

UNITED STATES SPACE LAW: COMMERCIAL SPACE LAUNCHES AND FACILITES*

by
Paul Stephen Dempsey**

INTRODUCTION

Stephen Hawking observed, "It is important for the human race to spread out into space for the survival of the species. Life on Earth is at the ever-increasing risk of being wiped out by a disaster, such as sudden global warming, nuclear war, a genetically engineered virus or other dangers we have not yet thought of." There are three major catalysts for space exploration and development: (1) scientific discovery, pursued predominantly by governmental institutions such as NASA; (2) military development, pursued by defense ministries and their contractors; and (3) commercial development.

President Ronald Reagan encouraged "domestic commercial exploration of space capabilities, technology, and systems for national economic benefit", though such activities must be consistent with "national security concerns, treaties, and international agreements."¹

* This article is adapted from the five volume compendium on *Space Law* edited by Paul Stephen Dempsey. Copyright © 2006 by Paul Stephen Dempsey. Published by the American Institute of Aeronautics and Astronautics, Inc. with permission.

** Tomlinson Professor of Global Governance in Air & Space Law, and Director of the Institute of

The US aerospace and aeronautics industry are viewed as significant contributors to US international prestige, influence, competitiveness, and economic well-being.² Private sector commercial activities are seen as having the potential to contribute both to the strength of the US economy and the US space program.³ Congress has decreed that NASA "seek and encourage, to the maximum extent possible, the fullest

Air & Space Law, McGill University. A.B.J. (1972), J.D. (1975), University of Georgia; LL.M. (1978) George Washington University; D.C.L. (1986), McGill University.

¹ Ronald Reagan, National Space Policy, National Security Decision Directive No. 42 (July 4, 1982).

The United States Government will provide a climate conducive to expanded private sector investment and involvement in civil space activities, with due regard to public safety and national security. Private sector space activities will be authorized and supervised or regulated by the government to the extent required by treaty and national security. *Id.*

² National Aeronautics and Space Administration Authorization Act of 1993 §§ 101(11), 501, Pub. L. 102-588, 106 Stat. 5107 (Nov. 4, 1992).

³ National Aeronautics and Space Administration Authorization Act of 1991, § 101(14), Pub. L. 101-611, (Nov. 16, 1990).

commercial use of space.”⁴ Space transportation services (including launch services)⁵ must be acquired from commercial providers whenever they are required.⁶ Private sector transportation systems are to be encouraged.⁷ The private commercial launch industry should be facilitated and promoted, and therefore launch services should be purchased from the private sector to the fullest extent possible.⁸

With promulgation of the Commercial Space Launch Amendments Act of 2004⁹, the US Congress established a strong policy in favor of promoting commercial launches, reentry, and launch sites with stable and minimal regulatory oversight applied fairly and expeditiously, so as to enable the US to retain its competitive position internationally, and contribute to the national defense and economic well being of the nation.¹⁰ Congress encouraged creation of a strong space transportation infrastructure with robust private sector participation.¹¹ The US government is instructed to encourage

and facilitate a domestic commercial space transportation industry and its industrial base, including “launch systems, infrastructure and workforce, necessary to meet ongoing . . . security and civil requirements.”¹²

Space transportation accounted for \$7 billion of the \$105 billion US commercial space industry in 2002. A “commercial launch” may carry a variety of payloads (civil, commercial, scientific, or military); it is deemed commercial if the payload owner commercially procured the launch.¹³

The Commercial Space Launch Act of 1984 [CSLA]¹⁴ authorized the U.S. Department of Transportation (which subdelegated such authority to the Federal Aviation Administration [FAA])¹⁵ to license the launch of a launch vehicles, reentry of a reentry vehicles, as well as the operation of a launch or reentry site.¹⁶ CSLA gave the FAA authority to:

- regulate the commercial space transportation industry, to the extent necessary, to ensure compliance with international obligations of the

⁴ National Aeronautics and Space Act of 1958 § 102(c), Pub. L. 85-568 (as amended through Pub. L. 106-391, 114 Stat. 1577 (Oct. 30, 2000).

⁵ Commercial Space Launch Act § 3, Pub. L. 98-575, 98 Stat. 3055 (Oct. 30, 1984). Commercial Space Launch Act Amendments of 1988, Pub. L. 100-657 (Nov. 15, 1988). 49 U.S.C. § 70101 (2003).

⁶ Commercial Space Act of 1998 § 201, Pub. L. 105-303, 112 Stat. 2843 (Oct. 28, 1998). The general rule is subject to numerous exceptions, however.

⁷ National Aeronautics and Space Administration Authorization Act of 1989 § 101(16)(C), Pub. L. 100-685, 102 Stat. 4083 (Nov. 17, 1988).

⁸ Launch Services Purchases Act of 1990, 42 U.S.C. § 2465b (2003).

⁹ Pub. L. 108-492.

¹⁰ 49 U.S.C. § 70101(a)(5), (6).

¹¹ 49 U.S.C. § 70101(a)(8).

¹² U.S. Space Transportation Policy (Jan. 6, 2005), reprinted in Space Law IV.B.1. 25(P. Dempsey, ed. Feb. 2006).

¹³ US Dep’t of Commerce, Trends in Space Commercialization, republished in Paul Stephen Dempsey, Space Law IV.B.United States.6-2 (2004).

¹⁴ 49 U.S.C. Subtitle IX, §§ 70101-70119 (2004); 14 CFR Parts 400-450 (2004).

¹⁵ 64 Fed. Reg. 19,586 (Aug. 19, 1999).

¹⁶ Chapter 701 of Title 49 of the United States Code confers upon the U.S. Secretary of Transportation authority to issue launch vehicle and site certificates and permits and regulate their operations. This authority, in turn, has been delegated by the Secretary to the Federal Aviation Administration [FAA].

United States and to protect the public health and safety, safety of property, and national security and foreign policy interest of the United States;

- encourage, facilitate, and promote commercial space launches and re-entries by the private sector;
- recommend appropriate changes in Federal statutes, treaties, regulations, policies, plans, and procedures; and
- facilitate the strengthening and expansion of the United States space transportation infrastructure.

This legislation was significantly amended by the Commercial Space Launch Amendments Act of 2004,¹⁷ which sought to reduce regulatory barriers to space launches so as to encourage the commercial development of space.¹⁸ It directs the Secretary of Transportation to “encourage, facilitate, and promote commercial space launches and reentry by the private sector”.¹⁹ One source describes this legislation as “the most significant piece of domestic space law, and its passage shows, for the first time, assertive steps by the government to promote public space travel.”²⁰

A U.S. citizen must obtain FAA authorization to launch, reenter or operate a launch or reentry site anywhere in the world.²¹ Any person seeking to

¹⁷ Pub. L. 108-492.

¹⁸ See Recent Development, Commercialization of Space: Commercial Space Launch Amendments Act of 2004, 17 Harv. J. Law & Tech. 619 (2004).

¹⁹ 49 U.S.C. § 70103 (b)(1).

²⁰ Spencer Bromberg, Public Space Travel – 2005: A Legal Odyssey into the Current Regulatory Environment for United States Space Adventurers Pioneering the Final Frontier, 70 J. Air L. & Com. 639, 569 (2005).

²¹ 49 U.S.C. § 70104(a)(2).

conduct commercial space transportation in the U.S. must also obtain FAA authorization.²² Such licenses are issued by the FAA’s Associate Administrator for Commercial Space Transportation [AST], who prescribes the terms and conditions for conducting authorized activity by the vehicle or site operator. Regulatory review of a launch application focuses on public health and safety, safety of property, and U.S. national security and foreign policy concerns and obligations.²³ U.S. government space activities (such as those by NASA and the Defense Department), however, are not subject to FAA jurisdiction.

The first licensed commercial suborbital launch occurred on March 29, 1989. Since then, more than 100 launches have

²² 49 U.S.C. § 70104(a)(1). However, “amateur rocket activities” are not licensed by the FAA, although an Experimental Airworthiness Certificate may be required. Such launch activities conducted at private sites must satisfy the following characteristics: -Powered by a motor(s) having a total impulse of 200,000 pound-seconds or less; -Total burning or operating time of less than 15 seconds; and -A ballistic coefficient- *i.e.*, gross weight in pounds divided by frontal area of rocket vehicle-less than 12 pounds per square inch.

²³ 68 Fed. Reg. 59977 (Oct. 20, 2003). The CLSA gave the FAA jurisdiction to regulate commercial space activities, “only to the extent necessary to ensure compliance with international obligations of the United States and to protect the public health and safety, safety of property, and national security and foreign policy interest of the United States, . . . encourage, facilitate, and promote commercial space launches by the private sector, recommend appropriate changes in Federal statutes, treaties, regulations, policies, plans, and procedures, and facilitate the strengthening and expansion of the United States space transportation infrastructure.”

been authorized.²⁴ But by 2002, the US was responsible for only 14% of space launches worldwide, compared with 18% for Europe, and 61% for Russia.²⁵

Interest in suborbital flights increased significantly after the Ansari X-Prize foundation offered a \$10 million reward to the first private vehicle that can carry a crew of three at an altitude of 100 kilometers, and can replicate the feat within two weeks.²⁶ In the 19th century, various prizes were awarded to the first airship flight (won by Alberto Santos-Dumont in 1901), or fly an airplane in a circle and land it intact (won by Henry Farman in 1906), or fly an aircraft across the Atlantic Ocean (by Charles Lindbergh in 1927).²⁷

In June 2004, Space Ship One inaugurated private-sector launches of passengers into space. In October 2004, it concluded a second successful launch, thereby winning the \$10 million X-Prize. Richard Branson's company, Virgin Galactic, then contracted with its builders to develop a fleet of commercial sub-orbital and launch vehicles.²⁸ Several thousand people have signed up to pay for a \$275,000 flight, scheduled to commence in 2008. Meanwhile, a \$30 million prize was established for the first sub-orbital passenger flight.²⁹

Clearly, there is a market for taking people into space, initially as tourists enjoying the novelty of the experience. As technology permits, space transportation likely will eclipse space tourism as a commercial market. Moreover, as other commercial sectors grow, such as space mining, transportation will be essential to shuttle technicians and workers to mining sites.

LAUNCH AND RE-ENTRY LICENSES

Under authority delegated by the Secretary of Transportation, licensing of commercial space launch and reentry is regulated by the FAA's Associate Administrator for Commercial Space Transportation. Final rules were promulgated for launches of expendable launch vehicles [ELVs] from non-federal launch sites in August 2006.³⁰ They are lengthy and comprehensive.³¹ The FAA conducts a safety review to determine whether the applicant can launch a vehicle and its payload without jeopardizing public health, safety or property.³² Under certain circumstances, license requirements may be waived.³³

Unless the launch and reentry is exempt from regulation,³⁴ the applicant may

²⁴ 71 Fed. Reg. 27772 (May 12, 2006).

²⁵ Frank Mooring, Jr., *Losing Thrust*, *Aviation Week & Space Tech.* 28 (June 9, 2003).

²⁶ <http://apo.faa.gov/foreca03/CHAP9-04.pdf> (visited May 17, 2004).

²⁷ Bill Gunston, *Aviation: The First 100 Years* 10 (2002).

²⁸ John Lewis & Christopher Lewis, *A Proposed International Legal Regime for the Era of Private Commercial Utilization of Space*, 37 *Geo. Wash. Int'l L. Rev.* 745 (2005).

²⁹ Steven Freeland, *Up, Up and . . . Back: The Emergence of Space Tourism and Its Impact on*

the International Law of Outer Space, 6 *Chi. J. Int'l L.* 1 (2005).

³⁰ 71 Fed. Reg. 50,508 (Aug. 25, 2006).

³¹ The Federal Register publication announcing them consists of more than 200 pages.

³² 14 CFR §§ 415.31, 415.103(a).

³³ The waiver provisions were added by the Commercial Space Act of 1998, Pub. L. 105-303, 49 U.S.C. § 70105(b)(3). The denial of a waiver may be appealed under 14 CFR § 404.5.

³⁴ An exemption applies if the vehicle is launched from a private site and the rocket: (1) has (a) motor(s) with a total impulse of 200,000

apply for: (1) a launch- or reentry-specific license; or (2) a launch or reentry operator license.³⁵ The FAA has 180 days to process a license application.³⁶ The licensing process consists of several steps:

- Pre-application consultation;
- Policy review and approval;
- Safety review and approval;
- Payload review and determination;
- Financial responsibility determination;
- Environmental review; and
- Compliance monitoring.³⁷

Pre-Application Consultation

An applicant for a license must consult with the FAA before submitting an application.³⁸ The applicant must provide information regarding the launch vehicle, the proposed mission and the launch site. This enables the applicant to become familiar with the FAA's expectations, and gives the AST the opportunity to become acquainted with the applicant's proposal.

Policy Review

The statute requires that a license be issued, "Consistent with the public health and safety, safety of property, and national security and foreign policy

pound-seconds or less; (2) and a total burning time of less than 15 seconds; and (3) has a ballistic content of less than 12 pounds per square inch. 14 CFR § 400.2.

³⁵ http://ast.faa.gov/lrra/about_lrra.htm (visited August 1, 2006).

³⁶ 49 U.S.C. § 70105(a).

³⁷ <http://ast.faa.gov/lrra/> (visited August 1, 2006).

³⁸ 14 CFR § 415.105.

interests of the United States"³⁹ Policy review requires that the application be assessed for consistency with these goals, and any international obligations of the United States. The FAA engages in interagency review with the U.S. Department of Defense, Department of State, and NASA to assess the security, foreign policy or international obligations.

Safety Review

In order to protect the crew and any space flight participants, the FAA is authorized to issue regulations governing the design or operation of a launch vehicle.⁴⁰ Though initial regulations must be limited to design features or operating practices that have resulted in a serious or fatal injury or contributed to an unplanned event, the FAA may promulgate more expansive regulations after an eight year developmental period (in 2012).⁴¹

The FAA conducts a safety review in order to determine whether the applicant is capable of launching without jeopardizing public health and safety, and the safety of property.⁴² A flight safety analysis determines where a launch vehicle may and may not fly, and monitors and controls the risk to the public.⁴³ In assessing the flight safety, the FAA reviews the proposed trajectory, malfunction turn, debris, flight safety limits, straight-up time, time

³⁹ 49 U.S.C. § 70105(a).

⁴⁰ 49 U.S.C. § 70105(c).

⁴¹ 49 U.S.C. § 79195(c)(2)(C).

⁴² 14 CFR § 415.31. See 14 CFR Part 417 Subpart C.

⁴³ Licensing and Safety Requirements for Launch – Part II, 71 Fed. Reg. 50,508 (Aug. 25, 2006). 14 CFR § 417.107(f).

delay, flight hazard, probability of failure, debris risk, toxic release, collision avoidance, overflight gate, and hold and resume gate.⁴⁴ The FAA also assesses the flight safety system (i.e., the system that provides control during flight to prevent a hazard from reaching a populated or other protected area during a launch vehicle failure).⁴⁵ Typically, a flight safety system includes a flight termination system and a command control system.⁴⁶

For orbital and suborbital expendable launch vehicles, the applicant must also file a comprehensive safety review document,⁴⁷ that reveals:

- Launch vehicle description;
- Payload description;
- Launch site description;⁴⁸
- Launch operator organization;⁴⁹
- Launch personnel certification program;⁵⁰
- Flight safety analysis;⁵¹
- Ground safety analysis;⁵²
- Launch plans;⁵³
- Launch schedule;⁵⁴
- Computing systems and software;⁵⁵

- Unique safety policies and practices;⁵⁶
- Flight safety system design and operational data;⁵⁷
- Flight safety system test data;⁵⁸
- Flight safety system crew data;⁵⁹ and
- Safety at the end of the launch.⁶⁰

The FAA conducts a qualitative and quantitative risk analysis of the application to discern whether it satisfies the safety obligations.⁶¹ The risk analysis evaluates vehicle reliability, casualty areas, the probability of a crash, the populations at risk, and the potential consequences.⁶² The qualitative analysis focuses on the reliability of the critical safety systems, the hazards potentially posed by the hardware, the risks posed to persons or property near the launch site or along the flight path, and to satellites and other orbital spacecraft. The quantitative analysis focuses on the applicant's launch safety practices and procedures, and the qualifications of key individuals.⁶³ The licensee must demonstrate that the risk of its launch falls below specified risk criteria.⁶⁴

⁴⁴ Licensing and Safety Requirements for Launch – Part II, 71 Fed. Reg. 50,508 (Aug. 25, 2006). 14 CFR §§ 417.105, 417.205 – 417.233.

⁴⁵ 14 CFR Part 417 Subpart D.

⁴⁶ Licensing and Safety Requirements for Launch – Part II, 71 Fed. Reg. 50,508 (Aug. 25, 2006).

⁴⁷ 14 CFR § 415.107.

⁴⁸ 14 CFR § 415.109.

⁴⁹ 14 CFR § 415.111.

⁵⁰ 14 CFR § 415.113.

⁵¹ 14 CFR § 415.115.

⁵² 14 CFR § 415.117.

⁵³ 14 CFR § 415.119.

⁵⁴ 14 CFR § 415.121.

⁵⁵ 14 CFR § 415.123.

⁵⁶ 14 CFR § 415.125.

⁵⁷ 14 CFR § 415.127.

⁵⁸ 14 CFR § 415.129.

⁵⁹ 14 CFR § 415.131.

⁶⁰ 14 CFR § 415.133.

⁶¹ “Acceptable flight risk through orbital insertion for an orbital launch vehicle, and through impact for a suborbital launch vehicle, is measured in terms of the expected average number of casualties ([c] c) to the collective members of the public exposed to debris hazards from any one launch.” 14 CFR § 415.35.

⁶² 71 Fed. Reg. 16251 (Mar. 31, 2006).

⁶³ http://ast.faa.gov/lrra/about_lrra.htm (visited August 1, 2006).

⁶⁴ 71 Fed. Reg. 16251 (Mar. 31, 2006).

The applicant must document the systems safety organization and identify safety personnel.⁶⁵ No license or permit holder may launch or reenter crew unless the crew has been trained and satisfied medical standards as specified in the license or permit.⁶⁶

Payload Review

Unless the payload is exempt, the FAA determines whether the payload owner or operator has obtained the necessary licenses, authorizations and permits. Payloads regulated by the U.S. Federal Communications Commission, the National Oceanic and Atmospheric and Oceanic Administration, or owned or operated by the U.S. government are exempt.⁶⁷ Congress forbade payloads that result in obtrusive space advertising⁶⁸ in the National Aeronautics and Space Administration Authorization Act of 2000.⁶⁹

Financial Responsibility Review

Applicants must demonstrate adequate financial responsibility in an amount sufficient to compensate an injured party for personal or property injury for the maximum probable loss.⁷⁰ Limits are

prescribed by the FAA.⁷¹ Most applicants ordinarily satisfy these requirements by purchasing liability insurance.⁷²

Environmental Review

The FAA is required to engage in an environmental evaluation, for a launch and reentry is considered a major federal action significantly affecting the quality of the human environment under the National Environmental Policy Act.⁷³

Compliance Monitoring

The FAA provides oversight to determine whether a licensed applicant is complying with its obligations under the law and rules and regulations promulgated thereunder. A licensee is obliged to permit the FAA to position an observer at the launch or reentry site.⁷⁴ The FAA may suspend immediately the operation of a launch site or the reentry of a vehicle if it concludes such action is necessary to protect the public health and safety, property, the national security, or a foreign policy interest of the United States.⁷⁵

SAFETY APPROVALS

In August 2006, the FAA promulgated regulations establishing procedures for obtaining a safety approval for a safety

⁶⁵ 71 Fed. Reg. 16251 (Mar. 31, 2006).

⁶⁶ 49 U.S.C. § 70105(b)(4).

⁶⁷ http://ast.faa.gov/lrra/about_lrra.htm (visited August 1, 2006).

⁶⁸ Obtrusive space advertising is defined as "advertising in space that is capable of being recognized by a human being on the surface of the Earth without the aid of a telescope or other technological device." 49 U.S.C. § 70102.

⁶⁹ Pub. L. 106-391 (Oct. 30, 2000). The FAA reviews payloads to ensure that they will not result in obtrusive space advertising under 14 CFR § 415.51. 41 Fed. Reg. 51,968 (Aug. 31, 2006).

⁷⁰ 49 U.S.C. § 70112(a).

⁷¹ 49 U.S.C. § 70112(a)(2). 14 CFR § 417.21.

⁷² See 49 U.S.C. § 70112. Certain third party liability claims above the insurance coverage, but below \$1.5 billion (adjusted for inflation) also may be paid by the U.S. government. 49 U.S.C. § 70113.

⁷³ 42 U.S.C. § 4321 et seq.

⁷⁴ 49 U.S.C. § 70106(a).

⁷⁵ 49 U.S.C. § 70108(a).

element.⁷⁶ Once issued, the holder could offer the approved safety element to launch and reentry operators. This allows different operators of approved equipment, components, parts, personnel or services⁷⁷ on different launch or reentry vehicles, thereby streamlining the process of reviewing and issuing licenses. An approved safety element can be used by different launch and reentry vehicle operators within the specified scope without having to go through a regulatory examination of the element's fitness and suitability for a particular launch or reentry. Applicants may include manufacturers or designers of a launch or reentry vehicle or component thereof, the designer or developer of a safety system or process, or personnel who perform critical safety functions in launch or reentry.⁷⁸ Applications are assessed based on performance-based criteria established by: (1) the FAA or other federal regulations; (2) government-developed or adopted standards; (3) industry consensus standards; or (4) applicant developed criteria, in that order.⁷⁹ Approvals are valid for five years, and are renewable.⁸⁰

EXPERIMENTAL PERMITS

The Commercial Space Launch Amendments Act of 2004 established an

experimental permit regime for the development of reusable suborbital rockets. Congress intended that, "At a minimum, permits should be granted more quickly and with fewer requirements than licenses."⁸¹ The experimental permit regime is intended to reduce the regulatory burdens upon developers of reusable suborbital rockets.

The FAA has reduced the number of requirements imposed upon permit vis-à-vis license applications, consonant with the special airworthiness certificates the FAA issues on special airworthiness certificates granted to experimental aircraft.⁸² The applicant must submit; (1) a program description (a description of the purpose for which the rocket will be operated, its dimensions, weight, thrust profiles, payloads, propellants, hazardous materials and systems); (2) a flight test plan (estimated number of flights, important flight-safety events, and maximum altitude); and (3) operational safety documentation.⁸³ If the applicant satisfies the applicable statutory and regulatory requirements, experimental permits should be issued within 120 days of receipt of a completed application.⁸⁴ Eligibility for an experimental permit depends upon whether the suborbital rocket is flown for one of the following purposes:

- Research and development to test new design concepts, equipment or operating techniques;

⁷⁶ Safety Approvals, 71 Fed. Reg. 46,847 (Aug. 15, 2006).

⁷⁷ Safety elements eligible for approval are launch vehicles, reentry vehicles, safety systems, processes, services or any identified component thereof, as well as qualified and trained personnel performing a process or function involving licenses launch activities or vehicles.

14 CFR § 414.3.

⁷⁸ 14 CFR § 414.5.

⁷⁹ 14 CFR § 414.19.

⁸⁰ 14 CFR § 414.21(d).

⁸¹ H. Rep. 108.429 § VII.

⁸² 71 Fed. Reg. 16251 (Mar. 31, 2006).

⁸³ 71 Fed. Reg. 16251 (Mar. 31, 2006).

⁸⁴ 49 U.S.C. § 70105a(a). 71 Fed. Reg. 15251 (Mar. 27, 2006).

- Showing compliance with requirements as part of the process for obtaining a license;
- Crew training before obtaining a launch or reentry license using the design for which the permit would be issued.⁸⁵
- No one may operate a reusable suborbital rocket under an experimental permit for the carriage of property or person for hire.⁸⁶

LAUNCH SITES

Since 1996, AST has issued site operator licenses to several US spaceports including California Spaceport at Vandenberg Air Force Base, Spaceport Florida at Cape Canaveral Air Force Station, the Virginia Space Flight Center at Wallops Island, and Kodiak Launch Complex on Kodiak Island, Alaska. These sites augment the launch capacity of the NASA and US Air Force facilities (particularly those at Cape Canaveral and Vandenberg Air Force Bases).⁸⁷ The first launch from a licensed, non-federal facility was at Spaceport Florida of NASA's Lunar Prospector aboard a Lockheed Martin Athena 2 on January 6, 1998.⁸⁸

Most FAA-licensed launches have been from U.S. Air Force launch sites.⁸⁹ The

FAA performs a Launch Site Safety Assessment [LSSA] to determine whether a federal launch range meets applicable safety requirements.⁹⁰ If the launch operator has contracted with a federal launch site for provision of the flight safety system, the FAA will accept that system as used or approved on the federal launch range. The FAA treats a federal launch range as that of the launch operators.⁹¹

For launches from a non-federal site, compliance with the requirements of the flight safety system is assessed through the licensing process.⁹² The FAA conducts a ground safety analysis, consisting of an identification of each potential hazard, causes, and controls the launch operator must establish to prevent the hazard from affecting the public.⁹³

CONCLUSION

US policies have evolved over time. The competition between the US and USSR for dominance of space has evolved into cooperation between the US and Russia in the International Space Station, though even in the post-Cold War era, defensive (and even offensive) applications of space garnish significant public investment. The US set out to be the leader in space research, science and technology, and undoubtedly accomplished that goal. Public

⁸⁵ 49 U.S.C. § 70105a(d). 71 Fed. Reg. 16251 (Mar. 31, 2006).

⁸⁶ 49 U.S.C. § 70105a(h).

⁸⁷ US Dep't of Commerce, Trends in Space Commercialization, republished in Paul Stephen Dempsey, Space Law IV.B.United States.6-2 (2004).

⁸⁸ <http://ast.faa.gov/aboutast/> (visited May 17, 2004).

⁸⁹ Safety Approvals, 71 Fed. Reg. 46,847 (Aug. 15, 2006).

⁹⁰ Licensing and Safety Requirements for Launch – Part II, 71 Fed. Reg. 50,508 (Aug. 25, 2006).

⁹¹ See 14 CFR § 417.13.

⁹² Licensing and Safety Requirements for Launch – Part II, 71 Fed. Reg. 50,508 (Aug. 25, 2006).

⁹³ Licensing and Safety Requirements for Launch – Part II, 71 Fed. Reg. 50,508 (Aug. 25, 2006). 14 CFR § 415.117. 14 CFR §§ 417.109 - 113

development of space activity is being replaced, albeit slowly, with privatization and commercial development.

No nation has accomplished as much space as has the US. As the European Space Agency, and as nations such as China fulfill their ambitions in space, we shall see if the US continues its insatiable thirst for triumph.

As the global economy grows, so too will commercial activities in space. As is the case with multinational corporations in other trade sectors, the ability of any individual nation to regulate them will be circumscribed. Moreover, a fragmented patchwork of national laws governing such issues as safety, security, environmental harm, and liability, in the long term, will impede the ability of space commerce to reach its full potential. An international body—the International Civil Aviation Organization [ICAO]—promulgates standards and recommended practices [SARPs] in many of these areas for commercial aviation, facilitating international harmonization of law and enhancing the development of commercial aviation.

The day may come when the world community realizes that an international body is needed to address common issues in the commercial development of space.⁹⁴ Progressive domestic laws in industrial nations addressing labor, taxation and the environment have already driven mining and

manufacturing industries off-shore. Stringent safety regulations and export restrictions could do the same for space. Hence harmonization of law can create a “level playing field” globally, alleviate uncertainty, and thereby facilitate private investment. Global harmonization of Space Law could come in the form of creation of a new international organization, or by amending the Chicago Convention of 1944⁹⁵ to include space within ICAO’s jurisdiction.⁹⁶

⁹⁴ Jurgen Cloppenburg, *The Future Regulation of Global Mobile Personnel Communications by Satellite: A Farewell to Lex Americana?*, XXV *Annals of Air & Space L.* 83, 134-37 (2000).

⁹⁵ Convention on International Civil Aviation, 61 Stat. 1180 (1944).

⁹⁶ ICAO’s membership of 189 nations comprises virtually the entire world community. It also possesses both quasi-legislative and quasi-judicial authority, and has more than a half century of experience in addressing safety international commercial aviation.