comment does not address the regulation of other business organizations.

¹⁸ In organizing the internal structure of a corporation, the relationships between shareholders, directors, and management must be determined. The corporation's name, corporate purpose, and aggregate number of shares also must be decided. See J. MOYE, THE LAW OF BUSINESS ORGANIZATIONS 75-88 (2d ed. 1982). While the corporate purpose is part of a corporation's internal organization, operations carrying out the purpose constitute a corporation's business activities. *Id.* at 75.

¹⁹ The United States "will have given certain direct rights and privileges it has enjoyed under international law to the private commercial interests of its citizenry while still being primarily liable for a wide array of adverse effects that might emanate from the exercise of those rights." CONGRESSIONAL RESEARCH SERVICE FOR THE SENATE COMM. ON COMMERCE, SCIENCE AND TRANSPORTATION, 98TH CONG., 1ST SESS., POLICY AND LEGAL ISSUES INVOLVED IN THE COMMERCIALIZATION OF SPACE 23

Therefore, the United States needs to devise a regulatory scheme to meet treaty obligations and minimize government liability.²⁰ Although many bilateral and multilateral agreements concerning the use of outer space exist,²¹ this Comment focuses on the four major international space treaties.²²

The United Nations, through the efforts of its Committee on Peaceful Uses of Outer Space, facilitated the development of the four major space treaties.²³ The most important agreement, the Outer Space Treaty,²⁴ prescribes the main framework for international space law.²⁵ Under the Outer Space Treaty all activities must be conducted "in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding."²⁶ Subsequent multilateral treaties expand the original Outer Space Treaty premise of international cooperation, applying it to specific issues and activities in outer space. The more detailed international space law treaties are the Rescue and Return Agreement,²⁷ the Liability Convention,²⁸ and the Registration Convention.²⁹

(Comm. Print 1983) [hereafter COMMERCIALIZATION OF SPACE].

²⁰ In the United States, treaties that are not self-executing must be implemented by specific congressional legislation. This Comment does not address the issue of whether provisions of the space law treaties are self-executing or non-self-executing.

²¹ See generally 2 UNITED STATES SPACE LAW (S. Gorove ed. 1982) (enumerating United States bilateral and multilateral space agreements).

²² See *supra* note 13.

²³ The Committee on Peaceful Uses of Outer Space (COPUOS) is supervised by the United Nations General Assembly's special political committee. Divided into two space subcommittees, COPUOS consists of a legal division and a scientific and technical division. C. CHRISTOL, *THE MODERN LAW OF OUTER SPACE* 16 (1982).

²⁴ See Outer Space Treaty, *supra* note 13.

²⁵ Professor Christol states that "[t]he modern law of outer space has resulted from the fact that a scientific and technological revolution occurred following World War II and that major States were anxious to embark on vast space programs It was considered that Earth-based rivalries naturally extended into [space]." C. CHRISTOL, *supra* note 23, at 844.

²⁶ Outer Space Treaty, *supra* note 13, art. III. Additionally, Article IV of the Outer Space Treaty discusses the "peaceful uses of outer space." The United States interprets "the peaceful uses of outer space" to mean that conventional weapons or military uses of outer space are not banned. Rather, only nuclear weapons and other weapons of mass destruction are prohibited in outer space. The United States maintains that military space activities may be nonaggressive and in the interest of maintaining peace and security. C. CHRISTOL, *supra* note 23, at 29. This Comment does not address the issue of the militarization of space.

²⁷ See Rescue and Return Agreement, *supra* note 13.

²⁸ See Liability Convention, *supra* note 13.

²⁹ See Registration Convention, *supra* note 13.

Within the international treaty framework, each state assumes full responsibility for both governmental and nongovernmental outer space activities.³⁰ Although the Outer Space Treaty specifically refers to “nongovernmental entities,” no reference is made to “private enterprise.”³¹ United States commentators, however, interpret “nongovernmental entities” to include private commercial endeavors.³² Moreover, though the treaties impose general obligations on participating states, each country is responsible for formulating specific policies to control the actions of its citizens and corporations. Therefore, the United States is obligated to establish regulations to supervise the private sector as well as national space activities.³³ For example, a related Outer Space Treaty provision directs states to retain jurisdiction and control over all outer space objects and personnel.³⁴ To further this requirement, the

³⁰ “States Parties to the Treaty shall bear international responsibility for national activities in outer space . . . whether such activities are carried on by governmental agencies or by non-governmental entities. . . .” Outer Space Treaty, *supra* note 13, art. VI.

³¹ *Id.*

³² For the United States commentators discussion of “nongovernmental activities,” see Dula, *Regulation of Private Commercial Space Activities*, PROC. TWENTY-FOURTH COLLOQUIUM ON LAW OF OUTER SPACE 25 (1982); Hosenball, *The Law Applicable to the Use of Space for Commercial Activities*, PROC. TWENTY-SIXTH COLLOQUIUM ON LAW OF OUTER SPACE 143 (1984); Menter, *Legal Responsibility for Outer Space Activities*, PROC. TWENTY-SIXTH COLLOQUIUM ON LAW OF OUTER SPACE 121 (1984); Menter, *The Impact of Treaties on Commercial Space Operations*, 1 HASTINGS INT’L & COMP. L. REV. 389 (1978).

“Nongovernmental” activities do not have the same meaning for each nation. Countries with heavily government sponsored industry may not have the same concerns as the United States for private enterprises’ interests. For example, the Soviet Union favors complete state control of outer space. Soviet jurist, V.S. Vereshchetin, argues that “nongovernmental” activities are not synonymous with private enterprise activities. See generally Vereshchetin, *Space Activities of “Nongovernmental Entities”: Issues of International and Domestic Law*, PROC. TWENTY-SIXTH COLLOQUIUM ON LAW OF OUTER SPACE 261 (1984); Vereshchetin, *International Space Law and Domestic Law: Problems of Interrelations*, 9 J. SPACE L. 31 (1981); see also G. ZHUKOV & Y. KOLOSOV, *INTERNATIONAL SPACE LAW* (B. Belitzky trans. 1984).

³³ “The activities of non-governmental entities in outer space . . . require authorization and continuing supervision by the appropriate State Party to the Treaty.” Outer Space Treaty, *supra* note 13, art. VI.

³⁴ Article VIII of the Outer Space Treaty requires a state “on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel.” Outer Space Treaty, *supra* note 13, art. VIII. The state of registry is defined as the launching state. Registration Convention, *supra* note 13, art. I. For a definition of “launching state,” see *infra* note 36.

The Outer Space Treaty’s jurisdiction and control provision prompted numerous au-

Registration Convention was adopted to monitor space activities.³⁵ Although the Registration Convention directs the states to report all launched objects and personnel to the United Nations, discretion lies with each individual state to determine the specific registration procedures.³⁶

The jurisdiction and control provision³⁷ and the continuous supervision requirement³⁸ together impose a duty on states to regulate their

thors to discuss the desirability and practicability of extending current domestic United States law to outer space. For a discussion of the merits of a federally codified uniform legal system for dispute resolution in space, see Note, *Dispute Resolution in Space*, 7 HASTINGS INT'L & COMP. L. REV. 211 (1983); see also DeSaussure & Haanappel, *A Unified Multinational Approach to the Application of Tort and Contract Principles to Outer Space*, 6 SYRACUSE J. INT'L L. 1 (1978) (discussing methods for determining the applicable law and forum for tort and contract disputes in outer space); Note, *The Extension of United States Criminal Jurisdiction to Outer Space*, 23 SANTA CLARA L. REV. 627 (1983).

The concept of a launching state retaining control and jurisdiction over permanent space settlements may become obsolete. Some authors predict that in the more distant future spacecrafts will not retain their national identities. See Glazer, *Domicile and Industry in Outer Space*, 17 COLUM. J. TRANSNAT'L L. 67 (1978). Furthermore, future generations of people born in space, "Homo Spatialis," may no longer have ties to Earth. See Robinson, *Frontier Law at L-5*, 4 ANNALS AIR & SPACE L. 617 (1979).

³⁵ The Outer Space Treaty's jurisdiction and control requirement is further developed in the Registration Convention, which imposes a duty on a state to register objects that it launches into outer space. Registration Convention, *supra* note 13, art. II. One function of a registration system is to provide states with data to prove damages and liability from space objects launched by other states. C. CHRISTOL, *supra* note 23, at 239.

³⁶ According to the Registration Convention, "[t]he term 'launching State' means: (i) A State which launches or procures the launching of a space object; (ii) A State from whose territory or facility a space object is launched." Registration Convention, *supra* note 13, art. I. Each launching state maintains its own registry and "inform[s] the Secretary-General of the United Nations of the establishment of such a registry." Registration Convention, *supra* note 13, art. II. Although launching states are required to establish their own registration system, international regulatory procedures exist for communications satellites in outer space. The International Telecommunications Union (ITU), an agency of the United Nations, regulates communications satellites. The ITU's purpose is to promote the efficient, effective, and economic use of the radio frequency spectrum. Within the ITU, the International Frequency Registration Board adopts, administers, and enforces telecommunications regulations. For further information regarding the ITU, see Colino, *International Cooperation Between Communications Satellite Systems: An Overview of Current Practices and Future Prospects*, 5 J. SPACE L. 65 (1977); Jasentuliyana, *Regulatory Functions of I.T.U. in the Field of Space Telecommunications*, 34 J. AIR L. & COM. 62 (1968); Leive, *Regulating the Use of the Radio Spectrum*, 5 STAN. J. INT'L STUD. 21 (1970).

³⁷ Outer Space Treaty, *supra* note 13, art. VIII.

³⁸ *Id.*, art. VI.

private space industry on Earth and in outer space. These responsibilities include regulating launches, outer space activities, and reentries. The United States continuous jurisdiction and control responsibilities extend to private launches in other countries.³⁹ Liability problems may arise when private businesses contract with foreign states to perform activities that later harm other states or the space environment.⁴⁰ To illustrate, suppose a private United States corporation launches a satellite from French Guiana. The parties decide that France will register the space object with the United Nations. Despite this decision, the United States and the French governments may be held jointly and severally liable for any harm caused by the private launch vehicle or satellite.⁴¹

International space law also establishes a state's responsibility to avoid harmful contamination and adverse changes in the Earth's atmosphere and outer space.⁴² Pollution is characterized in two forms, physical and nonphysical. Potential nonphysical harm includes interference with frequency allocations and orbital positions of communications satellites.⁴³ States must undertake "appropriate international consultations" before initiating activities that present "potentially harmful interference" with another nation.⁴⁴ The other form of pollution, physical pollution from human-made space debris, currently poses serious envi-

³⁹ Neil Hosenball, NASA's General Counsel, states:

Article VI and Article IX of the Outer Space Treaty appear to place responsibility on a party to the treaty for the space activities of its nationals irrespective of the place from which a launch might occur. Thus, the United States is responsible for supervision and authorization of a United States company launching into space from outside U.S. territory.

Hosenball, *supra* note 32, at 144. The extent to which the United States would be held jointly and severally liable with other nations for treaty violations arising from multinational business activities is unclear and beyond the scope of this Comment.

⁴⁰ For a discussion of a state's liability for damages, see *infra* notes 46-52 and accompanying text.

⁴¹ See *supra* note 39.

⁴² Outer Space Treaty, *supra* note 13, art. IX. Fuels used in the launching of space objects create pollution and adversely affect the Earth's atmosphere. C. CHRISTOL, *supra* note 23, at 129-30. Other examples of harm from space activity include "collision . . . with aircraft and space objects, . . . the production of solid debris, the unprogrammed return of space objects and their component parts to Earth, nuclear radiation, . . . bacteria or viruses possibly returned to Earth from space." *Id.* at 60-61 (footnote omitted). For a further discussion of Earth and space pollution, see *Legal Aspects of Protection of the Earth and Outer Space Environment*, PROC. TWENTY-FIFTH COLLOQUIUM ON LAW OF OUTER SPACE 1-66 (1983).

⁴³ C. CHRISTOL, *supra* note 23, at 130-31.

⁴⁴ Outer Space Treaty, *supra* note 13, art. IX.

ronmental hazards in space.⁴⁵ For example, if a drug manufacturing facility does not take precautions and indiscriminately disposes of industrial and human wastes, the risk of severe damage to other space operations from debris collisions increases. Additionally, inadequate waste control may result in contamination of the Earth and space environments. Since states are liable for space activities, they must regulate private enterprise to prevent these potential harms.

Damage claims for violating any of the above Outer Space Treaty obligations can be brought under the Liability Convention.⁴⁶ According to this treaty, the state is the only entity empowered to pursue damage claims against another state.⁴⁷ Thus, an individual claimant has no remedy under the Liability Convention and must pursue damage claims in alternative forums.⁴⁸

The Liability Convention also imputes liability to launching states for damages by its space objects. A launching state remains absolutely

⁴⁵ Human-made space debris in low Earth orbit colliding with a space station presents a potentially dangerous situation. This hazard becomes self-perpetuating when existing human-made debris in orbit collide, thereby creating more debris fragments. Human-made space debris can come from satellite breakups, spent spacecraft and rocket stages, separation devices, and explosion products. Presently, space debris about 10 cm. in size or larger can be tracked, but smaller objects avoid detection. The Johnson Space Center in Houston, Texas, proposes to track space debris by placing monitoring satellites at higher altitudes than the space station. Yet, according to present statistical analysis, effective methods to prevent debris from colliding with future space stations may be unrealistic. *See* AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, *SPACE DEBRIS* (1981); *Station Likely to be Hit by Debris*, *AVIATION WK. & SPACE TECH.*, Sept. 17, 1984, at 16.

⁴⁶ Liability Convention, *supra* note 13; *see also* Outer Space Treaty, *supra* note 13, art. VII.

⁴⁷ Under the Liability Convention, a state claiming compensation for damages caused by another state's space activities must elect to proceed either through the launching state's domestic courts or through diplomatic channels. The Convention does not require that local remedies be exhausted before a state may present a claim through diplomatic channels. Liability Convention, *supra* note 13, arts. IX & XI.

⁴⁸ Nationals of a country cannot claim damages against their own country under the Convention. Liability Convention, *supra* note 13, art. VII. Under the Convention, therefore, United States citizens have no rights against their government for damages caused by United States space activities. Claims for damages, however, can be pursued outside the Liability Convention. Although no provisions exist for individuals, corporations, or other private business enterprises under the Liability Convention, alternative forums are available. For instance, United States citizens and injured foreign parties can sue the United States under the Federal Tort Claims Act, 28 U.S.C. §§ 2671-2680 (1982). In addition, recovery may be pursued under the NASA Act, 42 U.S.C. § 2473 (1982), an administrative remedy that does not require fault to be proven. *See also* Dula, *supra* note 32, at 30-31.

liable for damages caused by its space object to anything on the Earth's surface or to aircraft in flight.⁴⁹ However, liability for damages to other space objects is determined by fault.⁵⁰ For example, if a United States ELV rocket booster returning to Earth damages a Japanese airplane, the United States will be held strictly liable. But when a spacecraft owned by a United States based corporation collides with a Japanese spacecraft, liability will be determined by fault. Although requiring that private outer space businesses obtain adequate liability insurance is one way of minimizing United States liability,⁵¹ a state remains directly liable for damages under the space treaties.⁵²

International cooperation, an important theme in the space treaties,

⁴⁹ "A launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the earth or to aircraft in flight." Liability Convention, *supra* note 13, art. II.

⁵⁰ In the event of damage being caused elsewhere than on the surface of the earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be liable only if the damage is due to its fault or the fault of persons for whom it is responsible.

Liability Convention, *supra* note 13, art. III. However, the collision of two aerospace vehicles returning to Earth presents potential difficulties in determining the appropriate liability standard. An aerospace vehicle, such as the United States Space Shuttle, operates both in and beyond the Earth's atmosphere. See Sloup, *supra* note 8, at 401. While the vehicle travels above the Earth's atmosphere, for example in Earth orbit, it is considered a space vehicle. See Sloup, *The "Aerospace Vehicle" as a Legal Concept*, 8 ANNALS AIR & SPACE L. 433 (1983) (discussing basic principles of aerospace vehicles). Yet, at some point during the aerospace vehicle's reentry it can be characterized as an aircraft in flight. It is beyond the scope of this Comment to determine the liability for damages of aerospace vehicles colliding during reentry into the Earth's atmosphere.

Commentators also speculate as to the extent damages in outer space will be compensated. For example, "[w]hile damage to a space-based electrophoresis manufacturing facility is clearly compensable, it is unclear whether the lost profits of the facility's operators, or the impaired health of persons dependent on the facility's medicines, are also subject to compensation." See Smith, Lopatkiewicz & Rothblatt, *Legal Implications of a Permanently Manned Presence in Space*, 85 W. VA. L. REV. 857, 860 (1983). For other articles discussing liability, see Christol, *International Liability for Damage Caused by Space Objects*, 74 AM. J. INT'L L. 346 (1980); Haanappel, *Product Liability in Space Law*, 2 HOUS. J. INT'L L. 55 (1979).

⁵¹ The Commercial Space Launch Act requires licensees to procure liability insurance. The amount of insurance is determined by the Secretary of the Department of Transportation (DOT) after consulting with the Attorney General and appropriate agencies. The amount must be sufficient to satisfy United States international obligations. See Commercial Space Launch Act, Pub. L. No. 98-575, 1984 U.S. CODE CONG. & AD. NEWS (98 Stat.) 3055 (to be codified at 49 U.S.C. §§ 2601-2623).

⁵² Outer Space Treaty, *supra* note 13, art. VII. Liability Convention, *supra* note 13.

is another obligation that may affect private outer space industry.⁵³ The treaties require the state to notify promptly the United Nations or the parties in danger of any life threatening phenomenon discovered in outer space.⁵⁴ The treaties also establish an affirmative duty to provide all possible aid to any astronaut needing assistance.⁵⁵ An affirmative duty to aid in outer space is analogous to the maritime law duty requiring reasonable efforts to rescue persons in distress.⁵⁶ As a result of this affirmative duty, outer space corporations potentially have obligations not only to their personnel, but to other spacefarers. For instance, a drug manufacturing corporation must aid spacefarers requesting assistance despite the inconvenience and expense of postponing business operations. This duty may conflict with the corporation's commercial pursuits and its fiduciary duty to shareholders. However, an affirmative duty to aid reflects the importance of protecting human life against a hostile space environment.

Another aspect of international cooperation requires that observational rights be implemented for "all stations, installations, equipment and space vehicles" and be "open to representatives of other States Parties to the Treaty on a basis of reciprocity."⁵⁷ The primary purpose for requiring observational rights is to ensure that outer space activities are, in fact, peaceful and comply with international space law provisions.⁵⁸ Recognizing that space industries will be primarily concerned

⁵³ See *supra* note 13. See OFFICE OF TECHNOLOGY ASSESSMENT, CIVILIAN SPACE POLICY AND APPLICATIONS 208-09 (1982) for a description of United States and Soviet Union joint endeavors that facilitated international cooperation in outer space.

⁵⁴ Outer Space Treaty, *supra* note 13, art. V.

⁵⁵ "In carrying on activities in outer space and on celestial bodies, the astronauts of one State Party shall render all possible assistance to the astronauts of other State Parties." *Id.* The Rescue and Return Agreement is primarily concerned with the safe return of astronauts after a forced landing on the high seas within a contracting state's territory. Rescue and Return Agreement, *supra* note 13.

⁵⁶ In maritime law, a shipowner or person in charge of a vessel has an affirmative duty to use reasonable means to rescue a seaperson in danger. 46 U.S.C. § 728 (1982); *Harris v. Pennsylvania R.R.*, 50 F.2d 866 (4th Cir. 1931). Professor Hamilton DeSaussure proposes extending this duty as well as other aspects of admiralty and maritime law to situations in outer space. See DeSaussure, *Toward a Law for Space Transport, The Maritime Analogy - A Legal Comparison*, 14 LINCOLN L. REV. 1 (1983); DeSaussure, *Astronauts & Seamen*, 10 J. SPACE L. 165 (1982); DeSaussure, *Maritime & Space Law Comparisons & Contrasts (An Oceanic View of Space Transport)*, 9 J. SPACE L. 93 (1981).

⁵⁷ Outer Space Treaty, *supra* note 13, art. XII.

⁵⁸ Professor DeSaussure stresses the importance of observational rights, stating: The presence of a permanent habitable module in earth or lunar orbit raises issues of national security more urgently than does the shuttle or an

with protecting "business secrets,"⁵⁹ the treaty provisions require advance notice of visits and a duty "to avoid interference with normal operations in the facility."⁶⁰ Thus, any observational procedures that the government establishes should balance the goal of international cooperation and the privacy interests of space industries.

In summary, the United States is responsible for private outer space activities under the multilateral space treaties. Therefore, legislation encouraging domestic private space development must also address United States international space responsibilities. With advance planning, federal regulation of private space activities will minimize United States liability for treaty violations. Through corporate structures the government can regulate outer space development. This Comment next examines corporate structures that allow varying degrees of federal control over outer space businesses.

unmanned, functional satellite. Dr. Diederiks-Verschoor has alluded to the military potential of earth orbiting stations, and mention has also been made that a station orbiting around the earth is theoretically more dangerous than a fixed installation on the moon or other celestial body. . . . The ultimate purpose of visitation is to prevent their use for aggressive purposes, not to harass or intimidate other space users. On site inspection after reasonable notice, conducted at reasonable times could guarantee MOFs [manned orbital facilities] would always be used for peaceful purposes in keeping with the fundamental principles of the Outer Space Treaty.

DeSaussure, *International Cooperation and Orbital Manned Space Stations*, PROC. TWENTY-SIXTH COLLOQUIUM ON LAW OF OUTER SPACE 295, 299 (1984) (footnotes omitted).

⁵⁹ In examining the security issues for private outer space industries, one commentator suggests that the protection of intellectual property rights will not be threatened by the Outer Space Treaty. Hoover, *Law and Security in Outer Space from the Viewpoint of Private Industry*, 11 J. SPACE L. 115, 122 (1983).

However, concerns with data and proprietary rights might arise from joint venture agreements between NASA and the private sector. A business working with the government may be required to submit periodic reports. These reports are often detailed disclosures that may conflict with an industry's desire to keep the status of its research project secret. Since the Freedom of Information Act requires disclosure of "government records" upon a party's request, information about a corporation's business secrets potentially may become available. "Information obtained under a guarantee of confidentiality may be protected and 'trade secrets' are a recognized exception to the Act. A company working with NASA must . . . be sure that if sensitive information becomes [a] 'Government Record' it qualifies as one of the exceptions to the disclosure requirements." OFFICE OF TECHNOLOGY ASSESSMENT, *supra* note 53, at 226; *see also* Mossinghoff, *Intellectual Property Rights in Space Ventures*, 10 J. SPACE L. 107 (1982).

⁶⁰ Outer Space Treaty, *supra* note 13, art. XII.

II. FEDERAL REGULATION OF CORPORATIONS

To meet treaty obligations and national space policy objectives, the federal government must regulate outer space corporations. By addressing the issue of regulation at this time, Congress will avoid many liability problems associated with outer space development.⁶¹ The federal government can regulate an industry by structuring a corporation's internal organization or supervising its external business activities.⁶² This Comment examines three corporate forms that allow varying degrees of federal control: wholly government owned corporations, quasi-public corporations, and the traditional incorporation model. Selecting a corporate structure largely depends on economic and noneconomic considerations and the desire to balance private sector interests and government treaty obligations. Within each corporate structure the government focuses on specific internal organizational elements necessary to regulate a particular space industry. In addition, a federal agency can be designated to regulate the external business activities of any one of the three structures. The three corporate structures surveyed furnish the government with the flexibility to devise an appropriate regulatory scheme tailored to each space industry.

A. Wholly Government Owned Corporations

1. Background

A wholly government owned corporation provides the federal government with control over both a corporation's internal organization and its business activities. Through wholly government owned corporations, Congress confers the advantages of a private business corporation to a public service administrative agency.⁶³ In *McCulloch v. Maryland*,⁶⁴

⁶¹ See *supra* notes 30-60 and accompanying text (discussing United States responsibilities under the outer space treaties).

⁶² See *supra* note 18.

⁶³ H. VAN DORN, GOVERNMENT OWNED CORPORATIONS 264 (1926). Wholly government owned corporations are separate legal entities that can sue or be sued and use revenues to acquire property in their own names. S. GOLDBERG & H. SEIDMAN, THE GOVERNMENT CORPORATION: ELEMENTS OF A MODEL CHARTER 5 (1953) [hereafter S. GOLDBERG]. Wholly government owned corporations operate primarily in five areas: industry, housing, agriculture, international relations and trade, and regional and local development. *Id.* at 9. For a list of government owned corporations, see ELEMENTS OF PUBLIC ADMINISTRATION 224-28 (F. Marx 2d ed. 1959).

The United States also has nationalized privately owned corporations. For example, during 1904-05 the government acquired all shares in the Panama Railroad Company, organized in 1849 under New York state law to build and operate railroads across the

the United States Supreme Court recognized Congress' implied power to create any agency furthering an end authorized by the Constitution.⁶⁵

Many government owned corporations were created during the world wars and the depression years.⁶⁶ Characteristics of these wholly government owned corporations typically included federal appropriations and government owned assets that were managed by government appointed board members.⁶⁷ Due to emergency circumstances, Congress exempted these corporations from various federal regulatory requirements, granting corporations independence from the normal administrative restraints imposed on government entities.⁶⁸ In particular, Congress used this structure to give government corporations greater financial freedom.⁶⁹ However, because Congress designs a wholly government owned corporation's internal organization, Congress also can use this structure to impose greater restrictions on corporate activities.

Through the grant of a corporate charter, Congress can tailor a corporation's internal organization to suit the needs of a particular industry. For example, a fledgling industry may be initially federally funded but charter provisions can direct it to become self-sustaining and profit

Isthmus of Panama. See Watkins, *Federalization of Corporations*, 13 TENN. L. REV. 89, 95-96 (1934-35).

⁶⁴ 17 U.S. (4 Wheat.) 316 (1819).

⁶⁵ Wholly government owned corporations, however, cannot be employed as devices to enlarge the federal government's constitutional authority. See S. GOLDBERG, *supra* note 63, at 3-4.

⁶⁶ ELEMENTS OF PUBLIC ADMINISTRATION, *supra* note 63, at 225; L. Musolf, Government Corporations: A Viable Instrument? (paper presented at Alternative Tools of Government Action, Urban Institute Conference, Washington, D.C., July 19-20, 1984) (copy on file with U.C. Davis Law Review).

⁶⁷ 1 NATIONAL ACADEMY OF PUBLIC ADMINISTRATION, REPORT ON GOVERNMENT CORPORATIONS 21 (1981) [hereafter NAPA REPORT]. No precise definition of wholly government owned corporations presently exists. To illustrate, while corporations designated as wholly government owned are subject to the 1945 Government Corporations Control Act's provisions, the Act does not define a wholly government owned corporation. 31 U.S.C. § 9101 (1982); L. Musolf, *supra* note 66, at 12.

The National Academy of Public Administration (NAPA) categorizes various types of government ownership into wholly government owned corporations, mixed public-private corporations, and private corporations. At the same time, NAPA acknowledges confusion over terminology. "One of the very problems in dealing with government corporations is to clarify what the term includes. Others, one quickly finds, may have a different interpretation, and the discussion is at risk of bogging down in an impenetrable morass of definitions." NAPA REPORT, *supra* at 1st unnumbered page.

⁶⁸ See ELEMENTS OF PUBLIC ADMINISTRATION, *supra* note 63, at 224.

⁶⁹ *Id.* at 229. "If the corporation is engaged in a self-sustaining function, its revenues would enable it to operate on its own resources more or less indefinitely, without annual subjection to the presidential and congressional power of the purse." *Id.*

oriented at some future date.⁷⁰ Congressional policy directives, additionally, may instruct a wholly government owned corporation to contract out duties to the private sector rather than require the corporation to perform them.⁷¹

By using a corporate charter, Congress also can specify the degree of regulation necessary to supervise a corporation's business activities. It may decide to exclude a wholly government owned corporation from the jurisdiction of certain federal regulatory agencies and statutes.⁷² Conversely, Congress may appoint executive departments to supervise the various business activities of a corporation.⁷³ As a result, this structure offers the federal government potentially complete control over the corporation's internal organization as well as its external business activities.

2. Application to Outer Space

While a wholly government owned corporation usually grants government enterprises more administrative freedom,⁷⁴ Congress, nevertheless, can utilize this structure to control all aspects of a commercial space industry. In addition to overseeing all of a government corporation's business activities, Congress can determine the corporation's major purposes and policies.⁷⁵

A wholly government owned corporation enables Congress to specify policy objectives in the corporation's charter. Thus, the federal government can coordinate international treaty obligations with its national

⁷⁰ Policy guidelines can direct the corporation to engage in extensive business-type transactions with the public. See S. GOLDBERG, *supra* note 63, at 9. NAPA recommends that the creation of government corporations be limited to enterprises that are revenue producing and potentially self-sustaining. See NAPA REPORT, *supra* note 67, at vii.

⁷¹ "The inclination to use business firms or other private bodies as contractors is distinctly an American style of conducting public activities on the margins of government." Sharkansky, *Policy Making and Service Delivery on the Margins of Government: The Case of Contractors*, 2 PUB. AD. REV., Mar.-Apr. 1980, at 116.

⁷² The United States Synthetic Fuels Corporation is an example of a wholly government owned corporation excluded from specific regulatory requirements. The Corporation is not subject to the Freedom of Information Act or government statutes covering areas of procurement, privacy, securities, and antitrust laws. See 42 U.S.C. §§ 8701, 8775 (1982); L. MUSOLF, *UNCLE SAM'S PRIVATE, PROFITSEEKING CORPORATIONS* 7 (1983).

⁷³ See L. Musolf, *supra* note 66, at 18.

⁷⁴ See *supra* notes 68-69 and accompanying text.

⁷⁵ Congress may also want to assign specific federal agencies to the corporation for additional regulation. See L. Musolf, *supra* note 66, at 18.

space policy by including provisions that ensure prior government approval for any new business activities. A wholly government owned corporation also may be directed to develop new high risk industries or pursue research activities that a private corporation may find unprofitable.⁷⁶ For example, Congress can require that a drug manufacturing corporation's activities include profitmaking objectives as well as scientific research to discover cures for cancer and diabetes.

Arguments exist, however, against using the wholly government owned structure to regulate outer space activities. First, creating federally owned corporations limits private sector involvement to providing goods and services to the government through contracting.⁷⁷ Contracting may discourage private sector competition in the research and development of innovative and efficient ways to exploit outer space resources. In turn, lack of competition may result in the circumvention of commercial space policy objectives. Second, regulating space industry through wholly government owned corporations requires substantial federal financing. Public funds will be invested with no guarantee that corporations will become self-sufficient or return the investment to the Federal Treasury.⁷⁸

In conclusion, the wholly government owned corporate structure provides the potential for government control over a space industry's internal organization and external business activities and ensures compliance with treaty obligations. However, using this corporate structure to regulate outer space industries precludes private enterprise's direct participation. Without private enterprise's direct participation in developing space industries, the spirit of the national space policy will be

⁷⁶ See *infra* text accompanying notes 125-28 for a discussion of the economic considerations of space industries.

⁷⁷ Contracting out to the private sector allows Congress to select "the kind of contract that seems suitable to [its] needs, and fine-tune details of organizational structure, goals, and personnel." I. SHARKANSKY, *PUBLIC ADMINISTRATION AGENCIES, POLICIES, AND POLITICS* 351-52 (1982).

⁷⁸ Charter provisions can be included to direct excess profits back to the Treasury. J. McDIARMID, *GOVERNMENT CORPORATIONS AND FEDERAL FUNDS* 221 (1938). Reimbursement for the use of public funds to develop technology that later benefits private businesses is a controversial subject. For example, the Space Shuttle's use reimbursement does not accurately reflect costs of the government's research and development, and benefactors of the Space Shuttle program are private companies who are not bearing the actual costs. See 14 C.F.R. §§ 1214.100-1214.107 (1984) for Shuttle service reimbursement procedures applicable to non-United States government users. See generally *Review of the National Aeronautics and Space Act of 1958: Hearings Before the Subcomm. on Space Science and Applications of the House Comm. on Science and Technology*, 98th Cong., 1st Sess. (1983).

undermined.⁷⁹

B. Quasi-Public Corporations

1. Background

The quasi-public corporate model presents Congress with an effective method to balance treaty obligations and national space policy goals. This structure enables Congress to plan for either joint ownership or private sector ownership of the corporation.⁸⁰ In the first situation, both the government and the private sector finance the corporation. In the latter, the government structures the corporation and the private sector alone finances it.

Comparable to a wholly government owned corporation,⁸¹ the internal organization and external business activities of a quasi-public corporation are influenced by Congress. The government guides the internal organization by structuring the composition of the investors, participants, and board of directors.⁸² Congress also can designate in the corporate charter an agency to regulate external business activities.⁸³ The potential for diverse combinations between federal and private interests may result in many variations of this structure.⁸⁴ Since government and private sector interests can be represented on a quasi-public corporation's board of directors, Congress can accommodate and equitably address competing interests. Quasi-public corporations are created to address unique situations that result in variegated structures,

⁷⁹ Dr. Karl-Heinz Bockstiegel, a West German law professor, reports that the first form of indirect private industry participation in space was from contractors providing goods and services for a state's space activities. See Bockstiegel, *Present and Future Regulation of Space Activities by Private Industry*, INTERNATIONAL CONFERENCE ON DOING BUSINESS IN SPACE: LEGAL ISSUES AND PRACTICAL PROBLEMS 136 (1981).

⁸⁰ See L. MUSOLF, *supra* note 72, at 1-10.

⁸¹ See *supra* text accompanying notes 63-79.

⁸² Note, *Comsat's First Decade: Difficulties in Interpreting the Communications Satellite Act of 1967*, 7 GA. J. OF INT'L & COMP. L. 678, 680 (1977) [hereafter Note, *Comsat's First Decade*].

⁸³ Congress instituted federal external control mechanisms over Comsat, a quasi-public corporation. See Communications Satellite Act of 1962, 47 U.S.C. § 721 (1982). For instance, the FCC has regulatory power over Comsat's activities, and NASA serves as a technical consultant and supplier of launch facilities. See also Note, *Comsat's First Decade*, *supra* note 82, at 681-82.

⁸⁴ The term "twilight zone organizations" describes combinations between the government and private sector. See L. Musolf, *supra* note 66, at 40. Other related terms are "mixed public-private corporations" and "private for profit corporations." See NAPA REPORT, *supra* note 67, at first unnumbered page; L. MUSOLF, *supra* note 72, at 1-10.

functions, and goals.⁸⁵

2. Application to Outer Space

Due to the flexibility of this structure, Congress can individually tailor quasi-public corporations to balance government and private interests in the development of outer space industry. This model is especially appropriate when Congress attempts to balance divergent policy interests and objectives equitably. The Communications Satellite Corporation (Comsat)⁸⁶ illustrates congressional use of a quasi-public corporation for profit⁸⁷ to establish a communications industry in outer space. While the Comsat model has its shortcomings,⁸⁸ many organizational features may be applicable to evolving forms of space industry.

Congress structured Comsat's internal organization to facilitate compromise among divergent interests.⁸⁹ While private ownership of the

⁸⁵ See L. MUSOLF, *supra* note 72, at 1-10, 99-118.

⁸⁶ Comsat was created by the Communications Satellite Act of 1962. 47 U.S.C. §§ 701-744 (1982). For a discussion of the legislative history of this Act, see COMMUNICATIONS SATELLITES IN POLITICAL ORBIT (L. Musolf ed. 1968).

⁸⁷ Corporations created by the federal government, but described as private, may be profitmaking or nonprofitmaking entities. For example, quasi-public corporations for profit include the Communications Satellite Corporation (Comsat), the Consolidated Rail Corporation (Conrail), the Federal National Mortgage Association (Fannie Mae), the National Corporation for Housing Partnerships, the National Railroad Passenger Corporation (Amtrak), and the Student Loan Marketing Association (Sallie Mae). Examples of private nonprofit corporations affiliated with the federal government include the Corporation for Public Broadcasting, the Legal Services Corporation, the National Park Foundation, the Securities Investor Protection Corporation, and the United States Railway Association. L. MUSOLF, *supra* note 72, at 1-4.

⁸⁸ Congress compromised divergent policy interests to quickly establish the United States communications system. Establishing a communications corporation ensured that the public benefited from a previously huge taxpayer investment in space technology research. However, Congress also wanted to continue the private ownership of commercial communications. L. MUSOLF, *supra* note 72, at 13; see also *infra* note 89 (discussing other United States communications policy objectives). After an intense legislative battle, Congress created Comsat, the first modern quasi-public corporation for profit. See COMMUNICATIONS SATELLITES IN POLITICAL ORBIT, *supra* note 86 (enumerating Comsat's legislative history).

Comsat's structural defects resulted from accommodating divergent policy interests. Professor Schwartz states that Congress created a structure "which contemplates numerous interlocking directorates; creates a backward and forward vertical joint venture; and provides for substantial minority interests by companies which are simultaneously potential suppliers, customers, and competitors." Schwartz, *Comsat, the Carriers, and the Earth Stations: Some Problems with "Melding Variegated Interests"*, 76 YALE L.J. 441, 464-65 (1967) (footnotes omitted).

⁸⁹ Comsat's divergent objectives were to: (1) encourage the rapid development of a

United States communications satellite system was favored,⁹⁰ safeguards were needed to prevent a single corporation from dominating the space communications market.⁹¹ Congress contemplated limiting Comsat's ownership to a group of common carriers,⁹² but ultimately chose broad-

satellite communications system; (2) establish private ownership and operation of the United States communications satellite system; and (3) maintain a wide distribution of benefits. Levin, *Organization and Control of Communications Satellites*, 113 U. Pa. L. Rev. 315, 316 (1965). Because of national pride and foreign policy concerns, the United States wanted to establish a global communications satellite system ahead of the Soviet Union. *Id.* at 325-26. In addition, the United States believed that national security needs would be enhanced by the development of an additional and efficient communications network. *Id.*

⁹⁰ In his national policy statement, President Kennedy informed the Senate that he favored private ownership and operation of the United States portion of the communications satellite system. Note, *The Communications Satellite Corporation: Toward a Workable Telecommunications Policy*, 27 HASTINGS L.J. 721, 725 (1976) [hereafter Note, *Telecommunications Policy*].

⁹¹ American Telephone and Telegraph (AT&T), then the largest corporation in the United States, possessed the technology to operate a communications satellite service. The government was concerned about AT&T extending its monopoly over domestic communication to the heavens. Schwartz, *supra* note 88, at 445. The government controlled the structuring of Comsat to prevent a monopoly. Ironically, Comsat, in essence, was a government created monopoly. For a discussion of Comsat's monopoly and anti-trust implications, see Levin, *supra* note 89, at 339-45; Schrader, *The Communications Satellite Corporation: A New Experiment in Government and Business*, 53 Ky. L.J. 732, 737 (1965); Note, *Telecommunications Policy*, *supra* note 90, at 734-52.

Along with Comsat's special monopoly privileges came various federally imposed guidelines. Comsat, in conjunction with the International Telecommunications Satellite Organization (Intelsat), provided telecommunications service to all interested countries. Although communications service might not be economically profitable, Comsat was required to serve an area if deemed to be a national objective. See Levin, *supra* note 89, at 323. Additionally, Comsat's internal regulatory safeguards required that services be procured from a wide variety of businesses, instead of from a few select corporations. 47 U.S.C. § 701(c) (1982); Levin, *supra* note 89, at 342-45; Schwartz, *supra* note 88, at 474.

⁹² Congress was concerned that the common carriers faced a potential conflict of interest with the development of a communications satellite system. Due to substantial expenditures in conventional terrestrial-based communications systems, common carriers might be reluctant to pursue rapidly any innovations that would render their prior investments obsolete. Congress feared that the common carriers, AT&T, Western Union International (WUI), International Telephone and Telegraph (IT&T), and RCA Global Communications, Inc. (RCA), with substantial investments in undersea cable and terrestrial communications systems, would significantly retard satellite technology advancements. See OFFICE OF TECHNOLOGY ASSESSMENT, *supra* note 53, at 226; Levin, *supra* note 89, at 345-49; Note, *Comsat's First Decade*, *supra* note 82, at 682.

A similar conflict of interest may confront corporate investment in space industries.

based shareholder representation including both the common carriers and the public.⁹³ While Congress structured Comsat's internal organization, it did not provide a direct grant of federal funds.⁹⁴ Rather, Comsat's initial capitalization relied on issuing corporate securities with restrictions placed on the class of potential investors.⁹⁵

Another way Congress chose to accommodate divergent interests was to appoint government representatives to Comsat's board of directors.⁹⁶ Of the fifteen member board of directors, six were appointed by the common carriers and six by the private shareholders.⁹⁷ The remaining three members of Comsat's board were appointed by the President to represent the public's interest.⁹⁸

The appointment of three government directors created the potential for internal conflicts within the board of directors.⁹⁹ Government appointed directors had neither veto power nor opportunities to control the decisionmaking process. Moreover, they faced the dilemma of "serving two masters at the same time."¹⁰⁰ As members of the board, these directors had a fiduciary duty to the corporation.¹⁰¹ Yet, the government appointed directors also were responsible for overseeing the public's interest.¹⁰²

Despite the government appointed directors' failure to represent government interests, a quasi-public corporation still is a viable structure to regulate evolving outer space industries because Congress can design other methods to balance competing interests equitably. Congress' ini-

Corporations must be sufficiently motivated to develop space industries rapidly, rather than be concerned about rendering their previous investments obsolete.

⁹³ 47 U.S.C. § 734(b)-(d) (1982); see Schrader, *supra* note 91, at 734-35.

⁹⁴ See Note, *Telecommunications Policy*, *supra* note 90, at 729.

⁹⁵ Comsat was originally designed to provide 50% stock ownership to common carriers. Private shareholders held the remaining 50% of the stock, giving the public an opportunity to invest in this venture. Foreign investment was limited to 20% of the voting stock. 47 U.S.C. § 734(a)-(d) (1982); see Schrader, *supra* note 91, at 734-35.

⁹⁶ 47 U.S.C. § 733(a) (1982); Schwartz, *Governmentally Appointed Directors in a Private Corporation — The Communications Satellite Act of 1962*, 79 HARV. L. REV. 350, 351 (1965).

⁹⁷ *Id.*

⁹⁸ *Id.*

⁹⁹ *Id.* at 361-63.

¹⁰⁰ "The common law obligation of directors to exercise the corporate powers for the common benefit of the stockholders has emphasized the dichotomy between private corporate interests and the public interest." Adams, *The National Railroad Passenger Corporation — A Modern Hybrid Corporation Neither Private Nor Public*, 31 BUS. LAW. 601, 607 (1976); see also Schwartz, *supra* note 96, at 361-63.

¹⁰¹ See Schwartz, *supra* note 96, at 361.

¹⁰² *Id.* at 352-53.

tial structuring of a broad interest based corporation will facilitate newcomer (for example, nonaerospace firms) access to space and spread the economic risks among many shareholders. Facilitating newcomer access is important because private development of outer space industry may be inhibited by risk factors such as high start-up costs, slow return on investments, and uncertain market demands for products.¹⁰³

Government and private business interests can be equitably represented on the board of directors. To ensure that government appointed directors are effective, Congress should improve on the Comsat model. For example, Congress should require that one-half of the board be government appointed directors who have practical experience in space industries, international relations or the applied sciences.¹⁰⁴ In addition, appointing government directors to full-time positions will allow them to devote efforts to a single corporation, as opposed to serving on different industries' boards.

The advantage of using a quasi-public corporate structure is that Congress has the flexibility to balance private sector interests and government treaty obligations. While Comsat's model has some shortcomings, the elements within a quasi-public corporation's internal organization can be varied to produce better results. Since a quasi-public corporation's charter designates the corporation's participants, goals, and investors, all policy objectives can be equitably addressed. Furthermore, the government still may regulate the corporation's external business activities through a designated federal regulatory agency.

C. *Traditional Incorporation Model*

1. Background

The traditional incorporation model regulates businesses at both the state and federal levels.¹⁰⁵ Each state has its own corporations code and

¹⁰³ The markets for most space-based industries are undeveloped. "Unlike innovations that emerge from an existing or clearly possible market opportunity, some space-based business will be based on totally new capabilities that will have to create new markets." OFFICE OF TECHNOLOGY ASSESSMENT, *supra* note 53, at 220. Conversely, market projections for Comsat indicated a ready demand and immediate need for communications satellites. At the time Comsat was created the nation faced a potential shortage of existing communications circuits within the next five years. *See* Levin, *supra* note 89, at 325-26.

¹⁰⁴ One criticism of Comsat was that its government appointed directors had no experience with the communications industry. *See* Schwartz, *supra* note 96, at 355-56.

¹⁰⁵ *See generally* Conard, *An Overview of the Laws of Corporations*, 71 MICH. L. REV. 623 (1973).

individually supervises its incorporating process.¹⁰⁶ The United States Constitution does not expressly authorize the federal government or the states to exercise incorporating powers.¹⁰⁷ During the first one hundred years after the Constitution was written, the federal government showed little interest in incorporating businesses.¹⁰⁸ As a result, the states began to exercise this power, and a multiplicity of corporations codes emerged.¹⁰⁹ Intense competition among the states to attract businesses resulted in a liberalization of their codes. This phenomenon became known as "corporate mongering," "charter mongering," or the "race of laxity."¹¹⁰

The federal government recognizes that "charter mongering" may lead to corporate abuses¹¹¹ and chooses to regulate specific corporate activities through federal regulatory agencies¹¹² and legislation.¹¹³ Al-

¹⁰⁶ *Id.* at 625; see also J. MOYE, *supra* note 18, at 74.

¹⁰⁷ See Conard, *supra* note 105, at 626.

¹⁰⁸ *Id.* at 627.

¹⁰⁹ *Id.*

¹¹⁰ *Id.* at 631. Justice Brandeis wrote that states advertised the least restrictive corporation codes: "The race was not one of diligence but of laxity." *Liggett Co. v. Lee*, 288 U.S. 517, 559 (1913); see also Comment, *A Historical Survey of Federal Incorporation*, 1 DEL. J. CORP. L. 370, 376-77 (1976). See generally R. NADER, M. GREEN & J. SELIGMAN, *TAMING THE GIANT CORPORATION* (1976) [hereafter R. NADER].

¹¹¹ Advocates of corporate reform believe present corporations codes foster abuses by limiting director, officer, and controlling shareholder liability for the corporation's conduct. See, e.g., Schwartz, *Federal Chartering of Corporations: An Introduction*, 61 GEO. L.J. 71, 73-74, 78 (1972). However, attempts to impose state regulations in the public's or shareholders' interest might drive corporations to more hospitable jurisdictions. See Conard, *supra* note 105, at 631-32. Therefore, uniform protection of shareholders, creditors, employees, and the general public must come from federal legislation. See Schwartz, *supra*, at 74.

¹¹² Federal regulatory agencies are part of the executive branch of government, rather than the legislative or judicial branch. A federal agency's source of power, however, is derived from the legislature and dictated by statute provisions. Given the authority to promulgate rules or to adjudicate matters, agencies also may possess regulatory, supervisory, rate-making, prosecutorial, and investigatory powers. Additionally, executive agencies may have powers to approve or prohibit certain business activities. See generally M. BARAM, *ALTERNATIVES TO REGULATION* (1982); P. COOPER, *PUBLIC LAW AND PUBLIC ADMINISTRATION* (1983); R. CORLEY, R. BLACK & O. REED, *THE LEGAL ENVIRONMENT OF BUSINESS* (1977); B. SCHWARTZ, *ADMINISTRATIVE LAW* (1984).

¹¹³ The federal government sets standards through legislation to control, among other things, monopolistic power, fraudulent stock sales, and labor conditions. See Schwartz, *supra* note 111, at 78. Examples of federal regulatory legislation include the Sherman Antitrust Act of 1890 and Clayton Act of 1914, which were passed to protect the market from large trusts, unfair trade restraints, and monopolies. The Federal Trade Commission, created in 1914, regulates unfair methods of competition. The Interstate Com-

though a uniform federal corporations code is a logical remedy to this two-tiered regulatory scheme, it is consistently defeated as a means of regulating corporations.¹¹⁴ Professor Cary described establishing federal standards for incorporation as politically undesirable: "It has been raised many times in Congress and in the literature but has no public appeal. American business would unanimously reject such a convenient vehicle for government control. . . ."¹¹⁵

While the federal government could regulate a corporation's internal organization through a uniform corporations code, it declines to do so and leaves this role to the states. Instead, the federal government focuses on regulating a corporation's external business activities through federal agencies.

2. Application to Outer Space

When using the traditional incorporation model for space industries, the federal government regulates a corporation's external activities, leaving the states to supervise the corporation's internal organization. While international treaties and national space policy implications together necessitate federal supervision of space commercialization, present federal regulatory legislation does not address the United States responsibilities for outer space activities.¹¹⁶ Therefore, new regulatory

merce Commission arose in 1887 to regulate railroad competition and other transportation carriers through rate structures. The Securities Act of 1933 and Securities Exchange Act of 1934 protect investors by regulating the issuance of securities and by continually supervising the trading of securities. See generally H. LIEBHAFSKY, *AMERICAN GOVERNMENT AND BUSINESS* (1971).

¹¹⁴ Strong support for and widespread discussion of a uniform federal corporations code existed throughout United States history. James Madison brought specific proposals for a federal incorporation law to the Constitutional Convention but it was thought unnecessary at the time and conducive to the creation of monopolies. The Progressive movement, in the early 1900's, called for federal chartering to supervise interstate corporations. However, controversies over varying degrees of actual governmental control of commercial activities resulted in the proposal's demise. During the Depression and late 1930's, Senator Joseph O'Mahoney was the prominent advocate of federal incorporation. Instead, regulatory agencies were set up largely because of the war effort. Note, *Federal Chartering of Corporations: Constitutional Challenges*, 61 *GEO. L.J.* 123, 124-128 (1972); see also R. NADER, *supra* note 110, at 65-71.

¹¹⁵ Cary, *Federalism and Corporate Law: Reflections upon Delaware*, 83 *YALE L.J.* 663, 700 (1974).

¹¹⁶ Only specific outer space activities are presently covered by federal legislation. For example, NASA's approval is required before nongovernmental Space Shuttle payload users are permitted to conduct their experiments onboard. See 14 C.F.R. § 1214.902(d) (1984).

The Commercial Space Launch Act illustrates legislation covering a narrow range of

legislation is required. If federal regulations conflict with state powers, the federal government preempts the state through the commerce and supremacy clauses.¹¹⁷ Consequently, Congress must determine the extent to which the federal government needs to preempt the state's incorporation powers in commercial space industry.

To illustrate, the federal government should regulate outer space businesses by instituting a licensing procedure. The license application process should require adequate supervision of certain incorporation elements, such as the corporate purpose. The federal government should also require continual disclosures of business activities once a license is granted.¹¹⁸ Disclosures would entail extensive reporting by the corporation to a technically knowledgeable agency for review. The agency, relying on its engineers and scientists, then would evaluate activities to ensure compliance with treaty obligations.

However, many incorporation elements do not need federal regulation. The outer space treaties impose government regulation over private external business activities in outer space.¹¹⁹ Therefore, the federal government should regulate the corporation's internal organization only to the extent that the corporation's foreseeable space activities are affected. For example, the corporation's name, aggregate number of shares, and decisions to divide shares into classes will not have a direct effect on the corporation's outer space activities.¹²⁰ In addition, neither determining shareholder rights in each class nor determining relationships between shareholders and directors will directly affect external business activities.¹²¹ These activities could be regulated by the states. Conversely, while determining the corporation's purpose is an internal

space activities. See Commercial Space Launch Act, Pub. L. No. 98-575, 1984 U.S. CODE CONG. & AD. NEWS (98 Stat.) 3055 (to be codified at 49 U.S.C. §§ 2601-2623). While the Act authorizes DOT to license private ELV's, DOT's power is limited to approving the type of launcher, launch sites, and ELV activities in outer space, i.e., deploying satellites. See *supra* note 4 and accompanying text.

¹¹⁷ U.S. CONST. art. I, § 8, cl. 3. (commerce clause); U.S. CONST. art. II, § 2 (treaty clause); U.S. CONST. art. I, § 8, cl. 18 (necessary and proper clause); U.S. CONST. art. VI, § 2 (supremacy clause).

¹¹⁸ Extensive continual disclosures are required by existing industries, such as banking. See generally C. GOLEMBE & D. HOLLAND, FEDERAL REGULATION OF BANKING 1983-84 (1983). Another way to allow the federal government continual review of corporate activities is to institute limitations on the corporate life and require periodic charter refiling.

¹¹⁹ See *supra* text accompanying notes 19-60.

¹²⁰ These incorporation elements are presently supervised by the state. See J. MOYE, *supra* note 18, at 118-19.

¹²¹ *Id.*

decision, any changes in the corporation's purpose and activities may result in United States liability. Thus, the federal government should preempt the states and regulate private space industry in this area.

The historical development of the traditional incorporation model¹²² demonstrates that the government will regulate various outer space industries through this structure, although regulation is necessary at both the state and federal levels. By preempting state incorporation powers in limited areas and assigning a federal agency to regulate a corporation's space activities, the traditional incorporation model can balance treaty obligations and national space policy directives.

D. Choosing a Model

Selecting one of the corporate structures depends on existing economic and noneconomic factors for each outer space industry. Since commercialization of space technologies requires the examination of each industry's special requirements, no overall superior model emerges.¹²³ As outer space industry develops, the government must predict which industries will need more government supervision, rather than later attempting to curtail private activities already established in outer space. With advance planning, both government and private interests for each space industry can be effectively balanced.

The government's noneconomic considerations focus primarily on the space treaty obligations and United States responsibility for treaty violations.¹²⁴ To adequately protect government interests, the President and Congress must ascertain the risk of United States liability from private sector activities. Specific private activities that increase the risk of United States liability are presently unknown. Therefore, the government must require extensive testing before each outer space industry is developed to minimize its liability. For instance, a new procedure for drug manufacturing in space may look promising due to relatively low start-up costs and ready markets. Before permitting outer space production, however, the government must determine, among other things, whether the process produces hazardous byproducts that will contaminate the Earth and space environments. These noneconomic considerations will dictate the degree of government regulation necessary for the

¹²² See *supra* notes 105-15 and accompanying text.

¹²³ See OFFICE OF TECHNOLOGY ASSESSMENT, *supra* note 53, at 10.

¹²⁴ Besides United States treaty obligations, the government might consider other noneconomic factors in determining the corporate structure best suited for a particular industry. Other noneconomic factors include national security concerns, foreign relations, and the existing domestic political climate.

individual industry.

Although the government determines the degree of federal regulation based on noneconomic considerations, it also must weigh various economic factors. The government must first evaluate private enterprise's ability to develop a particular outer space industry. If it determines that private enterprise requires federal assistance, the government must then consider the extent to which private enterprise will participate in developing the space industry.

Two important economic factors endemic to outer space industries are high entry barriers and undeveloped product markets.¹²⁵ Entry barriers in space involve high start-up costs and long delays in investment returns.¹²⁶ Since space technology is unreliable until tested and proved in outer space, investment in outer space industries is risky.¹²⁷ Moreover, most products manufactured in space will have undeveloped Earth markets, posing additional risks to investors. While potential markets exist for pharmaceuticals and electronic crystals, markets for other manufactured products and space services must be created.¹²⁸

Furthermore, the government, should examine other economic considerations before selecting the most appropriate corporate structure to regulate a space industry. Emphasis on international rather than domestic competition may be an important goal. If the United States desires to be the first country to establish a satellite salvaging operation and maintain preeminence in outer space, it may need to assist domestic businesses to compete effectively in international markets. This is because many countries — for example, the European nations — heavily subsidize their space industries.¹²⁹ Another economic factor the government must consider is the possibility of rendering Earth based manufacturing obsolete with superior and more efficient space manufacturing.¹³⁰ Calibration devices produced in space, for example, will be superior in quality to those manufactured on Earth, due to zero-gravity

¹²⁵ See OFFICE OF TECHNOLOGY ASSESSMENT, *supra* note 53, at 219-20.

¹²⁶ See *Unique Products, New Technology Spawn Space Business*, AVIATION WK. & SPACE TECH., June 25, 1984, at 40, 41.

¹²⁷ See OFFICE OF TECHNOLOGY ASSESSMENT, *supra* note 53, at 224-25.

¹²⁸ See *supra* note 103.

¹²⁹ See Anderson, *Europe vs. America in Space*, N.Y. Times, Mar. 17, 1985, at F4, col. 1. See generally Petition filed with the U.S. Trade Representative's Office by Transpace Carriers, Inc. against several European governments and their instrumentalities (May 25, 1984) (available at the U.S. Trade Representative's Office).

¹³⁰ For a discussion regarding a potential technological obsolescence situation in the communications industry, see *supra* note 92.

conditions.¹³¹ If space manufacturing proves to be more efficient, the Earth based production of these devices will become obsolete. Finally, the government must examine the availability of outer space resources. In the near future, physical space onboard a permanently habitable space facility will be limited. In the distant future, a scarcity of other space resources, such as preferred orbital positions, will foreseeably arise. The present overcrowding of communications satellites in the geosynchronous orbit illustrates the finite nature of space resources.¹³²

After evaluating both economic and noneconomic factors the federal government can better select an appropriate corporate structure for regulating a specific space industry. If the government foresees the need for heavy regulation to minimize United States liabilities and predetermines that an industry requires government assistance to overcome economic barriers, the wholly government owned or quasi-public corporation is a preferable model. When deciding between these two models, a quasi-public corporation may be the more appropriate regulatory structure if emphasis is on equitably balancing divergent policy objectives. If the government, instead, decides that the space industry's activities pose minimal risks to the United States and economic barriers appear relatively low, the traditional incorporation model is sufficient to regulate the industry.

Whichever model is selected, federal supervision of commercial space activities will be substantial. Although this degree of regulation may discourage some private industries from participating in outer space development, disadvantages can be counterbalanced. The government may provide tax incentives,¹³³ loan guarantees,¹³⁴ and antitrust exemptions¹³⁵

¹³¹ Latex particles, manufactured on the Space Shuttle, will be certified as calibration tools for manufacturers and users of small particle instruments such as calibrating devices that count blood cells or measure soot particles in the air. Due to zero-gravity, the space-produced particles are more uniform in size than those manufactured on Earth. These "space beads" are 1/2500 of an inch in diameter and will be sold in quantities of 15 million for \$400 beginning in 1985. NATIONAL BUREAU OF STANDARDS, UNITED STATES DEPARTMENT OF COMMERCE, FACT SHEET, STANDARD REFERENCE MATERIAL: 10-MICROMETER POLYSTYRENE SPHERES (July 1984); Large, *Tiny Space Beads Made to Measure are Bound to Create an Earthly Stir*, Wall St. J., Dec. 10, 1984, at 27, col. 1.

¹³² See generally *Telecommunications and the Geostationary Orbit*, PROC. TWENTY-SIXTH COLLOQUIUM ON LAW OF OUTER SPACE 1-66 (1984).

¹³³ See OFFICE OF TECHNOLOGY ASSESSMENT, *supra* note 53, at 269. Most tax exemptions do not extend to outer space. Congress should review current exemptions or devise new ones to encourage space development. When reviewing tax issues, Congress also must address outer space jurisdictional problems because the Outer Space Treaty does not recognize claims to sovereignty. See Outer Space Treaty, *supra* note 13, art.

to outer space industries. Furthermore, it can protect private enterprise by using a grandfather clause¹³⁶ to guard against future international agreements that adversely affect existing private rights.

In summary, the government must weigh both economic and noneconomic factors before selecting an appropriate corporate structure to regulate a space industry. Although regulation of commercial space activities will be substantial, regardless of the model chosen, Congress can use incentives to encourage widespread private enterprise participation. After Congress selects the appropriate corporate structure, it must then designate a federal agency to regulate the corporation's business activities. This Comment next surveys possible federal regulatory agencies and proposes policy guidelines for congressional consideration.

III. PROPOSED REGULATORY SCHEME

Utilizing any one of the three corporate structures requires Congress to select federal agencies to regulate external business activities. Federal agencies can encourage and direct the growth of private outer space industries. To further a comprehensive regulatory scheme, Congress must also establish policy guidelines to ensure that business activities comply with United States treaty obligations.

A. Federal Regulatory Agencies

The selection of a federal agency to regulate outer space industry will largely depend on the political climate.¹³⁷ The decision to create an

II.

¹³⁴ See OFFICE OF TECHNOLOGY ASSESSMENT, *supra* note 53, at 269.

¹³⁵ Congress provides antitrust exemptions especially for regulated industries. See L. SULLIVAN, ANTITRUST 717 (1977); OFFICE OF TECHNOLOGY ASSESSMENT, *supra* note 53, at 270.

¹³⁶ See COMMERCIALIZATION OF SPACE, *supra* note 19, at 38.

¹³⁷ In determining the organizational structure of an administrative agency the "basic organizational outlines are determined in accordance with prevailing political expectations." ELEMENTS OF PUBLIC ADMINISTRATION, *supra* note 63, at 130. In examining political factors, "organization in public administration is a problem involving legislative and executive points of view." *Id.* at 131.

Critics of regulatory agencies, including Marvin Bernstein, a frequently cited source, describe the "life cycle" of regulatory commissions:

In its youth, the regulatory agency is at a disadvantage relative to regulated industry in terms of expertise and experience, but it does have crusading zeal. . . . Once the regulated groups realize that the regulatory program will indeed be implemented, they will attempt to influence appointments to key positions in the agency. . . . "In the period of maturity,

entirely new administrative agency involves presidential and congressional willingness to expand the federal government. Since the current administration is curtailing government expansion, the creation of a new commercial space agency seems highly unlikely at this time.¹³⁸ The next decision, selecting an existing independent regulatory agency or executive department, depends on the degree of presidential accountability desired.¹³⁹ The heads of executive departments are directly accountable to the President, unlike the commissioners of independent agencies.¹⁴⁰ Because space development will affect areas of presidential concern, such as foreign affairs, an existing federal executive department is likely to be chosen to regulate commercial space industry. The impact foreign affairs will have on outer space development is illustrated by treaty responsibilities imposed on the United States for private commercial space activities.¹⁴¹

Since corporate outer space activities will affect overlapping areas of

regulation usually becomes more positive in its approach." . . . At this point, the agency may be considered to be less an outside umpire of regulated activity and more like a facilitator. . . . Finally, the agency slips in old age . . . [and] [t]he agency is without sufficient power or initiative to take any significant action against those it is charged with regulating.

P. COOPER, *supra* note 112, at 251-52 (footnotes omitted) (quoting Marvin Bernstein).

¹³⁸ Proposals in the Reagan Administration's 1986 fiscal budget call for dramatic cuts in government spending. Weinraub, *Reagan Assails Budget's Critics in Broad Attack*, N.Y. Times, Mar. 3, 1985, at A1, col. 1. The budget proposes to eliminate certain federal agencies, such as the Small Business Administration. *Id.* at A20, col. 3. The creation of a new federal agency is unlikely because of the emphasis on reducing the federal deficit. Despite proposed budget restraints, President Reagan, in his 1985 State of the Union Speech, reaffirmed his commitment to outer space development. He seeks record funding for research and development to provide new opportunities for free enterprise in outer space. State of the Union Address, 21 WEEKLY COMP. OF PRES. DOC. 140, 144 (Feb. 11, 1985).

¹³⁹ An important political factor concerning administrative agencies is the desired degree of presidential accountability. To illustrate, two types of administrative agencies are executive departments and independent regulatory commissions. Executive agencies are headed by a single department head who remains ultimately responsible to the President. The President appoints the department head and also retains the power to dismiss. In contrast, independent regulatory agencies are run by 5 to 11 commissioners, each commissioner holding essentially equal powers. Although commissioners are also appointed by the President, their terms are fixed and staggered. A President, theoretically, is never in the position of selecting all of an independent regulatory agency's commissioners. Additionally, independent regulatory agencies remain detached from executive control because a President may only remove a commissioner for cause. *See* B. SCHWARTZ, *supra* note 112, at 17; I. SHARKANSKY, *supra* note 77, at 22-23.

¹⁴⁰ *See supra* note 139.

¹⁴¹ *See supra* notes 19-60 and accompanying text.

government concern, complete regulatory responsibility for commercial operations should not be assigned to a single agency. A lead agency coupled with an interagency advisory group results in a more comprehensive regulatory scheme.¹⁴² Obtaining the benefits of other agencies' expertise is accomplished by requiring a lead agency to consult with appropriate interagency members on pertinent issues.

For example, the Department of Commerce (DOC) may be chosen as the lead agency due to its experience in both business development¹⁴³ and outer space operations.¹⁴⁴ The interagency advisory group may include the Department of Transportation,¹⁴⁵ NASA,¹⁴⁶ and the State Department,¹⁴⁷ since these three agencies have either an interest or exper-

¹⁴² The concept of an interagency group that consists of representatives from several agencies is not new. Interagency groups are created for joint deliberation on matters of common interest. *ELEMENTS OF PUBLIC ADMINISTRATION*, *supra* note 63, at 181.

A lead agency and an interagency group are used to license commercial ELV's. While the Department of Transportation (DOT) is designated the lead agency, it must consult with the Department of Defense, the Department of Commerce (DOC), the FCC, and NASA. This is done to ensure consistent application of regulatory requirements. *See* Commercial Space Launch Act, Pub. L. No. 98-575, 1984 U.S. CODE CONG. & AD. NEWS (98 Stat.) 3055 (to be codified at 49 U.S.C. §§ 2601-2623).

¹⁴³ DOC's offices promoting industry include the Office of Business Liaison, the Economic Development Administration, the International Trade Administration, and the Minority Business Development Agency. *See* OFFICE OF THE FEDERAL REGISTER, NATIONAL ARCHIVES AND RECORDS SERVICE, THE UNITED STATES GOVERNMENT MANUAL 1984/85, at 128-50 (1984) [hereafter OFFICE OF THE FEDERAL REGISTER].

¹⁴⁴ Offices within DOC that specialize in space-related activities include the National Oceanic and Atmospheric Administration, and the National Telecommunications and Information Administration. *Id.* Besides serving as an advisor in telecommunications, DOC operates meteorological and remote sensing satellite systems. *See* OFFICE OF TECHNOLOGY ASSESSMENT, *supra* note 53, at 244-45. In addition, the first manufactured space product, microscopic latex particles, will be offered commercially by an agency within DOC. *See supra* note 131.

¹⁴⁵ DOT was selected in 1984 as the lead agency for ELV commercialization to assist and regulate the growth of space transportation. Since space transportation plays a major role in exploiting outer space, DOT has an interest in developing outer space industry. *See* Commercial Space Launch Act, Pub. L. No. 98-575, 1984 U.S. CODE CONG. & AD. NEWS (98 Stat.) 3055 (to be codified at 49 U.S.C. §§ 2601-2623).

¹⁴⁶ NASA's expertise is in space technology and the promotion of space development. Since it remains primarily a research and development agency without regulatory authority, NASA is better suited as an interagency member rather than as the lead agency. *See generally* *Review of the National Aeronautics and Space Act of 1958, as amended: Report and Additional Views prepared by the Subcomm. on Space Science and Applications of the House Comm. on Science and Technology*, 98th Cong., 2d Sess. (1984).

¹⁴⁷ By including the State Department in the interagency group, it can interpret treaty obligations and speculate on the ramifications of treaty violations. *See* Dula, *The*

tise in space development. This regulatory scheme will expedite the licensing procedures of outer space industries. Rather than consulting multiple agencies to satisfy various licensing requirements, corporations will deal only with DOC.¹⁴⁸

In summary, existing executive agencies will regulate the current development of outer space corporations. A combination of a lead agency and interagency advisory group provides sufficient federal regulation over the external business activities of the wholly government owned corporation, quasi-public corporation, or traditional incorporation model. To further a comprehensive regulatory scheme, Congress must devise appropriate policy guidelines that direct the lead agency to develop procedural requirements and to address domestic and international concerns. A carefully designed plan for outer space industry development will minimize United States liability and effectively encourage widespread participation by private enterprise.

B. Proposed Policy Guidelines

In setting up a regulatory framework, Congress first needs to designate the lead agency and interagency advisory group and then grant the lead agency regulatory, adjudicatory, and rulemaking authority. Congress should also grant the lead agency authority to prohibit space activities that will foreseeably increase risks of United States liability. Civil penalties, enumerated in federal legislation and pursuant to treaty prohibitions, could be assessed after the lead agency conferred with the interagency advisory group.¹⁴⁹

Congress must direct the lead agency to create an environment that encourages domestic private enterprise development in outer space. The lead agency needs to implement a responsible, long range business policy coordinating the activities of various outer space industries. For example, it can aid new industries by identifying and eliminating barriers to productivity growth and by increasing awareness of new technologies

People of the USA and the USSR Must Work Together to Establish Space Industry, PROC. OF TWENTY-SIXTH COLLOQUIUM ON LAW OF OUTER SPACE 309, 322 (1984). While the State Department specializes in foreign affairs, it has no technical or business expertise. For a brief description of the State Department's responsibilities, see OFFICE OF THE FEDERAL REGISTER, *supra* note 143, at 383-94.

¹⁴⁸ See *supra* notes 6 and 142.

¹⁴⁹ The Commercial Space Launch Act permits DOT's Secretary to fine a private launch company up to \$100,000 for each violation committed. See Commercial Space Launch Act, Pub. L. No. 98-575, 1984 U.S. CODE CONG. & AD. NEWS (98 Stat.) 3055 (to be codified at 49 U.S.C. §§ 2601-2623).

and methods. Additionally, the lead agency can devise indicators to track business cycles and maintain economic models that forecast economic changes.

Besides instituting goals that facilitate private domestic enterprise, Congress must also provide the lead agency with a regulatory framework to comply with space treaty obligations. Since the United States is responsible for continual supervision of commercial space activities,¹⁵⁰ the agency, after conferring with the interagency group, must set adequate liability insurance levels for each industry.¹⁵¹ The lead agency also needs to institute an initial licensing procedure that screens applicants and their activities. The licensing procedure can include registration of all space objects and personnel launched into outer space.¹⁵² Moreover, the lead agency can require detailed and continual disclosures from each outer space industry. Finally, environmental concerns must be immediately addressed to avoid contamination of the Earth and space environments.¹⁵³ For example, standards regulating waste disposal in outer space must be developed and implemented.

Since the space treaties emphasize international cooperation between nations,¹⁵⁴ the lead agency should be directed to adopt this objective. Agency regulations should recognize the impact of a hostile space environment on human life and safety. The preservation of human life in outer space can be encouraged by requiring an affirmative duty to aid all spacefarers.¹⁵⁵ Another goal of international cooperation involves the peaceful uses of outer space.¹⁵⁶ In meeting this responsibility, the agency can arrange reciprocal visits between the space treaty nations onboard space facilities to ensure that activities are peaceful.¹⁵⁷ Lastly, Congress should require that industry share certain space benefits with the international community. For example, the United States can share information from meteorological services forecasting natural disasters in space and on Earth. Additionally, scientific and medical benefits derived from space research, such as cures for cancer, can be made available to all educational and medical institutions.

In summary, Congress must institute policy guidelines directing a regulatory agency to establish procedural requirements encouraging do-

¹⁵⁰ See *supra* note 33 and accompanying text.

¹⁵¹ See *supra* note 51.

¹⁵² See *supra* notes 34-36 and accompanying text.

¹⁵³ See *supra* notes 42-45 and accompanying text.

¹⁵⁴ See *supra* notes 53-60 and accompanying text.

¹⁵⁵ See *supra* notes 55-56 and accompanying text.

¹⁵⁶ See *supra* note 26 and accompanying text.

¹⁵⁷ See *supra* notes 57-58 and accompanying text.

mestic private industries, while also addressing international concerns. By carefully designing a plan for industry development, Congress can minimize United States liability while also facilitating private participation in outer space.

CONCLUSION

Current technology, coupled with national space policy objectives, presents private enterprise with new opportunities to exploit outer space. Since the space treaties impose liability on the United States for private outer space activities, Congress must design a comprehensive regulatory scheme. The explosion of new space industry predicted in the next few decades requires Congress to address regulatory issues promptly, minimizing United States liability for private space activities.

The federal government must next determine the most appropriate tool for regulating outer space industry. The three corporate structures examined provide the government with varying degrees of control over a corporation's internal organization and external business activities. Wholly government owned corporations, quasi-public corporations, and the traditional incorporation model are all viable regulatory tools. However, the selection of any one structure depends on a particular space industry's economic and noneconomic factors.

Based on the commercial space policy goals and United States treaty obligations, a combination of a lead agency and an interagency advisory group provides the most comprehensive regulatory scheme for commercial space activities. Directing the lead agency to develop procedural requirements that address domestic business and international concerns also is necessary. Since the expansion of commercial space industry is imminent, Congress must address domestic and international space issues and carefully plan for United States outer space development.

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