# JOURNAL

# OF

# SPACE

# LAW

**VOLUME 31, NUMBER 1**

**Summer 2005**

# JOURNAL OF SPACE LAW

UNIVERSITY OF MISSISSIPPI SCHOOL OF LAW
A JOURNAL DEVOTED TO SPACE LAW AND THE LEGAL PROBLEMS ARISING OUT OF HUMAN ACTIVITIES IN OUTER SPACE.

VOLUME 31 | SUMMER 2005 | NUMBER 1



All correspondence with reference to this publication should be directed to the *Journal of Space Law*, P.O. Box 1848, University of Mississippi School of Law, University, Mississippi 38677; jsl@olemiss.edu; tel: +1.662.915.6857, or fax: +1.662.915.6921.

*Journal of Space Law*. The subscription rate for 2005 is $100 U.S. for U.S. domestic/individual; $120 U.S. for U.S. domestic/organization; $105 U.S. for non-U.S./individual; $125 U.S. for non-U.S./organization. Single issues may be ordered at $70 per issue. For non-U.S. airmail, add $20 U.S. Please see subscription page at the back of this Volume.


ISSN: 0095-7577

# JOURNAL OF SPACE LAW

UNIVERSITY OF MISSISSIPPI SCHOOL OF LAW
A JOURNAL DEVOTED TO SPACE LAW AND THE LEGAL PROBLEMS ARISING OUT OF HUMAN ACTIVITIES IN OUTER SPACE.

VOLUME 31 | SUMMER 2005 | NUMBER 1

CONTENTS

# FOREWORD

# FORCES OF CHANGE IN SPACE LAW

*Joanne Irene Gabrynowicz*

This issue of the JOURNAL OF SPACE LAW provides a snapshot of the forces of change currently in play in space law. They are observable at both the national and international level and are occurring in the civil, commercial, military, and intelligence uses of space. The more important changes are intersecting between and among these sectors and are addressed by this issue's authors.

Important changes at the international level are identified in this issue's commentary, *The Evolutionary Stages of the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space*, by Professor Sergio Marchisio, the Subcommittee's current Chairperson. He describes the changes in the Subcommittee's role over time since its inception. Professor Marchisio identifies three stages of the Subcommittee's function. He sees it evolving from a law-making stage, to a Principles making stage, to an assessment stage based on the rights and obligations of the treaties in force. Significantly, Prof. Marchisio concludes that the role of the Legal Subcommittee is certainly not over as it continues to form the most suitable environment to promote the assessment of space law and the development of new norms.

Dr. Varlin J. Vissepó, in *Legal Aspects of Reusable Launch Vehicles*, addresses the changing processes of implementing a State's international obligations at the national level. He compares the national launch liability regimes of various States and identifies another emerging force of change: the new launch technologies that are at the intersection between aviation law and space law. Mr. Vissepó analyzes this intersection in legal terms and makes some recommendations about the proper international regime that ought to apply to the new generation of launch vehicles.

In *Space Travel Law (and Politics): The Evolution of the Commercial Space Launch Amendments Act of 2004*, Timothy Hughes and Esta Rosenberg describe how the U.S. took the next evolutionary step with its 21-year old national launch statute to include the new vehicles emerging from the private sector. Mr. Hughes and Ms. Rosenberg were directly and significantly involved in the *Act*'s lawmaking process, he as Committee Counsel in the U.S. House of Representatives and she as Senior Attorney in the Federal Aviation Administration's Office of Commercial Space Transportation. Together, they offer a first hand account of how the U.S. met its international legal obligations, served its national interests and how political philosophies played out in the legislative process. This seminal article is certain to become an authoritative reference piece for space law legislators and scholars around the world.

Dr. George Robinson writes about the interface between a specific international obligation—avoiding adverse changes in the Earth environment by introducing extraterrestrial matter—and relevant U.S. Constitutional requirements in *Interplanetary Contamination: The Ultimate Challenge for Environmental and Constitutional Lawyers?* He analyzes the domestic quarantine authority previously used by the U.S. in past lunar missions. Dr. Robinson concludes that the quarantine authority, and the process by which it is executed, has to change for the Vision for Space Exploration. To meet the Vision's requirements, U.S. Constitutional due process standards, and international treaty obligations, future quarantine authority must be more transparent, comprehensive and mission specific.

In *"Eyes" On Freedom—A View of the Law Governing Military Use of Satellite Reconnaissance in U.S. Homeland Defense*, Lt. Col. Christopher M. Petras presents an overview of the legal regime related to the U.S. Defense Department's use of satellite surveillance and offers a changing view of satellite use in a time of terrorist activities. Lt. Col. Petras analyzes some of the statutes and regulations that are intended to maintain a divide between military and civil activities in the U.S. He concludes that the purposes of some of these laws are misunderstood and that some steps have been taken to enhance civil-military integra-

tion for homeland security planning and operations. He concludes further that more needs to be done to clarify the provisions delineating the legal boundaries of interaction between the military, elements of the intelligence community, and federal, state, and local law enforcement agencies.

Finally, third-year law students Keishunna Randall and Jamie Rutland round out this issue of the JOURNAL OF SPACE LAW by gathering the space law that has changed since the last issue and organizing it into a bibliography containing case law and relevant publications.

# CALL FOR PAPERS

## JOURNAL OF SPACE LAW
## UNIVERSITY OF MISSISSIPPI SCHOOL OF LAW

A JOURNAL DEVOTED TO SPACE LAW AND THE LEGAL PROBLEMS ARISING OUT OF HUMAN ACTIVITIES IN OUTER SPACE.

## Volume 31, Issue 2

The National Remote Sensing and Space Law Center of the University of Mississippi School of Law is delighted to announce that it will publish Volume 31, issue 2 of the *JOURNAL OF SPACE LAW* in the second half of 2005.

Authors are invited to submit manuscripts, and accompanying abstracts, for review and possible publication in the *JOURNAL OF SPACE LAW*. Submission of manuscripts and abstracts via email is preferred.

Papers addressing all aspects of international and national space law are welcome. Additionally, papers that address the interface between aviation and space law are also welcome.

Please email manuscripts and accompanying abstracts in Microsoft Word or WordPerfect to:

jsl@olemiss.edu

Or, alternatively, a hardcopy of the manuscript and abstract, along with a computer diskette containing them in Microsoft Word or WordPerfect format may be sent to:

*JOURNAL OF SPACE LAW*
P.O. Box 1848
University, MS 38677
1-662-915-6857 (office)
1-662-915-6921 (fax)

To be considered for the next issue, submissions should be received on or before October 3, 2005. The *JOURNAL OF SPACE LAW* will continue to accept and review submissions on an ongoing basis.

# SPACE TRAVEL LAW (AND POLITICS): THE EVOLUTION OF THE COMMERCIAL SPACE LAUNCH AMENDMENTS ACT OF 2004

*Timothy Robert Hughes*[*]
*Esta Rosenberg*[**]

"A friend of mine once sent me a postcard with a picture of the entire planet Earth taken from space. On the back it said, 'Wish you were here.'" - Steven Wright[1]

Postcards from space soon may be possible. Famously described in the Star Trek television series as "the final frontier" for humanity, the space frontier has been traversed by fewer than four hundred and fifty individuals from Yuri Gagarin's historic first space flight in 1961 through the present day.[2] Given the astronomical cost and risk of human space flight, space travel generally has been limited to a select few govern-

---

[*] Timothy R. Hughes served as Majority Counsel to the Committee on Science in the United States House of Representatives from August 2003 through June 2005. Mr. Hughes was the principal House staff attorney responsible for drafting and shepherding the passage of commercial space transportation legislation, H.R. 3752, H.R. 5245 (enacted as P.L. 108-428), and H.R. 5382, the Commercial Space Launch Amendments Act of 2004 (enacted as P.L. 108-492). Mr. Hughes currently serves as Lead Counsel for Space Exploration Technologies of El Segundo, CA. This article is the independent work of its author and does not necessarily represent the findings, opinions, or views of the House Committee on Science.

[**] Esta Rosenberg is a Senior Attorney in the FAA's Office of Chief Counsel, Regulations Division, and a member of the International Institute of Space Law. Ms. Rosenberg has been counsel to the Office of Commercial Space Transportation since 1991. Ms. Rosenberg was the principal drafter of FAA regulations governing financial responsibility for licensed launch and reentry activities and licensing of reusable launch vehicle (RLV) missions. This article is the result of independent research of the author and does not represent the findings, opinions or views of the FAA.

[1] *See* http://www.brainyquote.com/quotes/authors/s/steven_wright.html (last visited July 22, 2005).

[2] According to the National Aeronautics and Space Administration's (NASA) website, more than four hundred people have ventured into space between 1961 and the present. *See* NASA Humans in Space, *at* www.nasa.gov/lb/vision/space/features/index.html (last visited June 16, 2005). For a comprehensive list of human space flight missions, *see* http://en.wikipedia.org/wiki/Space_travel#Humans_in_space.

ment-sponsored astronauts, cosmonauts, and taikonauts traveling aboard government-owned, funded and operated launch vehicles.[3] The promise of safe, regular and affordable space trips for average citizens aboard human-rated rocketships has been the stuff of science fiction. Recent advances in materials, propulsion systems, and structures, however, have brought the fantasies of space enthusiasts like Jules Verne, Arthur C. Clarke, and George Lucas somewhat closer to reality. On October 4, 2004, Scaled Composites, LLC, won the $10 million dollar Ansari X Prize by launching and successfully returning the first privately built and operated, manned rocket – fittingly named "*SpaceShipOne*" – to a height of more than 100 kilometers above the Earth's surface, twice in a two-week period.[4] With the success of this reusable spacecraft, space travel may have entered a new era in which private entities, rather than national governments, regularly, safely and affordably transport people into space.

Over the past five years, a number of wealthy entrepreneurs, including Sir Richard Branson of Virgin Atlantic Airways, Elon Musk of PayPal, and Jeff Bezos of Amazon.com have founded (and funded) private space transportation corporations, placing near-term bets that the technology (and the market demand) will exist to carry people and materials to and from space, safely and reliably, for an acceptable price, and in rea-

---

[3] In April 2001, Dennis Tito, an American businessman, became the world's first "space tourist," purchasing a flight aboard a Soyuz launch vehicle from the Russian government and spending more than a week aboard the International Space Station (ISS). The costs of a seat aboard the Soyuz rocket were not disclosed, but have been estimated at $20 million. Mark Shuttleworth, a South African businessman, likewise has purchased a trip to the ISS from the Russian government for approximately $20 million. *See* Christina Valhouli, *Having a Blast in Space*, FORBES.COM, *at* http://www.forbes.com/2002/04/18/0418feat.html (last visited July 18, 2005). *See also Commercial Human Space Flight: Joint Hearing Before the Subcomm. on Space and Aeronautics of the House Comm. on Science and the Subcomm. on Science, Technology, and Space of the Senate Comm. on Commerce, Science, and Transportation*, July 24, 2003, Hearing Vol. No. 108-26, 108th Cong. (2003) [hereinafter *Commercial Human Space Flight: Joint Hearing*].

[4] *See* X Prize Foundation web site, http://www.xprize.org (last visited June 16, 2005) (for information about *SpaceShipOne*'s first flight on June 21, 2004 and subsequent flights in pursuit of the X Prize).

sonable comfort.[5] The viability of their various business plans, most of which aim at some point to tap into what is believed to be a healthy market for personal space travel,[6] will depend upon continued advances in launch vehicle technologies. In the long-term, these entities hope that technologies will mature to allow for orbital flights, low-cost satellite launching, rapid point-to-point passenger travel, same-day package delivery, and a host of other commercial applications.[7] Despite tantalizing commercial possibilities, the long-term technological and commercial viability of commercial human space flight remains to be seen. Among the factors contributing to the industry's ultimate success or failure will be the application of laws and the formulation of regulations governing the carriage of human beings into space.

Until very recently, only expendable launch vehicles (ELVs) and certain types of ballistic missiles were available for private sector use. As such, the principal law governing the licensing and regulation of commercial space transportation vehicles, the Commercial Space Launch Act (CSLA), originally focused on

---

[5] On September 27, 2004, Sir Richard Branson, the Chairman of Virgin Atlantic Airways, announced the formation of Virgin Galactic, with the goal of offering suborbital rides into space for paying passengers by the turn of the decade. *See* Virgin Galactic, *A Starship Built on Enterprise, at* http://www.virgingalactic.com/en/who.asp (last visited May 31, 2005). Elon Musk, the co-founder of PayPal, founded Space Exploration Technologies (or "SpaceX") in June 2002. SpaceX has developed a family of launch vehicles intended to reduce the cost and increase the reliability of access to space and plans to launch its first rocket, the 'Falcon I', in 2005. *See* http://www.spacex.com (last visited July 20, 2005). Jeff Bezos of Amazon.com has founded a company called Blue Origin, with the stated mission of developing "vehicles and technologies that, over time, will help enable an enduring human presence in space" and an initial focus on the development of a crewed suborbital launch system. *See* http://www.blueorigin.com (last visited July 20, 2005).

[6] According to a market study by the Futron Corporation, suborbital space tourism could generate as much as $700 million per year in revenues by the year 2021 with over 15,000 passengers flying. Taken in tandem with orbital space tourism, the industry is projected to exceed $1 billion in revenues. *See* Press Release, Futron, Futron Releases Space Tourism Market Study to the General Public (Sept. 28, 2004), *available at* http://www.futron.com/press/spacetravel.htm (last visited June 4, 2005).

[7] *See generally,* X Prize In the News, *at* http://www.xprizefoundation.com/news/ (last visited June 16, 2005). *See also* H.R. 5382, COMMERCIAL SPACE LAUNCH AMENDMENTS ACT OF 2004, COMMITTEE REPORT, *Background and Need for the Legislation*, H. REP. 108-429, at 2-3 (2004) [hereinafter COMMITTEE REPORT].

ELVs.[8] As reusable launch vehicle (RLV) development progressed, Congress amended the law to address liability and government indemnification concerns and to address licensing authority for RLVs.[9] However, RLVs designed for human carriage were a statutory afterthought, and there was no express statutory declaration of regulatory jurisdiction, nor any instruction from the Congress regarding the licensing and safety regulation of human space flight. Shortly after the turn of the millennium, with the possibility of successful manned experimental flights like that of *SpaceShipOne* on the horizon, the emerging industry demanded greater legal certainty in order to secure insurance and attract further investment.[10]

The United States Congress aimed to clarify the legal landscape for the nascent commercial human space transportation industry in December 2004, with the passage of H.R. 5382, the Commercial Space Launch Amendments Act of 2004 (hereinafter 2004 Space Act).[11] The 2004 Space Act amends existing commercial space transportation law to establish a distinct regulatory framework for private human space flights. Contested on the floor of the House of Representatives, narrowly passed under suspension of the House rules, and projected by the media for failure in the United States Senate, the 2004 Space Act surprised many political observers by rocketing to

---

[8] Commercial Space Launch Act of 1984, Pub. L. No. 98-575, 98 Stat. 3055 (1984) [hereinafter CSLA]. Among other things, as drafted in 1984, the CSLA prohibits persons from launching a launch vehicle or operating a launch site within the United States (or, in the case of U.S. citizens, from anywhere in the world) unless they are properly licensed; and, in the case of a license holder, launching a payload (an object placed in space) unless that payload complies with all requirements of Federal law. The CSLA was included in a 1994 reorganization of U.S. transportation law, codified in Title 49 of the U.S. Code. The CSLA was codified under 49 USC Subtitle IX, chapter 701, "Commercial Space Launch Activities," and reflects non-substantive technical drafting revisions.

[9] Commercial Space Act of 1998, Pub. L. No. 105-303, 112 Stat. 2843 (1998).

[10] *See H.R 3245, The Commercial Space Act of 2003 Hearing before the Subcomn. on Space and Aeronautics of the House Comm. on Science*, 108th Cong., Hearing Vol. No. 108-33 (Nov. 5, 2003). *See also* COMMITTEE REPORT, *supra* note 7.

[11] H.R. 5382, Pub. L. No. 108-492, 108th Cong., 2d Sess. [hereinafter 2004 Space Act].

unanimous final passage as one of the last bills considered by the Senate on the last day of the 108th Congress.[12]

This article provides an overview of the law, regulations, and politics relating to commercial human space flight. It traces the manner in which the 2004 Space Act evolved over the course of the 108th Congress as a potential new industry began to emerge in the United States and public attention focused on the first private space flights in history. This article begins with some highlights of private RLV development efforts over the past twenty years. Part II addresses the legal and regulatory landscape during the same period of time. Part III discusses precursor legislation to the 2004 Space Act, focusing on H.R. 3752, a bill that passed by an overwhelming majority in the House of Representatives early in 2004, but languished in the United States Senate. Part IV focuses on the 2004 Space Act itself, describing the politics behind the law, as well as its regulatory prescriptions. Part V outlines the near-term and long-term regulatory and other legal challenges that the Secretary of Transportation and Congress face with respect to commercial human space flight.

## I. RLV DEVELOPMENT EFFORTS: TECHNOLOGY OUTPACES THE LAW

A private commercial space transportation industry did not exist in the United States until the mid-1980s. Prior to that time, commercial satellites and other payloads were launched into space on government-owned launch vehicles, including the only proven RLV in the world, the *Space Shuttle*.[13] Two major

---

[12] *See* Holman W. Jenkins, Jr., *The 'Final Frontier' May Be a Senate Waste Basket*, WALL ST. J., Dec. 8, 2004; Erica Werner, *Congress passes bill to allow space tourism*, ASSOCIATED PRESS, Dec. 8, 2004; Alan Boyle, *Congress OKs private space flight bill: Senate's 11th-hour approval opens way for tourism*, MSNBC NEWS, Dec. 8, 2004, *available at* http://www.msnbc.msn.com/id/6682611/ (last visited June 17, 2005).

[13] Through August 2005, the United States has launched the Space Shuttle fleet, a partially reusable vehicle system, one hundred fourteen times, with two catastrophic losses – a loss rate of 1.77 percent. Technically, the Space Shuttle remains a test program. As a technical matter, the Soyuz rocket used to place cosmonauts aboard the ISS is an expendable launch vehicle (ELV), as opposed to a reusable launch vehicle (RLV). STEPHEN J. ISAKOWITZ ET AL., INTERNATIONAL REFERENCE GUIDE TO SPACE LAUNCH SYSTEMS (American Institute of Aeronautics & Astronautics 4th ed. 2004).

events helped give rise to the development of a commercial space industry in the United States: the establishment of a European launch services organization (privately owned and operated, but heavily subsidized by European governments), and the tragedy of the *Space Shuttle Challenger* accident in 1986, after which commercial payloads were banned from being flown aboard the *Space Shuttle* fleet.

With a commercial market beckoning, the aspiring commercial space transportation companies relied upon ELVs to carry commercial payloads into space. RLVs were technologically infeasible at the time – but highly attractive inasmuch as repeated use of a launch vehicle promised to drive down launch costs (and, by extension, charges for the carriage of payloads). RLV development gained momentum in the mid- to late 1990s as the U.S. Government explored single stage to orbit technology and next generation *Space Shuttle* alternatives. In 1994, the Clinton Administration issued a National Space Transportation Policy, Presidential Decision Directive, that focused in large part on RLV research and development, which prompted flight demonstration technology development on a next-generation reusable launch system, in conjunction with the National Aeronautics and Space Administration (NASA).[14]

Through cooperative agreements beginning in the mid-1990s, NASA partnered with Lockheed Martin and Orbital Sciences Corporation – two of the three dominant players in the commercial launch services market – on the X-33 and X-34 developmental space vehicles. The cooperative arrangements did not involve the Department of Transportation (DOT), nor the Federal Aviation Administration (FAA), a modal administration within DOT. NASA did not require or expect its 'X' vehicle partners to obtain DOT licenses, nor could NASA offer indemnification to its partners under existing law.[15] This left the pri-

---

[14] *See* OFFICE OF SCIENCE AND TECHNOLOGY POLICY, THE WHITE HOUSE, NATIONAL SPACE TRANSPORTATION POLICY, PDD/NSTC-4 (Aug. 5, 1994), *available at* http://www.hq.nasa.gov/office/codez/new/policy/pddnstc_4.html (last visited June 20, 2005).

[15] *Indemnification and Cross-Waiver Authority: Hearings Before the Subcomm. on Space and Aeronautics of the House Comm. on Science,* 105th Cong. (1997) (testimony of

vate operators with potentially massive liability exposure to third parties when operating 'X' program aerospace vehicles – the industry's "single overriding concern" about engaging in collaborative efforts with NASA on the two 'X' vehicle projects.[16]

In response to the industry's liability concerns, Congress passed legislation granting NASA third-party liability indemnification authority for private operators of experimental aerospace vehicles developed under an agreement with NASA, conditioned upon the conduct of a series of safety reviews.[17] Presumably, without indemnification, 'X' vehicle operators would have been unwilling to flight test their vehicles. The legislation incorporated the general approach to risk-sharing codified in the CSLA; specifically, the law required vehicle operators to purchase liability insurance based upon an estimate of maximum probable loss (MPL). In addition, the law required cross waivers of claims among and between the NASA Administrator, the aerospace vehicle developer, and related entities of the developer, including contractors.[18] Because insurance for initial test flights was proving to be scarce and extremely expensive, NASA also gained authority to provide liability insurance for a vehicle developer.[19]

Due to technical and financial problems associated with X-33 development, NASA and Lockheed Martin discontinued involvement in the program in 2001. The cancellation dealt a significant blow to RLV development inasmuch as Lockheed Martin had been planning a commercial follow-on vehicle to be operated under the name "*VentureStar*." *VentureStar* was intended to be a commercial single stage to orbit vehicle capable of transporting cargo or passengers and Lockheed Martin had been actively engaged in business planning with a number of potential staging sites from which the vehicle would operate. The very prospect of *VentureStar* spurred more than a dozen states to consider becoming licensed by the federal government

---

NASA General Counsel, Edward A. Frankle) [hereinafter *Indemnification and Cross-Waiver Authority: Hearings*].

[16] *Id.*

[17] 42 U.S.C. § 2458c (2000).

[18] *Id.*

[19] *Id.*

as "spaceports."[20] Subsequent to cancellation of the X-33 project, NASA focused on the development of a "Crew Return Vehicle" (CRV) meant to provide the United States with crew transfer capabilities to and from the *International Space Station* (ISS). However, in 2001, the George W. Bush Administration canceled the CRV program because of cost growth problems.[21] A subsequent national RLV development program, the *Orbital Space Plane*, took its place in 2003, but it, too, was canceled within a year.[22]

Concomitant with the cooperative NASA-industry effort to develop the X-vehicles, a parallel, non-traditional effort to develop human-rated RLVs took off. In 1996, the X Prize Foundation, a private, non-profit entity, offered a $10 million purse, the Ansari X Prize ('X Prize'), to the first private entity to finance, build, and launch a spaceship, capable of carrying three people, to an altitude of 100 kilometers and return them safely to Earth twice in a two-week period flying aboard the same vehicle.[23] Relying on funds provided by the Ansari family and other private contributors, as well as a "hole-in-one" insurance policy offering to guarantee the availability of the $10 million prize, the X Prize was modeled after aviation prizes offered early in the 20th century – primarily, the twenty-five thousand dollar Orteig Prize awarded to Charles Lindbergh for completing the first trans-Atlantic airplane flight in 1927.[24]

More than twenty teams from seven countries registered for the X Prize competition. Competitors included teams from around the world, including entrants from the United States, Canada, Argentina, and Israel. In October 2004, just over eight

---

[20] Some of these States remain interested in establishing spaceports to support RLV flights. *See* FAA OFFICE OF COMMERCIAL SPACE TRANSPORTATION REPORT, 2005 U.S. COMMERCIAL SPACE TRANSPORTATION DEVELOPMENTS AND CONCEPTS: VEHICLES, TECHNOLOGIES, AND SPACEPORTS (2005), *available at* ast.faa.gov/files/pdf/Book1screen.pdf (last visited June 20, 2005).

[21] Wikipedia, *at* http://en.wikipedia.org/wiki/Crew_Return_Vehicle_(CRV) (last visited July 18, 2005).

[22] *Id. at* http://en.wikipedia.org/wiki/Orbital_Space_Plane (last visited July 18, 2005).

[23] Under the competition rules, an appropriate amount of ballast could be substituted for two of the three people in actual flights.

[24] More information about the X Prize Foundation is available at its web site, http://www.xprize.org (last visited June 20, 2005).

years after the X Prize Foundation first announced the competition, Scaled Composites, LLC (Scaled Composites), of California won the $10 million purse with its *SpaceShipOne* vehicle, operating under a license issued by the FAA pursuant to the CSLA.[25] Scaled Composites' efforts were funded in large part by Microsoft's co-founder, Paul Allen. It has been reported that Allen contributed upwards of $20 million to the venture.[26] In the wake of *SpaceShipOne's* successes, Sir Richard Branson, the Chairman of Virgin Atlantic Airways, announced the investment of $25 million in a new space venture to be called Virgin Galactic. The project plans to operate five slightly larger models of *SpaceShipOne* for commercial suborbital flights starting at about $200,000 per seat. Branson estimates that Virgin Galactic could fly 3,000 people within five years – though some observers remain skeptical about the viability of Branson's business plan and his commitment to the line of business.[27]

RLV development may have received another boost with President George W. Bush's proclamation in January 2004, of a new national "Vision for Space Exploration" (hereinafter Vision) to be carried out by NASA with private sector support.[28] The President's plan consists of three distinct, but related, components, each with potential implications for the use of RLVs. First, President Bush proposes to complete construction of the ISS by 2010 and to retire the *Space Shuttle* fleet. The second component of the Vision concerns new medium-term goals for human space flight. The central goal is to return humans to the Moon by 2020. To do this, NASA plans to develop a new Crew Exploration Vehicle (CEV) to be launched with humans aboard

---

[25] In April 2004, the FAA issued RLV mission licenses to two RLV developers– Scaled Composites, LLC, and XCOR Aerospace, Inc. – both prior to passage of the 2004 Space Act.

[26] *SpaceShipOne Rockets to Success,* BBC NEWS ON-LINE, *at* http://news.bbc.co.uk/2/hi/science/nature/3712998.stm (last visited July 18, 2005).

[27] *See Now Virgin to Offer Trips to Space*, CNN, Sept. 27, 2004, *available* http://www.cnn.com/2004/WORLD/europe/09/27/branson.space/index.html; *see also* Holma W. Jenkins, Jr., *The 'Final Frontier' May Be a Senate Waste Basket*, WALL ST. J., Dec. 8, 2004, at A13.

[28] *See* Press Release, Office of the Press Secretary, White House, President Bush Announces New Vision for Space Exploration Program (Jan. 14, 2004), *available at* http://www.whitehouse.gov/news/releases/2004/01/20040114-3.html (last visited June 20, 2005).

as early as 2012. Finally, the Vision calls for the United States (perhaps in conjunction with international partners) to explore Mars and "worlds beyond" with manned flights, and to promote the commercial exploitation of space.[29] The timing of future exploration will depend on the pace of technology development and the authorization and appropriation of federal funding.

In the summer of 2005 – nearly a year and a half after the Vision announcement – Congress has begun to debate and legislate with respect to the merits of the Vision.[30] Assuming Congressional support and, more importantly, Congressional funding for all (or even some aspects) of the Vision, private RLV research and development may accelerate. Both human- and cargo-carrying RLVs are likely to play a critical role in carrying out the Vision's stated goals of completing and utilizing the International Space Station, transitioning from the use of the Space Shuttle to alternative launch vehicles, returning astronauts to the Moon by 2020, and eventually sending human missions to Mars.

On December 21, 2004, President Bush issued a new National Space Transportation Policy, superseding the previous policy announced in 1996. The new policy establishes guidelines and implementation actions meant to ensure the Nation's ability to maintain access to and use of space for national defense, homeland security, and civil, scientific, and commercial purposes.[31] Acknowledging the potential of the commercial human space flight industry, the policy provides in relevant part:

> To exploit space to the fullest extent . . . requires a fundamental transformation in U.S. space transportation capabilities and infrastructure. In that regard, the United States Government must capitalize on the entrepreneurial spirit of the

---

[29] *Id.*

[30] On June 23, 2005, the Senate Committee on Commerce, Science and Transportation reported S. 1281, the National Aeronautics and Space Administration Act of 2005. On July 18, 2005, the House Committee on Science reported H.R. 3070, its own version of the National Aeronautics and Space Administration Act of 2005. *See* H.R. REP. 109-173. H.R. 3070 passed in the House of Representatives on July 22, 2005.

[31] *See* U.S. SPACE TRANSPORTATION POLICY, FACT SHEET (Jan. 6, 2005) *available at* http://www.ostp.gov/html/SpaceTransFactSheetJan2005.pdf (last visited June 20, 2005) (summarizing the U.S. Space Transportation Policy issued Dec. 21, 2004).

> U.S. private sector, which offers new approaches and technology innovation in U.S. space transportation, options for enhancing space exploration activities, and opportunities to open new commercial markets, including public space travel.[32]

The specific policies that will "capitalize on the entrepreneurial spirit of the U.S. private sector" are not described. Moreover, it is not apparent precisely what role "public space travel" might play in the country's overall space transportation strategy. Nonetheless, the 2004 National Space Transportation Policy is the first Executive Branch statement recognizing commercial human space flight as integral to the Nation's space policy and strategy for access to space.

## II. THE STATUTORY AND REGULATORY LANDSCAPE: 1984 TO 2004

Technological breakthroughs and financing for RLV research and development have come in fits and starts. Accordingly, the RLV industry has been slow to evolve, though not without major success stories like that of *SpaceShipOne*. Mirroring the growing pains of the commercial space industry in the United States, the statutory and regulatory landscape for commercial human space transportation likewise has evolved in uneasy spurts. With respect to human-rated RLVs, until enactment of the 2004 Space Act, there was no express statutory jurisdiction, nor any other direction from the Congress, for the licensing and safety regulation of private human space flight. Despite that fact, DOT reasonably interpreted existing law as providing implicit jurisdiction over crew-bearing RLVs and the agency engaged in a number of related regulatory activities, including the issuance of two licenses for piloted RLV missions.

### *A. 1984: The CSLA Takes Flight*

The CSLA provides the foundation upon which commercial space transportation licensing law and regulation has been built. Enacted in 1984, and subsequently amended, the CSLA

---

[32] *Id.* at 2.

was, and still is, the principal law governing the licensing and regulation of commercial space transportation in the United States. Introduced during the 98th Congress, the legislation passed in both houses of Congress by voice vote, with little apparent controversy. Given the era of its enactment, the law was drafted with commercial ELVs in mind, referring only to launches, launch vehicles, and launch sites, rather than reentries, reentry vehicles and reentry sites.

As originally enacted, the CSLA prohibits entities and persons from launching a launch vehicle or operating a launch site within the United States without a DOT license.[33] A U.S. citizen launching a launch vehicle or operating a launch site anywhere outside of the United States likewise requires a DOT license.[34] Separately, the law requires that payloads (defined as "objects placed in space" and presumably excluding human beings) comply with federal requirements applicable to their launch.[35]

The CSLA established DOT as the lead executive branch authority to oversee and coordinate commercial space launch activities in the United States.[36] In carrying out the responsibilities assigned to DOT under the CSLA, the Secretary was directed to encourage, facilitate, and promote commercial space launches by the private sector.[37] As originally enacted in 1984, the law instructed the Secretary of Transportation to issue licenses "consistent with the public health and safety, safety of property, and national security interests and foreign policy in-

---

[33] 49 U.S.C. app. § 2605(a)(1) (1984) (codified at 49 U.S.C. § 70104(a)(1) (2000 & Supp. 2005)).

[34] 49 U.S.C. app. § 2605(a)(2) (1984) (codified at 49 U.S.C. § 70104(a)(2) (2000 & Supp. 2005)). The breadth of licensing jurisdiction provided under the CSLA reflects congressional consideration of the extent of U.S. jurisdiction and liability for launch-related activities under international law and obligations. *See* S. REP. NO. 98-656, at 14 (1984), *reprinted in* 1984 U.S.C.C.A.N. 5328.

[35] 49 U.S.C. app. § 2610 (1984) (codified at 49 U.S.C. § 70108 (2000)).

[36] Exec. Order No. 12465, 3 C.F.R. 163 (1984) issued by President Reagan on February 24, 1984, established DOT as the lead agency within the Federal government for encouraging and facilitating commercial ELV activities by the U.S. private sector and instructed DOT to act as a focal point within the Federal government for private sector space launch contacts related to commercial ELV operations. Congress passed the CSLA later that year to codify DOT's authority and assure that the regulatory assignment would not be vulnerable to a change in Administration.

[37] 49 U.S.C. app. § 2604 (1984) (codified at 49 U.S.C. § 70103(b)(1) (2000 & Supp. 2005)).

terests of the United States...."[38] In that regard, the CSLA authorized the Secretary to prohibit, suspend, or terminate immediately licensed operations upon a determination that continuing them is detrimental to "the public health and safety, safety of property, or any national security interest or foreign policy interest of the United States."[39] The CSLA also allows the use of Government property and services by licensees, and as initially enacted, required each licensee to maintain liability insurance in an amount determined by the Secretary as necessary in light of international obligations of the United States.[40]

### *B. Spring 1988: DOT Asserts Jurisdiction Over Human Space Flight*

Initially delegating authority over commercial space launches to the Office of Commercial Space Transportation (OCST),[41] DOT began work upon a procedural framework for reviewing and authorizing proposals to conduct non-federal launch activities, including the launch of vehicles, the operation of launch sites, and the transport of payloads. In April 1988, nearly two years after the publication of an interim rule, DOT issued a Final Rule establishing license application procedures and the various reviews and approvals required to obtain a license.[42] Given the dominance of ELV technologies at the time, the Final Rule properly focused on ELV regulation.[43] However, the preamble to the Final Rule addressed DOT's jurisdiction over manned launch vehicles. Specifically, the Final Rule noted

---

[38] 49 U.S.C. app. § 2606 (1984) (codified at 49 U.S.C. § 70105(a) (2000 & Supp. 2005)).

[39] 49 U.S.C. app. § 2610 (1984) (codified at 49 U.S.C. § 70108 (2000)).

[40] Federal government liability for private sector launch activities under the Outer Space Treaties is explained in subsection C of this section.

[41] In 1984, the Department of Transportation established the Office of Commercial Space Transportation (OCST), reporting directly to the Secretary. In November 1995, OCST responsibilities were delegated to the Administrator of the FAA who established the Office of the Associate Administrator for Commercial Space Transportation.

[42] *See* Commercial Space Transportation Licensing Regulations, 53 Fed. Reg. 11,004 (1988) (final rule).

[43] The only reusable launch system then in existence was the Space Shuttle, which was operated by and for the government and therefore not subject to licensing under the CSLA. 49 U.S.C. app. § 2620(c) (1984) (codified at 49 U.S.C. § 70117(g) (2000)).

that in commenting on interim licensing regulations, the House Committee on Science and Technology[44] had cautioned DOT that it had been granted licensing authority only over the launch of payloads, which were defined by statute as objects, rather than people. DOT used the Final Rule to respond to the congressional warning as follows:

> Neither the [CSLA] nor the Report that accompanied the Act at passage indicates that 'launch of a launch vehicle' should be read exclusively as launch of an *unmanned* launch vehicle. While it is clear that the Act was drafted primarily for the launch activities most likely to occur in the near term, commercial launches of unmanned rockets, the Report clearly states that "[t]he Act currently provides adequate supervision for all *non-Governmental* (commercial or noncommercial) space launches ***." Regardless of the type of launch activity contemplated by a private entity, manned or unmanned, the Federal Government must be prepared to provide effective guidance.[45]

Therefore, at least for purposes of acting as lead agency within the federal government for the conduct of private sector launches, DOT asserted in 1988 that its jurisdiction properly included manned, as well as non-manned, launches. Congress did not respond or otherwise react to this assertion.

### *C. Fall 1988: Congress Addresses Liability and Offers to Share Risk*

Participants involved in launch and reentry operations are exposed to third-party liability arising from private claims under tort law. It is not clear, however, whether a strict liability or fault-based standard would apply to launch-related claims. Federal law does not expressly classify space transportation activities as "ultrahazardous,"[46] although at least some rocket-

---

[44] Subsequently, the name of the House Committee on Science and Technology would be truncated to the "Committee on Science."

[45] *See* Commercial Space Transportation Licensing Regulations, *supra* note 42, at 11006 (emphasis in original).

[46] In an April 2002 study prepared by the FAA pursuant to a statutory mandate, the FAA examined whether all space transportation activities should properly be deemed

related operations have been held to a strict liability standard under state law. For example, state courts have applied a strict liability standard with respect to ground testing of rocket engines both because of the high risk involved[47] and pursuant to nuisance theory.[48]

Regardless of the liability standard that might be applied under domestic law, the United States bears international responsibility for national activities in outer space and is internationally liable for damage under international obligations. Specifically, the United States is a party to two international treaties that address liability for public and private space activities: the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty)[49] and the 1972 Convention on International Liability for Damage Caused by Space Objects (Liability Convention).[50] Article VI of the Outer Space Treaty provides that signatories (or "States Parties") bear international responsibility for national activities in space, whether those activities are carried on by governmental agencies or by non-governmental entities. The activities of the latter require authorization and continuing supervision by the appropriate State Party under Article VI.[51] Under Article VII of the Outer Space Treaty, a State Party that launches or procures the launching of an object into outer space, and each State Party

---

ultrahazardous and subject to a strict liability standard. The study findings indicated that doing so would likely cause complications in claims litigation and would not enhance the societal goal of victim compensation. *See* ASSOCIATE ADMINISTRATOR FOR COMMERCIAL SPACE TRANSPORTATION, FAA, DOT, LIABILITY RISK-SHARING REGIME FOR U.S. COMMERCIAL SPACE TRANSPORTATION: STUDY AND ANALYSIS (2002), *available at* http://ast.faa.gov/rep_study/sp_reports.htm (last visited June 20, 2005) [hereinafter LIABILITY RISK-SHARING REGIME STUDY].

[47] Smith v. Lockheed Propulsion Co., 56 Cal. Rptr. 128 (Cal. Ct. App. 1967).

[48] Berg v. Reaction Motors Div., 181 A.2d 487 (N.J. 1962).

[49] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, Jan. 27, 1967 , 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

[50] Convention on International Liability for Damage Caused by Space Objects, March 29, 1972, 24 U.S.T. 2384, 961 U.N.T.S. 187 [hereinafter Liability Convention].

[51] See Outer Space Treaty, *supra* note 49, at art. VI, which states in pertinent part, "[t]he activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty."

from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its persons by such object or its component parts on the Earth, in air space or in outer space.[52] No standard for fault is established, however. Separately, the more specific Liability Convention imposes absolute liability on a launching State for damage caused by its space object on the surface of the Earth or to aircraft in flight.[53] Liability for damage occurring elsewhere, including space, is fault-based – making a launching State liable if the damage done is due to its fault or the fault of persons for whom it is responsible.[54]

Recognizing that the federal government is liable under international law for the activities of private entities in space, Congress took action in the fall of 1988 to protect federal interests, to provide the commercial launch industry with competitive parity relative to its international competitors, and to address industry concerns over catastrophic liability exposure.[55] Congress recognized that the U.S. launch industry's principal competitor, Europe's Arianespace, had gained the dominant market share of the commercial satellite launch business. Critically, Arianespace was shielded from the financial consequences of unlimited liability associated with a catastrophic accident by the promise of European government-backed indemnification.[56] In an effort to create a more level playing field, Congress crafted a comprehensive set of requirements governing financial responsibility and allocation of risk among launch par-

---

[52] *Id.* at art. VII, which provides as follows: "Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the moon and other celestial bodies, and each State Party from whose territory or facility an object is launched is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air or in outer space, including the moon and other celestial bodies."

[53] *See* Liability Convention, *supra* note 50, at art. II. The Liability Convention defines a launching State in Article I as: "[a] State which launches or procures the launching of a space object;" or "[a] State from whose territory or facility a space object is launched." *Id.* at art. I.

[54] *Id.* at art. III.

[55] Launch services providers had been accustomed to operating as government contractors eligible for government indemnification.

[56] For a comprehensive discussion of the background of the 1988 amendments to the CSLA see LIABILITY RISK-SHARING REGIME STUDY, *supra* note 46.

ticipants, including the federal government. Specifically, the federal government made a qualified promise of indemnification to U.S. launch companies in the case of a catastrophic accident. The new liability risk-sharing regime replaced the CSLA's rather general insurance requirements.[57] Initially enacted for a period of five years, the liability and indemnification regime remains in effect today due to periodic extensions of the law.[58]

The liability risk-sharing regime uses a three-tiered approach. First, the licensee provides insurance for all launch participants, including the U.S. Government, in an amount determined by the FAA based upon risk assessment known as "maximum probable loss" (MPL).[59] The amount of coverage required by the FAA is capped at either $500 million or the maximum insurance amount available "at reasonable cost," whichever is less.[60] Second, Congress may appropriate up to an additional $1.5 billion (to be adjusted for post-1988 inflation) to indemnify launch participants for third-party liability.[61] Third, any excess liability above the combined amount of insurance plus indemnification is the responsibility of the legally liable party.

Launch participants, including the U.S. Government, enter into no-fault reciprocal waivers of claims so that each party bears its own risk of loss and assumes responsibility for employee injury or loss.[62] As such, the liability risk-sharing scheme protects the United States from the liability it may have in any event, under international treaty obligations, up to DOT's as-

---

[57] Commercial Space Launch Amendments Act, Pub. L. No. 100-657, 102 Stat. 3903 (1988).

[58] The most recent extension occurred in 2004. *See* Act of Nov. 30, 2004, Pub. L. No. 108-428. Indemnification will sunset in December 2009, unless again renewed. *Id.*

[59] The CSLA allows licensees to demonstrate the financial wherewithal to cover maximum probable loss through means other than insurance although insurance is typically used to satisfy FAA requirements. 49 U.S.C. § 70112 (2000 & Supp. 2005).

[60] 49 U.S.C. § 70112(a)(3) (2000 & Supp. 2005).

[61] The promise of an indemnification payment is not automatic, however. Rather, the law provides a framework to govern preparation of third-party liability compensation plans and congressional consideration of such plans in cases where aggregate claims may exceed required financial responsibility. 49 U.S.C. § 70113 (2000 & Supp. 2005).

[62] 49 U.S.C. 70112(b) (2000 & Supp. 2005).

sessment of MPL, and at no cost to the government.[63] Liability risk-sharing provisions in the CSLA protect operators from potentially unlimited liability when launching payloads into space or otherwise conducting hazardous launch operations.

### *D. Early 1990s: Sparring over Reentry Authority*

In 1992, DOT first confronted the prospect of authorizing reentry of a vehicle from space. Specifically, DOT contemplated licensing reentry of the COMET, a vehicle developed in conjunction with a NASA Center for the Commercial Development of Space, for the purpose of returning experimental payloads from space to Earth. COMET was intended to be launched as a payload, remain on orbit for a 30-day period and then would return to a designated landing site on Earth. Upon review, DOT announced that it would license the return flight from space as a launch on a suborbital trajectory and premised its jurisdiction on the definition of "launch" contained in the CSLA. Under the CSLA, as initially enacted, the term "launch" was defined as "to place, or attempt to place, a launch vehicle and payload, if any, in a suborbital trajectory, in Earth orbit in outer space, or otherwise in outer space;..."[64]

Following Federal Register publication of its announced approach to authorizing the COMET reentry under a launch license, Rep. Ralph Hall (D-TX), then-Chairman of the Subcommittee on Space for the House Committee on Science, Space, and Technology, reprimanded DOT that it had exceeded the bounds of its authority.[65] Specifically, the Space Subcommittee instructed DOT that its licensing authority was limited to commercial launch operations of ELVs and "[h]ence, no explicit statutory authority exists currently for the licensing of pay-

---

[63] *See U.S. Commercial Space Launch Competitiveness, Parts 1 and 2: Hearings Before the Subcomm. on Space and Aeronautics of the House Comm. on Science*, 106th Cong. (1999) (statement of Esta Rosenberg, Attorney, Office of Chief Counsel, Federal Aviation Administration).

[64] 49 U.S.C. app. § 2603(2) (1984).

[65] *See* letter from Ralph M. Hall, Chairman, Subcommittee on Space, Committee on Science, Space, and Technology, U.S. House of Representatives (Sept. 9, 1992) (on file with author) [hereinafter Hall letter]. Rep. Hall has since changed his party affiliation.

loads."[66] DOT subsequently revised its approach to authorizing the COMET reentry by focusing exclusively on safety issues under its limited statutory authority to review a payload for purposes of assessing whether its launch would jeopardize public health and safety or other national interests.[67] However, with the prospect of commercial reentry technology on the horizon, Rep. Hall advised DOT to continue its safety review of the COMET reentry operations and committed to resolve through legislation commercial reentry vehicle licensing issues, including related indemnification and liability issues.[68]

### *E. 1998: Express Statutory Authority for Reentry Licensing*

In 1998, six years after the COMET reentry vehicle focused attention on the need for reentry authority, Congress amended the CSLA to explicitly grant authority to the FAA to license the return of vehicles from space to Earth, as well as authority to extend the benefits and burdens of the existing statutory risk-sharing regime, including eligibility for indemnification, to licensed reentry vehicle operators.[69] The significance of extending DOT licensing authority to reentry operations, along with statutory liability risk-sharing provisions, meant that the operator of a commercial reentry vehicle would benefit from the financial safety net available to ELV launch operators and would not 'bet the company' with each reentry.[70] The amended law did not address on-orbit regulatory jurisdiction and in hearings before the Senate Commerce Committee, the FAA confirmed that it was not seeking on-orbit jurisdiction.

In a Committee Report accompanying a predecessor bill to the 1998 CSLA amendments, the House Committee on Science

---

[66] *Id.*

[67] 49 U.S.C. app. § 2605(b) (1984).

[68] *See* Hall Letter, *supra* note 65.

[69] Commercial Space Act of 1998, *supra* note 9.

[70] In seeking indemnification authority for experimental aerospace vehicles, such as the X-33, NASA testimony indicated that potential liability of vehicle operators to third parties was their "single overriding concern." *See Indemnification and Cross-Waiver Authority: Hearings*, *supra* note 15. In response, NASA was granted indemnification authority for experimental aerospace vehicles developed under a cooperative agreement with NASA if certain conditions were satisfied. 42 U.S.C. § 2458c (2000).

highlighted the limits of FAA licensing authority over launch and reentry and attempted to bound the scope of activities for which government indemnification would be available with respect to licensed reentries. Specifically, the Committee asserted:

> [F]or purposes of the license requirement, reentry begins when the vehicle is prepared specifically for reentry. By way of definition, the Committee intends the term to apply to that phase of the overall space mission during which the reentry is intentionally initiated. Although this may vary slightly from system to system, as a general matter the Committee expects reentry to begin when the vehicle's attitude is oriented for propulsion firing to place the vehicle on its reentry trajectory.[71]

The Science Committee also noted:

> Sections 70112 and 70113, establishing an allocation of risk regime, are also amended to cover reentry in the same way that launches are covered. The Committee notes that these provisions apply to losses sustained as a result of licensed activities, (i.e., launches and reentries) not events or activities between launch and reentry; after reentry; or uncovered before launch.[72]

Extending licensing authority to reentry of a reentry vehicle, including an RLV, limited the government's shared assumption of risk to the deliberate act of intentional intact reentry. According to the Science Committee's Report, indemnification would not be available to cover claims resulting from activities before a licensed reentry was initiated or after licensed reentry was concluded. On-orbit activities fell outside the bounds of the law and, by extension, the newly established liability risk-sharing regime.

---

[71] Commercial Space Act of 1997, H.R. REP. NO. 105-347, 105th Cong., 1st Sess., at 21.
[72] *Id.* at 23.

### *F. 2000: FAA Issues RLV Mission Licensing Regulations*

In September 2000, the FAA's Office of Commercial Space Transportation, known by the acronym "AST," issued final rules defining the licensing process for RLV missions, including RLV missions with an on-board crew, and reentry of a reentry vehicle (2000 Regulations).[73] The FAA crafted licensing and financial responsibility regulations designed to provide as expansive a definition of licensed reentry as the statute could reasonably withstand in order to facilitate emerging RLV technology, but without creating an illusory liability safety net for licensees or promising more than Congress had agreed to deliver. In this regard, FAA regulations defined "reenter" or "reentry" to mean

> to return or attempt to return, purposefully, a reentry vehicle and its payload, if any, from Earth orbit or from outer space to Earth. The term "reenter; reentry" includes activities conducted in Earth orbit or outer space to determine reentry readiness and that are critical to ensuring public health and safety and the safety of property during reentry flight. The term "renter; reentry" also includes activities conducted on the ground after vehicle landing on Earth to ensure the reentry vehicle does not pose a threat to public health and safety or the safety of property.[74]

On-orbit operations following completion of a launch and preceding reentry readiness operations are not covered by an FAA license. As such, absent a clear causal nexus to a licensed launch or reentry, on-orbit operations would not be covered by the statutory financial responsibility and risk-sharing regime.

---

[73] *See* Commercial Space Transportation Reusable Launch Vehicle and Reentry Licensing Regulations, 65 Fed. Reg. 56,618-56,667 (Sept. 19, 2000). As part of companion rules addressing financial responsibility and risk management for licensed reentry, the FAA sought public comment on passenger liability and risk management considerations for passenger-bearing vehicles but noted that space tourism was beyond the scope of the rulemaking, thereby skirting the jurisdictional discussion. *See* Financial Responsibility Requirements for Licensed Reentry Activities, 65 Fed. Reg. at 56689 (Sept. 19, 2000).

[74] *See* 14 C.F.R. § 401.5 (2000).

The 2000 Regulations employ a three-pronged public safety strategy to address the safety of the uninvolved public.[75] Taken together, FAA safety requirements are meant to limit public safety risk exposure to the level deemed acceptable at federal launch ranges for ELV launches. The safety requirements also take into account the hazards of operating launch vehicles over populated areas.

First, to obtain an RLV mission or reentry license, an applicant must satisfy a collective risk measure known as the expected number of casualties or "$E_c$." $E_c$ is an estimation of risk that measures consequences in terms of human casualties. The 2000 Regulations reflect the FAA's determination that the combined risk to public safety of launch and reentry should be no greater than that tolerated for an ELV launch. In other words, an operator's determination to access space using a vehicle capable of round-trip transportation (as opposed to one-way travel) should not subject the public to greater risk than that deemed acceptable for one-way space access.[76] Second, an applicant must employ a system safety process that identifies the hazards associated with vehicle operation, their effects on public safety, means of controlling those hazards, and means of verifying the effectiveness of hazard controls.[77] Third, in the absence of sufficient reliability data for RLVs, the 2000 Regulations impose operating restrictions on vehicle flight, including restrictions on the amount of time a vehicle may expose densely populated areas to impact risks.[78] The regulations contain additional operational restrictions for unproven RLVs.[79]

---

[75] 14 C.F.R. Parts 431 & 435 (2000).

[76] Under the RLV mission licensing regulations, acceptable public risk is measured as follows: "(i) For public risk, the risk level to the collective members of the public exposed to vehicle or vehicle debris impact hazards associated with a proposed mission does not exceed an expected average number of 0.00003 casualties per mission (or $E_c$ criterion of $30 \times 10^{-6}$) to members of the public from the applicant's proposed activity; and (ii) For public risk, the risk level to an individual does not exceed .000001 per mission (or individual risk criterion of $1 \times 10^{-6}$)." 14 C.F.R. § 431.35(b)(1) (2000).

[77] 14 C.F.R. § 431.35(c) (2000).

[78] Specifically, the 2000 Regulations provide that, "[t]he projected instantaneous impact point (IIP) of the vehicle shall not have substantial dwell time over densely populated areas during any segment of mission flight...." 14 C.F.R. § 431.43(c)(2) (2000).

[79] 14 C.F.R. § 431.43 (2000).

Pursuant to FAA regulations, two types of licenses are available for RLV missions and reentry operations: a mission-specific license and an operator license. The mission-specific license authorizes one or more flights, within a single range of defined parameters, using one model or type of vehicle. The vehicle is approved for launch and reentry or landing only at an approved location. By contrast, the operator license provides broader flight authorization covering a family of vehicles within authorized parameters, and can include multiple launch sites and trajectories.[80]

The FAA has created a five-step process of reviews and approvals prior to the issuance of an RLV mission or reentry license. First, the FAA engages in pre-application consultation with prospective licensees to scope out technical and policy issues and to facilitate preparation of a complete application. Second, the FAA conducts a policy review and approval to determine whether a proposed mission presents any issues (other than those addressed through a separate technical safety review) that would adversely affect U.S. national interests, including national security and foreign policy interests, or would jeopardize public health and safety or the safety of property.[81] In addition to the policy review, the FAA requires a safety review and approval to examine whether an applicant is capable of launching the vehicle (and any payload) from a designated site and reentering it safely to a designated site without jeopardizing public health and safety and the safety of property.[82] Safety review requirements cover the applicant's safety organization, acceptable mission risk, the system safety process employed by the applicant, mission readiness criteria, mission rules, procedures, plans, and checklists, communications plans, operational requirements and restrictions, and mishap investigation and emergency response plans. Fourth, the FAA requires a payload determination to examine the policy and safety issues related to the proposed launch and reentry of any payload.[83] Finally, an

---

[80] 14 C.F.R. § 431.3 (2000).
[81] 14 C.F.R. §§ 431.21-431.27 (2000).
[82] 14 C.F.R. §§ 431.31-431.47 (2000).
[83] 14 C.F.R. §§ 431.51-431.61 (2000).

environmental review is required to enable the FAA to comply with the National Environmental Policy Act (NEPA)[84] and the associated Council on Environmental Quality implementing regulations.[85] In addition, the 2000 Regulations prescribe post-licensing requirements with which a license holder must comply to retain flight authorization.[86]

## III. PRECURSORS TO THE 2004 SPACE ACT: ABORTED ATTEMPTS AND STALLED EFFORTS

By the turn of the millennium, a good deal of the legal framework existed for the licensing and oversight of private manned RLV flights. Congress had enacted legislation extending licensing authority and indemnification for reentry flights, and the FAA had issued regulations for licensing RLV missions and reentry operations, inclusive of financial responsibility requirements. Space tourism conferences were drawing large crowds on Capitol Hill. And entrepreneurial space ventures seemed poised on the edge of obtaining much needed funding from venture capital markets, yet many vehicle concepts remained on the drawing board.

In a series of congressional hearings on the state of the commercial space transportation industry, industry leaders claimed that their continuing efforts to obtain financing were hurt by a lack of legal and regulatory certainty. Chief among their concerns was uncertainty over the FAA's approach to vehicle regulation, particularly regulations for hybrid vehicle concepts that combined an airframe with rocket engine technology.[87] By way of explanation, the ability of an RLV operator ultimately to obtain a license to operate a hybrid RLV was never in doubt; however, it was not apparent what process the FAA would use to regulate human-rated hybrid vehicles. Specifically, it remained to be seen whether hybrids would be regulated as civil aircraft subject to aircraft certification standards estab-

---

[84] 42 U.S.C. §§ 4321-4370f (2000).
[85] 40 C.F.R. Parts 1500-1508 (2000).
[86] 14 C.F.R. §§ 431.71-431.85 (2000).
[87] *Commercial Human Space Flight: Joint Hearing*, *supra* note 3.

lished by the aviation branch of the FAA, now known as Aviation Safety (AVS), or as launch vehicles subject to licensing standards established by AST, or under both regulatory regimes. Moreover, the CSLA used the term "suborbital rocket" in defining a "launch vehicle"[88] for purposes of launch licensing, but did not define what types of vehicles qualified as "suborbital rockets."

Beyond hybrid vehicle regulation, a number of other legal and policy questions relating to commercial human space flight remained. First and foremost, the FAA's jurisdiction over human space flight, though asserted by the FAA in 1988, still had not been addressed in statute – a point that caused concern for space entrepreneurs seeking a well-defined and permanent licensing process for their vehicles and operations. Moreover, the law had not yet addressed the manner in which the government should regulate the industry – that is, there was no congressional directive on public policy issues such as the government's role in encouraging the development of the emerging human space flight industry, and the level of protection that should be afforded to third parties, as opposed to passengers and crew. Furthermore, it was not apparent what training and medical requirements regulators might impose on passengers seeking the risky thrill of riding into space during the earliest phase of the new industry's operations. Moreover, the law did not address the treatment of passengers and crew with respect to liability and indemnification. Finally, there was no device in law or regulation to launch experimental RLVs absent the receipt of a full license from the FAA.

### *A. Congressional Hearings: Questioning Yields More Questions*

On June 13, 2003, Senators McCain (R. Ariz.) and Brownback (R. Kan.) introduced S.1260, the "Commercial Space Transportation Act of 2003." Chiefly aimed at extending the life of the indemnification regime featured in the CSLA, the bill also mandated a report by the Secretary of Transportation on the "need for a distinct regulatory regime for suborbital vehicles

[88] See 49 U.S.C. § 70102 (2000 & Supp. 2005).

taking into account the unique characteristics and purposes of these vehicles."[89] S.1260 failed to gain traction, but prompted a pivotal joint House-Senate hearing, entitled "Commercial Human Space Flight" convened by the Senate Science, Technology and Space Subcommittee and the House Subcommittee on Space and Aeronautics. This marked the first time that private human space flight merited its own hearing in Congress. The hearing charter summarized as key issues for congressional consideration the potential market for public space travel, the development of a space tourism industry by space entrepreneurs, and the absence of clear FAA policy on regulation of suborbital space tourism. Finally, the hearing concerned the appropriateness of extending the promise of federal indemnification to commercial human space flight ventures.[90]

In an opening statement, then-Chairman of the House Subcommittee on Space and Aeronautics, Rep. Rohrabacher (R-CA) cautioned that the future of space commercialization hinged on the FAA's ability to resolve the question of how to regulate commercial human space flight and, specifically, to provide clear regulatory guidelines.[91] Sen. Bill Nelson (R- FL) identified the absence of clear definitions for "suborbital rocket" and "suborbital trajectory" as outstanding issues requiring legislative fixes. Witnesses gave voice to a few recurring themes, among them the notion that space travel is an inherently risky proposition. In this regard, several witnesses argued for minimal government regulation, testifying that individuals should have the unfettered right to accept personal risk if properly informed of the dangers of space flight. Witnesses also recommended an appropriate role for federal regulators with respect to flight safety in order to protect the uninvolved public from the consequences of vehicle failure. Witnesses identified the need for a distinct regulatory regime for suborbital rockets to be used in human space flight, as opposed to those rules applicable to aircraft.[92] Overall, the threshold policy question of "just how safe is safe

---

[89] Commercial Space Transportation Act of 2003, S. 1260, 108th Cong. § 4 (2003).
[90] *Commercial Human Space Flight: Joint Hearing, supra* note 3.
[91] *Id.*
[92] *Id.*

enough" for passenger carriage took center stage: that is, should the government allow the transport of human beings and indemnify operators against third party liability without also imposing the very highest possible level of rigorous safety regulation?

The House Subcommittee on Space and Aeronautics made its first attempt to address in legislation some of the outstanding questions of law relating to commercial human space flight in H.R. 3245, the "Commercial Space Act of 2003."[93] Introduced by Rep. Rohrabacher, the bill responded to the themes articulated by witnesses during the joint House-Senate hearing on commercial space issues. Specifically, the bill explicitly provided DOT with licensing authority over human space flight. In addition, the bill extended the risk allocation and indemnification regime of the CSLA for an additional three years and made it applicable to human-bearing vehicles. Critically, the bill called for a regulatory regime premised on the right of participants to assume their own informed safety risk. Rather than focusing on passenger and crew safety, the FAA's safety regime would be limited to protecting the safety of the general or uninvolved public, with minimal training and standards for space travelers.

In November 2003, the Science Committee held hearings on H.R. 3245. Five witnesses from disparate disciplines, including academia, the commercial space transportation industry and the insurance industry, presented their views on the office or agency within the federal government best suited to regulate commercial human space flight. The hearing examined the relative merits of regulating commercial human space flight through AST, as opposed to the FAA's Regulation and Certification Office (or through another government office). The hearing also addressed the merits of providing indemnification to commercial human space flight ventures. The hearing made evident the need to better understand and articulate the government's risk management role and responsibilities with respect

---

[93] Commercial Space Act of 2003, H.R. 3245, 108th Cong., at §4 (2003).

to passengers as well as vehicle operators, including the appropriate level of federal safety regulation to be applied.

### *B. H.R. 3752: Soaring in the House, Crashing in the Senate*

The House Science Committee quickly jettisoned H.R. 3245 in favor of a more complex and fully developed bill on commercial human space flight, H.R. 3752. Also introduced by Rep. Rohrabacher, and this time co-sponsored by the Republican Science Committee Chairman, Rep. Boehlert (R-NY), and the Ranking Member on the Science Committee, Rep. Gordon (D-TN), the bill was marked up without amendment.[94] In a letter to Rep. Boehlert, Rep. Don Young (R-AK), Chairman of the House Transportation and Infrastructure Committee (T&I), asserted that T&I had "a valid claim to jurisdiction over certain provisions of the bill," but chose to forego its sequential referral "conditional on our mutual understanding that nothing in this legislation or my decision to forego a sequential referral waives, reduces or otherwise affects the jurisdiction" of the T&I Committee.[95]

In early March 2004, H.R. 3752 passed in the House of Representatives by an overwhelming, bipartisan margin - 402 to 1. The lone dissenting vote came from Rep. Paul (R-TX), who provided no explanation for his departure from the rest of the House. Though the final vote tally reflected bipartisan consensus, the bill initially received an underwhelming response from two Republican members of the House of Representatives. Brought before the House of Representatives for consideration under "suspension of the rules" – a voting procedure generally reserved for non-controversial bills that requires a vote of two-thirds of the members of Congress present and voting, and precludes amendments on the House floor – H.R. 3752 faced potential amendments from Rep. Lucas (R-OK) and Rep. Flake (R-AZ). Both amendments were withdrawn on the House floor,

---

[94] *See* legislative history of H.R. 3752, *available at* http://thomas.loc.gov.

[95] Letter from Rep. Don Young, Chairman, Committee on Transportation and Infrastructure, to Rep. Sherwood L. Boehlert, Chairman, Committee on Science, U.S. House of Representatives (Mar. 1, 2004) (on file with author).

however. In a colloquy with Rep. Boehlert, Rep. Lucas requested and received a promise that the House would consider changing the definition of "suborbital rocket" appearing in the bill if and when negotiations ensued with the Senate on the bill.[96] Separately, Rep. Flake contested the amount of money authorized for AST operations under the bill, but reconsidered his objections.[97]

H.R. 3752 met little resistance from the Democratic minority in the House of Representatives (where the 2004 Space Act later would meet its greatest recorded resistance), despite the fact that it placed greater restraints on the government's ability to protect passengers than does the 2004 Space Act. Specifically, H.R. 3752 did not contemplate the regulation of launch vehicles for the protection of passengers or crew whatsoever; rather, the bill focused solely on the protection of third parties. Regardless, upon receipt in the United States Senate, the legislation met stiff resistance and stalled. In an effort to speed the process in the Senate, Sen. Inhofe (R-OK) introduced S. 2772, the "Space Chase Act," in August 2004, which mirrored verbatim the language of H.R. 3752.[98] This legislation likewise stalled, but led to the opening of negotiations between the two chambers of Congress that, in turn, eventually produced the 2004 Space Act.

Though opposed in the Senate as written, H.R. 3752 provided a framework for the 2004 Space Act. Given the success of H.R. 3752 in the House of Representatives, it is worthwhile to examine its terms, especially where the bill differs from the enacted 2004 Space Act. Unlike the 2004 Space Act, H.R. 3752 followed a conventional path in Congress with a full committee mark-up followed by consideration on the House floor. This process yielded a Committee Report, adding greater clarity to the intentions of the House of Representatives.[99] The Report advanced the proposition that "[t]he regulatory regime that will govern commercial human space flight is, as yet, undetermined"

---

[96] 150 CONG. REC. H837 (daily ed. Mar. 4, 2004).
[97] *Id.* at H839-40.
[98] Space Chase Act, S. 2772, 108th Cong., 2d Sess. (2004).
[99] *See* COMMITTEE REPORT, *supra* note 7.

and that "[a]bsent a clear and balanced regulatory regime . . . the industry cannot effectively plan for its future, nor can it compete with international providers of similar services" and "may have difficulty attracting financing from would-be investors."[100]

i. Congressional Designation of Flight Authority

With the process and policy for the regulation of human-rated hybrid vehicles uncertain, and the emerging industry clamoring for clarity, H.R. 3752 spelled out in legislation the administrative delegation of authority that normally would fall within the discretion of the FAA. H.R. 3245 had instructed the Secretary to "clearly distinguish the Department's regulation of air commerce from its regulation of commercial human space flight...."[101] H.R. 3752 went further. The bill clearly segregated aircraft certification from CSLA-based launch licensing by requiring the Secretary of Transportation to execute the Department's space flight licensing and regulatory authority through AST.[102] Committee Report language for the bill recognized that some vehicles might be subject to dual regulation by AST and the Associate Administrator for Regulation and Certification (AVR); however, AST explicitly would be the primary and central entity regulating "all commercial space flight authority, including authority to regulate commercial human space flight."[103]

ii. Definition of "Suborbital Rocket"

The CSLA defines a "launch vehicle" as either "a vehicle built to operate in, or place a payload in, outer space" or a "sub-

---

[100] *Id.* at 2.

[101] *See* Commercial Space Act of 2003, *supra* note 93.

[102] *See* H.R. 3752, 108th Cong. § 3(c) (2004).

[103] *See* H.R. REP. NO. 108-429, at 12 (2004). AVR has been redesignated as the Associate Administrator for Aviation Safety, or AVS, with the recent addition of oversight responsibilities over the FAA's Office of System Safety. AVS is responsible for, among other things, the development of standards for and the certification of aircraft, airmen, air carriers and other commercial aviation operations.

orbital rocket." [104] The term "outer space" is not defined in the law, and, prior to enactment of the 2004 Space Act, the term "suborbital rocket" likewise was not defined. As such, the classification of hybrid vehicles as "launch vehicles" remained open to interpretation. Arguably, due to the hybrid combination of aviation and rocketry, certain vehicles, like *SpaceShipOne*, could fall within the regulatory sphere applicable to civil aircraft operating in the national airspace system and could also be subject to launch licensing under the CSLA. At first blush, it may seem surprising that the term "suborbital rocket" remained undefined in law until enactment of the 2004 Space Act. The absence of a definition did not create any regulatory obstacles until the advent of private sector RLV technology development, hence the issue remained dormant. Hybrid designs, combining aircraft-type winged vehicles with rocket propulsion, forced the FAA to squarely confront the need for a definition of "suborbital rocket" in order to differentiate regulatory regimes.

Through issuance of a Federal Register Notice in October 2003, the FAA had defined a "suborbital rocket" as "a rocket-propelled vehicle intended for flight on a suborbital trajectory, whose thrust is greater than its lift for the majority of the powered portion of its flight."[105] The Notice defined "suborbital trajectory" as "the intentional flight path of a launch vehicle, reentry vehicle, or any portion thereof, whose vacuum instantaneous impact point does not leave the surface of the Earth."[106] The FAA issued the Notice with the stated intention of better defining for regulated entities the appropriate flight authority necessary to lawfully operate a winged vehicle in and through the national airspace system. The Notice also meant to inform the public of the criteria used by the FAA to institutionally demarcate suborbital space vehicles from civil aircraft for purposes of identifying the appropriate flight authority. In this regard, the FAA explained that it differentiated launch vehicles from aircraft on the basis of flight physics, as opposed to altitude, mere

---

[104] 49 U.S.C. § 70104(a) (2000 & Supp. 2005).

[105] *See* Commercial Space Transportation; Suborbital Rocket Launch, 68 Fed. Reg. 59,977-79 (Oct. 20, 2003) (as corrected by 68 Fed. Reg. 61,241 (Oct. 27, 2003)).

[106] *Id.*

presence of wings, or other indicia.[107] Certain hybrid vehicles, those employing both aviation and aerospace characteristics, might require both an RLV mission license issued under 14 CFR part 431, and an experimental airworthiness certificate (EAC) issued under 14 CFR parts 21 and 91, for complete flight authorization to operate in the national airspace system, and the FAA committed to guiding a prospective license applicant accordingly.

Deferring to the FAA's judgment on such technical matters, H.R. 3752 incorporated the definition of "suborbital rocket" and "suborbital trajectory" announced by the FAA in October 2003. The Committee Report accompanying H.R. 3752 asserted that the "[u]se of these definitions should facilitate a clear identification of the line of business within the FAA with the primary responsibility for licensing a particular vehicle."[108] The Report stated that "certain flight plans may be subject to dual regulation by AST and another office within the FAA."[109]

Deference to the FAA's technical expertise proved to be short-lived, as the definition of "suborbital rocket" became a major sticking point in the House of Representatives. Specifically, Rep. Lucas questioned the language chosen to define suborbital rocket based on concerns about hybrid regulation. On the floor of the House of Representatives, shortly before the scheduled vote on H.R. 3752, Rep. Lucas and Rep. Boehlert engaged in the following colloquy:

> Mr. Lucas: As you know, Mr. Chairman, some suborbital reusable launch vehicles that will be used in commercial human space flight activities may have some attributes normally associated with airplanes as well as many attributes of rockets. My hope is that such hybrid vehicles would not have to be regulated under two separate regimes. What are the chairman's views on this matter?
>
> Mr. Boehlert: I thank the gentleman for that question. This is a very important issue on which we have worked extensively

---

[107] *Id.*
[108] H.R. REP. NO. 108-429, at 12 (2004).
[109] *Id.*

> with industry and the executive branch in developing this bill. As currently drafted, H.R. 3752 incorporates definitions promulgated by the Federal Aviation Administration to distinguish between suborbital rockets, which are under the jurisdiction of FAA's Associate Administrator for Commercial Space Transport, and other aerospace vehicles which are regulated by another part of the FAA. That said, I would be happy to keep working with the gentleman from Oklahoma (Mr. Lucas) and other interested parties as the bill moves forward to revisit the important issue of how best to regulate hybrid vehicles that are engaged in commercial human space flight.[110]

With that exchange, Rep. Lucas opted to vote for the bill, having secured a promise that the House would revisit the definition of "suborbital rocket" if the Senate took up the bill.

### iii. Experimental Permits

H.R. 3752 called for the FAA to issue "experimental permits" to allow for RLV research and development – an analogue to the "experimental airworthiness certificates" issued in the aviation arena, but previously absent from the regulatory landscape for licensing rockets.[111] The need for a regulatory regime enabling experimental research and development flights had not been addressed in hearings on Capitol Hill. Nonetheless, the stated intention of the bill was to "enable the development of new and innovative launch vehicle designs and to allow for crew training on experimental vehicles."[112] In this regard, H.R. 3752 instructed AST to model its regulatory approach to permits after the regulations promulgated by AVR when issuing experimental airworthiness certificates for aircraft – ironically, a reference to the processes of an organization that the bill meant to receive secondary status, if any, when it came to licensing hybrid vehicles. The bill prohibited a reusable suborbital rocket

---

[110] 150 CONG. REC. H837 (daily ed. Mar. 4, 2004).

[111] Although a license would be required for the conduct of test flights subject to launch licensing under the CSLA, the FAA had issued an advisory circular entitled, "Licensing Test Flight Reusable Launch Vehicle Missions", explaining how a test flight regime could be accommodated under a license. *See* FAA Advisory Circular No. 431.35-3 (Aug. 2002).

[112] H.R. REP. NO. 108-429, at 10 (2004).

operated under a permit from carrying any property or human being for compensation or hire.[113]

H.R. 3752 gave highly specific instructions for the provision of experimental permits. Specifically, the bill limited the Secretary's authority to issue permits for "reusable suborbital rockets" to those rockets that will be launched or reentered solely for: (1) research and development to test new design concepts, new equipment, or new operating techniques; (2) showing compliance with requirements as part of the process for obtaining a license; or (3) crew training before obtaining a license for a launch or reentry using the design of the rocket for which the permit would be issued. Permits were to allow "an unlimited number of experimental flights for a particular vehicle design." The Committee Report instructed AST to work closely with applicants on a case-by-case basis to determine what modifications may be made to a suborbital rocket without changing the vehicle design to an extent that would invalidate a permit. AST's decisions in this regard were to be driven by the "dual goals of promoting the industry and protecting the safety and health of the public."[114]

The Committee Report noted the drafter's intent that permits were to be granted "more quickly and with fewer requirements than licenses."[115] This streamlined process presumably meant that AST would have to either accelerate or deviate from the licensing methodology it had established by regulation in 2000. Of particular concern were environmental laws. In this regard, the Committee Report further urged DOT to use its authority in the CSLA, "to the greatest extent practicable to waive requirements of law when issuing permits" and to carefully review any existing laws that place significant technical and financial burdens on applicants and that may inhibit that development of the commercial human space flight industry, including environmental laws . . . ."[116]

---

[113] H.R. 3752, 108th Cong. (2004).
[114] H.R. REP. NO. 108-429, at 11 (2004).
[115] *Id.*
[116] *Id.*

iv. Treatment of Passengers and Crew

Like its predecessor bill, H.R. 3245, the intention of H.R. 3752 was to create a regulatory regime premised on the right of participants to assume their own informed safety risk. Rather than focusing on passenger and crew safety, the FAA's safety regime would be limited to protecting the safety of the general or uninvolved public with minimal training and standards for space flight participants and crew. Indeed, H.R. 3752 arguably prohibited the FAA from regulating rockets with respect to passenger and crew safety.

Pursuant to H.R. 3752, the holders of licenses and permits were to be subject to one basic requirement with respect to passenger safety; namely, license holders could launch or reenter a passenger – known in the bill as a "space flight participant" – only if the holder of the license or permit had informed the passenger in writing about the risks of the launch or reentry, including the safety record of the vehicle type. The space flight participant would, in turn, provide written informed consent to participate. As part of the bargain, space flight participants were not to be eligible for government indemnification from third party claims arising from their involvement in space travel. The rationale for this hands-off approach was simple:

> [S]pace flight participants wishing to ride on board a launch vehicle have chosen to undertake a risky venture of their own accord. As such, they do not merit the financial security provided by the promise of government indemnification. Moreover, space flight participants are not subject to any substantive regulation.[117]

The informed consent requirements for passengers were not to be necessarily simple, however, according to the House Science Committee report. The House instructed AST to "compile the safety records of launch or reentry vehicle types based on available flight data," and to provide those records to passengers,

---

[117] *Id.* at 12.

along with "copies of permit and launch license applications for the launch vehicle."[118]

With respect to crew carriage, the holders of licenses and permits likewise were to be subjected to two basic requirements: license holders could launch or reenter crew only if the crew had received specified training and had satisfied specified medical standards. The bill left crew training requirements up to the FAA and the industry, but instructed AST to "model its [medical] requirements, where applicable, after medical requirements for aircraft pilots."[119] Overall, crew regulations were to be justified by "a legitimate and compelling need to protect the health and safety of the public," rather than a need to protect the lives of the crew *per se*. To some degree, however, this was a distinction without a difference. If on-board crew needed to be kept alive so as to pilot a launch vehicle away from the uninvolved public, then crew preservation became critical to safety in general.

In what appears to be a nod to industry concerns about litigation arising from catastrophic losses, H.R. 3752 explicitly required crew and space flight participants to execute reciprocal waivers of claims both with licensees (or permittees) and the federal government. This requirement for flight participants would expire three years after the first licensed launch of a launch vehicle carrying a space flight participant. The requirement for crew presumably would carry on in perpetuity. Regardless, at least for the first three years of flight, it would appear that federal law would have hamstrung passengers from suing licensees for any bad act, absent willful misconduct. The Committee Report accompanying H.R. 3752 asserted that "all parties to the reciprocal waiver agreements will benefit inasmuch as potential liabilities will be eliminated in the case of a launch mishap."[120] However, in a seemingly contradictory statement, and contrary to existing reciprocal waiver of claims requirements implemented by the FAA,[121] the Committee Report

---

[118] *Id.* at 14.
[119] *Id.* at 13.
[120] *Id.* at 14.
[121] *See* 14 C.F.R. Parts 440,450 (2000).

accompanying H.R. 3752 provided that "claims of gross negligence against a licensee . . . by space flight participants or crew are not waived."[122] The statutory waiver of claims provisions were not amended to reflect an exception for gross negligence, however. The caution appears only in the Committee Report.

### C. *FAA Licenses* SpaceShipOne

Despite stalled legislative efforts like H.R. 3245 and H.R. 3752, the FAA issued the first-ever RLV mission license to Scaled Composites, on April 1, 2004. The license allowed the company to conduct launches of the *SpaceShipOne* RLV from restricted airspace and land at East Kern Airport District (commonly known as the "Mojave Airport"). The license authorized several engine burn-times, beginning with a 40-second burn.[123] Because of the hybrid nature of the winged *SpaceShipOne*, the FAA also required Scaled Composites to obtain an experimental airworthiness certificate (EAC) under 14 CFR parts 21 and 91.[124] Certain test flights that would not require an RLV mission license because of their short duration engine burn times were to be conducted solely under authority of the EAC.

The license authorizing *SpaceShipOne* missions directed Scaled Composites to comply with financial responsibility requirements set forth in the CSLA, including risk-based insurance requirements for third party liability in the amount of $3.1 million and the requirement to enter into a reciprocal waiver of claims agreement with its customer and the U.S. Government. Under the terms of the reciprocal waiver of claims agreement, and as explained in a 1998 rulemaking,[125] employees of the various signatories to the agreement are not required to waive their individual claims in the event of personal injury or property loss

---

[122] H.R. REP. NO. 108-429, at 14 (2004).

[123] The *SpaceShipOne* vehicle had already undergone a number of test flights of shorter engine burn times that under the FAA's criteria for "amateur rocket activities" were exempt from licensing. 14 C.F.R. § 400.2 (2000).

[124] 14 C.F.R. Parts 21, 91 (2000). The FAA presaged its requirement for an EAC in an October 2003 Notice. *See* Commercial Space Transportation; Suborbital Rocket Launch, *supra* note 105.

[125] *See* Financial Responsibility Requirements for Licensed Launch Activities; Final Rule, 63 Fed. Reg. 45,592-625 (Aug. 26, 1998).

or damage. However, except for employees of the federal government, the claims of injured employees become the financial responsibility of their employer under an assumption of responsibility provision in the agreement. The pilot of the *SpaceShipOne* was therefore not required by the license or FAA regulations to waive personal injury claims with respect to other participants in the activity, and the $3.1 million of liability insurance obtained by Scaled Composites in compliance with the FAA license was not intended to cover pilot claims for injury, damage or loss. Financial responsibility for claims against another entity involved in conducting the mission that any of the *SpaceShipOne* pilots may have had for injury, damage or loss as a result of licensed activity would have been the responsibility of the pilot's employer, Scaled Composites.

Twenty days after licensing Scaled Composites, the FAA issued the second RLV mission license to XCOR Aerospace, Inc., authorizing it to conduct up to 35 suborbital RLV missions at the Mojave Airport using the Sphinx launch vehicle. Unlike the *SpaceShipOne* license, flight authorization granted by the license was exclusively based on plans and blueprints as the Sphinx vehicle had not yet been constructed.

## IV. THE 2004 SPACE ACT: THE RIGHT STUFF FOR INDUSTRY AND TRAVELERS?

Upon passage in the House of Representatives, the House engrossed H.R. 3752 and sent it to the Senate for consideration.[126] Senate Parliamentarians referred the bill to the Senate Commerce, Science, and Transportation Committee (Commerce Committee). In the 108th Congress, Sen. McCain (R-AZ) chaired the committee and Sen. Hollings (D-SC) served as the ranking Democratic member – both Senators were in the last days of their respective tenures as Commerce Committee leaders, with

[126] When a bill is passed by the House of Representatives prior to passage by the Senate, it is "engrossed" – meaning that it is prepared for transmission to the Senate. For a complete discussion of Floor procedures in the House of Representatives *see* Parliamentary Outreach Program, U.S. House of Representatives Committee on Rules Majority Office, *Floor Procedures In The U.S. House of Representatives*, *available at* http://www.house.gov/rules/floor_man.htm (last visited June 18, 2005).

Sen. McCain term-limited as Chairman and Sen. Hollings retiring from the Senate at the close of the congressional session. Neither Senator had publicly opined on H.R. 3752 or the need for commercial human space flight legislation generally.

Upon receipt of the bill, the Commerce Committee took no formal action on the legislation in the form of a hearing or committee mark-up. (It falls within the discretion of a committee chairman to take action on a bill.) However, the staffs of the Commerce Committee and the House Science Committee began bipartisan negotiations on proposed Senate edits to H.R. 3752.[127] The negotiations took place in lieu of the Commerce Committee marking up and passing an alternative version of H.R. 3752, to be later considered by the entire Senate, and subsequently reconciled with the competing House bill.[128] After months of negotiations, the edits were extensive enough to merit the introduction of a new bill in the House of Representatives – H.R. 5382, the 2004 Space Act.[129]

### *A. Bipartisan Negotiations Yield a New Bill*

Negotiations between the House Science Committee and Senate Commerce Committee led to the introduction of a new bill – an unconventional, though not entirely unusual, legislative result. With the introduction of a pre-negotiated bill towards the end of the 108th Congress, the committee hearing and mark-up processes were bypassed, leaving the 2004 Space Act

---

[127] *See* 150 CONG. REC. H10048 (daily ed. Nov. 19, 2004). *See also Commercial Space Transportation: Beyond the X Prize, Hearing before the House Transportation and Infrastructure Committee, Subcommittee on Aviation*, 108th Cong. (2005) [hereinafter *Beyond the X Prize: Hearing*] (statement of Rep. Sherwood Boehlert), *available at* http://www.spaceref.com/news/viewpr.html?pid=16123 (last visited June 30, 2005) [hereinafter Boehlert Statement].

[128] In order for a bill to be presented to the President, it must pass both chambers of Congress in identical form. For many bills, the House and Senate will convene a conference committee in order to reach an agreement on competing language and produce a conference committee report.

[129] Requiring a new vote in the House of Representatives, the 2004 Space Act was introduced by Rep. Rohrabacher and co-sponsored by Rep. Boehlert and Rep. Gordon. Its predecessor, H.R. 3752, had been introduced by Rep. Rohrabacher and co-sponsored by Rep. Boehlert, Rep. Gordon, Rep. Hall, and Rep. Lampson. There is no recorded explanation for the absence of Rep. Hall and Rep. Lampson as co-sponsors of the 2004 Space Act.

without an accompanying committee report in either chamber of Congress. Ultimately, votes on the 2004 Space Act took place in the waning days of the 108th Congress, first in the House of Representatives and then in the Senate. Given the pre-negotiated language of the bill, no conference committee was convened and no conference report was drafted. Because the bill was considered by unanimous consent and without debate in the Senate, legislative history regarding Senate deliberation on the bill is virtually non-existent.

The discernible differences between H.R. 3752 and the 2004 Space Act point to the general areas of concern voiced in the Senate and negotiated with the House. The new language featured in the 2004 Space Act reflects the common ground forged between the House Science and the Senate Commerce Committees. As described by Rep. Boehlert, the language of the 2004 Space Act itself "is the equivalent of a conference report, as it reflects bipartisan negotiations" between the House and Senate.[130]

Bills that are not passed by both chambers of Congress by the close of the two-year legislative session automatically expire. Of course, expired bills may be reintroduced in the new Congress, but they must proceed through House or Senate approval processes from scratch – a time-consuming and uncertain proposition. In the 108th Congress, the leaders of the House and Senate originally scheduled the legislative session to end in late November. As of late October, the House Science and Senate Commerce Committees still had not reached consensus on the terms of a revised commercial human space transportation bill. With little time left to spare, the House Science and Senate Commerce Committees completed their negotiations on the 2004 Space Act and formally introduced the legislation in the House of Representatives on November 18, 2004.

With the introduction of a new bill in the House of Representatives (even a new bill based in large part on a preexisting bill such as H.R. 3752), the House parliamentarians assign the bill to House committees with relevant legislative jurisdiction.

---

[130] 150 CONG. REC. H10052, at 1445 (daily ed. Nov. 19, 2004).

H.R. 3752 had been referred by the House parliamentarians to the Science Committee, though the T&I Committee received a sequential referral – a referral that the T&I Committee chose to waive by exchange of letters with the Science Committee.[131] With the introduction of H.R. 5382, the T&I Committee once again had an opportunity to influence commercial human space flight legislation. Once again, the T&I Committee waived its sequential referral rights – this time in recognition of "the importance of H.R. 5382 and the need for the legislation to move expeditiously" given the imminent end of the 108th Congress.[132] Rep. Young, the T&I Committee Chairman, cautioned, however, that "nothing in the legislation or [the] decision to forego a sequential referral waives, reduces, or otherwise affects the jurisdiction of the Transportation and Infrastructure Committee . . . ."[133]

Given the T&I Committee's decision to decline a legislative referral, it would appear that the T&I Committee had no substantive objection to the 2004 Space Act. This was not the case, however, at least with respect to the senior Democratic members on the Committee. When the legislation came up for a vote in the House of Representatives, there was a vigorous debate on the proper scope of the FAA's authority to protect passengers. Rep. Oberstar (D-MN), the Ranking Member on the T&I Committee, and Rep. DeFazio (D-OR), opposed passage of the bill, analogized commercial human space flight to traditional aviation, and argued for the creation of a licensing regime that places a greater premium on safety for passengers.[134] Rep. Rohrabacher, Rep. Boehlert, Rep. Lampson, all members of the Science Committee, responded that, for the immediate future at least, commercial human space flight is more akin to adventure travel and should be more loosely regulated by the FAA.[135] The debate, described in greater detail below, highlighted a stark

---

[131] *Id. See also infra* Section III.B.

[132] 150 CONG. REC. H10049 (daily ed. Nov. 19, 2004) (letter from Rep. Don Young, Chairman, House Transportation and Infrastructure Committee to Rep. Sherwood L. Boehlert, Chairman, House Committee on Science).

[133] *Id.*

[134] *Id.* at H10049-50.

[135] *Id.* at H10050.

difference in regulatory (and political) philosophy and cast the outcome of the House vote on the 2004 Space Act into doubt.

The House Republican leadership scheduled a vote on the 2004 Space Act under suspension of the House Rules (a procedure requiring a two-thirds majority vote for successful passage) on November 20th – two days after the new bill's introduction. At that point in time, the Congressional session was approaching its scheduled adjournment date, known as adjournment *sine die*. It was not apparent how much longer the Congress might stay in session. However, Congress had yet to finalize and vote on a national intelligence reform bill – one of the centerpieces of the Republican agenda for the 108th Congress – and thus there was reason to believe that Congress might temporarily adjourn for the Thanksgiving holiday and return for a brief lame-duck session in early December.

Despite the objections voiced on the House floor by members of the T&I Committee, the 2004 Space Act received twenty-nine votes more than it needed to pass under suspension of the House Rules. The final vote on the bill stood at 269 to 120 – with strong bipartisan support.[136] Subsequent to passage in the House, the Senate scheduled a vote on the 2004 Space Act, but required unanimous consent for passage.[137] Anything short of unanimity, and the bill would fail. The vote never came to pass due to an "anonymous hold" placed on the bill – "holds" being one of the prerogatives enjoyed by Senators when a bill is scheduled for vote by unanimous consent. With a hold on the legislation and the 108th Congress set to expire, the 2004 Space Act appeared destined for failure. However, both chambers of Congress decided not to adjourn *sine die* until considering a wholly unrelated piece of legislation addressing national intelligence reform. Accordingly, Congress opted to temporarily ad-

---

[136] *Id.* at H10045-47.

[137] Senate floor proceedings are governed not only by the Senate's standing rules and precedents, but by various customs and practices. Generally, these practices require unanimous consent for the passage of bills. Senate rules and practices emphasize full deliberation and the decision-making of individual members, rather than the weight and power of the majority. *See* U.S. Senate, Senate Legislative Process, *Senate Floor Procedure*, *available at* http://www.senate.gov/legislative/common/briefing/Senate_legislative_process.htm#3 (last visited June 27, 2005).

journ and return for a brief lame-duck session at some later date.[138] This reprieve provided critical additional time for the 2004 Space Act to garner support in the Senate.

On December 8, 2004, the 2004 Space Act surprised many political observers by winning final passage in the Senate. With the prospect of another "hold" looming, and a unanimous vote required for passage in the Senate, the Wall Street Journal and other publications following the fate of the bill predicted its demise.[139] However, the bill received critical support in the waning hours of the 108th Congress from newly elected Senate Minority Leader, Sen. Reid (D-NV), and all holds on the bill ultimately disappeared.[140] In dramatic fashion, the 2004 Space Act was among the last bills considered by the Senate on the last day of the 108th Congress.[141] The bill became law upon signature by President Bush on December 23, 2004.

### *B. The 2004 Space Act: Terms and Conditions*

The 2004 Space Act assumed many of the features of H.R. 3752. Specifically, the new law requires the FAA to issue "experimental permits" to allow for RLV research and development. In addition, it mandates a regulatory regime premised on the right of participants to assume informed risk, and focuses chiefly on protecting the safety of the uninvolved public. Further, the law extends federal government indemnification to licensed commercial human space flights. However, the bill broke with H.R. 3752 in major ways; for example, the law alters the definition of "suborbital rocket" originally authored by the FAA and avoids express designation of AST as the FAA office responsible for regulating human space flight. The most glaring departure from H.R. 3752, however, is the approach to safety regulation for passengers and crew with respect to launch vehicle design and operation. The 2004 Space Act's requirements in

---

[138] Holman W. Jenkins, Jr., *The 'Final Frontier' May Be a Senate Wastebasket*, WALL ST. J., Dec. 8, 2004.

[139] *Id.*

[140] Jenkins, *supra* note 138. Erica Werner, *Congress passes bill to allow space tourism*, ASSOCIATED PRESS, December 8, 2004; Boyle, *supra* note 12.

[141] *Id.*

this regard caused a brief firestorm on Capitol Hill that nearly brought the bill down in the House and continues to smolder in the 109th Congress.[142]

i. An Eight-Year Limit on Vehicle Regulation for Passenger Safety

H.R. 3752 had met little resistance from the Democratic minority in the House of Representatives, despite the fact that the bill placed even greater restraints on the government's regulatory authority to protect passengers than does the 2004 Space Act. Specifically, H.R. 3752 did not contemplate the regulation of launch vehicles for the protection of passengers or crew whatsoever; rather, the bill focused solely on the protection of third parties. By contrast, the 2004 Space Act makes some allowances for passenger safety regulation, yet received fairly significant opposition in the House.[143]

The 2004 Space Act provides unfettered authority to DOT to regulate for the safety of the general public, but takes a deregulatory bent with respect to passenger safety. Specifically, the bill requires informed consent for passenger carriage. Moreover, for the first eight years after enactment, the law limits the Secretary of Transportation's ability to issue regulations "governing the design or operation of a launch vehicle to protect the health and safety of crew and space flight participants" to "restricting or prohibiting design features or operating practices" that either:

> (i) have resulted in serious or fatal injury (as defined in 49 CFR 830, as in effect on November 10, 2004) to crew or space flight participants during a licensed or permitted commercial human space flight; or

---

[142] On February 9, 2005, the Aviation Subcommittee of the T&I Committee held a hearing on commercial space transportation. *See Beyond the X Prize: Hearing*, *supra* note 127. During the hearing, Rep. Oberstar voiced continued displeasure with the passenger safety provisions of the 2004 Space Act. *See* Jeff Foust, *The Safety Dance*, THE SPACE REV. (Feb. 21, 2005) *at* http://www.thespacereview.com/article/326/1 (last visited June 21, 2005). One day earlier, on Feb. 8, 2005, Rep. Oberstar introduced H.R. 656, a bill to amend the 2004 Space Act. The bill was referred exclusively to the House Science Committee for consideration. *See* H.R. 656, 109th Cong. (2005).

[143] 150 CONG. REC. H10048 (daily ed. Nov. 19, 2004).

> (ii) contributed to an unplanned event or series of events during a licensed or permitted commercial human space flight that posed a high risk of causing a serious or fatal injury (as defined in 49 CFR 830, as in effect on November 10, 2004) to crew or space flight participants. [144]

Absent a "serious or fatal injury" or events that presented a "high risk of causing a serious or fatal injury," DOT lacks authority to regulate the design or operation of a launch vehicle for the sole purpose of protecting crew and passengers. Critically, however, DOT may regulate the design and operation of a launch vehicle to protect the general public.[145] Accordingly, to the extent crew safety and survival influence safe operation of the vehicle with respect to public safety (for example, crew survival may be critical to a vehicle's ability to land in sparsely populated terrain), DOT maintains limited discretion to regulate vehicle operation and design.

Under the new law, this limited scope of DOT authority pertains only to flights "carrying a human being for compensation or hire" – that is, licensed flights, as opposed to flights conducted pursuant to an experimental permit (although the same caveat with respect to crew safety vis-à-vis safety of the general public applies to both licensed and permitted flights).[146] DOT may not issue any such regulations in the context of experimental flights. Furthermore, any regulations must be "issued with a description of the instance or instances when the design feature or operating practice being restricted or prohibited contributed to a result or event" that resulted in or posed a high risk of resulting in "a serious or fatal injury."[147] After eight years, DOT may issue any regulations it sees fit "taking into consideration the evolving standards of the commercial space flight industry."[148]

The philosophy behind limiting DOT regulatory authority in this way derives from a philosophical view of the commercial

---

[144] 49 U.S.C. § 70105 (c)(2)(C) (2000 & Supp 2005).
[145] *Id.* § 70105 (c)(4).
[146] *Id.* § 70105 (c)(2)(B).
[147] *Id.* § 70105 (c)(2)(D).
[148] *Id.* § 70105 (c)(3).

human space flight industry as highly vulnerable to premature or ill-conceived regulations. As described by Rep. Rohrabacher on the floor of the House of Representatives, the commercial human space flight industry "is like a baby in its crib."[149] Rep. Boehlert later echoed this sentiment in a congressional hearing, stating, "[t]his is an infant industry; it is not the equivalent of today's airline industry."[150] On the House floor, Rep. Boehlert succinctly described the rationale for deferring DOT regulation for eight years as follows:

> . . . [H]ere is what the bill does not do. It does not allow the FAA right now to guess whether some new untested rocket technology will do harm to the people on board. Why? Because this industry is at the stage when it is the preserve of visionaries and daredevils and adventurers. These are people who will fly at their own risk to try out new technologies. These are people who do not expect and should not expect to be protected by the government. Such protection would only stifle innovation.[151]

According to Rep. Boehlert and other proponents of the legislation, private human space flight, for the time being at least, is the "preserve of visionaries and daredevils and adventurers." As such, the human space flight industry needs less regulation, rather than more, to mature, and DOT had to be expressly prohibited by law from issuing certain types of regulations that might "stifle innovation."[152]

The 2004 Space Act states that "the regulatory standards governing human space flight must evolve as the industry matures . . . ." According to Rep. Boehlert, the legislation strikes "the right balance, protecting the public without stifling the industry . . . and sets the industry on a path toward greater regulation as it develops."[153] This rosy description of an evolving regulatory environment stands in stark contrast with the regulatory and safety arguments of Rep. Oberstar, the Ranking

---

[149] 150 CONG. REC. H10048 (daily ed. Nov. 19, 2004).
[150] Boehlert Statement, *supra* note 127.
[151] 150 CONG. REC. H10048-49 (daily ed. Nov. 19, 2004).
[152] *Id.* at 10049.
[153] Boehlert Statement, *supra* note 127.

Member on the T&I Committee. Both Rep. Oberstar and Rep. DeFazio opposed passage of the bill, analogized commercial human space flight to traditional aviation, and argued for the creation of a licensing regime that places a greater premium on safety for passengers.[154]

Shortly before the scheduled vote in the House of Representatives on the 2004 Space Act, Rep. Oberstar distributed a "Dear Colleague" letter criticizing the bill. According to the letter, the legislation's safety standards "appear to be an industry wish list."[155] Rep. Oberstar summarized the 2004 Space Act's safety standards as follows:

> This standard in the bill amounts to the codification of what has been come to be known in aviation safety parlance as the "tombstone mentality": don't regulate until there are fatalities. For many years, many of my colleagues on the House Transportation & Infrastructure Committee and I have criticized the Federal Aviation Administration for waiting until after a disaster to take safety actions, and have urged more proactive safety oversight. We should not legislate a tombstone mentality for safety oversight of this new space tourism industry.[156]

During a floor debate on the 2004 Space Act, Rep. Oberstar reiterated this argument,[157] requested deferral of consideration of the bill in the House of Representatives until the 109th Congress,[158] and offered compromise language. Specifically, Rep. Oberstar proffered language that would have allowed DOT to "[p]rescribe minimum standards necessary for safety of design features and operation of a launch vehicle, taking into account the inherently risky nature of human space flight."[159] The language, however, was not eligible for consideration as an amendment to the bill inasmuch as H.R. 5382 was being considered under "suspension of the Rules" – a voting mechanism re-

---

[154] 150 CONG. REC. H10050-51 (daily ed. Nov. 19, 2004).

[155] Letter from James L. Oberstar, Ranking Democratic Member, Committee on Transportation and Infrastructure, to Colleagues (Nov. 19. 2004) (on file with author).

[156] *Id.*

[157] 150 CONG. REC. H10050 (daily ed. Nov. 19, 2004).

[158] *Id.*

[159] *Id.* at H10051.

quiring a two-thirds vote for passage and precluding amendments on the House floor.

In response to Rep. Rohrabacher's assertions that the human space flight industry is in its "infancy" and should be more lightly regulated for at least eight years, Rep. Oberstar cited "jet aviation" as an example of a technology that was not "strangled in its crib by overregulation."[160] Further to this point, Rep. Oberstar argued on the House floor,

> I listened with great interest to . . . the chair of the full committee [Rep. Boehlert] who said, "Protection would stifle innovation," who said, "It would be silly to regulate Burt Rutan's vehicle [SpaceShipOne]." I do not think that safety regulation is ever silly.[161]

Silly or not, in the end, the debate over passenger safety regulation was won by proponents of the 2004 Space Act. The eight-year limitation on DOT's ability to issue vehicle design and operating regulations stands. The debate, however, has not ended inasmuch as Rep. Oberstar has introduced legislation in the 109th Congress, H.R. 656, that would amend the CSLA to allow DOT broader regulatory authority.[162]

### ii. At Long Last, Who is in Charge?

Beyond passenger safety regulation, the 2004 Space Act further departed from the text of H.R. 3752 by avoiding express designation of AST as the entity within the FAA that will regulate human space flight. Rather, the law grants to the Secretary of Transportation safety oversight and licensing jurisdiction, presumably leaving to the Secretary the decision as to where to delegate authority over commercial human space flight within the agency. Specifically, the new law amends the 'Findings and Purposes' section of the CSLA[163] to provide that "a critical area of responsibility for the Department of Transporta-

---

[160] *Id.*
[161] *Id.* at H10050.
[162] H.R. 656, 109th Cong. (2005); *see* Foust, *supra* note 142.
[163] 49 U.S.C. § 70101 (2000 & Supp. 2005).

tion is to regulate the operations and safety of the emerging commercial human space flight industry . . . ."[164]

While the 2004 Space Act gives DOT discretion to internally delegate authority over human space flight, the Act also instructs the Secretary to "ensure that only one license or permit is required from the Department of Transportation to conduct activities involving crew or space flight participants, including launch and reentry, for which a license or permit is required under [the CSLA]."[165] This "one-stop shopping" requirement reflects the aircraft certification versus launch licensing debate that dominated the July 2003 joint hearing and gave rise to industry concerns over the definition of "suborbital rocket." While the new provision requires that "only one license or permit is required," the legislation also provides that "the Secretary shall ensure that all Department of Transportation regulations relevant to the licensed or permitted activity are satisfied."[166] As such, it would appear that DOT must fashion a licensing and permitting regime controlled by one entity within the agency. Moreover, the FAA must create licensing and experimental permitting regimes that place all DOT requirements under a single flight authorization.[167]

Though the new law clarifies DOT jurisdiction over both manned and unmanned RLVs, jurisdiction for orbital operations remains unsettled. As amended by the 2004 Space Act, the CSLA contemplates the licensing of launches and reentries, but does not address the on-orbit operations of RLVs. Whether or not this is an important omission remains to be seen inasmuch as, for the foreseeable future at least, commercial RLVs will be capable only of suborbital flights. Nonetheless, additional legislative action may be required if the United States is committed

---

[164] *Id.* § 70101(a)(13).

[165] *See* 2004 Space Act, *supra* note 11, § 2(c).

[166] *Id.*

[167] Prior to enactment of the 2004 Space Act, where a launch vehicle was a hybrid (and therefore might otherwise qualify as a "civil aircraft"), the FAA required an EAC to authorize vehicle flight, in addition to a license, where flight amounted to launch of a suborbital rocket — there was no experimental permit possibility at the time. Under the new law, a single experimental permit (feasibly with terms similar to an EAC) may be issued. However, only one instrument is required for flight authorization.

to enabling commercial human space flight that extends beyond a suborbital journey up to and back from space.

iii. Suborbital Rockets: A Broader Definition

Through the issuance of a Federal Register Notice in October 2003, the FAA announced its definition of a "suborbital rocket" as "a rocket-propelled vehicle intended for flight on a suborbital trajectory, whose thrust is greater than its lift for the majority of the powered portion of the flight."[168] Deferring to the FAA's judgment on technical matters, HR 3752 had incorporated the definition of "suborbital rocket." Deference to the FAA's technical expertise proved to be short-lived, as the definition of "suborbital rocket" became a major sticking point as H.R. 3752 came up for a vote in the House of Representatives. As promised to Rep. Lucas on the floor of the House of Representatives, the House Science Committee revisited in the 2004 Space Act the definition of "suborbital rocket" originally penned by the FAA.

The definition of "suborbital rocket" newly codified in the CSLA reads as follows:

> "suborbital rocket" means a vehicle, rocket-propelled in whole or in part, intended for flight on a suborbital trajectory, and the thrust of which is greater than its lift for the majority of the rocket-powered portion of its ascent.[169]

The definition differs from the FAA's original version in two major respects. First, the launch vehicle in question no longer is "a rocket-propelled vehicle," but rather "a vehicle, rocket propelled in whole or in part." The latter phrase clearly encompasses a wider range of launch vehicles than the former, with rocket propulsion feasibly being a partial source of a vehicle's ability to move (rather than its sole source). Second, the new definition centers on a vehicle whose thrust is greater than lift "for the majority of the rocket-powered portion of its ascent," rather

---

[168] *See* Commercial Space Transportation; Suborbital Rocket Launch, *supra* note 105.

[169] 49 U.S.C. § 70102(19) (2000 & Supp. 2005).

than the "majority of the powered portion of the flight." Again, this phraseology encompasses a wider range of vehicles. Rather than requiring that thrust exceed lift for "powered portions" of a voyage (powered portions that might include rocket power and other manner of propulsion), the law requires that thrust exceed lift only for the "rocket-powered portion." Rather than focusing on the entire flight of a vehicle, the new definition focuses solely on its ascent.

Taken in tandem with the "one-stop shopping" requirement, the expansion of the definition of "suborbital rocket" appears to have satisfied Rep. Lucas' stated hopes that since "some suborbital reusable launch vehicles . . . have some attributes normally associated with airplanes as well as many attributes of rockets," they should "not have to be regulated under two separate regimes."[170] Importantly, Congress qualified the new definition of "suborbital rocket" with the proviso that the definition stands for at least three years. However, "[s]tarting three years after the date of enactment [of the 2004 Space Act], the Secretary may issue final regulations changing the definition . . ."[171]

iv. Informed Consent: Risky Business Knowingly Allowed

The 2004 Space Act codifies a regulatory regime premised on the right of participants to assume their own informed safety risk. Rather than focusing on passenger and crew safety, the FAA's safety regime is limited to protecting the safety of the general or uninvolved public. Importantly, the FAA may, after three years from enactment of the new law, create training and medical standards for space flight participants. However, it is permissible for the FAA to require a physical exam for passengers and to establish training and medical standards for crew.[172] Overall, however, the holders of licenses and permits are subject to one chief requirement with respect to crew and passenger safety: informed consent.

---

[170] 150 CONG. REC. H837 (daily ed. Mar. 4, 2004).

[171] 49 U.S.C. § 70120(c)(2)(A) (2000 & Supp. 2005).

[172] For passengers, only physical examinations are possible during the first three years after enactment. After three years, medical qualifications feasibly may be expanded. *See* 49 U.S.C. § 70105(b)(6)(B) (2000 & Supp. 2005).

Under the 2004 Space Act, crew must be informed, in writing, by a licensee or permittee before formally entering into an employment arrangement[173] that the U.S. Government has not certified the vehicle as safe for the carriage of any persons. The law does not require that crew waive claims against their employer or other private entities — that is, entities other than the U.S. Government and its contractors and subcontractors, involved in the launch. When viewed in that light, this provision appears intended to safeguard employers from employee lawsuits in the event of damage, injury or loss by establishing that crewmembers willingly and knowingly assume the risk of flight. A licensee or permittee will want to decide how best to fulfill this requirement in order to preserve its defenses against tort claims by crewmembers or their families.

A licensee or permittee must also inform a space flight participant, in writing, about the risks of launch and reentry, including the safety record of the vehicle type used in conducting the launch or reentry, and must also inform space flight participants, in writing, that the vehicle is not government-certified as safe for carriage of persons. The latter requirement appears to dispel or defeat any expectation on the part of a space flight participant that the FAA has prescribed through regulatory requirements a level of safety comparable to that existing in aviation (or in other forms of transportation known as common carriage).[174] The latter requirement may also help defeat an action against an operator based on a breach of warranty theory, even though certification itself is not an FAA warranty.

The 2004 Space Act also provides that a licensee or permittee may only launch or reenter a space flight participant if that person has provided written informed consent to participate in the activity. Although the 2004 Space Act does not require that

---

[173] If already employed, the employee must be informed as early as possible, but in any event before any launch in which that individual participates as a crewmember.

[174] In responding to questions, FAA Administrator, Marion Blakey, noted that in the near term, private human space flight is not common carriage and will not be like other routine transportation. *Beyond the X Prize: Hearing, supra* note 127 (statement of Marion Blakey, FAA Administrator), *available at* http://www.house.gov/transportation/aviation/02-09-05/02-09-05 memo.html (last visited Aug. 15, 2005).

space flight participants waive claims against the other entities involved in the launch, with an exception for the U.S. Government and its contractors and subcontractors, described below, statutory requirements for disclosure of risk and informed consent are designed to assure that space flight participants understand and acknowledge that they fly at their own peril and knowingly assume the risk of space flight hazards.

The doctrine of informed consent creates a duty to disclose risks and dangers material to a reasonable person in deciding upon a course of action.[175] In a litigation-oriented society, documenting written informed consent must be done with due regard to applicable law, or it may create additional litigation perils for negligent nondisclosure. Further complicating matters are jurisdictional differences governing the appropriate standard for measuring the adequacy of disclosure.

For an emerging industry such as private space flight, there is no established community standard or customary practice. Absence of a community standard may not settle the question of the appropriate standard to apply for assessing adequacy of disclosure. The 2004 Space Act instructs the FAA to issue regulations under which a space flight participant provides written informed consent to participate in the launch or reentry and to provide to the FAA written certification of compliance with certain regulations. The extent to which the FAA prescribes the requisite level of detail may, in essence, create or at the very least greatly inform the relevant legal standard of care and detail in disclosing to a space flight participant the risks of launch and reentry. If that is the intended result of implementing regulations (or FAA guidance in the absence of regulations), then it is reasonable to expect that operators would seek written FAA approval, or validation, of their certification of compliance with informed consent requirements.

In cases concerning participation in recreational activities, written informed consent is typically documented in combina-

---

[175] Accordingly, a wise licensee or permittee would consider documenting informed consent along with a waiver of liability. This was the informed consent regime contemplated in H.R. 3752, 108th Cong. (2004).

tion with a waiver of liability and assumption of risk agreement detailing the type and nature of risk involved, but such agreements may not bar negligence claims where they do not sufficiently inform a participant of the specific and precise nature of the risk. Because informed consent requires knowledge of the risk assumed and an understanding of the nature of the risk, operators must determine which information concerning risk would be material to a space flight participant. As risk is often measured as a combination of the likelihood of an occurrence and its consequences, a prudent operator would disclose not just those events with a high likelihood of occurrence, but also those having a low likelihood of occurrence and severe consequences. Licensees and permittees will want to use great care in preparing the necessary documents.

The dilemma facing a licensee or permittee in obtaining informed consent and a waiver and release of liability can be aptly summarized as follows:

> [d]rafters of releases always face the problem of steering between the Scylla of simplicity and the Charybdis of completeness. Apparently no release is immune from attack. If short and to the point, a release will be challenged as failing to mention the particular risk which caused a plaintiff's injury or as insufficiently comprehensive. It will be attacked as totally ineffective if a key word is placed in the caption for emphasis but not repeated in the text, or if, despite unambiguous language, the word "negligence" is not used. If the drafter avoids these shortcomings by adding details and illustrations, the plaintiff invokes the doctrine *expressio unius exclusio alterius est* and characterizes the causative hazard as one not found among those listed in the release, but if the list ends with an inclusive term...it will be argued, under the principle *ejusdem generis*, that the risk encountered is nonetheless not assumed, because its nature is different from those listed....To be effective, a release need not achieve perfection; only on Draftsman's Olym-

> pus is it feasible to combine the elegance of a trust indenture with the brevity of a stop sign.[176]

The FAA has already issued draft guidance on informing space flight participants of the risks that attend space flight.[177] The FAA's guidance material refers to both government and private sector vehicles and explains that an RLV operator should provide a record of all vehicles that have carried a person because they are the most relevant to what RLV operators propose to do.

The requirements of the 2004 Space Act and FAA guidance construing the new law may complicate life for a vehicle operator. The FAA will need to assess the practicality of its guidance material given that the breadth of vehicles covered under the guidance direction feasibly would include the *Redstone* rocket that enabled the *Mercury* program, the *Apollo* program vehicles, the *Saturn* rockets, and of course, the *Space Shuttle*. Also encompassed by FAA guidance material are 'X' vehicles operated by the government as developmental and experimental technologies. This begs the question: to what level of detail will a private entity be able to obtain information concerning the safety record of all such government vehicles? And, if an operator provides a vast amount of technical data, will it effectively defeat or nullify the "informed" nature of the consent, much like the fine print on a lengthy contract?

The 2004 Space Act also requires written disclosure by the FAA of any relevant information related to risk or probable loss during each phase of flight gathered by the agency in making the MPL determinations for third party liability and government property damage insurance required under the CSLA.[178] The FAA routinely offers to make its MPL analyses available to a licensee when issuing insurance requirements to that licensee;

---

[176] Olivelli v. Sappo Corporation, 225 F. Supp. 2d 109, 118 (D.P.R. 2002) (quoting National and International Brotherhood of Street Racers, Inc. v. Superior Court, 264 Cal. Rptr. 44, 46-47 (Cal. App. 1989).

[177] Draft guidance for commercial suborbital reusable launch vehicle operations with space flight participants can be downloaded from the AST web site at http://ast.faa.gov (last visited June 30, 2005).

[178] 49 U.S.C. § 70112 (2000 & Supp. 2005).

however, disclosure to space flight participants may be problematic to the extent it involves a licensee's trade secrets or proprietary commercial or financial data designated as confidential under 14 CFR 413.9. Disclosure of government property damage or loss scenarios may also conflict with national security interests of the United States and the FAA will need to reconcile government interests with the need to supply risk data to prospective space flight participants.

v. Liability Risk-Sharing and Indemnification

First enacted in 1988, the CSLA liability risk-sharing regime assigns financial responsibility for third-party launch liability to the licensee but initially caps it at the lesser of $500 million or the maximum amount of insurance available at reasonable cost. Licensees generally satisfy the requirement to demonstrate financial responsibility by obtaining liability insurance. The actual amount licensees are obligated to cover is based on the MPL risk analysis.[179] To date, the required amount of insurance based upon MPL analysis has been less than $500 million in all cases.

The licensee's financial responsibility must cover all of the entities involved in carrying out a launch, as well as the U.S. Government, as though each had obtained its own liability coverage. This approach was adopted in 1988, in order to relieve the capacity strain on the liability insurance market. The U.S. Government must be covered as an additional insured, at no cost to the Government, under the CSLA and FAA implementing regulations.[180] The Government is therefore covered in the event of an international claim under the Liability Convention, under which the United States is absolutely liable as a launching State for damage caused by its space object on the surface of the Earth or to aircraft in flight.[181]

---

[179] The MPL calculation for each type of launch vehicle authorized to launch at a particular launch site under an FAA license is listed at the FAA/AST web site http://ast.faa.gov (last visited June 30, 2005).

[180] *See* 14 C.F.R. pt. 440 (2000).

[181] See the discussion of liability under the Outer Space Treaty and Liability Convention under Section II. C, *infra*.

In return, through the CSLA risk allocation regime, the U.S. Government conditionally agrees to indemnify launch participants for third party claims up to about $2 billion above the required amount of insurance, after factoring in the prescribed inflation adjustment. Doing so may require a special appropriation and the CSLA contains detailed procedures for congressional consideration of claims payment. Above the combined amount of FAA-assessed liability insurance plus indemnification from the U.S. Government, responsibility for satisfying third-party liability returns to the licensee or legally liable party.

As previously noted, the 1998 extension of the risk-sharing regime to reentry operations was extremely significant in that it afforded prospective RLV operators the benefits of limiting financial risk and not "betting the company" in the event of a catastrophic accident. It also allowed time for insurance markets to respond to the risks involved in intentional intact reentry.[182]

With certain noteworthy exceptions, the 2004 Space Act extends the financial responsibility and allocation of risk provisions of the CSLA to human space flight conducted under an FAA license allowing operators, customers other than space flight participants,[183] and contractors and subcontractors to enjoy the benefits of public/private risk sharing that have been critical to the success of the commercial launch industry. How-

---

[182] In seeking indemnification authority for experimental aerospace vehicles developed under cooperative agreements between private entities and NASA, the General Counsel of NASA testified in 1998 before the House Subcommittee on Space and Aeronautics to the scarcity and expense of insurance for test flights. *See Indemnification and Cross-Waiver Authority: Hearings, supra* note 15.

[183] The term "customer" is defined in FAA regulations for purposes of implementing financial responsibility requirements under 14 C.F.R. parts 440 and 450, but is not defined by statute. For purposes of launch financial responsibility, the term "customer" means "the person who procures launch services from the licensee, any person to whom the customer has sold, leased, assigned, or otherwise transferred its rights in the payload (or any part thereof) to be launched by the licensee, including a conditional sale, lease, assignment, or transfer of rights, any person who has placed property on board the payload for launch or payload services, and any person to whom the customer has transferred its rights to the launch services." 14 C.F.R. § 440.3(a)(3) (2000). The FAA will need to reconsider the definition to the extent a space flight participant is regarded as procuring launch services.

ever, indemnification is not available under the newly enacted law for flights conducted under a permit, as opposed to a license.

Extending the promise of indemnification to vehicle operators in the human space flight business reflects the value of promoting the new industry, as reflected in congressional findings associated with the 2004 Space Act. The law recognizes the benefits of opening space to the public and that greater private investment in developing vehicles capable of carrying humans into space "will stimulate the Nation's commercial space transportation industry as a whole...."[184] In terms of granting liability protection, Congress evidently regards private human space flight capability as comparable to that of private satellite launches. By extending benefits to operators of man-rated commercial vehicles comparable to those afforded operators of ELVs, Congress has determined that the emerging human space flight industry, with its attendant risks, requires and is deserving of this unusual, though not extraordinary, safety net. While indemnification or other limitation of liability is available to other industries,[185] generally government support of this kind is limited to situations in which the industry is deemed critical to U.S. economic well-being or otherwise serves the public weal.

Critically, all indemnification under the CSLA will expire at the end of 2009, unless a further extension is granted.[186] Administration officials and industry advocates have testified on multiple occasions to the need for indemnification in order for U.S. industry to remain internationally competitive; however, indemnification has had its detractors in Congress who question the need to continue extraordinary relief for a maturing industry. Depending upon the rate of development of human space

---

[184] *See* 2004 Space Act, *supra* note 11, § 2(a)(5).

[185] *See, e.g.*, indemnification of the commercial nuclear power industry under the Price-Anderson Act, 42 U.S.C. § 2210 (2000). *See also* the Support Anti-Terrorism by Fostering Effective Technologies Act of 2002 or SAFETY Act limiting the liability of operators of technologies certified as anti-terrorism technologies. Pub. L. No. 107-296, §§ 861-865 (2002).

[186] The risk-sharing regime, including indemnification, was added in 1988 with a 5-year sunset provision. The termination date has been extended several times, most recently in 2004. *See* Pub. L. No. 108-428 (2004).

flight vehicles, it is conceivable that a space tourism industry will have barely gotten off the ground before the next sunset date is reached.[187]

vi. Space flight participants are Not Indemnified

The 2004 Space Act allows individuals to undertake space flight at their own physical and financial risk. Space flight participants are excluded from indemnification eligibility under the 2004 Space Act and are not entitled to the benefits of liability insurance coverage.[188] Absent enforceable private contractual arrangements between a space flight participant and the vehicle operator (licensee) holding the participant harmless and indemnified by the operator, ineligibility may prove to be a substantial deterrent to an individual, particularly a wealthy one with "deep pockets," in deciding whether to engage in space flight.

Significantly, nothing prevents a licensee or operator from adding individual space flight participants as additional insureds under its liability policy. In fact, a smart consumer might demand it and a smart operator might offer it as a competitive advantage. Given that space flight participants will be potential "deep pockets," assuming the cost of a ticket will be significant for the foreseeable future, it is not unreasonable to expect that a wealthy space flight participant would be named as a defendant in the event of damage claims brought by an injured third party.

---

[187] Indemnification was extended to RLV reentry in 1998, and extended in 1999 through the end of 2004, based in large measure upon the argument that absent liability protection, RLV developers would not benefit from the financial safety net that proved critical to the commercial ELV industry in the early 1990s in developing a market. However, in that 5-year time frame, *SpaceShipOne* became the only RLV to fly. The RLV industry has yet to yield any competitive or financial benefit from the statutory indemnification safety net.

[188] Federal law mandates that insurance provided by the licensee for third-party liability also protect the customer and the U.S. Government and the contractors and subcontractors of each, as well as the licensee and its contractors. 49 U.S.C. § 70112 (2000 & Supp. 2005). The 2004 Space Act does not add comparable requirements for space flight participants.

vii. No Indemnification for Permitted Flights

Under the 2004 Space Act, absent a license, the operator of a reusable suborbital rocket flies at its own financial peril, although the FAA must require financial responsibility and liability coverage for entities, other than space flight participants, involved in permitted flight, just as it does for licensed flights.[189] Flights conducted under an experimental permit are not eligible for indemnification under section 70113 of the CSLA, as amended by the 2004 Space Act. Experimental permits are envisioned as a research and development (R&D) flight authorization for reusable suborbital rockets, to show compliance with licensing requirements or for crew training. Once a license is issued for a particular suborbital rocket design it may no longer be operated under an experimental permit.

Absence of indemnification for permitted flights prompts a question about congressional motivation: Did Congress intend to make permitted flights of suborbital reusable rockets ineligible for liability indemnification because they entail less risk than would licensed activity or because they entail greater risk? Arguably, Congress might have considered that a permitted flight would expose the general public to less risk than one conducted under an RLV mission license and therefore fixed a shortened review period (120 days in place of 180 days for a license) for the FAA to issue a permit. This perception of reduced risk may also explain the congressional "encouragement" reflected in the statute to eliminate requirements of federal law that would otherwise apply to the activity. In this regard, the FAA may decide that flights confined to an unpopulated or sparsely populated area limit risk to public health and safety and warrant expeditious issuance of a permit. With less attendant risk, vehicle operators could not as readily argue that they are "betting the company" with each flight, as ELV operators argued in 1988 when indemnification authority was added to the CSLA.

However, the legislative record for H.R. 3752 suggests that FAA licensing authority *enhances* public safety and thereby

[189] *See* 49 U.S.C. § 70105a(i) (2000 & Supp. 2005).

makes indemnification less of a financial risk for the government when a launch is licensed. If that is so, then abbreviating FAA safety review through the permitting process, as envisioned by the legislation, *increases* risk to public safety and, correspondingly, the chance that the government may be called upon to indemnify excess third-party liability. In fact, in foreclosing eligibility for government indemnification, it appears that Congress has decided that liability risk-sharing for permitted flights is too risky and, accordingly, will not obligate, even conditionally, federal government funds in support of permitted flights.[190]

### viii. Reciprocal Waivers of Claims

Risk sharing under the CSLA involves reciprocal waivers of claims and an assumption of responsibility among the entities involved in a licensed launch or reentry. The CSLA requires the licensee and its customer and the contractors and subcontractors of each to enter into reciprocal waivers of claims under which each entity accepts its own risk of property damage or loss and agrees to be responsible for injury, damage or loss suffered by its employees.[191] A launch services customer (for example, a satellite owner) places its payload on the launch vehicle at its own risk but can purchase satellite insurance to protect its cargo. Where a federal agency is involved in launch or reentry services[192] the licensee and its customer, and their respective contractors and subcontractors, are directed by the CSLA to enter into a similar reciprocal waiver of claims agreement with the U.S. Government on behalf of itself and its contractors and subcontractors; however, the government's obligations are different in scope from that assumed by private entities.[193] The government's property damage waiver is limited to claims for federal range property damage and that of its contractors and subcontractors involved in launch or reentry services in excess of the

---

[190] *See* H. R. REP. NO. 108-429, at 12 (2004).

[191] 49 U.S.C. § 70112(b)(1) (2000 & Supp. 2005).

[192] *See* 49 U.S.C. § 70102 (2000 & Supp. 2005) (defining launch services and reentry services).

[193] 49 U.S.C. § 70112(b)(2) (2000 & Supp. 2005).

insurance amount required by the FAA to protect government property at federal ranges. The required amount of insurance (or other financial responsibility) for such claims is capped by statute at the lesser of $100 million or the maximum available at reasonable cost, and is determined by the FAA based upon its MPL risk assessment.

Traditionally, individual employees of the various entities involved in a launch are not required to waive claims or assume responsibility for damage or loss personally suffered as a result of licensed activity. However, except for Government personnel,[194] the financial obligation to cover the claims of an employee against another launch participant is assumed by that employee's employer under the reciprocal waiver of claims agreement.[195] Although all employees are third parties because they are not excluded from the statutory definition, not all employee claims are covered claims eligible for indemnification in accordance with implementing regulations issued by the FAA. Claims of "Government personnel" are covered claims, however, and the government is obligated to cover their claims if they exceed the required amount of third-party liability insurance. Indemnification under the CSLA is not intended to cover claims of the employees of the licensee, its customer or their contractors and subcontractors.

The 2004 Space Act significantly changes this arrangement for human space flight. Where the federal government, through its agencies or its contractors and subcontractors, is involved in launch or reentry services for human space flight, the 2004 Space Act requires that the crew and space flight participants also enter into reciprocal waivers of claims. For the first time, individuals are required by statute to waive claims for their own personal injury and property damage or loss. Although a literal reading of the reciprocal waiver requirements as amended by

---

[194] FAA regulations define "Government personnel" to mean: "employees of the United States, its agencies, and its contractors and subcontractors, involved in launch services for licensed launch activities. Employees of the United States include members of the Armed Forces of the United States." 14 C.F.R. § 440.3(a)(6) (2000).

[195] Assumption of responsibility for employee losses is explained at length in the part 440 rulemaking. *See* Financial Responsibility Requirements for Licensed Launch Activities, *supra* note 125.

the 2004 Space Act indicates that crew and space flight participants must waive claims against all of the entities involved in launch services or reentry services, it is important to note that inclusion of crew and space flight participants in the reciprocal waiver scheme appears only in the reciprocal waiver provision involving the government, and not in the reciprocal waiver requirement reserved to private entities.[196] It therefore becomes necessary to reconcile the two reciprocal waiver requirements.

By including crew and space flight participants only in the waiver agreement with the U.S. Government, it would appear that Congress intended to insulate the government and its contractors from crew and space flight participant claims while preserving the right of crew and space flight participants to assert claims for injury, damage or loss against the other entities involved in the activity (subject to private agreements to waive claims). The inclusion of crew and space flight participants in the waiver scheme involving the U.S. Government suggests that only their right to seek damages from the U.S. Government and its contractors has been deliberately foreclosed.

Because crew and space flight participants are not "third parties" under the statutory definition,[197] claims of crew and space flight participants against other entities involved in the licensed or permitted activity are neither covered by statutory-based insurance requirements nor are they covered claims eligible for indemnification under the CSLA or implementing regulations at 14 CFR 440.19(a).[198] Entities involved in human space flight will therefore need to protect themselves against liability to space flight participants. Crew retain their status as employees under the reciprocal waiver agreement and their claims

---

[196] This is a distinct change from H.R. 3752, which included crew and space flight participants in both reciprocal waiver of claims provisions of the CSLA. 49 U.S.C. § 70112(b)(1)-(2) (2000 & Supp. 2005).

[197] 49 U.S.C. § 70102(21)(E) (2000 & Supp. 2005). The statutory definition of "crew" encompasses more than the flight crew and therefore extends the waiver requirement to those individuals employed by a licensee and its contractors and subcontractors who perform activities directly relating to the launch, reentry, or other operation of or in a launch vehicle or reentry vehicle that carries human beings. *Id.* § 70102(2).

[198] The families of crew and space flight participants are not excluded from the definition of "third party," however, and their claims may be eligible for indemnification.

against other entities involved in the licensed or permitted activity remain the financial responsibility of their employer.[199]

Although crew and space flight participants are not required to waive damage nor injury claims against other private entities involved in the space flight, the 2004 Space Act does not prohibit or otherwise prevent a space vehicle operator from insisting upon such a waiver as a contractual term and condition of providing a ride. It is a matter left to the business judgment of each operator. Regardless, the enforceability of waiver agreements between a vehicle operator and space flight participants is a matter of concern that will be closely monitored by space law practitioners as well as the government and launch industry.[200]

Space flight participants may wish to consider the benefit of entering into a mutual waiver of claims agreement with the vehicle operator, although not directed by statute to do so. Absent a waiver agreement under which the licensee waives claims against the space flight participant, a space flight participant is vulnerable to claims by the operator for damaging the vehicle.[201] It may therefore be in the best interests of all concerned to enter into reciprocal waiver agreements even if they are not required by statute.

---

[199] 49 U.S.C. § 70102(2) (2000 & Supp. 2005).

[200] Committee Report language associated with HR 3752, the predecessor legislation to the 2004 Space Act, originally signaled the Committee's view that space flight participants should not be required to waive claims against a licensee for gross negligence, as well as willful misconduct. *See* H. R. REP. NO. 108-429, at 14 (2004). This language is hardly dispositive inasmuch as it is Committee Report language, rather than statutory language, and it concerns a predecessor bill. Moreover, as the FAA has made clear in the two rulemakings governing financial responsibility for licensed launch and reentry activities, only willful misconduct is excepted from the current scope of the no-fault reciprocal waiver of claims scheme. *See* Financial Responsibility Requirements for Licensed Launch Activities, *supra* note 125; Financial Responsibility Requirements for Licensed Reentry Activities, *supra* note 73. In any event, a prudent launch operator may wish to be extremely precise in drafting waiver agreements for space flight participants and crew.

[201] Perhaps apocryphal, it has been suggested that signs were placed on various portions of the International Space Station in time for Mr. Tito's visit bearing the legend, "You break it, you bought it."

### ix. Experimental Permits

The Act extends to the FAA authority to issue an experimental permit, in place of a launch or reentry license, for certain types of reusable suborbital rocket flights. Prior to the 2004 Space Act, a launch or reentry license was the only flight authorization contemplated by the CSLA. The FAA has long held authority to waive requirements for a license under the CSLA when not needed to safeguard public health and safety, the safety of property or U.S. national security and foreign policy interests;[202] however, the waiver process can be cumbersome and time-consuming. An experimental permit should enable research and development flight testing of new vehicles without the time-consuming rigors of a launch license determination.

Permitting authority granted under the 2004 Space Act is nearly unchanged from that provided in H.R. 3752, the predecessor legislation. According to the Committee Report accompanying H.R. 3752, the regulatory approach to issuing experimental permits was to be modeled on the FAA approach to issuing experimental airworthiness certificates (EACs) under the Federal Aviation Regulations, 14 CFR parts 21 and 91. The Committee Report calls for a more streamlined approach to permitting, as opposed to licensing, with fewer requirements, a shorter review period and possibly a different approach to public safety risk analysis than that employed by the FAA in issuing launch licenses (i.e., demonstration of acceptable mission risk, including estimated casualty expectations, system safety process and analysis including hazard assessment, and compliance with operational restrictions). The FAA will need to resolve how best to conduct an expedited permitting action in order to facilitate development of reusable suborbital rockets as the 2004 Space Act envisions.

An experimental permit under the Act is available only for reusable suborbital rockets and only when operated for one or more of the following purposes: research and development to test new design concepts, equipment or operating techniques, demonstrating compliance with licensing requirements, or crew

---

[202] 49 U.S.C. § 70105(b)(3) (2000 & Supp. 2005).

training.[203] An experimental permit can authorize an unlimited number of launches and reentries for a particular rocket design and must be crafted in a manner that captures the range of modifications that may be made to the vehicle without invalidating the permit. Once an operator obtains a license to operate the vehicle it can no longer be operated under an experimental permit.

The Act does not prohibit a rocket operated under an experimental permit from carrying space flight participants; however, it may not be operated for compensation or hire. Financial responsibility requirements apply to experimental permits but there is no third-party liability indemnification available for claims in excess of the required amount of insurance.

By specifically referring in the Committee Report for H.R. 3752 to the FAA's longstanding approach to issuing EACs, the House of Representatives appears to have embraced an enabling philosophy that avoids the detailed regulatory world of type certification, production certification, and airworthiness standards applicable to aircraft available for common carriage under the Federal Aviation Regulations (FARs).[204] An EAC provides flight authorization for certain limited purposes listed in the FARs,[205] including research and development flight testing of new aircraft design concepts, new operating techniques or new aircraft uses. An EAC may be issued for the conduct of flight tests to show compliance with airworthiness regulations, for crew training, exhibition, air racing, and market surveys. An EAC provides flight authorization for operating amateur-built aircraft where the major portion of the aircraft was fabricated and as-

---

[203] *Id.* § 70105a(d).

[204] The application process for obtaining an EAC is extremely streamlined. Requirements are found in 14 C.F.R. § 21.193 (2000), which provides that to obtain an EAC an applicant must submit a statement of purpose; sufficient data, such as a photograph, to identify the aircraft; and information required by the FAA as a result of a visual inspection by an FAA official. Where the aircraft is to be used for experimental purposes, the applicant must also identify the purpose of the experiment, an estimate of the number of flights or time required to conduct the experiment, the areas over which the experiment will be conducted, and three-dimensional drawings or photographs of the aircraft unless it is converted from a previously certificated aircraft without appreciable change in the external configuration. 14 C.F.R. § 21.193(d) (2000).

[205] *See* 14 C.F.R. § 21.191 (2000 & Supp. 2005).

sembled by persons who undertook the project solely for their own education or recreation. An EAC may also be issued for the operation of kit-built aircraft under criteria specified in the regulation.[206] A manufacturer of U.S.-built aircraft may also seek an EAC to use an aircraft in conducting market surveys, sales demonstrations or customer crew training.[207] However, even with an EAC, FAA operating rules apply in order to safeguard all users of the national airspace system.

a. Environmental Streamlining

Under FAA Order 1050.1E, entitled, "Environmental Impacts: Policies and Procedures," absent extraordinary circumstances, aircraft operated under an EAC generally fit within a categorical exclusion under the National Environmental Policy Act (NEPA). A "categorical exclusion" under NEPA means, in brief, a category of actions that individually or cumulatively do not have a significant effect on the human environment.[208] If, by shortening the time required for the issuance of an experimental permit under the Act, Congress intended to encourage "environmental streamlining" similar to that accorded to experimental aircraft, then it may be frustrated in its expectations. Environmental reviews are required under NEPA for "major Federal actions" falling within its purview. NEPA applies to agency decision making and issuance of a launch approval, whether through a license or permit, is considered a major Federal action under NEPA criteria.[209] NEPA directs Federal agencies to comply with its policies to the fullest extent possible "unless existing law applicable to the agency's operations expressly prohibits or makes compliance impossible."[210] The 2004 Space Act does not go so far as to expressly prohibit the FAA from complying with NEPA in determining whether to issue an experimental permit.

The FAA order on environmental review policy allows the agency to pursue issuing a categorical exclusion and it may be-

---

[206] *Id.*
[207] *Id.* § 21.195 (2000).
[208] 40 C.F.R. § 1508.4 (2000).
[209] *See id.* § 1508.18.
[210] *Id.* § 1500.6.

come possible, working with the Council on Environmental Quality (CEQ), to issue one for reusable suborbital rocket launches if the necessary factual foundation exists to support a categorical exclusion for reusable suborbital rocket launches. It is important to note, however, that a categorical exclusion issued for launch vehicles would not relieve the FAA from its responsibilities under NEPA with respect to licensing the operation of a proposed launch or reentry site.

b. Protection of Public Health and Safety

Public safety is maintained in several ways under an EAC. The traveling public is protected by the FAA's prohibition on use of aircraft operated under an EAC for compensation or hire.[211] Safety of the uninvolved public, on the ground and in the national airspace system, is protected by confining aircraft flight tests to areas over open water, or to sparsely populated areas, having light air traffic.[212]

In issuing experimental permits for reusable suborbital rocket launches under its newly granted authority, the FAA must determine how to streamline its safety processes and still limit risk to the uninvolved public. The Committee Report accompanying H.R. 3752 suggests that "permits should be granted more quickly and with fewer requirements than licenses."[213] Although the Committee Report does not suggest a less conservative level of acceptable risk to public safety than that currently utilized in licensing launches, it offers the following instruction:

> The Committee expects AST to carefully review the methodology and assumptions currently applied when calculating expected casualty rates, to assess the appropriateness of such calculations with respect to the issuance of permits, and to explore possible alternative methods of calculating expected casualty rates. The Committee directs AST to conduct a simi-

---

[211] The traveling public has certain expectations of safety when utilizing FAA-certificated aircraft that have undergone the rigors of certification, expectations that do not apply to experimental operations.

[212] 14 C.F.R. § 91.305 (2000).

[213] *See* H. R. REP. NO. 108-429, at 11 (2004).

> lar review with respect to calculating expected casualty rates in the context of licensing.[214]

The Committee's expectations may suggest that the FAA is utilizing an appropriate measure of acceptable risk to public safety in authorizing space launches and reentries;[215] however, the emphasis on reviewing FAA methodology and assumptions and the admonition to explore possible alternative methodologies suggests that FAA implementation of acceptable risk thresholds may not be appropriate for experimental permits. A similar suggestion is made with respect to licensing determinations.

One approach to streamlining safety reviews while safeguarding the uninvolved public may be to confine the area in which reusable suborbital rockets are authorized to operate, similar to the approach utilized by the FAA in issuing EACs. However, even if the FAA delimits or prescribes approved operating areas, at what level of confidence, if any, can the FAA feel assured that an operator can confine its operations to that area? A rocket undergoing a test flight protocol may act unpredictably – in fact, one reason a vehicle would be undergoing a test flight program is because its performance reliability would not yet have been demonstrated.

Currently, RLV mission licensing rules issued by the FAA provide that an unproven vehicle shall be operated so that during any portion of flight either its projected instantaneous impact point (IIP)[216] does not have substantial dwell time over populated areas or the expected average number of casualties to the public does not exceed 30 in a million launches assuming the vehicle fails at any time the IIP is over a populated area.[217] The FAA may wish to consider revisiting the presumption of an absolute probability of failure in order for an unproven vehicle

---

[214] *Id.*

[215] *See supra* note 76.

[216] The instantaneous impact point, or IIP, is the projected impact point on the surface of the Earth where a vehicle or vehicle debris would land if the vehicle were to fail or break apart. As a general matter, the IIP is not underneath a vehicle but is located ahead of it because atmospheric forces would cause the vehicle to impact downrange from the point in the atmosphere where the failure or break-up occurs.

[217] 14 C.F.R. § 431.43(d) (2000).

to have dwell time over a populated area under the latter alternative. The FAA might also wish to consider alternative approaches to determining how much dwell time is "substantial" when evaluating risk.

It is significant to note, however, that neither the legislation nor the legislative history suggest any diminution of FAA safety responsibilities in protecting the uninvolved public from the hazards of launch vehicle flight. The measure of acceptable collective and individual risk reflected in FAA licensing regulations for ELVs and RLV missions reflects that utilized for years at the national launch ranges and no public injury has resulted from any federal range launch since the Nation's space launch program began over fifty years ago. Congress has not suggested a less conservative level of acceptable public risk replace that currently established in FAA regulations. The FAA will need to examine whether and how it can responsibly adjust its methodology for assessing risk in order to satisfy the congressional mandate to issue experimental permits on a streamlined expeditious basis as Congress intends.

Time will tell if the EAC model is appropriate (or even instructive) to facilitate eventual licensing of reusable suborbital rockets for compensation or hire. Regardless, the problem transitioning from an experimental permit to a license remains to be solved. In the aircraft certification arena, an EAC allows for test flights but, ultimately, to carry passengers for hire a vehicle must satisfy certification requirements consisting of performance and operating requirements, including standards for part design, performance and maintenance. It remains an open question whether an experimental permit will enable the FAA to ultimately transition from a permit to a license in granting flight authorization to the operator of a vehicle without following an approach to vehicle certification similar to that successfully used for aircraft.

To date, the FAA has maintained that certification of launch vehicles would be overly burdensome and costly for launch operators. Moreover, it is not the approach to safety reflected in the CSLA. Whereas the FAA certificates aircraft under FAA regulations, the CSLA focuses on the ability of an operator to carry out a safe launch with a particular vehicle. In

essence, the operator holds the "ticket," not the vehicle. For ELVs launched chiefly at federal ranges over open ocean areas, this approach has been appropriate and sufficient to ensure public safety. For human space flight, it remains to be seen whether it is possible to build a licensing program that does not *eventually* include vehicle design standards or certification.[218]

### c. Liability and Operating Risk

As discussed above, liability insurance or other financial responsibility is required of the permittee, but there is no indemnification available for the vehicle operator or any of the entities involved in the permitted flight. The rationale for withholding indemnification eligibility appears to be borne of the possibility of greater financial exposure for the U.S. Government associated with a flight conducted under an experimental permit because there is less government safety oversight.[219] This begs the question: With potentially unlimited liability for such permitted flights, will investors be deterred? Conversely, does the statutory approach of encouraging more expeditious permitting without the promise of government-backed financial protection for injured innocent third parties leave victims without a remedy in the event an under-capitalized or limited liability entity is responsible for a catastrophic event?

The 2004 Safety Act recognizes that test pilots and crew may suffer grave injury or possibly perish in the course of conducting a test flight program. While they or their estates may pursue private legal remedies, the FAA is instructed by the 2004 Space Act that serious or fatal injury to crew or space flight participants is not grounds for suspension of an experimental permit.[220]

---

[218] As previously discussed, statutory restrictions on the FAA's regulatory approach to licensing are in place for eight years, after which the FAA is free to prescribe safety standards, "taking into account the evolving standards of safety in the commercial space flight industry." 49 U.S.C. § 70105(c)(3) (2000 & Supp. 2005).

[219] *See* H. R. REP. NO. 108-429, at 12 (2004).

[220] 2004 Space Act, *supra* note 11, § 2(c)(19). The Act does allow the FAA to suspend a *license* where the Secretary (or FAA Administrator, by delegation) determines that based upon a prior launch or reentry resulting in serious or fatal injury to crew or space

## V. REGULATORY AND LEGAL CHALLENGES GOING FORWARD

The 2004 Space Act imposes a number of rulemaking challenges on the FAA accompanied by tight statutory deadlines. In the near term, regulations are required for obtaining an experimental permit for the operation of a reusable suborbital rocket, for crew training and medical standards, and for obtaining written informed consent of a space flight participant, as well as certification of compliance by the space flight participant with any regulations the FAA may issue with respect to physical examinations. Moreover, the FAA may issue regulations relating to the design or operation of a launch vehicle with respect to the safety of the uninvolved public.

In the longer term, the FAA may promote continuous improvement of the safety of human-bearing launch vehicles by promulgating regulations, issuing safety approval procedures directed at the protection of the health and safety of crew and space flight participants, requiring space flight participants to submit to physical examinations before undertaking a launch or reentry,[221] imposing medical and training requirements for space flight participants,[222] and imposing design or operational standards for a human-bearing launch vehicle used for compensation or hire in order to protect the health and safety of crew and space flight participants but only where serious or fatal injury or an unplanned event has occurred that poses a high risk of serious or fatal injury to crew or space flight participants. The caveat sunsets in December 2012.[223] Also, in three years, Congress will return to the FAA the authority to redefine in regula-

---

flight participants, continued operations are likely to cause additional serious or fatal injury to crew or space flight participants.

[221] These requirements can only be in effect for three years following enactment of the 2004 Space Act, or through December 2007.

[222] These requirements cannot take effect before December 23, 2007. In other words, for the first three years that the FAA has regulatory authority over persons other than crew traveling into space, Congress intends that at most a space flight participant may be required to undergo a physical examination as a condition of being on board the launch vehicle. After three years, the FAA may impose medical and training requirements for space flight participants.

[223] 49 U.S.C. § 70105 (2000 & Supp. 2005).

tions what constitutes a "suborbital rocket," in order to cover all appropriate vehicles.[224]

Proposed regulations relating to crew, space flight participants and experimental permits must be issued by December 2005, with final regulations due six months thereafter – an aggressive regulatory schedule. Congress appears to recognize this reality and, while throwing down a gauntlet to the FAA, has allowed the agency to issue licenses and experimental permits for human-bearing vehicles before issuance of final regulations. In essence, Congress is allowing the FAA to regulate through non-binding guidance and encourages expedited issuance by the FAA of guidance information to implement the 2004 Space Act.[225] However, the Act prohibits the FAA from issuing licenses or permits for such vehicles if in three years time (by December 2007) the FAA has failed to issue final regulations.

Design or operational standards to protect crew and space flight participant health and safety need not be promulgated within the 18-month timeframe. Indeed, those standards are warranted, in accordance with the Act, only where an actual event has occurred during a licensed or permitted flight causing serious or fatal injury to crew or space flight participants, or contributed to an event with a high risk of serious or fatal injury to crew or space flight participants, and will apply only to flights conducted for compensation or hire — that is, under a license as opposed to a permit. Given the technological challenges that must be overcome and the apparent benefits of proceeding cautiously in offering space tourism services to the general public, it is rather unlikely that vehicle designers and operators will be transitioning from permitted flights to licensed operations in the next two years.

Just as Congress in enacting the 2004 Space Act had to balance the government's responsibilities in enabling a commercial human space flight industry against an individual's right to accept personal risk, the FAA will need to determine the appro-

---

[224] The regulations defining "suborbital rocket" cannot take effect for six months after promulgation in order to give Congress time to review them and consider their adequacy.

[225] 49 U.S.C. § 70120(c) (2000 & Supp. 2005).

priate regulatory approach to enabling safe operation of this emerging industry while safeguarding the national airspace system and the uninvolved public.

The 2004 Space Act was criticized on the floor of the U.S. House of Representatives for its "tombstone" mentality,[226] that is, allowing the FAA to issue design and operational standards to protect crew and space flight participants only after serious injury or fatality on the vehicle has occurred. Yet, the FAA retains regulatory authority to promote the continuous improvement of the safety of human-bearing launch vehicles. The FAA will need to determine "how safe is safe enough" but is expected to exercise substantial regulatory restraint absent a vehicle failure that causes serious injury or fatality to crew or passengers. It remains to be seen whether the traveling public, future consumers of human space flight services, will demand more. It also remains to be seen whether entrants to this new industry sector are able to fulfill their announced safety philosophies as planned.[227]

The FAA will not undertake its rulemaking challenges in a vacuum. Federal agency rulemaking must be conducted in accordance with an array of legal requirements, including the procedural requirements of the Administrative Procedure Act.[228] In addition, federal agency rules are scrutinized under Executive Order 12866, issued in 1993, which provides guiding principles to federal agencies in establishing their regulatory philosophy and in designing regulatory solutions to address public need.

Executive Order 12866 directs agencies to promulgate only regulations that are required by law, that are necessary to interpret the law, or that become necessary by compelling need, such as material failures of private markets to protect or improve the health and safety of the public, the environment or the well-being of the American people.[229] Agencies must con-

---

[226] *See Beyond the X Prize: Hearing*, *supra* note 127 (statement of Congressman Oberstar (D. Minn.)).

[227] *See id.* (statement of Mr. Will Whitehorn, President, Virgin Galactic).

[228] Government Organizations and Entities, Pub. L. No. 89-554, 80 Stat. 378 (1966). Requirements affecting notice and comment rulemaking are contained in 5 U.S.C. §§ 551-59 (2000).

[229] Exec. Order No. 12,866, 58 Fed. Reg. 51,735, § 1 (Sept. 30, 1993).

sider whether alternatives to regulation are appropriate to achieve the desired behavior. Where a regulatory path is warranted agencies are instructed to assess costs and benefits and regulate in the most cost-effective manner to achieve the regulatory objective. Agencies are directed to tailor their regulations to impose the least burden on society including individuals and businesses. Other requirements include consideration of regulatory impacts on small businesses under the Regulatory Flexibility Act.[230] Given the entrepreneurial nature of the emerging space tourism industry, the FAA will need to pay particular attention to economic impacts of its rules on small entities.

If suppliers of space travel services will be as safety conscious as they currently maintain that they plan to be, there should in fact be less need for the FAA to issue prescriptive safety regulations. A number of entities interested in pursuing space travel for individuals already have formed an industry group for the purpose of developing voluntary consensus standards. This is a promising development in terms of pursuing private market solutions to safety issues in lieu of federal regulation.

## VI. FUTURE CHALLENGES

As discussed in Section II, above, the FAA has licensing authority over launch and reentry of an RLV but does not have authority over on orbit operation of the vehicle. Absence of FAA jurisdiction over on orbit operations does not present an immediate concern for the human space travel industry to the extent that it focuses on suborbital flights. For suborbital launch vehicles, the FAA retains continuing regulatory oversight over vehicle operations and, under existing rules, the FAA requires continuous insurance coverage to protect launch participants, including the U.S. Government but excluding space flight participants, in the event of third-party liability. There is no break in jurisdiction or in eligibility for indemnification where a license

---

[230] 5 U.S.C. §§ 601-12 (2000).

has been issued, as opposed to a permit.[231] For orbital human space flight, in light of U.S. international treaty obligations, it seems unlikely that the FAA can responsibly and properly authorize launch and reentry of an orbital manned vehicle without oversight responsibility and regulatory authority over activities conducted in space, on orbit, and without the ability to require insurance to protect U.S. Government interests.[232]

Other governments currently are interested in developing commercial human space flight capabilities and have begun to focus on the respective legal regimes that will enable it. Accordingly, the United States will not be alone in identifying the legal issues that must be resolved for the commercial human space flight industry to develop and flourish, nor will it be alone in designing solutions. At the moment, there are more questions than answers as to whether and how international cooperation might occur.

The Outer Space Treaties supply core concepts of international law that apply to the activities of non-governmental entities in outer space; however, government-to-government agreements may be concluded to obtain landing rights in other countries. As vehicle technology develops, reusable rockets may provide point-to-point delivery and transportation services on an orbital and suborbital basis. Vehicles regarded by the United States as suborbital rockets may not necessarily be viewed the same way by other sovereign states, however. This possibility gives rise to a number of questions: Would a foreign government necessarily deem a hybrid vehicle to be a "suborbital rocket" simply because it meets that definition under U.S. law, or might the foreign government consider the vehicle to be an aircraft? Will hybrid reusable vehicles be allowed the right of innocent

---

[231] Supplementary Information accompanying FAA Financial Responsibility Requirements for Licensed Reentry Activities; Final Rule explains that "for those RLVs that operate in a suborbital manner, that is, vehicles that do not enter a closed path and for which return to Earth is a matter of physics rather than human intervention, a single determination of financial responsibility covering all flight risk is deemed appropriate. For such vehicles, satisfaction of part 440 insurance requirements would be necessary to address the risks that attend operation of a suborbital RLV." *See* Financial Responsibility Requirements for Licensed Reentry Activities, *supra* note 73.

[232] See discussion of State Party responsibilities under the Outer Space Treaties, in Section II. C., *supra*.

passage through another sovereign nation's airspace, or will flight be subject to aviation rules? Will damage caused in another nation by an American owned and operated reusable suborbital rocket be the subject of an international claim under the Liability Convention (under which the United States is absolutely liable) or will claims be handled in a manner similar to aviation proceedings? If a foreign hybrid suborbital rocket launched from abroad causes damage in the United States would the country of origin of the rocket necessarily agree with a U.S. position that the foreign government is absolutely liable as a launching State under the Liability Convention?[233]

Under the terms of the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (Rescue and Return Agreement),[234] personnel of a spacecraft that land in another State's territory or on the high seas are to be rendered all necessary assistance and returned promptly to representatives of the launching authority.[235] While the title of the treaty refers to "astronauts," the treaty itself refers to "personnel" of a spacecraft. Only the Outer Space Treaty refers to "astronauts" and instructs States Parties to regard them as "envoys of mankind in outer space" and to render them all possible assistance in the event of emergency landing in another State's territory or on the high seas.[236] With the advent of personal commercial space travel, will crew and passengers be deemed "astronauts" for purposes of implementing the Rescue and Return Agreement in the event of accident, distress, emergency or unintended landing?

## VII. CONCLUSION

"Postcards from space" beckon. Space tourism and other applications for commercial trips into space now appear to be a

---

[233] Under the Liability Convention, a launching State means "(i) a State which launches or procures the launching of a space object; or (ii) a State from whose territory or facility a space object is launched." Liability Convention, *supra* note 50, at art. I.

[234] Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119.

[235] *See id.* at arts. 2-4.

[236] Outer Space Treaty, *supra* note 49, at art. V.

near-term possibility. Longer term plans for private space travel, including orbital flights and perhaps even lunar trips, could follow in the decades to come. The commercial possibilities of space travel are tantalizing, but the long-term technological and commercial viability of commercial human space flight remains to be seen. Continued advances in RLV technologies making space travel safer and more affordable will be the ultimate driver for the emerging industry's long-term success. Secondary, but also critical to the industry's ultimate success or failure will be the application of laws and the formulation of regulations governing the carriage of human beings into space.

The 2004 Space Act provides a legislative framework for the regulation of commercial human space flight. The Act is premised on the notion that, at least for the immediate future, the commercial human space flight industry is "the preserve of visionaries and daredevils and adventurers"[237] – innovators and risk-takers who should be allowed to fly passengers at their own informed risk in order to try new technologies and stimulate further innovations. The Act acknowledges, however, the important role that regulation must play in protecting third parties.

The FAA now faces a number of near-term and long-term regulatory challenges. Regulations are imminent for obtaining an experimental permit for the operation of a reusable suborbital rocket, for crew training and medical exams for participants, and for obtaining written informed consent from aspiring passengers. Other regulations are sure to follow. In enacting the 2004 Space Act, Congress attempted to balance safety concerns against the desire to loosely regulate a nascent commercial human space flight industry in such a way that it will blossom. The FAA will need to determine the appropriate regulatory approach to enabling safe operation of this emerging industry while safeguarding the national airspace system and the uninvolved public. Critical though it is, this legal and regulatory balancing act likely will not determine the fate of a new indus-

---

[237] 150 CONG. REC. H10048-49 (daily ed. Nov. 19, 2004).

try. Rather, the industry's fate ultimately will hinge on its ability to conquer remaining technological hurdles and develop consumer confidence by safely, regularly, and affordably carrying human beings into space.

# "EYES" ON FREEDOM—A VIEW OF THE LAW GOVERNING MILITARY USE OF SATELLITE RECONNAISSANCE IN U.S. HOMELAND DEFENSE

*Christopher M. Petras*[*]

ABSTRACT

The events of September 11, 2001 induced sweeping organizational changes within the U.S. Department of Defense (DoD), and the tragedy prompted calls from both in and outside the Pentagon for a new approach to domestic defense missions. However, expansion of the armed forces' historical role in protecting the homeland and providing for national defense—in which activities were focused almost exclusively outward, beyond U.S. borders—gives rise to myriad potential statutory and regulatory impediments to employing military capabilities within the United States. Furthermore, issues associated with activities of the armed forces inside the United States can be particularly vexing and controversial insofar as they entail use of advanced military technology. There is no better example of the quandaries presented to legal practitioners in this regard than the statutory and regulatory regime for employing military satellite reconnaissance inside the United States. First, this article provides a basic overview of the legal regime related to DoD's use of satellite photoreconnaissance inside the United

* Lieutenant Colonel Petras (B.A., University of Dayton; J.D., Samford University; LL.M., McGill University) is Chief of International Air Operations Law, Office of the Staff Judge Advocate, Headquarters North American Aerospace Defense Command (NORAD) and United States Northern Command, Peterson AFB, Colorado. He is a member of the Bar in the State of Alabama. The opinions and conclusions expressed herein are those of the author. They are not intended and should not be thought to represent official ideas, attitudes, or policies of the U.S. Air Force, U.S. Northern Command, the Department of Defense, or any agency of the United States Government. The author thanks Ms. Laura S. Jennings for her helpful comments on earlier versions of this article.

States. Second, this article contrasts the international legal regime governing satellite reconnaissance, which generally stands for the freedom of all nations to engage in intelligence gathering from outer space, with the restrictive statutory and regulatory regime applicable to domestic military use of satellite reconnaissance. Third, this article highlights gaps in U.S. law that could impact DoD's ability to fulfill its role in providing assistance to civilian authorities that share responsibility for U.S. homeland security.

## INTRODUCTION

> *We are fighting terror with all the tools we have at our disposal: diplomacy and law enforcement, intelligence and homeland security. As a last resort, we have turned to our military. And the skill and heroism of American Armed Forces are making this country proud.*
>
> GEORGE W. BUSH
> April 16, 2003

Throughout United States' history, the armed forces have been charged with protecting the homeland and providing for national defense, but prior to September 11, 2001 (9/11), the military looked almost exclusively outward, beyond U.S. borders, in defense of the nation.[1] This changed in the wake of the September 11th terrorist attacks, as the tragic events of that day galvanized government and public focus on the defense and security of the American homeland.[2] Though the preeminent role of U.S. military forces in post-9/11 homeland defense has thus far remained, as it traditionally had been, the conduct of international armed conflict on foreign soil (as, for example, in the case of both Afghanistan and Iraq), the threat of terrorism has unquestionably altered the way in which the government views the defense of the United States. From both in and out-

---

[1] Steven M. Rinaldi et al., *Protecting the Homeland: Air Force Roles in Homeland Security*, 16 AEROSPACE POWER J. 77 (2002).

[2] *Id.*

side the Pentagon there are now calls for the military to rethink its approach to domestic military missions.[3]

Indeed, the reality of the U.S. homeland as a battlefield in the war against terrorist threats has already prompted the creation of the Office of the Assistant Secretary of Defense for Homeland Defense to oversee DOD's performance of its homeland defense mission. This office is further charged with integrating the military's activities into the broader national strategy for homeland security. The specter of 9/11 has also led to the establishment of United States Northern Command (USNORTHCOM), which unified responsibility for U.S. land, air and maritime defense under a single military commander. However, these organizational changes notwithstanding, DoD continues to grapple with the challenge of how to best leverage its military capabilities to secure the homeland, while at the same time successfully conducting deployed combat operations.[4]

The prospect of increased domestic military involvement to combat terrorism necessarily entails sorting through myriad potential statutory and regulatory impediments to employing military capabilities within the United States.[5] The difficulty of this task is further compounded by the fact that, unlike many of the deep-rooted principals of the *jus in bello* (law of war),[6] U.S.

---

[3] *See* U.S. GENERAL ACCOUNTING OFFICE, HOMELAND DEFENSE: DOD NEEDS TO ASSESS THE STRUCTURE OF U.S. FORCES FOR DOMESTIC MILITARY MISSIONS 9 (2003) [hereinafter GAO REPORT ON HOMELAND DEFENSE]; *see also* Rinaldi, *supra* note 1, at 78-79; *and* Michael Champness, *The Role of the U.S. Air Force in Fighting Terrorism at Home*, 16 AEROSPACE POWER J. 101 (2002).

[4] *See* GAO REPORT ON HOMELAND DEFENSE, *supra* note 3, at 30-33; *see also* Rinaldi, *supra* note 1, at 78-79; *and Use of the Nation's Military Capability in Homeland Security: Testimony before the Subcommittee on National Security, Emerging Threats, and International Relations of the House Comm. on Government Reform*, 108th Cong. 28 (2003) (statement of Michael A. Wermuth, Senior Policy Analyst for RAND Corporation and Manager of Domestic Counterterrorism Programs in RAND's National Security Research Division) [hereinafter Wermuth].

[5] *See, e.g.*, Wermuth, *supra* note 4, at 2-12.

[6] The branch of law concerning "the law of war" sets out the rules of conduct for hostilities, and it is based on customary law. This section of the law reflects recognized practices of States in war, as well as treaty law. Such examples of treaty law include the Hague Regulations of 1899 and 1907, the four Geneva Conventions of 1949. The Four Geneva Conventions protect war victims—the sick and wounded (First); the shipwrecked (Second); prisoners of war (Third); and, to a limited extent, all civilians in the territories of the countries in conflict (Fourth). This treaty law also includes the Addi-

law governing domestic military activities is in many ways emergent and commonly misunderstood.[7] Moreover, due to time-honored American mores favoring limited military participation in civilian law enforcement and opposition to government overreaching, issues associated with activities of the armed forces inside the United States can be particularly controversial insofar as they entail use of advanced military technology.

There is perhaps no better example of the quandaries faced by legal practitioners in this regard than the statutory and regulatory regime for employing military satellite reconnaissance inside the United States or, more specifically, whenever "United States persons"—i.e., U.S. citizens, corporations, or legal resident aliens—are involved. On the one hand, international legal principals governing States' use of satellite reconnaissance are relatively well-established and, like many international norms related to military activities, afford States broad latitude to act in the interest of their national security. Conversely, U.S. law pertaining to DoD's use of domestic satellite surveillance is a convoluted patchwork of statutes and regulations which are understandably restrictive in nature. The complexity of this scheme in many ways reflects the diverse, sometimes countervailing interests of the armed forces, the Intelligence Community, and the many law enforcement organizations involved in homeland security, and the interplay of constitutionally protected civil liberties.

This article provides a basic overview of the legal regime related to DoD's use of satellite surveillance, more specifically satellite photoreconnaissance,[8] inside the United States. As part of the "national reconnaissance imagery platform" architecture, reconnaissance satellites support DoD in carrying out U.S. na-

---

tional Protocols of 1977, which define key terms, such as "*combatants*," and prohibited practices such as "indiscriminate attack."

[7] Wermuth, *supra* note 4, at 3.

[8] Satellite surveillance could in theory also include "signals intelligence" or SIGINT, that is "[i]ntelligence derived from communications, electronic, and foreign instrumentation signals." U.S. JOINT CHIEFS OF STAFF, JOINT PUBLICATION 1-02, DEPARTMENT OF DEFENSE DICTIONARY OF MILITARY AND ASSOCIATED TERMS (Apr. 12, 2001), available at http:// www.dtic.mil/doctrine (last visited June 6, 2005) [hereinafter DoD DICTIONARY].

tional security objectives, but operate under the control of the Director of Central Intelligence.[9] Accordingly, these same national systems also support the Department of State and other federal departments and agencies outside of DoD.[10] In this latter regard, there are many "Tasking, Processing, Exploitation, and Dissemination" (TPED) issues arising out of the shared use of this limited resource, as well as challenges associated with the formulation of policies and procedures for the use of national systems by a wide array of Federal civil agencies, each with its own particular set of rules and restrictions. These matters, however, are outside the scope of the ensuing discussion, as are restrictions on the exploitation of classified satellite imagery for mapping, civil observation, and other nontraditional uses.

This article is divided into three main parts. Part I provides a brief synopsis of international law governing satellite reconnaissance, which is in many ways a by-product of long-standing U.S. policies, and, in essence, stands for the freedom of states to engage in intelligence gathering from outer space. As such, Part I serves as a launching point of sorts for the discussion that follows in Part II, which analyzes the restrictive legal and regulatory regime applicable to the military use of satellite reconnaissance domestically. Finally, the Conclusion contains some final remarks and proffers a possible solution. The article is intended to provide a concise statement of the rules relative to domestic satellite reconnaissance, while simultaneously high-

---

[9] *See infra* notes 64-68 and accompanying text.

[10] 50 U.S.C. § 404e (2004). For instance, the Civil Applications Committee (CAC), a Federal interagency committee, provides civil Federal agencies with access to classified imagery information needed to support their missions. Established in 1968 and officially chartered in 1975 by the Office of the President, the CAC is chaired by the U.S. Geological Survey (USGS) and includes representatives from the Department of Agriculture, Department of Commerce, Department of Energy, Department of the Interior, Department of Transportation, Federal Emergency Management Agency, National Aeronautics and Space Administration, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, and National Science Foundation. In addition to traditional mapping, activities of the CAC include a broad spectrum of environmental and remote sensing applications, including: monitoring volcanoes; detecting wild fires; responding to emergencies caused by natural disasters, such as hurricanes, earthquakes, and floods; monitoring ecosystems; and mapping wetlands. The USGS further supports Federal civil agency use of classified satellite imagery by providing imagery acquisition services, and the use of secure facilities and data exploitation systems to all CAC member agencies, through its National Civil Applications Program (NCAP).

lighting gaps in the law that could impact DoD's ability to fulfill its role in providing assistance to civilian authorities that share responsibility for U.S. homeland security.

## I. INTERNATIONAL LEGAL REGIME

### *A. The Freedom to Conduct Satellite Reconnaissance*

From the first overflight of the Soviet Union by a U-2 reconnaissance aircraft in July 1956, the Eisenhower Administration recognized that the usefulness of the "spy plane" to acquire imagery of the U.S.S.R was transitory.[11] However, with the downing of Captain Gary Powers' U-2 on May 1, 1960, the U.S. commitment to satellite reconnaissance became a *fait accompli.*[12] Indeed, as the Cold War confrontation between the United States and the Soviet Union intensified, there was a keen sense of urgency within the administration to deploy reconnaissance satellites as "a means of penetrating Soviet secretiveness."[13] Establishing the principle of "freedom of space" and the corresponding right of unimpeded overflight in outer space for military reconnaissance satellites was, thus, perhaps the principal aim of U.S. space policy throughout the first ten years of the space age (1957-66).[14]

American efforts to obtain international political and legal sanction for space-based photoreconnaissance arguably came to fruition with the conclusion of the Outer Space Treaty of 1967.[15] The first three articles of the Outer Space Treaty create a

---

[11] Albert D. Wheelon, *Lifting the Veil on Corona*, 11 SPACE POLICY 249, 251 (1995).

[12] *See* PAUL B. STARES, THE MILITARIZATION OF SPACE: U.S. POLICY, 1945-1984, 46 (1987).

[13] *See id.* and DEPT. OF STATE, PLANNING IMPLICATIONS FOR NATIONAL SECURITY OF OUTER SPACE IN THE 1970S, BASIC NATIONAL SECURITY POLICY PLANNING TASK I (1964), *quoted in* STARES, *supra* note 12, at 94; *see also* COLIN S. GRAY, AMERICAN MILITARY SPACE POLICY: INFORMATION SYSTEMS, WEAPON SYSTEMS AND ARMS CONTROL 26 (1982) ("The different political characteristics of the two societies render[ed] the U.S. far more dependent upon photographic and electronic intelligence.").

[14] *See* STARES, *supra* note 12, at 35, 59-71; *and* DAVID N. SPIRES, BEYOND HORIZONS: A HALF CENTURY OF AIR FORCE SPACE LEADERSHIP 38-40 (rev. ed. 1998).

[15] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, G.A. Res. 2222, U.N. GAOR, 21st Sess., Supp. No. 16, at 13, U.N. Doc. A/6316 (1967), 18 U.S.T. 2410, 1967 U.S.T. LEXIS 613 [hereinafter Outer Space Treaty].

framework for the peaceful exploration and use of outer space and comprise space law's four basic elements.[16] First, the "common interest principle" (Article I) requires that exploration and use of outer space be for the common "benefit and interest" of all States. Second, the "freedom principle" (Article I) assures freedom of access to, and freedom of exploration and use of outer space for all States.[17] Third, the "nonappropriation principle" (Article II) means that outer space cannot be subjected to exclusive claims of sovereignty by select States.[18] Fourth, Article III makes general principles of international law (*lex generalis*), including rules of customary law, and the United Nations (U.N.) Charter[19] applicable to outer space.[20]

Together, the principles enumerated in Articles I and II of the Outer Space Treaty establish outer space as a *res communis* under international law.[21] That is, "space is owned by no one but is free for use by everyone."[22] As such, military reconnaissance satellites orbiting the Earth operate in *territorium extra commercium* or "international space," much like aircraft operating in international airspace over the high seas; ergo, data gathering by such satellites is consistent with international norms.[23] Additionally, the application of international law in

---

[16] CENTRE FOR RESEARCH OF AIR & SPACE LAW, MCGILL UNIVERSITY, SPACE ACTIVITIES AND EMERGING INTERNATIONAL LAW 270 (Nicolas M. Matte ed., 1984) [hereinafter SPACE ACTIVITIES & INT'L LAW]; *compare id. with* BESS C.M. REIJNEN, THE UNITED NATIONS SPACE TREATIES ANALYSED 16 (Editions Frontières 1992) (noting that, in practice, common interest principle has predominantly been interpreted as assuring only "equitable access" to outer space and its benefits for those States having requisite technology and financial resources).

[17] *See* SPACE ACTIVITIES & INT'L LAW, *supra* note 16, at 270.

[18] *See id.* at 275.

[19] Charter of the United Nations, Jun. 26, 1945, 59 Stat. 1031, T.S. 993, 3 Bevans 1153, 1945 U.S.T. LEXIS 199, ratified by the United States on Aug. 8, 1945 and entered into force on Oct. 24, 1945.

[20] *See* Ivan A. Vlasic, *Space Law and the Military Applications of Space Technology*, *in* PERSPECTIVES ON INTERNATIONAL LAW 385, 394 (N. Jasentuliyana ed., 1995); *see also* REIJNEN, *supra* note 16, at 102.

[21] *See* Carl Q. Christol, *Article 2 of the 1967 Principles Treaty Revisited*, 9 ANNALS OF AIR & SPACE L. 217, 217-21 (1984).

[22] *See* Rochus Moenter, *The International Space Station Legal Framework and Current Status*, 64 J. AIR L. & COM 1033, 1039 (1999).

[23] *See* THE HIGHWAYS OF AIR AND SPACE LAW OVER ASIA 49-76 (Chai-Jui Cheng & P. Mendes de Leon eds., 1992), *reprinted in* BIN CHENG, STUDIES IN INTERNATIONAL SPACE LAW 572, 578-81 (1997).

outer space under Article III of the Outer Space Treaty means that Article 2(4) of the U.N. Charter applies in outer space, making it unlawful for a State to interfere in a hostile manner with the space assets of another State, to include reconnaissance satellites.[24] It also means that the self-defense exception to the bar on the use of force recognized under Article 51 of the U.N. Charter also applies in space, so that a State can legally use force to defend itself against such hostile actions should they nevertheless occur.[25]

The foregoing provisions of the Outer Space Treaty are generally viewed as enunciating preexisting legal principles based on the practice of States dating back to the launching of the first satellite.[26] Therefore, these legal principles are considered to be

---

[24] *See* Vlasic, *supra* note 20, at 394; *and* Philip D. O'Neill, Jr., *The Development of International Law Governing the Military Use of Outer Space*, *in* NATIONAL INTERESTS AND THE MILITARY USE OF SPACE 169, 177 (William J. Durch ed., 1984); *see also* Manfred Lachs, Preserving the Space Environment (Opening Address to Symposium on Conditions Essential for Maintaining Outer Space for Peaceful Uses, Mar. 12, 1984), *in* MAINTAINING OUTER SPACE FOR PEACEFUL PURPOSES 5, 7 (Nandasiri Jasentuliyana ed., 1984) (Proceedings of Symposium held in The Hague, Mar. 1984) [hereinafter PEACEFUL PURPOSES].

[25] S. HOUSTON LAY & HOWARD J. TAUBENFELD, STUDY ON THE LAW RELATING TO ACTIVITIES OF MAN IN SPACE 73 (1970) (surmising that "Under present treaty rules and/or customary law, as demonstrated in practice, national statements, and United Nations resolutions... [i]nternational law including the United Nations Charter where appropriate, applies to acts in outer space. This expressly includes the right of self defense."); *see also* BRUCE A. HURWITZ, THE LEGALITY OF SPACE MILITARIZATION 72 (1986) (noting that Legal Sub-Committee of U.N. Committee for Peaceful Uses of Outer Space (COPUOS) rejected view that right of self-defense does not extend to outer space); *and* GENNADII ZHUKOV, INTERNATIONAL SPACE LAW 89 (Progress Publishers 1976) (stating that States can lawfully use force in or through outer space in self-defense); *see also* J.E.S. FAWCETT, INTERNATIONAL LAW AND THE USE OF OUTER SPACE 39 (1968) (reasoning that no provision of Charter or rule of customary law imposes "any upper limit above the surface of the Earth on the legitimate exercise of the right of self-defense.").

[26] *See* MAURICE N. ANDEM, INTERNATIONAL LEGAL PROBLEMS IN THE PEACEFUL EXPLORATION AND USE OF OUTER SPACE 15 (1992) ("[D]uring the launching into orbit by the Soviet Union in 1957 of the first artificial earth satellite, Sputnik-1, there was no protest in any form from any state or group of states about any violation of, or infringement on its territorial sovereignty of its air space... [therefore] all states established as a precedent the principle of the freedom of flight of space objects of one state over the territory (air space) of another."); *see also, e.g.*, Question of the peaceful use of outer space, G.A. Res. 1348, U.N. GAOR, 13th Sess., Supp. No. 18, at 5, U.N. Doc. A/4090 (1959); *and* Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, G.A. Res. 1962, U.N. GAOR, 18th Sess., Supp. No. 15, at 15, U.N. Doc. A/5515 (1964); *and* International Cooperation in the Peaceful Uses of Outer Space, G.A. Res. 1721, *reprinted in* C. WILFRED JENKS, SPACE LAW 320 (1965).

part of customary international law and, thus, binding on all States regardless of whether they are actually a party to the agreement.[27] Furthermore, a consensus has developed within the U.N., which recognizes that the Outer Space Treaty mandate that space be used "exclusively for peaceful purpose"[28] allows for self-defense as well as intelligence-related activities in outer space.[29] Hence, it can fairly be said that international law affords States a fundamental right to acquire data from space.[30]

Of course, this view is by no means universal. Indeed, some States continue to characterize space-based surveillance as "non-peaceful" and, therefore, unlawful under Article IV of the Outer Space Treaty.[31] In addition, U.N. sanction of data collection from space, which is implicit in its Principles on Remote Sensing of the Earth from Outer Space, is expressly restricted to civilian uses.[32] Nevertheless, all things considered, interna-

---

[27] *See* Ivan A. Vlasic, *The Growth of Space Law 1957-65: Achievements and Issues*, in YEARBOOK OF AIR AND SPACE LAW 1965, at 365, 374-80 (René H. Mankiewicz ed., 1967).

[28] Outer Space Treaty, *supra* note 15, art. IV (providing that "[t]he moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes.").

[29] *See* CARL Q. CHRISTOL, THE MODERN INTERNATIONAL LAW OF OUTER SPACE 24-25 (1982); *and* G.S. Raju, Military Use of Outer Space: Towards Better Legal Controls, *in* PEACEFUL PURPOSES, *supra* note 24, at 91; *see also* Richard A. Morgan, *Military Use of Commercial Communication Satellites: A New Look at the Outer Space Treaty and "Peaceful Purposes,"* 60 J. AIR L. & COM. 237, 303 (1994) (noting that consensus within U.N. is consistent with Outer Space Treaty's "peaceful purposes" requirement, where military uses of space are permissible and lawful as long as they remain 'nonaggressive' as per Article 2(4) of the U.N. Charter, which prohibits "the threat or use of force").

[30] *See* White House Fact Sheet, National Space Policy (Sep. 19, 1996), *available at* http://www.spaceref.ca/news/viewpr.html?pid=3355 (last visited June 6, 2005) [hereinafter National Space Policy (1996)].

[31] *See, e.g.*, Report of the Committee on the Peaceful Uses of Outer Space, U.N. GAOR, 56th Sess., Supp. No. 20, at 4, U.N. Doc. A/56/20 (2001) (noting that one delegation expressed view that "international cooperation in the peaceful uses of outer space was hindered by non-peaceful utilization of space technology, for example the development of spy satellites."); *see also* CHENG, *supra* note 23, at 582-83 ("[The Soviet Union and some Eastern European countries] used to maintain that espionage, no matter where it was carried out, was contrary to international law and the Charter of the United Nations, and that space objects and astronauts involved in such 'illegal' activities would place themselves outside the pale of the various space treaties.").

[32] *See* Principles Relating to Remote Sensing of the Earth from Outer Space, Principle 1(a), U.N. GAOR, 41st Sess., Supp. No. 20, U.N. Doc. A/41/20 and Corr. 1 (1986); *see also* Steven Gorove, *The U.N. Principles on Remote Sensing: Focus on Possible Controversial Issues*, *in* LIBER AMICORUM HONORING NICOLAS MATTE 105, 106 (1989); *see gen-*

tional acceptance of the legitimacy of intelligence gathering from outer space was effectively secured with the enshrinement of space-based photoreconnaissance in the Cold War strategic arms control regime, wherein it is described as "National Technical Means."[33]

### *B. Prohibition on Interference with "National Technical Means"*

In May 1972, the first round of Strategic Arms Limitation Talks (SALT) between the United States and the Union of Soviet Socialist Republics concluded with the execution of both the Anti-Ballistic Missile Treaty (ABM) Treaty[34] and the SALT I agreement.[35] The ABM Treaty was intended to curb the nuclear arms race and reduce the risk of nuclear war between the two superpowers by placing limitations on ABM systems,[36] to include a prohibition on development, testing, or deployment of space-based ABM systems or components.[37] Conversely, SALT I was "a holding action, designed to complement the ABM Treaty... and provide time for further negotiations," by freezing the number of inter-continental ballistic missile (ICBM) launchers and submarine launched ballistic missile (SLBM) launchers on each side.[38]

Notably, both the ABM and SALT I treaties contained identical provisions prohibiting any "interference" with the "national

---

*erally* Michael R. Hoversten, U.S. National Security and Government Regulation of Commercial Remote Sensing from Outer Space, 50 A.F. L. REV. 253, 262-65 (2001).

[33] Wheelon, supra note 11, at 251.

[34] Treaty on the Limitation of Anti-Ballistic Missile Systems, May 26, 1972, U.S.-U.S.S.R., 23 U.S.T. 3435, 1972 U.S.T. LEXIS 74 (ratified by the United States on Sep. 30, 1972; entered into force on Oct. 3, 1972) [hereinafter ABM Treaty].

[35] Interim Agreement between the United States of America and the Union of Soviet Socialist Republics on Certain Measures with Respect to the Limitation of Strategic Arms, May. 26 1972, U.S.-U.S.S.R., 23 U.S.T. 3462, 1972 U.S.T. LEXIS 75 (entered into force on May 24, 1976) [hereinafter SALT I].

[36] ABM Treaty, *supra* note 34, Preamble.

[37] *Id.* at art. V. It has been argued that the ABM Treaty, in effect, codified the MAD doctrine, because "it preserved the theory that nuclear war would be deterred on the basis of nuclear offensive forces to mutually destroy each other." John E. Parkerson, Jr., *International Legal Implications of the Strategic Defense Initiative*, 116 MIL. L. REV. 67, 97 (1987) (citing CHRISTIAN SCIENCE MONITOR, Nov. 4, 1985, at 29, col. 4).

[38] U.S. ARMS CONTROL & DISARMAMENT AGENCY, ARMS CONTROL AND DISARMAMENT AGREEMENTS 121 (1996); *see also* ABM Treaty, *supra* note 34, art. I-III.

technical means" (NTM) used by either side to assure or verify compliance by the other party.[39] Although NTM is not explicitly defined in the text or negotiating history of either treaty,[40] NTM is generally understood to refer to the array of intelligence gathering capabilities that are used to collect data from outside the territory of the observed nation. It includes land-based radars, radar and intelligence systems on ships and aircraft, long-distance seismic sensors, air sampling equipment, and photo-reconnaissance satellites and space-based sensors.[41] Furthermore, while the meaning of the "noninterference clause"[42] was never made explicit at the time,[43] the prevailing interpretation is that it outlaws actions taken by one party to disrupt the operation of any NTM of the other party.[44] Accordingly, the two treaties tacitly recognized the legality of space-based reconnaissance and data collection as a means of verifying treaty compliance, and the treaties prohibited any interference with their function in this capacity.[45]

Of course, the ABM Treaty's bilateral ban on the development, testing, or deployment of space-based ABM systems expired along with the rest of the treaty's provisions, when the

---

[39] ABM Treaty, *supra* note 34, art. XII, para. 1 & 2; *and* SALT I Agreement, *supra* note 35, art. V, para. 1 & 2.

[40] *See* David A. Koplow, *Arms Control Inspection: Constitutional Restrictions on Treaty Verification in the United States*, 63 N.Y.U.L. REV. 229, 240 n.39 (1988) (noting that NTM is not defined in "any of the arms control treaties that use the term, and official statements are careful to avoid the restrictiveness that might accompany a precise definition." (citing WILLIAM F. ROWELL, ARMS CONTROL VERIFICATION: A GUIDE TO POLICY ISSUES FOR THE 1980S, at 52 (1986))).

[41] *Id.* at 240; *see also* Ivan A. Vlasic, *Verifying Compliance with Arms Control Agreements: What Ever Happened to ISMA?, in* ARMS CONTROL AND DISARMAMENT IN OUTER SPACE 191 (Nicholas M. Matte, ed., 1985) (noting that "national technical means" includes "a variety of technical information-gathering methods for monitoring both military activities and armaments subject to verification... [consisting] most importantly, of satellites, ships, aircraft and ground based radar stations, as well as other technical devices.").

[42] Sources cited *supra* note 39.

[43] STARES, *supra* note 12, at 166.

[44] *See* Koplow, *supra* note 40, at 256 n.153 (citing BUREAU OF PUBLIC AFFAIRS, U.S. DEP'T OF STATE, SPECIAL REPORT NO. 55, COMPLIANCE WITH SALT I AGREEMENTS, at 3-4 (1979)).

[45] STARES, *supra* note 12, at 168.

U.S. withdrew from the accord in June 2002.[46] However, the principle of "noninterference" with NTM endured under the auspices of SALT I and in certain other arms control agreements that were concluded between the two Cold War adversaries.[47] Moreover, in 1990, the sixteen member states of the North Atlantic Treaty Organization (NATO)[48] and six members of the former Warsaw Pact[49] concluded the Treaty on Conventional Armed Forces in Europe (CFE Treaty),[50] which contains a prohibition on interference with NTM very similar to the provisions found in the ABM Treaty and other arms control agreements.

However, the CFE treaty is particularly noteworthy in that it refers to "multinational" as well as national technical means of verification. Specifically, the CFE Treaty provides that, "[a] State Party shall not interfere with national *or multinational* technical means of verification of another State Party."[51] The reference to "multinational technical means" was added to the treaty at the request of NATO member States that wanted to

---

[46] *See* U.S. DEPT. OF STATE, TEXT OF DIPLOMATIC NOTES SENT TO RUSSIA, BELARUS, KAZAKHSTAN, AND THE UKRAINE ON DECEMBER 13, 2001 (Dec. 14, 2001), *available at* http://www.state.gov/r/pa/prs/ps/2001/6859.htm (last visited June 6, 2005); *but compare* George Miron, *Legal Memorandum: Did the ABM Treaty of 1972 Remain in Force After the USSR Ceased to Exist in December 1991 and Did It Become a Treaty Between the United States and the Russian Federation?*, 17 AM. U. INT'L L. REV. 189 (concluding that ABM Treaty between the United States and Union of Soviet Socialist Republics (U.S.S.R.) lapsed in 1991, when U.S.S.R. dissolved and, thereby, ceased to exist).

[47] *See, e.g.*, Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Strategic Offensive Arms [SALT II], June 18, 1979, U.S.-U.S.S.R., art. XV, 1979 U.S.T. LEXIS 220, *reprinted in* 18 I.L.M. 1138 (no longer in force); Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter Range Missiles [INF Treaty], Dec. 8, 1987, U.S.-U.S.S.R., art. XII, 1987 U.S.T. LEXIS 211, *reprinted in* 27 I.L.M. 90; *and* Treaty on the Reduction and Limitation of Strategic Offensive Arms, Jul. 31, 1991, U.S.-U.S.S.R., art. IX, S. TREATY DOC. NO. 102-20 [hereinafter START Treaty].

[48] NATO then consisted of Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Turkey, United Kingdom, and United States.

[49] The former *Warsaw Pact* consisted of Bulgaria, Czech and Slovak Federal Republic, Hungary, Poland, Romania, and Union of Soviet Socialist Republics.

[50] Treaty on Conventional Armed Forces in Europe, Nov. 19, 1990, 1990 U.S.T. LEXIS 227, *reprinted in* 30 I.L.M. 1 (entered into force Nov. 9, 1992) [hereinafter CFE Treaty].

[51] *Id.* at art. XV, para. 2 (emphasis added).

make it clear that CFE State Parties could jointly operate technical means of verification.[52]

Upon entering into force in 1992, the CFE Treaty thus extended application of the once bilateral precept of "noninterference with NTM" to all twenty-two State Parties to the treaty. Thereafter, in May 1996, the CFE Treaty was amended to take into account the evolving European geo-strategic environment following the demise of the Warsaw Pact and the enlargement of NATO,[53] at which time the number of State Parties to the CFE Treaty expanded to thirty.[54] Consequently, today the military space activities of all thirty CFE State Parties are specifically, albeit perhaps only negligibly, restricted by the treaty's prohibition on interference with NTM. In other words, unless a State Party is acting in self-defense or pursuant to a U.N. Security Council mandate, any purposeful attempt to disrupt operation of another Party's space-based NTM or, alternatively, to disrupt operation of another Party's terrestrial NTM *from* space, would constitute "interference" with that system in violation of Article XV of the CFE Treaty. Plus, such "interference" is a violation of Article XV, no matter how *de minimus* in scope or effect any such attempt may be.[55]

International recognition of the fundamental right of States to acquire data from space for intelligence purposes was the cornerstone of the "open sky" policy that guided the U.S. effort

---

[52] U.S. DEPT. OF STATE, LETTER OF SUBMITTAL FOR CONVENTIONAL ARMED FORCES IN EUROPE (CFE) TREATY, Jul. 2, 1991, S. TREATY DOC. NO. 102-8, 1990 U.S.T. LEXIS 227, at 167.

[53] *See* BUREAU OF ARMS CONTROL, U.S. DEPT. OF STATE, FACT SHEET ON CONVENTIONAL ARMED FORCES IN EUROPE (CFE) TREATY (Jun. 18, 2002), *available at* http://www.state.gov/t/ac/rls/fs/11243.htm (last viewed June 6, 2005); *see also* Marian Nash, *Contemporary Practice of the United States Relating to International Law*, 91 AM. J. INT'L L. 493, (1997).

[54] *Id.* The thirty CFE State Parties are: Armenia, Azerbaijan, Belarus, Belgium, Bulgaria, Canada, Czech Republic, Denmark, France, Georgia, Germany, Greece, Hungary, Iceland, Italy, Kazakhstan, Luxembourg, Moldova, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovak Republic, Spain, Turkey, Ukraine, United Kingdom, and United States. *Id.*

[55] As noted previously, hostile interference with space systems that is commensurate with the use of armed force is prohibited under Article 2(4) of the U.N. Charter. *See supra* note 24.

at an initial foray into space in the mid-1950s,[56] and this doctrine remains a key element of the nation's space policy to this day.[57] At the same time, the recognition of the importance of photoreconnaissance satellites as a stabilizing factor in world affairs through the monitoring of arms control agreements and the positive contribution they have made to the security of all nations have each led to the assimilation of the lawfulness of space-based "intelligence, surveillance, and reconnaissance" into the *corpus juris spatialis*.[58] However, the specter of the Gestapo secret police of Nazi Germany that loomed over the creation of the modern U.S. military-intelligence apparatus in 1947,[59] and a series of "especially troubling" infringements on civil liberties and other abuses by U.S. intelligence agencies which occurred over the course of the succeeding decades,[60] have contributed to a much different treatment of satellite reconnaissance under U.S. domestic law.

## II. DOMESTIC LEGAL RESTRICTIONS

Given the longstanding American support for the use of outer space for defense and intelligence purposes, it is ironic that the concept of domestic legal restrictions on satellite imaging is probably most commonly associated with the United States' seemingly paradoxical response to the potential threat to national security posed by the proliferation of commercial sat-

---

[56] *See* NAT'L SECURITY COUNCIL, U.S. SCIENTIFIC SATELLITE PROGRAM (NSC 5520) (1955), *reprinted in* ORGANIZING FOR EXPLORATION, 1 EXPLORING THE UNKNOWN: SELECTED DOCUMENTS IN THE HISTORY OF THE U.S. CIVIL SPACE PROGRAM (J. Logsdon ed., 1998), *construed in* STARES, *supra* note 12, at 33-35, *and* SPIRES, *supra* note 14, at 40-43.

[57] National Space Policy (1996), supra note 30.

[58] Ivan A. Vlasic, *The Legal Aspects of Peaceful and Non-Peaceful Uses of Outer Space*, *in* PEACEFUL AND NON-PEACEFUL USES OF SPACE 37, at 38, 45 (B. Jasani ed., 1991).

[59] *See* William C. Banks & Peter Raven-Hansen, *Targeted Killing and Assassination: The U.S. Legal Framework*, 37 U. RICH. L. REV. 667, 695-98 (2003); *see also* DAVID MCCULLOUGH, TRUMAN 550-553 (1992).

[60] *See* SELECT COMM. ON INTELLIGENCE, 103D CONG., LEGISLATIVE OVERSIGHT OF INTELLIGENCE ACTIVITIES: THE U.S. EXPERIENCE 3-6 (Comm. Print 1994) [hereinafter SENATE REPORT ON INTELLIGENCE OVERSIGHT].

ellite imagery—*i.e.*, "shutter control."[61] Shutter control is a euphemism for the statutory, regulatory, and policy scheme that gives the federal government the authority to restrict U.S. commercial satellite companies' collection or distribution of imagery that might compromise U.S. national security interests.[62] However, in the post-9/11 homeland defense paradigm, the notion of domestic legal restrictions on satellite imaging has an entirely different meaning. Whereas shutter control curtails the activities of private entities, the legal restrictions at issue here are intended to keep a tight rein on DoD intelligence elements. Additionally, while shutter control raises constitutional concerns about the prior restraint of free speech,[63] limitations on domestic use of national photoreconnaissance platforms are intended to protect the public from governmental intrusions that would contravene their right to be free from unreasonable searches, right to privacy, and other constitutionally protected civil liberties.

### *A. Restrictions on Military Satellite Imaging of "U.S. Persons"*

The National Security Act of 1947 (Act) is perhaps best known within military circles for reorganizing the U.S. national defense structure for the post-war era, to include creating the DoD and establishing the Air Force as a separate armed service. However, the Act is also noteworthy as the primary authorizing statute for the U.S. intelligence apparatus.[64] In this latter regard, the Act established the Central Intelligence Agency (CIA) as an independent intelligence agency, separate and distinct from the departments charged with the conduct of foreign rela-

---

[61] NAT'L IMAGERY AND MAPPING AGENCY, IMAGERY POLICY SERIES § 9, pt. B, at 9 (1993) (portions of document are classified) [hereinafter IPS § 9, pt. B]. Notably, domestic imagery from commercial systems does not fall under the authorities of the DCI, and therefore use of such "open source" imagery is governed by authorities and responsibilities specific to the user organization. *Id.*

[62] *See, e.g.*, Hoversten, *supra* note 32; *and* Raphael Prober, *Shutter Control: Confronting Tomorrow's Technology with Yesterday's Regulations*, 19 J. L. & POLITICS 203 (2003).

[63] *See* Prober, *supra* note 62, at 203-4.

[64] National Security Act of 1947, 61 Stat. 496 (codified as amended at 50 U.S.C. §§ 401-441c (1994)) [hereinafter Nat'l Security Act].

tions or the preservation of national defense. It also created the position of Director of Central Intelligence (DCI) to serve as both head of the CIA and leader of the "Intelligence Community" (IC),[65] with responsibility for consolidating intelligence gathered by intelligence arms of other departments and agencies.[66] The Act further dictates that U.S. "national reconnaissance imagery platforms"[67] operate under the authority of the DCI.[68] Consequently, these systems must also operate subject to legal and policy limitations on IC activities derived from the U.S. Constitution, the Act, Executive Order 12333, and other applicable statutes and directives.

Executive Order (E.O.) 12333 implements the National Security Act and details the duties and responsibilities of all agencies and activities within the IC, including those of DoD.[69] Among other things, E.O. 12333 directs the Secretary of Defense to "[c]ollect, produce and disseminate military and military-related foreign intelligence and counterintelligence as required for execution of [DoD] responsibilities."[70] E.O. 12333 also requires that the Secretary of Defense act in concert with the Attorney General to promulgate procedures for the collection, retention and dissemination of information within the United States, as well as the use of certain information gathering techniques.[71] The full panoply of these statutorily mandated proce-

---

[65] The "intelligence community" consists of federal executive branch agencies and organizations that work separately and together to conduct U.S. intelligence activities. Today, the DoD IC members are: the Defense Intelligence Agency (DIA); the National Security Agency (NSA); the National Reconnaissance Office (NRO); the National Geospatial-Intelligence Agency (NGA) and the Army, Navy, Air Force, and Marine Corps Intelligence Agencies; and the Non-DoD IC members are: the Central Intelligence Agency (CIA); the Department of Homeland Security (DHS); the Federal Bureau of Investigation (FBI); the State, Energy and Treasury Departments; and the United States Coast Guard.

[66] SENATE REPORT ON INTELLIGENCE OVERSIGHT, supra note 60, at 2-3.

[67] IPS § 9, pt. B, *supra* note 61, at 2. "National reconnaissance imagery platforms" include both spaceborne and certain airborne platforms. *Id.*

[68] Nat'l Security Act, *supra* note 64, § 111, 50 U.S.C. § 404f (1994).

[69] Exec. Order No. 12333, 46 Fed. Reg. 59,941, para. 1.11, at 59,946 (Dec. 4, 1981), 3 C.F.R., 1981 Comp., at 200 [hereinafter E.O. 12333].

[70] *Id.* at para. 1.11(b), (d), (h).

[71] *Id.* at para. 1.11(d); *see also* U.S. DEPT. OF DEFENSE DIRECTIVE 5240.1, DOD INTELLIGENCE ACTIVITIES, para. 4.2, at 4 (1988) [hereinafter DODD 5240.1].

dures is set forth in DoD Regulation 5240.1-R,[72] but *Procedure 2*, entitled "Collection of Information about United States Persons," is particularly significant for present purposes. It not only specifies the kinds of information about "U.S. persons"[73] that may be collected by Defense intelligence components, but also establishes criteria governing the means of collection, including the use of "overhead reconnaissance."[74]

To start with, *Procedure 2* requires that information about U.S. persons only be acquired using the "least intrusive means," which is established through a four-step methodology.[75] First, to the extent feasible, information about U.S. persons must be collected exclusively from publicly available sources or with the consent of the person concerned. Second, if collection from these sources is not feasible or sufficient, information may be collected from cooperating sources. Third, if collection from cooperating sources is not feasible or sufficient, other lawful investigative techniques that *do not* require a judicial warrant or the approval of the Attorney General may then be employed, as appropriate. Finally, if use of this third set of techniques is not feasible or sufficient, *Procedure 2* allows for the use of investigative techniques that *do* require a warrant or approval by the Attorney General.[76]

But exactly where "overhead reconnaissance" fits in this analytical framework is not made clear. Certainly, given the on-demand availability of commercial high-resolution satellite imagery over the Internet,[77] photographic images collected via

---

[72] U.S. DEPT. OF DEFENSE REGULATION 5240.1-R, PROCEDURES GOVERNING THE ACTIVITIES OF DOD INTELLIGENCE COMPONENTS THAT AFFECT UNITED STATES PERSONS (1982) [hereinafter DOD 5240.1-R].

[73] "'United States person' means a citizen of the United States, an alien lawfully admitted for permanent residence (as defined in section 101(a)(20) of the Immigration and Nationality Act), an unincorporated association a substantial number of members of which are citizens of the United States or aliens lawfully admitted for permanent residence, or a corporation which is incorporated in the united States, but does not include a corporation or an association which is a foreign power...." 50 U.S.C. § 1801 (1994).

[74] DOD 5240.1-R, *supra* note 72, at 2-1.

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

[76] *Id.* (emphasis added).

[77] Both of the U.S. commercial satellite imagery firms (Orbimage Inc. and Space Imaging Inc.) sell their imagery products over the Internet; however, as noted previously

satellite might reasonably be assumed to fall within the rubric of "publicly available information," as opposed to an "investigative technique" necessitating a warrant or special approval.[78] However, U.S. Supreme Court jurisprudence on the constitutional, Fourth Amendment "search and seizure" implications of aerial reconnaissance[79] and, most recently, the decision of the Court in *Kyllo v. United States*, 533 U.S. 27 (2001), suggest otherwise.

Notably, the Supreme Court has held that the Fourth Amendment does not require the police to obtain a warrant in order to perform naked-eye aerial observation of private homes, businesses, and surrounding areas.[80] The Court has further held that the mere fact that human vision is "enhanced" does not render aerial observations unconstitutional.[81] The idea that visual observation of those portions of a house or business that are in plain public view does not constitute a "search" is a logical extension of the principle enumerated in the case of *Katz v.*

---

(*supra* note 61), domestic imagery from commercial systems does not fall under the authorities of the DCI.

[78] Information is "available publicly" if it—has been published or broadcast for general public consumption, is available on request to a member of the general public, could lawfully be seen or heard by any casual observer, or is made available at a meeting open to the general public. In this context, the 'general public' also means general availability to persons in a military community even though the military community is not open to the civilian general public.

*Id.* at Appendix A, at A-1.

[79] The Fourth Amendment to the U.S. Constitution states:

> The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

U.S. CONST. amend. IV. Police and other government officials are therefore prohibited from searching homes or businesses or seizing their property without reasonable grounds to believe that a crime has been committed and, in most cases, cannot conduct a search of a home or business without a written search warrant from an impartial judge or magistrate, detailing where they will search and what they expect to find. *Id.*

[80] California v. Ciraolo, 476 U.S. 207 (1986); Dow Chemical Co. v. United States, 476 U.S. 227 (1986); Florida v. Riley, 488 U.S. 445 (1989); *see also* Kyllo v. United States, 533 U.S. 27, 34 (2001) ("[T]he technology enabling human flight has exposed to public view (and hence, we have said, to official observation) uncovered portions of the house and its curtilage that once were private.").

[81] *See Dow Chemical*, *supra* note 80 (upholding use of precision aerial mapping camera to collect images of industrial complex).

*United States*, 389 U.S. 347 (1989). In *Katz* the Court held, "[w]hat a person knowingly exposes to the public, even in his own home or office, is not subject to Fourth Amendment protection" because there is no reasonable expectation of privacy.[82]

Even so, when it comes to the subject of satellite surveillance of a house, business, or its curtilage, the Court has expressed ambivalence. For example, in *Dow Chemical Co. v. United States*, the majority opined that the aerial photographs at issue, which if enlarged and viewed under magnification would reveal objects as small as *one-half inch* in diameter, were "not so revealing of intimate details as to raise constitutional concerns."[83] But, at the same time, the Court maintained that use of "highly sophisticated surveillance equipment not generally available to the public, such as *satellite technology*," to surveil private property "might be constitutionally proscribed absent a warrant."[84] Similarly, in *Kyllo* the Court held that utilizing a high-tech device not in general public use (*i.e.*, a thermal imager) to surveil a home is a "search" and is thus presumptively unreasonable without a warrant. The Court noted that the device revealed "details of the home that would have otherwise been unknowable with out physical intrusion."[85] Applying this rationale to space-based surveillance, one could logically surmise that insofar as satellite imaging of the *exterior* of a house is no more revealing than visual observation of the property from the air, it would be no more violative of the Fourth Amendment and, therefore, equally permissible without a warrant. Yet, the Court seems prepared to reject this reasoning

---

[82] 389 U.S. 347, 351 (1967), *quoted in Ciraolo*, *supra* note 80, at 213; *see also Kyllo*, *supra* note 80, at 32.

[83] *Dow Chemical*, *supra* note 80, at 238 ("Although [the photographs] undoubtedly give EPA more detailed information than naked-eye views, they remain limited to an outline of the facility's buildings and equipment."); *id.* at 238 n.5 ("No objects as small as ½-inch in diameter such as a class ring, for example, are recognizable, nor are there any identifiable human faces or secret documents captured in such a fashion as to implicate more serious privacy concerns.").

[84] *Id.* (emphasis added); *cf.* Washington v. Jackson, 150 Wn.2d 251, 76 P.3d 217 (2003) (holding that attaching global positioning system (GPS) device to vehicle in order to track driver's movements via satellite requires warrant).

[85] *Kyllo*, *supra* note 80, at 40.

outright, as an "overly mechanical" interpretation of these Constitutional protections.[86]

The utilization of national photoreconnaissance assets to obtain "domestic imagery"[87] is, in fact, governed by procedures promulgated by the National Geospatial-Intelligence Agency (NGA),[88] formerly the National Imagery and Mapping Agency (NIMA).[89] The NGA is a DoD combat support agency[90] responsible for managing IC (to include DoD) use of "imagery and geospatial information" provided by the National Reconnaissance Office (NRO) whose raison d'etre is building and operating satellites.[91] According these procedures, IC elements can only use domestic imagery to further a clear "foreign intelligence mission," and then, only if commercial open source imagery of the targeted property is "unsuitable or unavailable."[92] Otherwise, military requests for domestic imagery must be made only in connection with "authorized activities of the armed forces."[93] Additionally, by statute "use of an electric, mechanical, or other

---

[86] *See id.* at 35-36:

> The Government maintains... that the thermal imaging must be upheld because it detected 'only heat radiating from the external surface of the house'.... But just as a thermal imager captures only heat emanating from a house, so also a powerful directional microphone picks up only sound emanating from a house and a satellite capable of scanning from many miles away would pick up only visible light emanating from a house. We rejected such a mechanical interpretation of the Fourth Amendment in *Katz*.

[87] "Domestic imagery" is defined as "any national reconnaissance imagery covering the land areas of the 50 United States, the District of Columbia, and the territories and possessions of the United States to a 12-nautical-mile seaward limit of the land areas." IPS § 9, pt. B, *supra* note 61, at 2.

[88] *See supra* note 61.

[89] National Defense Authorization Act for Fiscal Year 2004, Pub. L. No. 108-136, § 921, 117 Stat. 1392 (2003).

[90] *Cf.* 10 U.S.C. § 442 (2004) ("The [NGA] shall... [provide geospatial intelligence] in support of the national security objectives of the United States...."); *but see* 50 U.S.C. § 404e(a) (2005):

> In addition to the Department of Defense missions set forth in section 442 of title 10, United States Code, the National Geospatial-Intelligence Agency shall support the geospatial intelligence requirements of the Department of State and other departments and agencies of the United States outside the Department of Defense.

[91] Nat'l Security Act, *supra* note 64, § 105, 50 U.S.C. § 403-5(b)(2)-(3) (2005).

[92] IPS § 9, pt. B, *supra* note 61, at 4.

[93] *See id.* at 1.

surveillance device in the United States for monitoring to acquire [foreign intelligence] information... under circumstances in which a person has a reasonable expectation of privacy and a warrant would be required for law enforcement purposes[,]" requires either Attorney General authorization (for periods up to a year) or a court order.[94] However, in accordance with the NGA procedures, "domestic imagery requests" are processed and approved under the authority of the DCI.[95] So, in practice, satellite photoreconnaissance is regarded as a lawful investigative technique that *does not* necessitate a warrant, or even the approval of the Attorney General.[96]

Beyond the general requirement that information on U.S. persons always be gathered using "the least intrusive means," *Procedure 2* specifically prohibits DoD intelligence component use of overhead reconnaissance to collect information on U.S. persons, *unless*: (a) the information is necessary to perform an assigned function of the collecting component, and (b) the reconnaissance itself is not focused on a specific U.S. person.[97] In addition, whenever any intelligence collection about U.S. persons is undertaken within the United States, *Procedure 2* imposes several additional constraints. First, the collection cannot be carried out to acquire information about the "domestic activities" of any U.S. person.[98] In this context, "domestic activities" refers to "activities that take place within the United States that do not involve a significant connection with a foreign power, organization, or person."[99] Secondly, the intelligence sought cannot be otherwise available through "overt means," consisting of "methods of collection whereby the source of the information being collected is advised, or is otherwise aware, that he is providing such information to [DoD] or a component

---

[94] Foreign Intelligence Surveillance Act of 1978, Pub. L. No. 95-511, §§ 101(f), 102, 103, 92 Stat. 1783 (codified as amended at 50 U.S.C. §§ 1801-1811, 1821-1829, 1841-1846, 1861-62 (1994)) [hereinafter FISA].

[95] IPS § 9, pt. B, *supra* note 61, § 9, pt. B, at 1, 3 (citing Nat'l Security Act, *supra* note 64; E.O. 12333, *supra* note 69; Exec. Order No. 12,951, 60 Fed. Reg. 10,789 (Feb. 28, 1995); and Presidential Decision Directive 49, National Space Policy (Sep. 14, 1996)).

[96] *See supra* notes 75-76 and accompanying text.

[97] DoD 5240.1-R, *supra* note 72, at 2-1 & 2-3.

[98] *Id.* at 2-4.

[99] *Id.* at 2-1.

thereof."[100] Lastly, such collections must also be coordinated with the FBI and approved in writing by the head of the DoD intelligence component concerned.[101]

### B. *Use of "Domestic Imagery" in Military Support Civilian Law Enforcement*

Separate and apart from the matter of the lawfulness of the military's use of space-based reconnaissance inside the United States is the potentially more controversial question of whether, and under what circumstances, military users may provide satellite imagery to civilian authorities for use in law enforcement. The likely contentiousness of this issue reflects "the traditional and strong resistance of Americans to any military intrusion into civilian affairs."[102] In fact, America's interest in limiting military involvement in civilian affairs has a long history beginning with the Declaration of Independence and continued in the Constitution, certain acts of Congress, and decisions of the Supreme Court.[103]

The centerpiece of U.S. policy concerning the respective roles of civil and military authority in the enforcement of the law is undoubtedly the Posse Comitatus Act (PCA).[104] The PCA was adopted in 1878 as a response to complaints from former Confederate States about the use of federal troops in law enforcement roles during the post-Civil War Reconstruction era,

---

[100] *Id.*

[101] *Id.* at 2-4.

[102] Laird v. Tatum, 408 U.S. 1, 15-16 (1972).

[103] For a detailed discussion of these limitations, *see* Bissonette v. Haig, 776 F.2d 1384, 1387-89 (8th Cir. 1985) (per curiam), *aff'd on reh'g*, 800 F.2d 812 (8th Cir. 1986) (en banc).

[104] Posse Comitatus Act of 1878, 20 Stat. 152 (1878) (codified as amended at 18 U.S.C. § 1385 (1994)). *See generally* PAUL SCHOTT STEVENS, U.S. ARMED FORCES AND HOMELAND DEFENSE—THE LEGAL FRAMEWORK 23 (2001), *available at* http://www.csis.org/pubs/2001_armedforces.pdf; *and* Brian L. Porto, Annotation, *Construction and Application of Posse Comitatus Act (18 U.S.C.A. § 1385), and Similar Predecessor Provisions, Restricting Use of United States Army and Air Force to Execute Laws*, 141 A.L.R. FED. 271 (2003).

and was intended to reinstate regular civil authority in the South.[105] The PCA provides:

> Whoever, except in cases and under circumstances expressly authorized by the Constitution or Act of Congress, willfully uses any part of the Army or the Air Force as a posse comitatus or otherwise to execute the laws shall be fined not more than $10,000 or imprisoned not more than two years, or both.

Thus, the PCA makes it a crime to use any part of the military[106] as a "posse comitatus" or otherwise to execute civilian laws.[107] Federal courts have interpreted the PCA prohibition on use of the military to "execute" the law as barring the armed forces from activities that comprise a direct, active role in law enforcement,[108] and have in turn developed three tests to determine when military involvement constitutes more than indirect assistance:

> The involvement must not "constitute the exercise of regulatory, proscriptive, or compulsory military power," must not "amount to direct active involvement in the execution of the

---

[105] *See* STEVENS, *supra* note 104, at 23 ("Most controversial of these roles was the supervision of elections, a practice that many Democrats believed had stolen the presidency from their candidate, Samual Tilden, in 1876."); *see also* Matthew C. Hammond, *The Posse Comitatus Act: A Principle in Need of Renewal*, 75 WASH. U. L.Q. 953, 953-61 (1997); *and* H.W.C. Furman, *Restrictions Upon Use of the Army Imposed by the Posse Comitatus Act*, 7 MIL. L. REV. 85, 92-96 (1960).

[106] By its terms, 18 U.S.C. § 1385 (2005) places no restrictions on Navy participation in law enforcement operations; however, regulations issued pursuant to 10 U.S.C. § 375(2005), prohibit "direct participation" by military personnel in a civilian "search, seizure, arrest, or other similar activity" unless expressly authorized by law. *See* United States v. Yunis, 924 F.2d 1086 (D.C. Cir. 1991); *see also* U.S. DEPT. OF DEFENSE DIRECTIVE 5525.5, DOD COOPERATION WITH CIVILIAN LAW ENFORCEMENT OFFICIALS (1986) [hereinafter DODD 5525.5].

[107] The phrase "posse comitatus" is literally translated from Latin as "power of the county" and is defined at common law to refer to all those over the age of 15 upon whom a sheriff could call for assistance in preventing any type of civil disorder. United States v. Hartley, 796 F.2d 112, 115 n.3 (5th Cir. 1986) (citing H.R. REP. NO. 97-71, pt. 1, at 4 (1981)), *reprinted in* 1981 U.S.C.C.A.N. 1781 (citing 1 WILLIAM BLACKSTONE, COMMENTARIES *343-44); BLACK'S LAW DICTIONARY 1102 (6th ed. 1990) (posse comitatus defined as "the power or force of the county").

[108] *See* United States v. Khan, 35 F.3d 426, 431 (9th Cir. 1994), *as amended on denial of rehearing*, 1994 U.S. App. LEXIS 32285, at **13 (citing *Yunis*, *supra* note 106, at 1094); *see also Hartley*, *supra* note 107, at 114 (quoting United States v. Red Feather, 392 F. Supp. 916, 922 (D.N.D. 1975)).

> laws," and must not "pervade the activities of civilian authorities. If any one of these tests is met, the assistance is not indirect."[109]

In light of these pronounced standards, military involvement in activities such as arrest; seizure of evidence; search of a person; search of a building; investigation of crime; interviewing witnesses; pursuit of an escaped civilian prisoner; search of an area for a suspect and other like activities is prohibited.[110]

In contrast, the PCA does not apply where there is an *independent military purpose* that justifies the involvement of the armed forces in such matters.[111] These purposes include, for example, "investigations that concern violations of the law on military bases or within military operations, that relate to the order and discipline of military personnel, or that are necessary to protect military personnel, equipment, or installations."[112] Congress has also expressly exempted military participation in drug interdiction and enforcement operations from the PCA, authorizing DoD to provide support to the counter-drug activities of other federal departments and agencies, as well as those of State, local and foreign law enforcement agencies. Such support may include satellite surveillance of air, land, or sea traffic

---

[109] *Kahn*, *supra* note 108, at 431, *cited with approval in* United States v. Hitchcock, No. 00-10251, 2002 U.S. App. LEXIS 15726, at *14-18 (9th Cir. Mar. 21, 2002):

> The *Kahn* court's tests were an interpretation of 32 C.F.R. § 213.10, a regulation that has since been withdrawn. *See* Removal of Parts, 58 Fed. Reg. 25,776 (Apr. 28, 1993). Section 213.10 embodied a prior version of DoD Directive 5525.5 [cited *supra* note 106]. *See id.* The provisions interpreted by the *Kahn* court remain in the current version of the Directive. Thus, *Kahn's* tests remain controlling.

*See also* Yunis, *supra* note 106, at 1094; Bissonette, *supra* note 103, at 1389-90; Hitchcock, *supra* note 109, at *13 (citing DoDD 5525.5, *supra* note 106, § E4.1.7.2 and §§ 4, E4.1.7. n7); *and* United States v. McArthur, 419 F. Supp. 186 (D.N.D. 1975), *aff'd*, 541 F.2d 1275, *cert. denied*, 430 U.S. 970 (1977).

[110] *Red Feather*, *supra* note 108, at 925.

[111] *See* DoDD 5525.5, *supra* note 106, Enclosure 4, para. E4.1.2; *see also* STEVENS, *supra* note 104, at 27 n.129 ("The 'independent military purpose' standard has been articulated by the secretary of defense [sic] pursuant to his rulemaking authority under 10 U.S.C. § 3765 (1994).").

[112] STEVENS, *supra* note 104, at 27; *see also* sources cited *id.* at 27 n.130.

for up to 25 miles inside U.S. borders.[113] Pursuant to this legislative mandate, the Secretary of Defense has delegated the authority to approve domestic law enforcement requests for the use of space assets for counter-drug missions in the contiguous 48 states and Alaska to the military commander of United States Northern Command (CDRUSNORTHCOM), and in Hawaii to the military commander of United States Pacific Command (CDRUSPACOM).[114]

In addition, other legislation passed by Congress to specifically permit certain forms of indirect military assistance to civilian law enforcement agencies,[115] though primarily aimed at drug interdiction, is not expressly limited in this regard. These statutes therefore provide positive legal authority for the military to share domestic imagery with law enforcement officials for use in a wide range of contingencies.[116] In particular, Section 371 of Title 10 of the United States Code authorizes DoD to furnish "any information collected during the normal course of military training or operations that may be relevant to a violation of any Federal or State law" to civilian authorities with jurisdiction over the offense.[117] This statutory authority is given effect by DOD 5240.1-R, *Procedure 12*, which provides that DoD intelligence components may provide relevant law enforcement authorities with "incidentally acquired information" if it is rea-

---

[113] National Defense Authorization Act for Fiscal Year 1991, Pub. L. No. 101-510, § 1004, 104 Stat. 1629 (1990); *see also* National Defense Authorization Act for Fiscal Year 2002, Pub. L. No. 107-107, § 1021(6), 115 Stat. 1212 (2001).

[114] U.S. OFFICE OF THE CHAIRMAN OF THE JOINT CHIEFS OF STAFF, INSTRUCTION 3710.01A, DOD COUNTERDRUG SUPPORT, Enclosure A, at A-3 & A-4 (2004) [hereinafter DoDI 3710.01A], *available at* http://www.dtic.mil/doctrine/index.html (imaging activities inside United States must be coordinated with the Defense Intelligence Agency (DIA)).

[115] 10 U.S.C. §§ 371-382 (1994).

[116] *See* STEVENS, *supra* note 104, at 27.

[117] 10 U.S.C. § 371(a) (1994); *see also* DODD 5525.5, *supra* note 106, Enclosure 2, para. E2.1.4:

> [T]he needs of civilian law enforcement officials may be considered when scheduling routine training missions. This does not permit the planning or creation of missions or training for the primary purpose of aiding civilian law enforcement officials, and it does not permit conducting missions or training for the purpose of routinely collecting information about U.S. citizens.

sonably believed to indicate that a violation of federal, state, local or foreign law has occurred.[118]

The PCA proscription on "direct participation" of the military in law enforcement notwithstanding, federal courts have consistently regarded overhead photographic reconnaissance as the type of passive activity that is sanctioned under the PCA and related regulations.[119] In view of this, Title 10 allows DoD to make military equipment and facilities available for law enforcement purposes,[120] and, under certain circumstances, to provide military personnel to operate the equipment as well.[121] In fact, the law specifically authorizes the Secretary of Defense to provide equipment and personnel to conduct "aerial reconnaissance" in support of foreign or domestic counter-terrorism operations;[122] though whether this authority actually extends to DCI controlled imagery platforms is not entirely clear.

Yet despite the apparent permissiveness of the law with respect to sharing information collected for military purposes (including overhead imagery) with civilian law enforcement agencies and, in some circumstances, collecting such information

---

[118] DoD 5240.1-R, *supra* note 72, at 12-1.

[119] *See Bissonette*, *supra* note 103, at 1389-90 (holding use of Air Force personnel, planes, and cameras to fly surveillance does not violate Posse Comitatus Act (PCA), (citing United States v. Casper, 541 F.2d 1275 (8th Cir 1976) (per curiam), *cert. denied*, 430 U.S. 970 (1977)); United States v. Rasheed, 802 F. Supp 312, 324-325 (D.Haw. 1992) (holding that Navy assistance to law enforcement, which included aerial reconnaissance, was passive and did not amount to direct participation in search, seizure or arrests); *and Red Feather*, *supra* note 108, at 925 (concluding that aerial photographic reconnaissance flights and other like activities would not be unlawful under PCA); *compare* Wrynn v. United States, 200 F. Supp. 457 (E.D.N.Y. 1961) (holding participation of Air Force helicopter and crew in State Sheriff's search for escaped civilian prisoner violated PCA).

[120] 10 U.S.C. § 372 (1994).

[121] *Id.* § 374.

[122] *Id.* § 374(b)(1)(C), (b)(2)(C) (authorizing DoD to aid Federal law enforcement agencies with "aerial reconnaissance" in cases related to immigration, customs, narcotics trafficking or terrorism); *see also* DoDD 5525.5, *supra* note 106, Enclosure 3, para. E3.1.3 ("The assistance provided by DoD Intelligence Components is subject to DoD Directive 5240.1 [and 5240.1-R]...."); *and* STEVENS, *supra* note 104, at 27 n.128 ("It is noteworthy that the DoD Authorization Act for Fiscal Year 2000 permits the secretary of defense [sic] to "provide assistance to civil authorities in responding to an act of terrorism or threat of an act of terrorism" and to "waive the requirement for reimbursement." (citing National Defense Authorization Act for Fiscal Year 2000, Pub. L. No. 106-65, § 1023, 113 Stat. 512 747 (1999))).

directly on their behalf, the authority for DoD "intelligence elements"[123] to assist civilian law enforcement is ambiguous.

A case in point is the National Security Act wherein it provides:

> [E]lements of the intelligence community may, upon the request of a United States law enforcement agency, collect information outside the United States about individuals who are not United States persons. Such elements may collect such information notwithstanding that the law enforcement agency intends to use the information collected for purposes of a law enforcement investigation or counterintelligence investigation.[124]

Applying the *expressio unius est exclusio alterius* canon of statutory construction, whereby items not mentioned are deemed to have been excluded by deliberate choice,[125] this provision arguably manifests a legislative intent to restrict DoD intelligence element support to *federal* agency requests for collections *outside* the United States about individuals who are *not* U.S. persons.[126] Yet, at the same time, E.O. 12333 appears to afford IC elements significantly more latitude. In fact, it not only al-

---

[123] DoD "intelligence elements" include the National Security Agency (NSA), the National Reconnaissance Office (NRO), the National Geospatial-Intelligence Agency (NGA), and the Defense Intelligence Agency (DIA). *See* Nat'l Security Act, *supra* note 64, § 105A, 50 U.S.C. § 403-5a(b) (1994).

[124] *Id.* § 403-5a(a). For purposes of this subsection, "[t]he term 'United States law enforcement agency' means any department or agency of the Federal Government that the Attorney General designates as law enforcement agency for purposes of this section." *Id.* § 403-5a(c)(1).

[125] *See* Barnhart v. Peabody Coal Co., 537 U.S. 149, 168 (2003); *but see* Neuberger v. Commissioner, 311 U.S. 83, 88 (1940) ("[T]he maxim 'expressio unius est exclusio alterius' [is] but an aid to construction, not a rule of law." (citing United States v. Barnes, 222 U.S. 513, 519 (1912))); *and* Transamerica Mortg. Advisors, Inc. *(TAMA) v. Lewis*, 444 U.S. 11, 29 (1979) (rejecting application of maxim *expressio unius est exclusio alterius* absent specific support in legislative history for proposition that it was advanced to support (citing Cort v. Ash, 422 U.S. 66, 82-83 n.14 (1975))); *see also* Chevron U.S.A. v. Natural Resources Defense Council, 467 U.S. 837 (1984); *and* Cass R. Sunstein, *Law and Administration After Chevron*, 90 Colum. L. Rev. 2071, 2109 n.182 (1990) (recognizing that principle *expressio unius est exclusio alterius* "is a questionable one in light of the dubious reliability of inferring specific intent from silence"), *cited in* Pauley v. BethEnergy Mines, 501 U.S. 680, 703 (1991).

[126] *But cf.* Chevron U.S.A. v. Echazabal, 536 U.S. 73 (2002) (holding that expansive phrasing of statute was inconsistent with exclusive specification claimed by respondent).

lows IC elements to provide "specialized equipment, technical knowledge, or assistance of expert personnel for use by any [federal] department or agency," without regard to either the location or the identity of the target of the collection, but also authorizes "support to *local* law enforcement agencies" whenever "lives are endangered."[127] This legal ambiguity is further exacerbated by the lack of detailed NGA policy on the use of NTM for law enforcement support.[128]

### *C. Analysis and Application*

Together, the rules set forth in DoD 5240.1-R, *Procedure 2*, discussed in Part II.A, *supra*, provide a ready, though restrictive framework, through which DoD intelligence components can lawfully conduct satellite reconnaissance within the United States in support of military missions, even if it incidentally entails collecting imagery of U.S. persons. Again, the threshold qualification is that such collections cannot touch on "domestic activities."[129] Rather, they are essentially restricted to gathering of "foreign intelligence information," which is defined, by statute, as:

> (1) information that relates to, and if concerning a United States person is necessary to, the ability of the United States to protect against—(A) actual or potential attack or other grave hostile acts of a foreign power or an agent of a foreign power; (B) sabotage or international terrorism by a foreign power or an agent of a foreign power; or (C) clandestine intelligence activities by an intelligence service or network of a foreign power or by an agent of a foreign power; or (2) information with respect to a foreign power or foreign territory that relates to, and if concerning a United States person is necessary to—

---

[127] *See supra* note 69, para. 2.6 (emphasis added); *see also* DoD 5240.1-R, *supra* note 72, at 12-1.

[128] As of July 2004, the NGA policy on the use of national reconnaissance imagery platforms to support law enforcement was still in draft. *See* IMAGERY POLICY SERIES § 9C, Law Enforcement Activities. Pending publication of this more specific guidance, DIRs for domestic law enforcement support are handled on a case-by-case basis, with each request undergoing review by NGA legal counsel.

[129] *See supra* notes 98-99.

(A) the national defense or the security of the United States; or
(B) the conduct of the foreign affairs of the United States."[130]

In this context, a "foreign power" notably includes, *inter alia*, "a group engaged in international terrorism or activities in preparation therefore."[131]

Consider, for example, the case of a suspected al-Qa'ida terrorist training camp wherein it is believed attacks on U.S. military installations are being planned. Collecting intelligence that provides indication and warning of potential military aggression, contributes to the security of DoD installations, activities, property or personnel, or supports related military operations (*e.g.*, force protection,[132] antiterrorism,[133] and counterterrorism),[134] clearly falls within the purview of DoD's intelligence elements.[135] Thus, consistent with *Procedure 2*, photoreconnaissance assets could be employed to surveil camp activities and simultaneously accumulate information about individual participants, to include any U.S. persons, since the collection is not targeting a particular U.S. person.

Furthermore, provided the intelligence to be gained from satellite surveillance of the hypothetical terrorist training camp could not be obtained by overt means and the collection was both coordinated with the FBI and approved by the head of the DoD collecting component, per *Procedure 2*, use of space-based surveillance would presumably be permissible *even if* the camp were located within the territorial sovereignty of the United

---

[130] Foreign Intelligence Surveillance Act of 1978, Pub. L. No. 95-511, § 101(e), 92 Stat. 1783 (codified as amended at 50 U.S.C. §§ 1801-1811 (1994)).

[131] *Id.* § 101(a).

[132] The term "Force Protection" refers to "Actions taken to prevent or mitigate hostile actions against Department of Defense personnel (to include family members), resources, facilities, and critical information." DOD DICTIONARY, *supra* note 8.

[133] The term "antiterrorism" refers to "Defensive measures used to reduce the vulnerability of individuals and property to terrorist acts, to include limited response and containment by local military forces." *Id.*

[134] The term "counterterrorism" refers to "Offensive measures taken to prevent, deter, and respond to terrorism." *Id.*

[135] E.O. 12333, *supra* note 69, para. 1.11(b), (c) & (h); *see also* Nat'l Security Act, *supra* note 64, § 105, 50 U.S.C. § 403-5(a)(4) (1994) (directing that "The Secretary of Defense shall... ensure that the elements of the intelligence community within [DoD] are responsive and timely with respect to satisfying the needs of military forces.").

States. For unlike domestic extremists, whose sphere of activity is contained within U.S. borders,[136] the al-Qa'ida terrorist network is international in nature, such that the potential for attacks on U.S. military bases represents a global threat.[137] Accordingly, in the instant scenario, information concerning activities at the U.S.-based al-Qa'ida terrorist training camp and its participants (to include U.S. persons) would properly be characterized as "foreign intelligence information," rather than information about "domestic activities."[138] Indeed, to interpret "domestic activities" so broadly as to include those of international terrorist organizations operating inside the United States would, in effect, be tantamount to a *de facto* bar on the collection of foreign intelligence information within U.S. territory, since, once again, to the extent that U.S. persons may potentially be involved, the collection of intelligence concerning "domestic activities" is prohibited. This would obviously render provisions of the Foreign Intelligence Surveillance Act (FISA) relating to intelligence collection within the United States redundant; therefore, such an interpretation must be rejected.[139]

Conversely, as Part II.B suggests, the legal framework for employing military satellite reconnaissance for law enforcement is divergent with the availability of domestic imagery from NTM for use by civil law enforcement agencies appearing to hinge, in large part, on the purpose underlying its collection. For example, in those instances where the collection of imagery is justified by a foreign intelligence mission or valid military purpose,[140] 10 U.S.C. § 371 ostensibly provides authority for military users to share the imagery with concerned civilian law enforcement agencies.[141] So in the case of the aforementioned hypothetical terrorist training camp, military satellite imagery

---

[136] *See* FED. BUREAU OF INVESTIGATION, U.S. DEP'T OF JUSTICE, TERRORISM IN THE UNITED STATES 1999, at ii, 3-7, 18 (1999).

[137] *See id.* at ii.

[138] *See supra* notes 99 and 130.

[139] It is a well-settled rule that a statute must, if possible, be construed in such fashion that every word has some operative effect. *See* United States v. Menasche, 348 U.S. 528, 538-539 (1955) (quoting Montclair v. Ramsdell, 107 U.S. 147, 152 (1883)).

[140] *See* text accompanying notes 87-96.

[141] *See supra* notes 115-118 and accompanying text.

taken of the camp and its participants, *even* U.S. persons, could rightfully be furnished to civilian law enforcement officials as "information collected during the normal course of military operations,"[142] albeit subject to NGA procedural limitations.[143] And, as noted previously, there is also separate express legislative sanction for DoD to provide satellite reconnaissance support to law enforcement in counter-drug operations, pursuant to which the appropriate geographic military commander, be it CDRUSNORTHCOM or CDRUSPACOM, can approve use of national overhead or aerial assets for domestic imaging within 25 miles of U.S. borders.[144]

Outside of the counter-drug realm, however, the authority for the military to collect domestic imagery at the behest of civilian law enforcement is splintered and contradictory. On the one hand, reconnaissance assets that are not part of the "national reconnaissance imagery platform" architecture may be employed by DoD components (*i.e.*, other than intelligence components) to acquire information about persons or organizations inside U.S. territory that is essential to the accomplishment of specified military missions,[145] but may also be employed at the request of law enforcement officials pursuant to the authorities granted per U.S. Code, Title 10 and E.O. 12333.[146]

For example, when the Washington D.C. metro area was subjected to a series of seemingly random shootings in the fall of 2002, the FBI's sniper investigation requested and received DoD aid in the form of an Army RC-7B fixed-wing aircraft. The aircraft was operated by a military crew and equipped with high-

---

[142] *See supra* note 117 and accompanying text.

[143] IPS § 9, pt. B, *supra* note 61, at 5. NGA procedures prohibit distribution of domestic imagery to parties other than those identified in the approved "domestic imagery request" or "DIR" and, while it is not unusual for DIRs to be amended to add recipients, the addition of civil law enforcement agencies poses imagery classification and database access problems that, for all practical purposes, may oftentimes be insurmountable. *Id.*

[144] *See supra* notes 113 and 114, and accompanying text.

[145] *See* U.S. DEPT. OF DEFENSE DIRECTIVE 5200.27, ACQUISITION OF INFORMATION CONCERNING PERSONS AND ORGANIZATIONS NOT AFFILIATED WITH THE DEPARTMENT OF DEFENSE (1980).

[146] *See supra* notes 120-122, 127 and accompanying text; *see also, e.g.*, CIVIL AIR PATROL REGULATION 900-3 (E), MISCELLANEOUS (Jul. 15, 1986) (noting that authorized Civil Air Patrol (or "U.S. Air Force Auxiliary") assistance to law enforcement agencies includes "patrol, surveillance, and reporting").

technology sensors to help pinpoint the source of gunfire. In that case, the potential nexus between the shootings and terrorism[147] provided sufficient impetuous for the Secretary of Defense to exercise his statutory authority to make military personnel available to operate aerial reconnaissance equipment for domestic counter-terrorism operations.[148] Moreover, inasmuch as the pilot and crew were not directly or actively performing law enforcement duties, but merely operating the aircraft and surveillance equipment under the direction of civilian law enforcement officials, Pentagon attorneys were completely justified in their assessment that support to the FBI sniper investigation was PCA-compliant.[149]

The regime for employment of national systems in support of law enforcement, on the other hand, is significantly less transparent. Indeed, when it comes to use of national systems, the express authority of the Secretary of Defense to approve support to law enforcement by or involving DoD personnel[150] is implicitly constrained, since access to NTM platforms is ultimately controlled by the DCI.[151] Likewise, the scope of authority for intelligence component support to law enforcement is equally ambiguous. Title 10, E.O. 12333, and federal PCA jurisprudence, together seem to offer DoD sweeping authority to collect overhead imagery on behalf of federal, state and local law enforcement agencies. Conversely, §105A of the National Security Act (50 U.S.C. § 403-5a) on its face substantially restricts such activities insofar as they entail employment of "national reconnaissance imagery platforms,"[152] by effectively limiting

---

[147] *See, e.g.*, Dan Verton, *NIPC Loses One of Its Own to "Beltway" Sniper*, COMPUTERWORLD, Oct. 16, 2002, *available at* http://www.computerworld.com/governmenttopics/government/story/0,10801,75154,00.html.

[148] *See supra* note 122; *but see* Elaine M. Grossman, *Former JAG: Military Aid in D.C. Sniper Pursuit May Have Broken Law*, INSIDE WASHINGTON PUBLISHERS, Nov. 14, 2003, *available at* http://www.fas.org/ sgp/news/2002 /11/itp111402.html.

[149] *See* sources cited *supra* note 119; *compare* Grossman, *supra* note 148.

[150] *E.g.*, 10 U.S.C. § 372, 374.

[151] *See supra* note 68. This apparent divergence of statutory authority likewise calls into question the force of the delegation of authority from the Secretary of Defense to military commanders to approve use of NTM in support of counter-drug operations under CJCSI 3710.01A (cited *supra* note 114).

[152] *Compare supra* note 67, *with* sources cited in *supra* note 146.

IC element support to collections performed on behalf of *federal* agencies, conducted *outside* the United States, and concerning only *non-U.S.* persons.[153] Finally, even assuming the legal authority exists, furnishing domestic imagery to law enforcement in a timely manner may on occasion prove impracticable in the absence of express NGA guidelines for doing so.[154]

## III. CONCLUSION

On September 11, 2001, the sun did indeed set on a different world[155]—one demanding new civilian and military organizational structures dedicated to the homeland security mission.[156] Since the infamous attacks on the World Trade Center and the Pentagon, the Administration and Congress have taken action to reshape the Federal government to better deliver military support to combat terrorism within U.S. territory.[157] Within DoD, in particular, both the civilian oversight roles and military organizations that deal with homeland defense have been restructured, to include establishment of USNORTHCOM.[158] However, as important as these steps may be to enhancing civil-military integration for homeland security planning and operations,[159] the foregoing assessment shows that more needs to be done to clarify statutory and regulatory provisions delineating the legal boundaries of interaction between the military, elements of the intelligence community, and federal, state, and local law enforcement agencies.

Specifically, in the case of domestic satellite reconnaissance, the National Security Act's restriction on intelligence component assistance to law enforcement agencies must be ex-

---

[153] *See supra* note 123.

[154] *See supra* note 128.

[155] President George W. Bush, Address to a Joint Session of Congress and the American People (Sep. 20, 2001), *available at* http://www.whitehouse.gov/news/releases/2001/09/20010920-8.html.

[156] *See* Wermuth, *supra* note 4, at 14.

[157] *Id.* at 19.

[158] *See* discussion *supra* Introduction, pp. 1-3 herein; *see generally* Wermuth, *supra* note 4, at 15-24.

[159] *See* Wermuth, *supra* note 4, at 19; *see also* OFFICE OF HOMELAND SECURITY, NATIONAL STRATEGY FOR HOMELAND SECURITY 47 (2002), *available at* http://www.whitehouse.gov/homeland/book.

amined to assess its impact on the availability of potentially valuable domestic imagery to the federal, state, and local law enforcement agencies primarily responsible for countering terrorist attacks on the United States homeland. Moreover, new regulatory procedures should be promulgated to succinctly couple the ability of intelligence elements to collect domestic imagery with the legislative authorities which would allow DoD to provide such imagery to civilian law enforcement agencies. These measures will serve to solidify the legal landscape relative to the domestic employment of national reconnaissance assets, and thereby better posture the armed forces, and DoD intelligence elements in particular, to employ military capabilities when needed to support and enhance law enforcement efforts to counter terrorist threats.

Of course, as the limited amount of Supreme Court dicta on domestic use of satellite surveillance suggests, the question of whether space-based reconnaissance assets should be used for purposes of law enforcement inside the United States absent a warrant is still quite controversial. Future developments respecting the warrant requirement could impact the "least intrusive means" analysis for acquiring information about U.S. persons in accordance with DoD Regulation 5240.1-R, *Procedure 2*, and further restrict the collection of domestic imagery concerning U.S. persons. Aside from this procedural point, however, questions such as whether the collection of satellite imagery constitutes a "search" necessitating a warrant or, for that matter, whether such information should be provided to law enforcement agencies at all, are not *per se* military concerns. Rather, these issues must be resolved by the American people through their courts and legislatures, with due consideration for both fundamental principals of individual liberty and the nation's domestic security needs.

Notably, less than a year prior to the September 11th terrorist attacks, the Commission to Assess United States National Security Space Management and Organization, chaired by current Secretary of Defense Donald H. Rumsfeld and more commonly referred to as "the Space Commission," recognized the innate potential of space assets to support U.S. domestic security objectives, while postulating that America's choices with

respect to advancing this potential would affect the nation's security for decades to come.[160] Prospective advancements in law and policy, like the ones proposed here concerning military use of satellite reconnaissance within the United States—not to mention those that are likely to become necessary as the Department of Homeland Security matures and other, perhaps unprecedented organizational, oversight and database issues arise— will be essential to fulfilling the promise of space assets for enhancing domestic security. Nevertheless, given the potential impact on America's constitutionally protected freedoms, any developments in this regard will undoubtedly likewise influence and pervade the lives of future generations, and, therefore, cannot be taken lightly.

---

[160] COMM'N TO ASSESS U.S. NAT'L SECURITY SPACE MGMT. & ORG., REPORT PURSUANT TO P.L. 106-65, Executive Summary, at 15 (2001), *available at* http://www.defenselink.mil/pubs/space20010111.html (last visited June 8, 2005).

# INTERPLANETARY CONTAMINATION: THE ULTIMATE CHALLENGE FOR ENVIRONMENTAL AND CONSTITUTIONAL LAWYERS?

*George S. Robinson*[*]

"All of the planets, All of the time."[1]

## I. LEGAL GENESIS OF THE ISSUES

> "In the exploration and use of outer space, including the moon and other celestial bodies, States...shall...conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter and, where necessary shall adopt appropriate measures for this purpose."[2]

Once again, the National Aeronautics and Space Administration (NASA) has been directed to resume studies and plan-

---

[*] Dr. Robinson, retired from the Smithsonian Institution, is currently in private law practice, and serves on several boards of trustees and advisory committees, including NASA's Planetary Protection Advisory Committee. He received an AB from Bowdoin College ('60), an LL.B from the University of Virginia ('63), an LL.M. from the McGill University Institute of Air and Space Law ('67), and the first Doctor of Civil Laws degree from McGill University's Graduate Law Faculty, Institute of Air and Space Law ('71).

[1] *See* Linda Billings and John Rummel, "All of the Planets, All of the Time: Planetary Protection at NASA" SPACE TIMES, 12 (January/February 2004). The authors state that "while a primary focus of NASA's solar system exploration program is the search for evidence of life on Mars, the agency's current approach to planetary protection is 'all the planets, all the time.'" *Id.* Dr. John Rummel is the Planetary Protection Officer in NASA's Office of Planetary Protection, and Linda Billings is a research associate with the SETI Institute.

[2] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies, Jan. 25, 1967, art. IX, 18 U.S.T. 2410, 610 U.N.T.S. 2005 (entered into force on Oct. 10, 1967) [hereinafter Outer Space Treaty]. While the genesis of interplanetary contamination control rests in the Outer Space Treaty, much of the international law from which contamination control is derived relates to the law of the seas. *See generally*, Myres S. McDougal & Norbert A. Schlei, *Hydrogen Bomb Tests in Perspective: Lawful Measures for Security*, 64 YALE L.J. 648 (1955) (addressing law relating to "permissibility of use"). *See also*, MYERS S. MCDOUGAL & WILLIAM T. BURKE, THE PUBLIC ORDER OF THE OCEANS (1962).

ning designed to incorporate human missions into the exploration of the Moon and Mars.[3] The first and foremost concern continues to be containment of adverse interplanetary cross-contamination. "Adverse" is a word that can be interpreted as having many diverse characteristics, both technical and legal, depending on the focus of the exploration program.[4] The word "contamination" has just as many variations and uncertainties, depending again upon the context of its use, that is, technical or legal.[5]

Whether human or robotic, the planning stages for all Mars missions have, and will continue to address, well-considered planetary protection procedures consistent both with international and domestic scientific goals, policies, and laws, particularly as they relate to the protection of Earth's biosphere and, equally as important, the need to conduct planetary research for carbon-based life unencumbered by sites inadvertently contaminated with Earth indigent biota and carbon-based life precursors carried to those sites robotically or by humans in human missions. One of the primary objectives of planetary research is

---

[3] Policy statement of President George W. Bush, 40 WEEKLY COMP. PRES. DOC. 175 (Feb. 9, 2004).

[4] Essentially, the initial primary concern about the potential for adverse and/or harmful planetary contamination related to back contamination issues and whether extraterrestrial life forms, or Earth indigent life forms taken into space and returned in mutated status from, say, excessive radiation, will be or will become infectious and/or toxic in a fashion that cannot be accommodated by human and other Earth biota immune systems...including fisheries, domestic livestock, crops, and plants and animals in the wild.

[5] "Contamination" has many definitions, both in statutory and case law, depending upon the context and circumstances being addressed. Black's Law Dictionary does not offer a legal definition of contamination or contaminate, but it is clear from Webster's Ninth New Collegiate Dictionary that a rather benign definition is not intended, i.e., "contamination", which is a state of being contaminated, is akin to contagion, befouling, foul, filthy, and the like. *See* WEBSTER'S NINTH NEW COLLEGIATE DICTIONARY 283 (1991). Use in Article IX of the 1967 Outer Space Treaty of the phrases "adverse changes" and "harmful contamination" implies that it could be passive contamination or infectious, etc., contamination. "Adverse" can denote a hostile change in circumstances or simply as being opposed to prevailing interests. (Outer Space Treaty, *supra* note 2, at art. IX.) In either event, any issue of law dealing with extraterrestrial contamination causing adverse or harmful changes likely would rely on the formulae and protocols designed by NASA and the Committee on Space Research (COSPAR), created by the International Council of Scientific Unions (ICSU) to determine whether and to what extent a piece of space equipment or an astronaut is considered contaminated or adversely changed and for what purposes.

to understand the genesis of our solar system, galaxy, and, indeed, our universe; and particularly and often most compelling, the origin of life and whether carbon-based Earth life is unique, that is, "are we alone?" Obviously, the theological and philosophical issues assume extraordinary importance in the pursuit of this research, and too little attention has been given to these issues as integral components of space sciences and exploration.[6] Does or has life, as we currently recognize it, principally carbon-based, exist or has it existed on other planets or celestial bodies (moons, asteroids, and the like), and is life truly the business of the universe? Hopefully, in a more pragmatic sense, what is learned will have useful application to understanding the ultimate survivability characteristics of *Homo sapiens sapiens* and its own Earth indigent web of life.

It is absolutely essential, critical, that not only the United States, but the entire world, develop and apply adequate protective barriers and containment procedures to ensure against, or at least reduce the risk to an acceptable level, adverse or harmful forward contamination of Mars and other planets being explored, as well as harmful back contamination of Earth. Originally, NASA's efforts relating to containment concerns focused primarily, if not exclusively, on issues of *back* contamination and were overseen principally by an Interagency Committee on Back Contamination (ICBC).[7] The concern focused on health

---

[6] For broad and frequently fascinating discussions of issues relating to morality and ethics in exploration of the solar system, and particularly Mars, *see* J. Baird Callicott, *Moral Considerability and Extraterrestrial Life*, *in* MORAL EXPERTISE (D. MacNiven, London: Routledge ed., 1990). *See also* Robert H. Haynes, *Ecce Ecopoiesis: Playing God on Mars*, *in* MORAL EXPERTISE : STUDIES IN PRACTICAL AND PROFESSIONAL ETHICS 161-183 (Don MacNiven ed., 1990) and C.P. McKay, *Does Mars Have Rights?*, *in* MORAL EXPERTISE : STUDIES IN PRACTICAL AND PROFESSIONAL ETHICS 184-197 (Don MacNiven ed., 1990). In this respect, particularly as it relates to the requisite to include the general international public reasonably in decision-making processes regarding the potential harmful contamination of Earth and other planets/celestial bodies, *see* Margaret S. Race, *Societal Issues as Mars Missions Impediments: Planetary Protection and Contamination Concerns*, 15 ADV. SPACE RES. 285 (1994). *See also*, Margaret S. Race, *Anticipating the Reaction: Public Concern about Sample Return Missions*, 14 PLANETARY REP. 20-22 (July/Aug. 1994), and Margaret S. Race, *Planetary Protection, Legal Ambiguity and the Decision Making Process for Mars Sample Return*, 18 ADV. SPACE RES. 345 (1996).

[7] For the purpose of providing assistance to NASA in formulating a program to prevent adverse contamination of Earth's biosphere by lunar matter returned from

issues related to the return of lunar samples, astronauts, and returned equipment to Earth from the various *Apollo* missions. Much of the work of that committee was rendered questionable, in large part, because only a handful of scientists believed there might even be a possibility of life forms or life precursors on the Moon; there was believed to be no water and other life support requirements for carbon-based life on or in the Moon. Perhaps most important, President John F. Kennedy had made it clear to the international public that the United States was committed to making a human landing on the Moon and a safe return before it was accomplished by the former Soviet Union.[8] This was a race! Moreover, it was perhaps more politically driven than the product of scientific curiosity and the advancing state of engineering technology. While the Soviet Union, the only other spacefaring nation at the time, purported to heed adverse or harmful contamination control procedures, very little effort was made in the Soviet space program to ensure spacecraft ster-

---

human explorations, the Interagency Committee on Back Contamination (ICBC) was established and came into effect through an August 24, 1967 interagency agreement. The principal agencies represented on that Committee were NASA, the Department of Agriculture, the then Department of Health, Education and Welfare (HEW), the Department of the Interior, and the National Academy of Sciences. Interestingly, heavy emphasis was placed on three members (Interior, Agriculture, and HEW) since they possessed at least limited quarantine authority and NASA had none. *See* Interagency Agreement between the National Aeronautics and Space Administration, the Department of Agriculture, the Department of Health, Education, and Welfare, the Department of Interior, and the National Academy of Sciences on the Protection of the Earth's Biosphere from Lunar Sources of Contamination, Aug. 24, 1967.

[8] For a discussion of the domestic and international law and politics impacting the development and application of evolving contamination control and quarantine regulations established for the human lunar mission program beginning with *Apollo11* through the end of the *Apollo* Program, *see* George S. Robinson, *Contamination of Earth's Ecosystem by Extraterrestrial Matter: United States Authority to Promulgate and Enforce Quarantine Regulations* (1970) (unpublished doctoral dissertation, McGill University Institute of Air and Space Law, Montreal Canada) (on file at McGill University Institute of Air and Space Law). *See also*, George S. Robinson, *Earth Exposure to Extraterrestrial Matter: NASA's Quarantine Regulations*, 5 INT'L LAWYER 219 (1971). *See particularly*, L.B. Hall and R.G. Lyle, *Foundations of Planetary Quarantine*, *in* PLANETARY QUARANTINE 5 (L.B. Hall, ed., Gordon and Breach, New York, NY 1971) (L. B. Hall was the director of NASA's Office of Planetary Quarantine right before, during, and after the Apollo 11 mission). *See also* J.R. Bagby, Jr., *Back Contamination: Lessons Learned During the Apollo Lunar Quarantine Program*, Jet Propulsion Laboratory CR-560226 (1975).

ilization and containment procedures.[9] However, on the theory that such a program is only as good as its weakest link, progressive efforts were made to reach some level of assuredness that contamination control procedures were truly international.[10]

Early attempts to reduce the risks of lunar and planetary contamination to an acceptable level (outbound or forward contamination, back contamination, and cross contamination between and among celestial bodies, human fabricated as well as natural) started in 1956 at the International Astronautical Federation's Seventh Annual Congress convened in Rome. Initial attempts to coordinate international efforts to reduce human initiated interplanetary contamination to an acceptable level of risk led in part to the establishment of the International Institute of Space Law under the aegis of the Federation. Standards were to be established and implemented by international law. Early steps also were made in 1956 by the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) to address contamination and sterilization issues.

The International Council of Scientific Unions (ICSU) established an *ad hoc* Committee on Contamination by Extraterrestrial Exploration (CETEX), which provided preliminary findings regarding the potential for contamination of the Moon, Mars, and Venus. CETEX then recommended the establishment of a code of conduct for space missions and research. In the same year, ICSU accepted those recommendations from CETEX and established the Committee on Space Research (COSPAR) to coordinate worldwide space research. In 1958, the United States National Academy of Sciences also established the Space Science Board (SSB), which was given the mandate, among other instructions, of addressing and providing advice on issues of planetary contamination. Between 1959 and 1964, the SSB recommended sterilization of space probes and, significantly, endorsed the CETEX Code of Conduct and the establishment of

---

[9] For an early characterization of the incipient phases of the Soviet and American planetary contamination containment policies, *see* Bruce Murray et al., *Planetary contamination II: Soviet and U.S. Practices and Policies*, 155 SCIENCE 1505-1511 (1967).

[10] *See*, generally, George S. Robinson, *NASA'S Accountability for Life and Informed Public Consent: Planetary Protection and Evolving Law*, 17 (3) THE AIR & SPACE LAW. 9-11, 26 (Winter 2003).

COSPAR. ICSU then adopted resolution 10 of the Code ("Space Experiments with Undesirable Effects")[11] recommending that all countries launching space experiments with possible adverse effects on other scientific research should provide ICSU and COSPAR with information about those intended experiments sufficient to evaluate the potential for contamination, adverse or not. COSPAR also organized a "Consultative Group on Potentially Harmful Effects of Space Experiments" to help conduct these evaluations about potential adverse or harmful effects. In the United States, NASA adopted a policy regarding the Moon, Mars, and Venus that spacecraft sent to these particular bodies will have an absolute minimum microbial count, based on engineering, spacecraft assembly procedures, and established sterilization criteria.[12]

COSPAR adopted a quantitative framework for the development of planetary protection standards lasting until 1982. In 1967, after about ten years of intense work under the auspices of the United Nations, all of these concerns about planetary outbound or forward, cross- and back-contamination resulting from space activities were addressed in the Outer Space Treaty of 1967.[13] With this Treaty provision fully recognized in the directives of all spacefaring nations, COSPAR has been developing with NASA and other domestic and international space agencies various formulae through the years regarding just when a planetary body or space vehicle or platform has become contaminated, and under what technical circumstances of risk management the contamination is acceptable or unacceptable. Nevertheless, the issues of what constitutes harmful contamination and adverse change in Earth's environment have yet to be interpreted and defined legally. That likely will have to await

---

[11] COMMITTEE ON SPACE RESEARCH, 20 COSPAR INFORMATION BULLETIN 25-26 (Nov. 1964).

[12] For an excellent summary of the early history of spacecraft quarantine contamination control policies and procedures adopted by NASA, as well as the applicable criteria and standards determined acceptable by U.S. scientists, *see*, by L.B. Hall, *Recent Developments in Planetary Quarantine*, 9 DEV. INDUS. MICROBIO. 19 (1968). L.B. Hall was NASA's former Planetary Protection Officer,

[13] Outer Space Treaty, *supra* note 2, at Art. IX.

relevant scientific data and related technological information deriving from each space mission *in situ*. The legal definition of "adverse" and "harmful" will also change as Earth indigenous sciences progress, separately or in concert, with the planetary exploration space sciences.

Between the successful completion of the *Apollo 11* mission and now, significant increases in scientific data deriving from a multitude of different types of space studies programs and projects have enhanced the belief that life, even carbon-based life, is truly the business of the Universe. Contamination control and biotic and engineering containment protocols have taken quantum leaps in development and sophistication.[14] But of principal concern and focus here, although not exclusively, is the human component of planetary exploration and the need for particularized contamination containment and component quarantine protocols that satisfy numerous safety conditions and applicable laws to which unreturned robotic activities in space research are not held accountable.

In point of fact, in preparing for the *Apollo* missions, particularly *Apollo 11*, many laws in the United States were addressed and disposed of, some properly, some questionably, some rather cavalierly, and some simply ignored. For example, restraining orders and injunctions were assessed and evaluated in the context of temporary relief and irreparable damages that would be created for the *Apollo 11* mission.[15] There were ques-

---

[14] The latest successful U.S. and European robotic landers on Mars are providing extraordinary data regarding the presence of water and other carbon-based life support matter. General and specific discussions about evolving planetary protection policies and protective protocols can be seen in J.D. Rummel, *Planetary Protection Policy* 12(4) ADV. SPACE RES. 129 (1992); Patricia M. Sterns and Leslie I. Tennen, *Recent Developments in the Planetary Protection Policy: Is the Outer Space Environment at Risk?, in* 32 COLLOQUIUM ON THE LAW OF OUTER SPACE 163 (1989). *See also* Patricia M. Sterns and Leslie I. Tennen, *Current United States Attitude Concerning Protection of the Outer Space Environment,* 27 COLLOQUIUM ON THE LAW OF OUTER SPACE 398 (1984). The NASA Mars rovers *Spirit* and *Opportunity* have returned data indicating the presence of methane gas in some of the caves on Mars. These caves containing methane are located rather near the strong indications of pre-existing (and perhaps even existing) water sources, and if the methane in fact derives from these water sources, scientists have a strong indication also of biometabolic processes which do, in fact, emit methane.

[15] Two major sources of authority exist for seeking temporary relief from governmental agency action: (1) The Administrative Procedure Act, 5 U.S.C. § 550 - 596, and

tions of who has standing to petition for a restraining order or temporary injunction against the launch of *Apollo 11* until the issues surrounding particularly back contamination procedures and relevant quarantine regulations could be fully vetted before and by the general public.[16] Who or what would be the proper defendants in these circumstances, and what would be the availability of a judicial review of NASA's quarantine protocol and rules as a prerequisite to issuing an injunction?[17] What is the requirement for federal rule making to be subject to the Administrative Procedure Act (APA) and, in the case of the *Apollo 11* launch, the applicability or not of the thirty days notice of effective date requirement?[18] What is the law and rele-

---

(2) 28 U.S.C. § 2282, wherein provision is made for enjoining the enforcement of a Federal statute.

[16] *See* 5 U.S.C § 702 wherein it is provided that standing is had by "[a] person suffering legal wrong because of agency action, or adversely affected or aggrieved by agency action within the meaning of a relevant statute...."

[17] Essentially, the judiciary has recognized three exceptions to immunity of agency personnel from personal liability and specific relief, where an action against an officer of the United States for the specific relief does not also constitute a "suit against the United States":

> If the officer purports to act as an individual and not as an official, a suit directed against that action is not a suit against the sovereign ... On a similar theory, where the officer's powers are limited by statute, his actions beyond those limitations are considered individual and not sovereign actions. The officer is not doing the business which the sovereign has empowered him to do or he is doing it in a way which the sovereign has forbidden ... [and where] the statute or order conferring power upon the officer to take action in the sovereign's name is claimed to be unconstitutional.

Larson v. Domestic & Foreign Commerce Corporation, 337 U.S. 682 (1949). As stated by Mr. Justice Hughes, "...in case of an injury threatened by his illegal action, the officer cannot claim immunity from injunctive process." *Id.* at 690, *citing* Philadelphia Co. v. Stimson, 223 U.S. 605, 620 (1912). The principle has frequently been applied with respect to state officers seeking to enforce unconstitutional enactments. It is equally applicable to a Federal officer acting in excess of his authority or under an authority not validly conferred. *Id* at 690-91. *Cf.*, North Carolina v. Temple, 134 U.S. 22, 30 (1890) (recognizing that a suit may fail "...if the relief requested cannot be granted by merely ordering the cessation of the conduct complained of but will require affirmative action by the sovereign or the disposition of unquestionable sovereign property.")

[18] "Informal written or oral consultation with affected parties or with advisory committees is the mainstay of rule-making procedure," particularly in view of the fact that public scrutiny can be avoided by the often-used facility of invoking the proviso of "impractical, unnecessary, or contrary to the public interest." KENNETH CULP DAVIS, 1 ADMINISTRATIVE LAW TREATISE § 6.02, 36 (1958), This concern is one of the primary reasons that every reasonable effort is being pursued to involve the public in the development of contamination control and quarantine procedures for the Mars Sample Re-

vance regarding agency discretion and judicial review?[19] What are the issues of injunctive relief as they relate to questions of Constitutionality?[20] What was the analogy of nuclear testing at the time of *Apollo 11* and the legal arguments surrounding nuclear testing on the High Seas?[21] What was the international

---

turn mission and later human mission to Mars and return. *See* Margaret S. Race, *Planetary Protection, supra* note 6, 345-50 (Dr. Race observes that "[a]s scientists and mission planners develop planetary protection requirements for future Mars sample return missions, they must recognize the socio-political context in which decisions about the mission will be made and pay careful attention to public concerns about potential back contamination of Earth. To the extent that planetary protection questions are unresolved or unaddressed at the time of an actual mission, they offer convenient footholds for public challenges in both legal and decision making realms, over which NASA will have little direct control."). Dr. Race, with direct experience in similar situations involving the unknowns of scientific research and public reactions to potential consequences, continues by asserting that "[l]egal issues with the potential to complicate future missions include: procedural review under National Environmental Policy Act (NEPA); uncertainty about institutional control and authority; conflicting regulations and overlapping jurisdictions; questions about international treaty obligations and large scale impacts; uncertainties about the nature of the organism; and constitutional and regulatory concerns about quarantine, public health and safety. In light of these important legal issues, it is critical that NASA consider the role and timing of public involvement in the decision making process as a way of anticipating problem areas and preparing for legitimate public questions and challenges to sample return missions."

[19] Despite much argumentation to the contrary, it was determined that action or responsibility committed by statute to agency discretion is not subject to judicial review. 5 U.S.C. § 701(a)(2). However, with respect to *Apollo 11* and subsequent *Apollo* missions, the issue was one not of agency discretion, but rather whether there was adequate legislative authority for NASA to incorporate the quarantine regulations as a component of the mission.

[20] Injunctions obviating the enforcement of Federal legislation are authorized specifically by 28 U.S.C. § 2282, *repealed by* Act of August 12, 1976, Pub. L. No. 94-381, § 2, 90 Stat. 1119, which provides that the only grounds for "...restraining the enforcement, operation or execution of any Act of Congress..." is when the legislation is repugnant "...to the Constitution of the United States." *See also* Darlington, Inc. v. F.H.A., 134 F. Supp. 337 (D.S.C., 1955), *rev'd on other grounds*, 352 U.S. 977 (1956). *See also*, Flast v. Cohen, 392 U.S. 83 (1968) (defining what constitutes "repugnance to the Constitution").

[21] Nations have employed the High Seas and superjacent airspace for a rapidly increasing variety of reasons, particularly with respect to testing weapons of mass destruction and the development of advanced aviation concepts, as well as human and robotic exploration of the ocean floors and minerals. Many of the uses have been conflicting and attempts to resolve them are manifest in various conventions and treaties. For a discussion of conflicting uses of the High Seas and international airspace, *see* George S. Robinson, *Military Requirements for International Airspace: Evolving Claims to Executive Use and De Facto Control*, J. NAT. RESOURCES (July 1970). *See also* George S. Robinson, *The Regulatory Prohibition of International Supersonic Flights*, 18 BRIT. INT'L & COMP. LAW Q., Part 4, 833-846 (Oct. 1969) (discussing the economic and legal problems attendant to conflicting uses of international airspace as they relate to innovative aviation technology).

customary and treaty law relating to a reasonable use embracing the legal and practical distinction between unacceptable interference and acceptable use?[22] Was there any progress at the time of *Apollo 11* and subsequent *Apollo* missions in involving the World Health Organization in outbound sterilization practices and the problematic threat of back contamination?[23] Was there any practical consideration by the United States of extraterritorial application of criminal laws and sanctions?[24]

Of principal concern and focus here, although not exclusively, is the human component of planetary exploration and the need for particularized contamination containment and component quarantine protocols that satisfy numerous safety conditions and applicable laws to which unreturned robotic activities in space research are not held accountable.

## II. QUARANTINE PROTOCOL

As tentative and politically influenced as the lunar surface sample return missions were in preparations for the remote possibility of harmful contamination of the Moon and Earth, planning for the Mars Sample Return (MSR) mission[25] will be infinitely more complex. This is true not just in the technology and mission designs ultimately adopted to accomplish the goals but because of the heightened public awareness of the missions and the positive focus on the likelihood of finding carbon-based life forms or precursors on Mars. It is certain that the experts

---

[22] For an excellent historical summary of international law and its functional applicability to areas not subject to sovereign jurisdiction, *see* Myres S. McDougal & Norbert A. Schlei, *Hydrogen Bomb Tests in Perspective: Lawful Measures for Security*, 64 YALE L.J. 648 (1955).

[23] In July 1964, Lawrence B. Hall (USA), V.V. Parin (USSR), and F. Violette (France) met in Paris to discuss "WHO Consultation on Health Aspects" of the exploration and peaceful uses of outer space. *See* the report by Mr. Hall in the files of the Office of Planetary Quarantine [now the Office of Planetary Protection], NASA Headquarters, Washington, DC.

[24] For a discussion of extraterritorial application of criminal provisions of various NASA and other U.S. and treaty laws, *see* George S. Robinson, *Contamination of Earth's Ecosystem*, *supra* note 8, at 116-121.

[25] Particularly in terms of design engineering; public involvement; shared military interests and funding in the technology used; domestic and international political concerns prevailing from the time of conceptualization to return of samples; and, ultimately, astronauts in the ultimate human mission to Mars and return.

planning these missions will be joined by an informed public in the routine, daily decision-making regarding procedures, standards, and criteria adopted to ensure planetary protection.[26] Many government agencies and international organizations will be providing oversight and routine review of any plans being offered by NASA regarding planetary protection, particularly from potential harmful biotic back contamination. Further, government experts also recognize that,

> [i]t is almost certain that many legal, regulatory and institutional decision-making issues will surface regardless of whether public opposition arises against the mission. In the event of disagreement over MSR plans, there are numerous federal, state and local laws that could be used for challenging mission decisions in court.[27]

---

[26] Toward this end, on February 13, 2001, the NASA Administrator signed into effect, pursuant to the Federal Advisory Committee Act (5 U.S.C. § 1-16) and The National Aeronautics and Space Act of 1958, as amended [Pub. L. 85-568, *as amended*, Sec. 203(c)(7)], the NASA "Charter of the Planetary Protection Advisory Committee of the National Advisory Council" (PPAC). The purpose and duties of the PPAC is to "...advise the NASA Administrator through the NASA Advisory Council on Agency programs, policies, plans, and other matters pertinent to the Agency's responsibilities for biological planetary protection, as defined in NPD 8020.7, including NASA planetary protection policy documents and components, implementation plans, and organization...." National Aeronautics and Space Administration Charter of the Planetary Protection Advisory Committee of the NASA Advisory Council, Feb. 13, 2001, *available at* http://www.hq.nasa.gov/office/oss/adv/PPACCharter.htm (last viewed June 10, 2005) [hereinafter 2001 NASA Charter]. A more recent version of the 2001 NASA Charter was signed on April 29, 2005, *see* National Aeronautics and Space Administration Charter of the Planetary Protection Advisory Committee of the NASA Advisory Council, April 29, 2005, *available at* http://www.science.hq.nasa.gov/strategy/ppac/PPACCharter2005.pdf (last viewed June 10, 2005). The membership of the Committee consists of up to 20 members selected to ensure "a balanced representation among industry, academia, and Government...At least four of the Committee members shall be persons knowledgeable in one or more of the fields of bioethics, law, public attitudes and the communication of science, the Earth's environment, or related fields." 2001 NASA Charter. Further, non-voting "representatives" shall be solicited for attendance and advice from the Department of Agriculture, Department of Energy, Department of Health and Human Services (National Institutes of Health and the Centers for Disease Control and Prevention), Department of the Interior, Department of Transportation, Environmental Protection Agency, National Science Foundation, and the Executive Office of the President of the United States. *Id.* Also important to note is that the meetings, held at least twice a year, are *open to the general public. Id.*

[27] *See* Donald.L. DeVincenzi et al., *Planetary Protection, Sample Return Missions and Mars Exploration: History, Status, and Future Needs*, 103 (E12) J. GEOPHYS. RES.,

Unlike preparations for the Lunar sample return missions of the *Apollo* program, infinitely more legal complexities face the MSR mission planners particularly for the follow-on human mission to Mars. Although there certainly is room for discussion of priority considerations, several experts believe that the most probable and important legal issues to resolve pertain to certain provisions found in the U.S. National Environmental Policy Act (NEPA), since that legislation "requires all federal agencies to conduct comprehensive reviews and interdisciplinary analyses of environmental impacts prior to decision-making."[28] In addition to the detailed public disclosure required in a NEPA Environmental Impact Statement (EIS), a public process involvement in the form of a launch approval for the MSR and Mars human mission is required that, under a Presidential Directive,[29] would initiate a multi-agency review of experiments and/or launches if there is any possibility, regardless of how remote, that those activities may have large scale adverse environmental consequences to Earth. This requirement may, however, be satisfied through the work engendered by the EIS. Nevertheless, given the scientific and engineering complexities involved in returning Mars surface samples to Earth, "it could take several years to complete the documentation, public hearings, agency consultations, and stepwise review and publication process required under NEPA."[30]

As already noted in part by Dr. Race,[31] numerous other legislative and regulatory issues need to be satisfied before the MSR mission is undertaken, all of which could complicate and delay both the MSR mission and the eventual human presence on Mars. Some of these issues relate to decisions regarding leg-

---

28,577, 28,581 (Nov. 25, 1998). *See also*, Margaret S. Race, *Planetary Protection, supra* note 6.

[28] DeVincenzi, *supra* note 27, at 25,581.

[29] Presidential Directive/National Security Council Memorandum, Scientific or Technological Experiments with Possible Large-Scale Adverse Environmental Effects and Launch of Nuclear Systems into Space, Presidential Directive PD/NSC-25, May 8, 1996.

[30] DeVincenzi, *supra* note 27, at 25,581. This is an observation reported to have been made in 1996 by S. Dawson, Jet Propulsion Laboratory, in a personal communication to Dr. Margaret S. Race.

[31] *See* Margaret S. Race, *Planetary Protection*, *supra* note 6.

islative control and authority, presently conflicting regulations, overlapping jurisdictions, uncertainties regarding treaty obligations and effectiveness with respect to planetary protection measures, and questions about United States Constitutional law regarding quarantine protocols and extraterritorial applications of implementing quarantine regulations. These and related issues will require constant integration of continually changing scientific data, technological challenges, *un*informed public concerns, political considerations unrelated to planetary protection requirements, health and safety of astronauts, legal interpretations in the form of case law, and very likely new legislation to clarify these complexities and authorize clear governmental control and accountability to resolve the ambiguities and conflicts.

## III. QUARANTINE PROCEDURES AND APPLICABLE LAW

Prior to 1991, the Code of Federal Regulations had the following section on environmental contamination,

> Scope: This part establishes: (a) *NASA* policy, *responsibility and authority* to guard the Earth against any harmful contamination or adverse changes in its environment resulting from personnel, spacecraft and other property returning to the Earth after landing on or coming within the *atmospheric envelope* of a celestial body; and (b) security requirements, restrictions and safeguards that are necessary *in the interest of national security*.[32]

The 1997 Code of Federal Regulations states that 14 C.F.R. Part 1211 is "Reserved".[33] In another, it is characterized as "Removed,"[34] and the change announcement is referenced.[35] The reference page has the statement that "NASA is removing 14

---

[32] 14 C.F.R. § 1211.100 (emphasis added).

[33] *Id.* edition dated Jan. 1, 1997, p. 75 to end.

[34] In the back of the Volume 14, on page 481, is a section titled "List of CFR Regulations affected" and identifies by year all the changes to the Code of Federal Regulations made since 1986. 14 C.F.R. Part 1211 is characterized as "Removed" in 1991. *Id.* at p. 484.

[35] CFR56 P 19259.

CFR 1211 since it has served its purpose and is no longer in keeping with current policy."[36]

Reference to "Reserved" and "Removed" creates some confusion and ambiguity, but it is clear that NASA is unsure at this time what regulations will evolve to cover future planetary protection procedures relating to the possibility of harmful contamination and the need for regulations implementing a quarantine protocol that covers material and humans exposed to extraterrestrial matter and returned to Earth. It also is clear that NASA is unsure what authority it has to invoke quarantine of material and humans, and intends to have at least some regulations in place that can be re-enacted quickly to cover unexpected contamination events that directly affect Earth. Nevertheless, in order to evaluate Part 1200 to identify the legal and practical deficiencies incorporated in the regulations relied on in the past, an assessment of the regulations in effect until January 1, 1997 follows. This can ensure that the regulations are properly modified or eliminated when new regulations are promulgated for future MSR missions and the ultimate human mission to Mars.

The most important regulatory deficiency is that there is no legislation authorizing NASA to promulgate its own quarantine regulations. Review of the previously relied upon regulations, presently withdrawn, reveal unauthorized regulatory "bootstrapping" by NASA without seeking legislative authorization from the Congress to promulgate quarantine regulations. Unauthorized quarantine is a subject of very sensitive and historical significance.[37] Uncertainty regarding legislative authority to quarantine is exhibited by NASA's reliance in the first instance

---

[36] *Supra* note 33.

[37] Quarantine involves restraint of people and property without definite time limits, based solely on the certainty or likelihood of contamination that may or may not be harmful. In the history of the American colonies and the early United States, a common practice by incumbent politicians seeking re-election was to declare the opponent as being subject to quarantine for health reasons, at the very least until the elections were over. Subsequently, legislatively authorized quarantine required there to be contact/contamination with a "*known* infectious disease." Of course, when dealing with extraterrestrial contamination, at least until determined otherwise from experience, there is no way to know whether contamination with inanimate material as well as extraterrestrial biota could result in contamination by an "infectious" disease, let alone a "known" infectious disease. *See* George S. Robinson, *Contamination of Earth's Ecosystem*, *supra* note 8.

on the legislative authority of the Department of Health and Human Services and the Department of the Interior to implement regulations to detain, examine, quarantine, and decontaminate.

Set forth, below, are some of the principal areas of weakness that must be addressed in the now withdrawn regulations.

1. Unclear categories of contamination: The regulation states, "[t]he provisions of this part apply to all NASA manned and unmanned space missions which land on or come within the atmospheric envelope of a celestial body and return to the Earth."[38]

The quarantine regulations discussed below must apply to all types of NASA space missions. The constraints of principal importance are that the quarantined objects must (a) land on or come within the atmospheric envelope of a celestial body,[39] and (b) return to Earth. Obviously, matter existing in interstitial space, other than celestial bodies and which is included in atmospheric envelopes, is not part of the extraterrestrial matter covered by the exposure and quarantine protocol and regulations. The presumption is that the "other" matter in space is not considered to be contaminating, or that the probability of pathogenic organic and toxic inorganic complexes surviving or existing in outer space is still too remote to consider, or that the probability of an encounter between space missions and such "free floating" matter is too remote to be covered by regulations at present.[40] No mention is made either of cross contamination

---

[38] 14 C.F.R. § 1211.101.

[39] Under certain circumstances, it is reasonable to assume "celestial" body would include artificial bodies, such as the *International Space Station*, as well as naturally occurring celestial bodies.

[40] For early space missions, it was determined by the Interagency Committee on Back Contamination that, should any microorganism in space strike a spacecraft the force of impact (16,000 meters/second) would destroy that microorganism. Much has been learned about unanticipated survivability characteristics of extremophiles on Earth and survival of microorganisms in space that make such an assumption perilous at best. At present, scientists are discovering the devastating effects of viruses, bacteria, and other forms of Earth indigent biota that only recently are becoming known because of the extensive travel to and from remote areas of heretofore relatively unvisited sections and isolated ecosystems of Africa, Latin America, the Southeast Asian continent, etc. The HIV virus and its increasing number of mutations is an excellent example. Extremophiles are only lately being discovered to exist and thrive in areas of Earth

where an object or person comes in contact with other equipment and humans exposed as defined in this section.

2. Lack of direct authority:[41] The regulation relies on Sections 203 and 304 of the National Aeronautics and Space Act of 1958, (NAS Act), as amended. Neither of these sections addresses any issue of quarantine authority directly. In addition to the Outer Space Treaty,[42] the regulation cites internal management policies[43]as authority. However, these management instructions do not provide authority to quarantine; only authority to assist in implementing valid quarantine authority.

3. Details unsupported by adequate authority:[44] The details of how seizure and quarantine procedures and NASA policies will be implemented are addressed, but with extraordinarily broad and self-assumed discretion given to the NASA Administrator to develop them. Again, however, there is only the assumption that adequate legislative authority exists.

## IV. THE *APOLLO* PROGRAM: HOW NOT TO PROCEED WITH A QUARANTINE PROTOCOL

The ICBC was established to coordinate activity in the United States relating to protection from back contamination. The enabling agreement distinguishes between regulatory agencies such as the Departments of Agriculture, Health, Education and Welfare, and the Interior, and other interested agen-

---

where none were thought to be able to sustain carbon based organic life. Even in the deepest parts of the oceans, scientists are finding single cell and colonies of biota thriving in and around superheated thermal vents where the metabolic characteristics and requirements of living Earth organisms are in many ways significantly, if not completely, different from those of other Earth indigent life forms. Even in NASA's "clean rooms", such as the decontamination facility at the Jet Propulsion Laboratory in California, previously unknown Earth indigent microorganisms are being discovered and named, and unique metabolic activities of these microorganisms are being identified. For an excellent resource on the locations and characteristics of extremophiles, such as anaerobes, thermophiles, psychrophiles, acidophiles, and the like, particularly in the context of recognizing potential astrobiological life forms and their support systems, *see* The Astrobiology Web *available at* http://www.astrobiology.com/extreme.html (last accessed on May 31, 2005).

[41] 14 C.F.R. § 1211.103.

[42] Outer Space Treaty, *supra* note 2, at art. IX.

[43] 14 C.F.R. § 1211.103, *citing to* Management Instructions 1052.90 and 8020.13.

[44] 14 C.F.R §§ 1211.104 – 1211.108.

cies such as the regulatory agencies plus NASA and the National Academy of Sciences.[45] Only those federal agencies with direct statutory authority to promulgate quarantine regulations were designated as regulatory.[46] In contrast to these regulatory agencies, NASA has not been granted specific legislative authority to promulgate quarantine regulations. From this perspective, it is important to understand the political and procedural history of the quarantine regulations that NASA published for the *Apollo* program. On the very day *Apollo 11* began its historic journey to the Moon, NASA published its "Extraterrestrial Contamination" regulations in the Federal Register. These regulations established:

> a) NASA policy, responsibility, and authority to guard Earth against harmful contamination or adverse changes in its environment resulting from personnel, spacecraft, and other property returning to Earth after landing on or coming within the atmospheric envelope of a celestial body; and
>
> b) Security requirements, restrictions, and safeguards that are necessary in the interest of the national security.[47]

As noted previously, NASA did not publish its quarantine regulations until 16 July 1969, the day *Apollo 11* was launched. This is a procedure contrary to the APA, which states that "the required publication...of a substantive rule shall be made not less than 30 days before its effective date, except...as otherwise provided by the agency for good cause found and published with the rule."[48] The "good cause" stated by NASA was,

> In the light of the Apollo 11 space mission and the need to guard the Earth against extraterrestrial contamination, it is hereby determined that compliance with section 553 of Title 5 of the United States Code is impracticable and contrary to the

---

[45] *See supra* note 7.

[46] The Department of Agriculture regulates pathogens that affect plant and certain animal life; the Department of Health, Education and Welfare (now the Department of Health and Human Services), with pathogens that affect humans; and the Department of the Interior that regulates the introduction of injurious species.

[47] 14 C.F.R. § 1211 (1969).

[48] 5 U.S.C. § 553(d)(3).

> public interest; therefore, the provisions of this Part 1211 are effective upon publication in the Federal Register.[49]

This was merely a restatement of the decision, not an explanation of why it was "impracticable" and "contrary to the public interest" for NASA to comply with the APA provisions.[50] Publication of the rule appears to have been delayed until the day of the launch of *Apollo 11* because it would have been contrary to NASA's interests to publish the regulations earlier and open them for public comment and discussion. If this was done, there was the possibility—albeit remote—of a restraining order and temporary injunction being imposed on the launch.[51] It is very likely that NASA acted in this fashion

> to minimize exposure to the back contamination issue to the public, [and] to ensure there was no program derogation [or launch delay], in the time-frame set for the Apollo 11 mission, caused by lengthy administrative procedures if the public were to be permitted consultative participation and/or scrutiny in the development of the back contamination standards and quarantine regulations.[52]

NASA relied on four other sources of "authority"[53] to reinforce the validity of its quarantine protocol and regulations: the

---

[49] *See* 69 Fed. Reg. 8473, 34 Fed. Reg. 11975, 11976 (July 16, 1969), in which the NASA Administrator avoided the 30 days' notice of proposed rule making attendant to the start of the Apollo 11 mission (during which, according to the Administrative Procedures Act, the public and other interested parties/entities would be permitted to comment on the proposed rule). This was a "non-substantive statement" offered as an attempt to ensure the Apollo 11 launching would occur on time without delays that might be caused by what NASA officials considered might be "frivolous" and "uninformed" attempts to obtain restraining orders and the like.

[50] 5 U.S.C. § 553(d)(3).

[51] *See* George S. Robinson, *Contamination of Earth's Ecosystem*, *supra* note 8, at 149, n.202. *See also* George S. Robinson, *Earth Exposure to Martian Matter: Back Contamination Procedures and International Quarantine Regulations* 15 COLUM. J TRANSNAT'L L. 17, *see also*, George S. Robinson, *Return of Extraterrestrial Biota: Legal, Ethical and Moral Participation by the Public*, *in* 20 COLLOQUIUM ON THE LAW OF OUTER SPACE 430 (1977).

[52] *See* George S. Robinson, *Contamination of Earth's Ecosystem*, *supra* note 8, at 149, n.202. *See also* George S. Robinson, *Earth Exposure to Martian Matter*, *supra* note 51, and *see also* George S. Robinson, *Return of Extraterrestrial Biota*, *supra* note 51.

[53] 14 C.F.R. § 1211.103, which provides that the authority relied on for the quarantine regulations was "(a) Sections 203 and 304 of the National Aeronautics and Space

obligation to avoid harmful contamination of Earth and other celestial bodies;[54] criminal penalties for noncompliance with NASA regulations;[55] physical and national security interests;[56] and internal NASA policy dealing with back contamination issues,[57] and the quarantine authority of the Departments of Agriculture, the Interior, and Health, Education and Welfare (now Health and Human Services).

"In the exploration and use of outer space, including the Moon" signatories to the Outer Space Treaty are required "to avoid [its] harmful contamination".[58] Regarding "the environment of the Earth" they are required to "avoid...adverse changes...resulting from the introduction of extraterrestrial matter and, *where necessary* shall, adopt appropriate measures for this purpose".[59] At the time of *Apollo 11*, as is true now, the state-of-the-art did not permit absolute knowledge of the existence of extraterrestrial life forms on the Moon (and whether they would be harmful to Earth's biosystem or any of its component life forms). This could not be determined until after astronaut contamination with lunar material had occurred and they had been biomedically tested for harmful biotic and nonbiotic contamination under secure conditions in the Lunar Receiving Laboratory. The second factor, and perhaps the most limiting, is that the Outer Space Treaty cannot be considered self-executing.[60] Therefore, adequate authority does not exist in that source *generally* for the NASA Administrator to "adopt appropriate measures" for the purpose of safeguarding Earth from

---

Act of 1958, as amended (42 U.S.C. 2473, 2455 and 2456, (b) 18 U.S.C.799, (c) Article IX, Outer Space Treaty, TIAS 6347 (18 UST 2416), (d) NASA Management Instructions 1052.90 and 8020.13."

[54] Outer Space Treaty, *supra* note 2, at art. IX.

[55] 18 U.S.C. § 799.

[56] 42 C.F.R. § 304, 18 U.S.C. § 799.

[57] NASA Management Instructions 1052.90 and 8020.13 (Aug. 24, 1967).

[58] Outer Space Treaty, *supra* note 2, at art. IX.

[59] *Id.* (emphasis added).

[60] "(4) An international agreement of the United States is 'non-self-executing' (a) if the agreement manifests an intention that it shall not become effective as domestic law without the enactment of implementing legislation." *See* RESTATEMENT (THIRD) OF FOREIGN RELATIONS LAW OF THE UNITED STATES § 111 (1987). Note the distinction between what is considered enabling *legislation* and implementing *regulation* in U.S. procedural law.

extraterrestrial contamination. Reliance on criminal sanctions[61] was also insufficient as a matter of law to support NASA's assertion of quarantine authority necessary to publish its quarantine regulations. The criminal regulation stated,

> [w]hoever willfully shall violate, attempt to violate, or conspire to violate any regulation or order promulgated by the Administrator of the National Aeronautics and Space Administration for the protection or security of any...facility...spacecraft, or similar vehicle, or part thereof...shall be fined under this title, or imprisoned not more than one year, or both.[62]

This provision was used as a mechanism for enforcing those regulations issued by NASA to protect or secure NASA facilities, and spacecraft. The initial lunar quarantine regulations were intended for the astronauts, other NASA employees, and various scientists and engineers assigned to conduct initial research regarding the returned lunar samples, as well as spacecraft and other government property. The authority NASA claimed may have been sufficient for the purpose of removing its own employees and equipment to the Lunar Receiving Laboratory for indefinite periods of "incarceration", but this authority was insufficient to grant general quarantine power over *all* potential "extraterrestrially exposed" persons and property.[63] Further, it is clear from a reading of these regulations that "security" was very likely intended to mean only "physical" security.

Similarly, 42 USC Sections 2455 and 2456 relate to preserving and enhancing the physical integrity and security of NASA *installations*. Section 2455 involves security investigations of NASA employees and contract personnel regarding access to sensitive data and installations.[64] Section 2456 permitted cer-

---

[61] *See supra* note 55.

[62] *Id.*

[63] In 14 C.F.R. § 1211.102 (b) (1969), NASA defined "extraterrestrially exposed" as "the state or condition of any person, property, animal or other form of life or matter whatever, who or which has: 1. Touched directly or come within the atmospheric envelope of any other celestial body; or 2. Touched directly or been in close proximity to (or has been exposed directly to) any person, property, animal or other form of life or matter who or which has been extraterrestrially exposed."

[64] 42 U.S.C. § 2455.

tain NASA employees to carry firearms.[65] Clearly, these provisions were insufficient to serve as authority for NASA's quarantine protocol regulations.

The NASA Management Instruction 1052.90 incorporated the ICBC Interagency Agreement into NASA management policy.[66] NASA's reliance on its own internal directives as a source of authority to promulgate quarantine protocol regulations was nothing short of unauthorized promulgation of authority to quarantine that, in fact, did not exist.

NASA officials were fully aware of the relative potential for biological contamination associated with the *Apollo* program, and also its broad impact on public interest if these potential problems were made known. Although presently somewhat more attuned to and sophisticated about its responsibilities to involve the general public in developing outbound and back contamination control procedures, facilities, and contamination control protocols that involve robotics and humans coming in contact with the Moon, Mars, and other celestial bodies being explored *in situ*, NASA officials made decisions early in the development of the back contamination program that appeared to take note of the advice and concerns about the adequacy of that program expressed by interested non-NASA scientists. In fact, legal counsel at NASA felt that the Administrator, acting alone or in conjunction with other government officials (that is, certain agency members of the ICBC with limited and specific quarantine authority), did not have authority to enforce the quarantine of any contaminated persons or property. "Legislation," asserted counsel, "would be necessary to obtain this authority."[67] Nevertheless, another internal memorandum to the General Counsel opined in September of 1969 that,

> this [quarantine] power derives from a general Congressional delegation of authority to promote the general welfare to certain executive agencies, and from the inherent power of the

---

[65] 42 U.S.C. § 2456.

[66] Management Instruction 1052.90 (Aug. 24, 1967).

[67] Internal NASA memorandum from Robert J. Wojtal, to the General Counsel, (Feb. 25 1969), shortly before the launch of *Apollo 11*, and entitled "Quarantine – Protection of the Earth from Lunar Contamination" (on file with author).

> executive to control access to the United States as part of the foreign affairs power of the executive, NASA partakes of both of these powers where they pertain to the space activities of the United States, and therefore of the authority to quarantine extraterrestrially exposed persons or materials.[68]

Based upon these two opinions, at a minimum the foundation may have been laid for an interested third party to seek a judicial declaratory judgment.

The ICBC member agencies with legislated quarantine authority had decided, *ad hoc*, to merge their respective quarantine authorities and delegated this "collective" quarantine authority to NASA for the purpose of issuing its own quarantine regulations. Accordingly, NASA took the position that if one of the ICBC members with quarantine authority exercises that authority and quarantines an extraterrestrially exposed person, property, animal, or other form of life or matter whatever, NASA will not exercise its own rather pallid authority to quarantine that same extraterrestrially exposed person, property, animal, or other form of life or matter whatever.[69]

### *A. Constitutional Concerns with NASA's Quarantine Regulations...Then and Now*

The fact that the Outer Space Treaty is not self-executing required that legislation be enacted to implement the Treaty.[70] Congress has the power "to make all laws which shall be necessary and proper for carrying into Execution...all other powers vested by this Constitution in the Government of the United

---

[68] Memorandum from Joseph W. Dellapenna, to the NASA General Counsel (Sept. 2, 1969, entitled "[T]he basis of NASA's Authority to Quarantine Extraterrestrially Exposed Persons and Materials" (on file with author).

[69] 14 U.S.C. § 1211.105 – Extraterrestrial Exposure – Relationship with Departments of Health, Education, and Welfare and Agriculture.

[70] Very early in the history of American jurisprudence, Chief Justice John Marshall stated his view that a treaty is not self-executing if "the terms of the [treaty]...import a contract, [and] when either of the parties engages to perform a particular act, the treaty addresses itself to the political, not the judicial department; and the legislature must execute the contract before it can become a rule for the Court." Foster v. Nelson, 27 U.S. 253, 314 (1829).

States, or in any Department or Officer thereof."[71] The Congress, therefore, has the authority to enact legislation necessary and proper for the execution and implementation of a treaty properly made by the President with the advice and consent of the Senate.

The issue, then, is whether the Administrator of NASA, acting alone or in conjunction with other Government officials, had then and has now the authority to (1) apprehend, detain, examine, decontaminate, and quarantine individuals; and (2) seize, examine, decontaminate, condemn, and destroy animals, or other forms of life or property, if such individuals, animals, or property should, through design or by accident, be exposed to extraterrestrial matter obtained by, or involved in, a NASA space mission. The issue of whether the extraterrstrial exposure involves *harmful* contamination is not addressed and settled.

The NAS Act provides that NASA may "[i]n the performance of its functions...make, promulgate, issue, rescind, and amend rules and regulations governing the manner of its operations and the exercise of the power vested in it by law".[72] The Congressional Record indicates that the intent was to give NASA broad authority, enabling it to "carry on a wide spectrum of activities which relate to the successful use of outer space."[73] It seems very unlikely that this general, vague, and at times ambiguous, language was meant to include the highly contentious and troublesome authority to quarantine property and particularly people, given its history of abuse throughout the world and in the early history of American politics. Since the act of quarantine carried out by NASA would involve the detention and incarceration not only of Government employees and property but of private individuals as well, it is an extreme stretch to interpret Congressional intent as giving the NASA Administrator *carte blanche* authority in this area without more specifically delineated constraints, especially since it involves the issue of deprivation of liberty and property that is protected by the Constitution.

---

[71] U.S. CONST. art I, § 8, cl. 18.
[72] 42 U.S.C. § 2473(c)(1).
[73] H.R. REP. NO. 2166, 85th Cong. (2d Sess. 17 1958).

Whenever the U.S. Congress has legislated authority to quarantine, such authority has been the subject of well-defined procedural constraints.[74] Without the necessary delegation of specific authority by the Congress, NASA, an independent Executive Branch agency, was in effect legislating for the Congress when it promulgated and published its quarantine regulations. Additionally, NASA confronted the Judicial Branch with perhaps the most controversial provisions of its quarantine regulations, such as those concerning NASA's response to court orders:

> a. NASA officers and employees are prohibited from discharging from the limits of a quarantine station any quarantined person, property, animal or other form of life during an announced quarantine period in compliance with a subpoena, show cause of any court or other authority without the prior approval of the General Counsel and the Administrator.
>
> b. Where approval to discharge a quarantined person, property, animal in compliance with such a request, order or demand of any court or other authority is not given, the person to whom it is directed shall, if possible, appear in court or before the other authority and respectfully state his inability to comply, relying for his action upon this Sec. 1211.107.[75]

NASA's failure to submit to legal process regarding implementation of its quarantine regulations seems to put the Executive Branch on a collision course with the Judiciary, creating a separation of powers controversy of the first magnitude. Combined with NASA's encroachment into the Legislative Branch, these

---

[74] *See, e.g.*, 21 C.F.R. § 1240 (Control of Communicable Diseases; Food and Drug Administration, Department of Health and Human Services); 42 C.F.R. Parts 71 and 72 (Foreign Quarantine and Interstate Shipment of Etiologic Agents; Public Health Service, Department of Health and Human Services); 9 C.F.R. Parts 49 – 124 (Cooperative Control and Eradication of Livestock or Poultry Diseases; Interstate Transportation, Exportation and Importation of Animals and Animal Products; Viruses, Serums, Toxins, and Analogous Products; Organisms and Vectors); 7 C.F.R. Part 301 (Domestic Quarantine Notices; Animal and Plant Health Inspection Service, Department of Agriculture); 7 C.F.R. Part 340 (Introduction of Organisms and Products Altered or Produced Through Genetic Engineering which are Plant Pests or Which There is a Reason to Believe are Plant Pests; Animal and Plant Health Inspection Service, Department of Agriculture).

[75] 14 C.F.R. § 1211.107.

two separation of powers issues would probably be sufficient to invalidate the regulations upon judicial review.

### *B. The Constitution, the U.S. Supreme Court and Police Power*

Since the U.S. Supreme Court has consistently upheld the authority of a state to make reasonable quarantine regulations under the state's exercise of its police power, and since the Court also has recognized that it would be proper for the Congress to enact quarantine legislation,[76] there is no bar to enactment of such legislation. Apparently, the authority that the Congress has exercised in enacting provisions such as 42 U.S.C. 264,[77] is the authority "[t]o regulate commerce with foreign nations, and among the several states..."[78] and "[t]o make all Laws which shall be necessary and proper for carrying into Execution the foregoing Powers and all other Powers vested by this Constitution in the Government."[79]

There has been no direct confrontation before the U.S. Supreme Court regarding Congressional exercise of the quarantine authority and that of the "right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures;"[80] the right not to "be deprived of life, liberty, or property, without due process of law,"[81] and the proscription that "[n]ether slavery nor involuntary servitude...shall exist within the United States, or any place subject to their jurisdiction."[82]

The U.S. Supreme Court has heretofore held Constitutional various state quarantine provisions that deal with an actual communicable disease, while any proposed quarantine legisla-

---

[76] *See* Compagnie Francaise de Navigation a Vapeur v. Louisiana State Board of Health, 186 U.S. 380 (1902). *See also* Morgan's Steamship Co. v. Louisiana Board of Health, 118 U.S. 455 (1886); Francis A. Benton v. Curtis Reid, 231 F. 2d 780 (D.C. Cir. 1956).

[77] 42 U.S.C. 264 (The Public Health Service General Powers And Duties Quarantine And Inspection).

[78] U.S. CONST. art. I, §. 8, cl. 3.

[79] *Id.* at art. I, §. 8, cl. 18.

[80] *Id.* at amend. IV.

[81] *Id.* at amend. V.

[82] *Id.* at amend 13, § 1.

tion applicable to planetary contamination, outbound and back contamination, would not; there would be only speculation at this point in time, a possibility, that contaminated materials carry communicable diseases or may otherwise endanger Earth's biosphere or potential biospheres of other celestial bodies. Bearing this distinction in mind, the issues arise whether (1) seizure pursuant to future legislation would be unreasonable and therefore in conflict with the 4th Amendment; (2) the permitted seizure, examination, decontamination, and detention of contaminated persons or property would be an arbitrary, capricious, and unreasonable act with no reasonable relation to a legitimate legislative purpose and, therefore, prohibited by the 5th Amendment; (3) procedures invoked in the quarantine are not suitable and proper and thus do not meet the procedural due process requirement of the 5th Amendment; and (4) whether the quarantine of contaminated persons results in an involuntary servitude prohibited by the 13th Amendment.

### *C. The Quarantine Regulations and "Due Process"*

The NASA quarantine regulations include the following definition:

> (c) Quarantine means the *detention, examination* and decontamination of any person, property, animal or other form of life or matter whatever that is extraterrestrially exposed, and *includes the apprehension or seizure of such person*, property, animal or other form of life whatever.[83]

Although the term "incarceration" is rarely used in United States law, it does appear occasionally in statutes. When so used, it always appears to mean confinement by competent public authority under due legal process. "Imprisonment," however is the act of "...confining a man in prison; the restraint of man's personal liberty; coercion exercised upon a person to prevent the free exercise of his powers of locomotion."[84] Further, the act or

---

[83] 14 C.F.R. § 1211.102 (c) (emphasis added).

[84] For a definition of "imprisonment," *see* BLACK'S LAW DICTIONARY 370 (4th ed. 1951). For a definition of "confinement," *see* BLACK'S LAW DICTIONARY WITH

status of *confinement* "may take place without the actual application of any physical agencies of restraint [such as locks or bars], but by verbal compulsion and display of available force."[85]

Additionally,

> "[I]mprisonment" may be accomplished by a private person as well as competent public authority. If the imprisonment is unjustified, it comes from [t]he unlawful arrest or detention of a person without a warrant, or by an illegal warrant, or a warrant illegally executed, and either in a prison or a place used temporarily for that purpose, or by force and constraint without confinement...[F]alse imprisonment consists in the unlawful detention of the person of another, for any length of time, whereby he is deprived of his personal liberty.[86]

If quarantine confinement is by competent authority, or pursuant to due process, then the act may be referred to as incarceration and is, therefore, legitimate. However, "competent" has been defined in the present context as "having sufficient ability or authority; possessing the requisite physical, mental, natural or legal qualifications."[87] In addition, "competent authority" has been defined, in application to courts and public officers, as having "jurisdiction and due legal authority to deal with the particular matter in question."[88] If specific quarantine legislation or other sources of authority do not permit detention for the purposes detailed in NASA's regulations on extraterrestrial exposure, it can be argued that "competent authority" does not exist for the quarantine of extraterrestrially exposed people, objects and any other matter whatever. Additionally, the provision that "[t]he quarantine may be used only on a determination, *with or without a hearing*, that there is probable cause to believe that such person, property, animal or other form of life or matter whatever is extraterrestrially exposed"[89] may violate

---

PRONUNCIATIONS, 757 (6th ed. 1990). *See also*, Dupler v. Seubert, 230 N.W. 2d 626, 631 (Wis. 1975).

[85] BLACK'S LAW DICTIONARY, *supra* note 84.

[86] BLACK'S LAW DICTIONARY, *supra* note 84.

[87] *Id.* at 284.

[88] *Id.*

[89] 14 C.F.R. § 1211.104 (emphasis added).

the due process guarantees of the 5th Amendment of the U.S. Constitution.

Without specific quarantine authority to examine and decontaminate a potentially exposed person (for example, but not exclusively, an individual or material accidentally or incidentally coming into contact with an individual, equipment or material who or that has been exposed intentionally as part of a particular mission and who or that may have become *potentially* contaminated through unintended sequential exposure), the issue arises whether anything more than isolation and detention is an abuse of police power, especially if the individual or material detained is forced to submit to examination and decontamination. To make the circumstances even more questionable, without certainty as to what pathogen, toxin, etc., is being sought, such examination and decontamination could be a lengthy process. These and other due process issues arise when considering the past NASA quarantine regulations. They must be avoided in formulating new regulations.

The essential guarantee of the due process clause of the 5th Amendment is that the Government may not imprison or otherwise physically restrain a person, except in accordance with specific and fair procedures. Although the due process clause of the 5th Amendment is concerned primarily with procedures used in the context of restraining, imprisoning, indicting, and convicting someone of a crime, it in fact covers all governmental deprivations of liberty.

While the required statutory authority may differ depending upon the type of action, government can never impose substantial physical restraints on an individual without establishing a procedure to determine the factual basis and legality of such actions. In *Addington* v. *Texas*,[90] the U.S. Supreme Court determined that an adult could not be involuntarily committed to a psychiatric institution on burden of proof that requires the State merely to show by a "preponderance of the evidence" that the person is dangerous to himself or another. Although the Court did not require a "beyond reasonable doubt" standard, it

[90] Addington v. Texas, 441 US 418 (1979).

held that trial courts must at least use a "clear and convincing" evidence standard. Quarantine proceedings are arguably comparable to those of civil commitment, since neither is criminal and both are related to public health and safety. As such, they both should require the same burden of proof, that is, "clear and convincing evidence," as the applicable standard.

The NASA quarantine regulations relied on in the past allow the Administrator of NASA to quarantine an individual "based only on a determination, with or without the benefit of a hearing, that there is *probable cause* to believe that such a person...is extraterrestrially exposed"[91]. Although the definitions may vary from case to case and court to court, "probable cause" has been defined in Black's Law Dictionary as "[r]easonable cause; having more evidence for than against."[92] Therefore, it would appear that procedural due process would not have been afforded to individuals who are quarantined under these regulations since the burden of proof for the government is not more than a "preponderance of the evidence."

The NASA quarantine regulations were often vague and non-specific. For example, they required simply that the Administrator "shall in his discretion...[d]etermine that a particular person...is extraterrestrially exposed and quarantine such person...."[93] Nowhere is the basis for this deprivation of liberty defined in terms of the types of pathogens being sought, or reasons for believing that the individual is contaminated or infected at all. Under the regulations, the Administrator,

> in his discretion shall [h]old such hearings at such times, in such manner and for such purposes as may be desirable or necessary under this part, including hearings for the purpose of creating a record for use in making any determination under this part or for the purpose of reviewing any such determination.[94]

---

[91] 14 C.F.R.§ 1211.104(3) (emphasis added).
[92] BLACK'S LAW DICTIONARY 1201 (6th ed. 1999).
[93] 14 C.F.R. § 1211.104(7).
[94] *Id.*

Again, the regulations provided no guidance as to the content of hearings or what right of appeal there might be from a decision of the Administrator. In short, since the Administrator is not authorized by legislation to quarantine, it is highly questionable whether the ultimate confinement of person or property by a duly authorized NASA quarantine officer can be accomplished within the constraints imposed by the 4th and 5th Amendments of the U.S. Constitution.

Finally, responding to the original question whether it is unreasonable or arbitrary to seize and otherwise deprive contaminated persons of liberty or to deprive persons of contaminated property by quarantine, it may be assumed, based on current scientific data, that no reasonable person could contend at this time that Earth's immediate ecosystem is immune from the danger of extraterrestrial contamination. Precisely because the danger of adverse or harmful contamination of Earth's biosphere is unknown, and because the possibility exists that extraterrestrial biota may possess pathogenic disease characteristics unknown to humans, it is persuasively reasonable to permit seizure and quarantine in this *sui generis* situation but only under tightly controlled conditions. Relatively unconstrained regulatory quarantine and enforcement authority residing in one government official, here the NASA Administrator, is not altogether persuasively reasonable. Therefore, since the 4th and 5th Amendments proscribe unreasonable seizures[95] and arbitrary, capricious and unreasonable acts with no reasonable relation to a *legitimate legislative* purpose,[96] *proper* quarantine legislation so giving rise to NASA's quarantine policies and regulations would not violate the U.S. Constitution.

If what is required by the procedural due process aspect of the 5th Amendment is "that kind of procedure...which is suitable and proper to the nature of the case, and sanctioned by the established customs and usages of the courts",[97] then this re-

---

[95] Carroll et al. v. United States, 267 U.S. 132, 147, 149 (1925).

[96] Darrell V. Boylan v. United States, 310 F.2d 493, 498-499 (9th Cir. 1962) *cert. denied*, 372 U.S. 935 (1963). *See also Compagnie Francaise*, 186 U.S at 393.

[97] *Ex Parte* Wall, 107 U.S. 265, 289 (1883). *See also* Cafeteria & Restaurant Workers Union v. McElroy et al., 367 U.S. 886, 895 (1961).

quirement may be met by specific and carefully crafted legislation. In brief, the procedure envisaged would be an administrative determination based on probable cause that the person or material had been contaminated. This determination undoubtedly would be reviewable on application for a writ of *habeas corpus*, though the quarantined person would not be permitted to appear before the court.[98]

If, then, a person is deprived of liberty or property with due process of law, it appears that legislation could not be successfully contested on the ground that the quarantined person is thus required to perform an involuntary servitude proscribed by the 13th Amendment. The argument would be specious. Insofar as a person's liberty is denied, it would be accomplished with due process of law in accordance with the 5th Amendment; and insofar as the 13th Amendment proscribes involuntary servitude, no enforced compulsory service or labor would be required under such new legislation. In short, although proper and sufficient legislative authority underlying NASA's old quarantine regulations did not exist, and does not exist at present for new quarantine regulations, there appears to be no Constitutional obstacle to passage of necessary authorizing legislation by the Congress to accommodate this *sui generis* situation.

### *D. The Law and "Takings" under the Constitution*

The Fifth Amendment of the U.S. Constitution provides that "private property [shall not] be taken for public use, without just compensation."[99] Ownership, use, and transfer of private property of all types are rights, not benefits or privileges bestowed by the government. Of course, governments have the obligation to govern *lawfully*; thus, the rights of property owners are not absolute and the government may, within prescribed limits, regulate the use of property. Where those regulations amount to a taking of private property, governments must pay

---

[98] *See* 28 U.S.C. §§ 2241-2255 (for applicable provisions dealing with the writ of *habeas corpus*). *See also* United States v. L. Thomas Shinnick, 219 F. Supp. 789 (E.D.N.Y. 1963).

[99] U.S. CONST. amend. V.

the owner for the property rights abridged. The fact that a government's actions are otherwise constitutionally authorized does not mean that those actions cannot effect a taking. However, such a taking must be for a public purpose within the government's Constitutional authority, and only then on the payment of just compensation.

Government actions taken specifically for purposes of protecting public health and safety ordinarily are given greater latitude by courts before their actions are considered to be takings. Where public health and safety are the asserted regulatory purposes, the health and safety risk posed by the property use to be regulated must be identified with as much specificity as possible and should be "real and substantial". That is, it must be more than speculative and must present a genuine risk of harm to public health and safety.

Any action to regulate property use, through seizure and quarantine, for public health and safety purposes must, to avoid a taking, specifically be designed to counter the identified risk and must substantially advance those public health and safety purposes. The action also must, within the limits of available technology and information, be no more restrictive than necessary to alleviate the health and safety risk created by the use to be regulated.

In assessing whether quarantine or confiscation is for the protection of the public health and safety, some of the following factors should be examined:

> (1) The certainty that the property use to be regulated poses a health and safety risk in the absence of government action; and
>
> (2) The severity of the injuries to public health and safety should the identified risk materialize, based on the best available information at the time the risk is undertaken.

From the perspective, then, of a "takings" implication analysis, the greater the certainties of the severity, the more stringent measures are justified. Although the ideal is that the response taken to counter the risks is no greater than the risk posed, this presupposes that appropriate technology and information are

available. That information for the MSR mission and the later human mission to Mars is not available! Until it is, development and application of quarantine protocols, necessary legislation, implementing regulations, and applicable treaties must be developed hand-in-glove with the scientists, engineers, program and project managers, and particularly with program and project budget officers involved. It is not enough for the legislators and the lawyers to await the final MSR mission program approval before taking tangible steps to ensure any quarantine laws and takings are fully consistent with applicable law. To do otherwise would invite, as it did with the *Apollo* and Lunar Surface Sample Return missions, political answers and regulatory bootstrapping more harmful, perhaps, than the actual risk of harmful and adverse outbound and back contamination consequences.

### *E. Contamination and Quarantine: Space Treaties and Other International Law*

Regarding international collaboration and regulation of space activities, there is an affirmative duty set forth in the Outer Space Treaty requiring States-Parties to "immediately inform the other States Parties...or the Secretary-General of the United Nations of any phenomena they discover in outer space...which could constitute a danger to the life or health of astronauts."[100] This duty is required only when a *potential* danger becomes apparent. In the circumstances of outbound and back contamination, the *potential* for danger or harm is becoming, albeit slowly, increasingly apparent primarily through ongoing robotic exploratory missions.[101]

The Outer Space Treaty, Article IX,[102] addresses the need of States-Parties to be

---

[100] Outer Space Treaty, *supra* note 2, at art. V.

[101] The potential for harmful cross and back contamination from mutated Earth indigent biota in the *International Space Station* is being assessed in varying degrees of urgency, principally as part of ongoing biomedical evaluations of astronauts and biological scientific experiments on board the station.

[102] Outer Space Treaty, *supra* note 2, at art. IX.

> ...guided by the principal of co-operation and mutual assistance and shall conduct all their activities in outer space...with due regard to the corresponding interests of all other States Parties....[103]

Article IX then goes on to provide, as indicated previously, that Parties to the Treaty shall explore space and celestial bodies so as to

> avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter and, where necessary, *shall adopt appropriate measures for this purposes*.[104]

Clearly, then, the Outer Space Treaty is not self-executing, at least with respect to Article IX. No additional specific legislation was adopted in the United States for implementing this provision of the Treaty.

One of the most important requisites of Article IX is that cooperation and mutual assistance *shall* be the guiding principle. Concisely, States-Parties to the Treaty are bound to prevent harmful effects to Earth's biosphere through back contamination. Cooperation and mutual assistance presuppose, at a minimum, multilateral consultations regarding standards and procedures to be followed. The wording requiring States to "adopt appropriate measures for this purpose" is sufficiently inclusive to be directed at several or all States Party to the Treaty or in the absence of conclusions based on multilateral consultations, each launching or otherwise responsible State must take appropriate measures *unilaterally*. But it may well be that in the absence of any specific agreement, U.S. quarantine regulations, assuming they are properly authorized by the Congress, may be recognized under international law as applied to non-U.S. citizens on the high seas, in foreign territory, in international airspace, and in outer space on celestial bodies, or the *International Space Station*.

The obligation under Article IX also requires that,

---

[103] *Id.*

[104] *Id.* (emphasis added).

> [i]f a State Party...has reason to believe that an activity or experiment planned by it or its nationals in outer space...would cause potentially harmful interference with activities of other States Parties in the peaceful exploration and use of outer space, it shall undertake appropriate international consultations before proceeding with any such activity or experiment.[105]

Outbound contamination control is integral to understanding the requirements for back contamination control procedures, i.e., it is essential to know that Earth biota taken to Mars, for example, is properly inventoried and not mistaken for Mars biota, or has not mutated into a new and unknown type or paraspecies. So, the requirement for consultation was included in part to cover the biotic threat from wherever it might come. Although the threat to Earth of contamination by non-Earth indigent organisms was originally thought to be remote, contamination from irradiation-induced mutants of Earth biota was and continues to be a seriously considered possibility. The consultations required in by the Outer Space Treaty[106] have been increased and enhanced through the more focused and intense coordination with the COSPAR by nations conducting and planning space activities.

Of principal concern, regarding the international obligations of States-Parties to coordinate their treaty activities in a way that diminishes the potential for harmful back contamination, is Article V of the Outer Space Treaty which requires astronauts be "safely and promptly returned to the State of registry of their space vehicle."[107] Among other possible reasons, it may be presumed that the prompt return requirement means that recovered astronauts and equipment are not held captive for political purposes and technical and military analyses by other nations prior to return to the country of origin. This, of course, can raise the issue of whether the prompt return of astronauts clause would supersede quarantine measures designed to prevent the potential international threat to Earth's environment and the public health.

---

[105] *Id.*
[106] *Id.*
[107] *Id.* at art. V.

### *F. The Rescue and Return Agreement*

Leaving aside for the moment the role of COSPAR in developing and coordinating outbound and back contamination control standards, criteria, and procedures to protect against creating adverse conditions (health of animals and plants) caused by harmful back contamination with non-Earth as well as Earth indigenous mutated pathogenic life forms, the real focal point for establishing effective contamination barriers and quarantine protocols is in the international arena. The role of international waters creates jurisdictional issues that require assessment of certain sovereign activities on the high seas in the past that could provide much precedence for how to conduct and even whether to conduct a search for extraterrestrial life, and for assessing and resolving planetary protection issues in the future. At present, however, it is necessary to review the influence and impact of the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space[108] on any domestic and international back contamination regulations.

The Rescue and Return Agreement does not define the astronaut return criteria found in the Outer Space Treaty, although the language is the same, that is, astronauts shall be "safely and promptly returned." No guidance is given when safety or promptness is to take precedence. However, relating only to the return of objects launched into space, the Rescue and Return Agreement indicates an overriding concern for safety. Article 5(4) provides that,

> a Contracting Party which has reason to believe that a space object or its component parts discovered in territory under its jurisdiction, or recovered by it elsewhere, is of a hazardous or deleterious nature may so notify the launching authority, which shall immediately take effective steps, under the direc-

[108] Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, T.I.A.S. 6599, 672 U.N.T.S. 119 (effective Dec. 3, 1968) [hereinafter Rescue and Return Agreement].

> tion and control of the said Contracting Party, to eliminate possible danger of harm.[109]

This provision requires launching parties[110] to minimize the risks posed by nuclear powered satellites and radioactive component parts, but may be inferred as encompassing contamination hazards inherent in explore-and-return space missions. This provision was drafted to cover situations such as the Canadian claim against the former Soviet Union for damage to the environment caused by the *Cosmos 954* accident, which occurred when the orbit of the *Cosmos 954* decayed causing it to re-enter the atmosphere and strew hazardous radioactive debris across a large portion of Canada.[111]

Particularly significant to the promulgation and implementation of U.S. and international quarantine regulations applied outside the territorial, *in rem*, or *in personam* jurisdiction of any nation, is the determination of four issues. They are (1) whether non-citizens of a launching state(s) who assist in the rescue of astronauts and equipment are subject to United States quarantine; (2) whether the Return and Rescue Agreement does, in fact, recognize the legitimacy of applying quarantine procedures (including temporary incarceration, at least as between contracting parties) to non-citizens who are exposed to extraterrestrial matter by assisting astronauts in distress; (3) whether international recognition of rights and obligations in the rescue and prompt return of astronauts also includes the necessity of applying extraterritorially, unilaterally promulgated quarantine regulations in the absence of internationally promulgated regulations; and (4) whether recognition of the need for regulations presupposes the necessity of sanctioning provisions as a means

---

[109] *Id.* at art. 5(4).

[110] The definition of "launching party" is more fully developed in the subsequent space treaties. *See* Convention on Registration of Objects Launched in Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention].

[111] *See* Amanda L. Moore and Jerry V. Leaphart, *Manipulation and Modification of the Outer Space Environment: International Legal Considerations* 25 COLLOQUIUM ON THE LAW OF OUTER SPACE 15, 16 (1982). *See also* Michael Bein, *Star Wars & Reactors in Space: A Canadian View* (1986) *available at* http://www.animatedsoftware.com/spacedeb/canadapl.htm (last visited June 15, 2005).

of enforcing the regulations, assuming domestic jurisdiction can be had over alleged offenders.

Several of the salient, and in the present context pertinent, provisions of the Return and Rescue Agreement appear ambiguous and inconclusive.[112] For example, it is not clear *who* must be rescued, assisted and returned; who must be returned *promptly*; what *conditions justify* delay in the return of astronauts; and in what *manner* the astronauts must be returned. Ambiguities can be seen in the fact that both the Outer Space Treaty and the formal title of the Return and Rescue Agreement refer specifically to *astronauts*, while the substantive provisions of the Return and Rescue Agreement speak of spacecraft *personnel*. Obviously, in the latter instance, the coverage regarding who must be returned promptly is much broader than implied simply by the word "astronaut." For internal political reasons, NASA initially defined "astronaut" as that member of a spacecraft crew authorized to navigate the craft. It was a question of whether "payload specialists" and other specialists on board for specific limited tasks would be qualified as that special breed known as the "pilot astronaut" comprising NASA's *Astronaut Corps*, with separate and distinct recognition. Definitions varied from country to country, and the terminology in domestic enabling legislation as well as in the various space treaties was not always consistent. "Personnel" can include anyone else officially assigned to the spacecraft, such as payload specialists, scientists, physicians, technicians, mechanics, surface crews during errant recovery operations, and the like. From another perspective, "personnel" would not cover unauthorized passengers and, in the not so distant future, commercial passengers in the form of scientists traveling by space shuttle to the *International Space Station* or other orbiting habitat...and, indeed, a tourist.

Although not all the ambiguities in, and inconclusiveness of, some of the Return and Rescue Agreement provisions are of

---

[112] *Compare* R.C. Hall, *Comments on Rescue and Return of Astronauts on Earth and in Outer Space*, NASA A69 – 37115, wherein it is observed at p. 115 that "[t]he rights and duties of States with respect to rescue and return of astronauts who have crash-landed on Earth are carefully drawn, and it does not appear that there are any foreseeable circumstances of astronaut-emergency on earth not covered in these articles."

practical importance, several are. For example, is a contracting state compelled to return a non-astronaut crew member promptly? Must an astronaut always be considered an official crew member? Is a passive passenger considered a crew member? Is there an official difference between astronaut and astronaut pilot? Does NASA have different definitions and, if so, for what specific purposes? Do other nations have differing definitions of "astronaut"? Will these definitional discrepancies have an effect on quarantine protocols and procedures adopted by COSPAR or nations establishing their own quarantine protocols and implementing regulations? If the contracting State to the Return and Rescue Agreement also is a party to the Outer Space Treaty, is it not required by Article IX either to apply its own adequate quarantine procedures and regulations, or in the absence of such, to return the "personnel" promptly to ensure adequate application of quarantine procedures by the launching or other responsible state? What if the launching state or other responsible participant in a given mission has imposed standards for detention and quarantine that are more stringent than those adopted by COSPAR? Must the lesser standards be applied?

A Contracting State is obligated to pursue all "possible steps" and render "all necessary assistance" only if a spacecraft landing occurs in territory under the sovereign jurisdiction of such State.[113] Should there be any dispute as to what constitutes assistance that is necessary and steps that are possible to take, including measures to protect Earth's biosphere from harmful back contamination, it would appear that the State rendering assistance is the final arbiter as to what quarantine measures are satisfactory.[114] Such a decision would be consistent with the

---

[113] Return and Rescue Agreement, *supra* note 108, at art. 2. Pursuant to Article 3 of the Agreement, the sole obligation of a Contracting State to spacecraft personnel located on the high seas or any other place not under the jurisdiction of another State is to *extend assistance if in a position to do so* and if such assistance is necessary to ensure *speedy recovery*. *Id.* at art. 3.

[114] Even though a State rendering assistance might be bound legally by the COSPAR contamination criteria and relevant quarantine protocol, it is not difficult to envisage such a State assessing and determining that the risk of harmful back contamination is sufficiently slight, when compared with the advanced technology available by seizing

requirements of Article IX of the Outer Space Treaty. In the absence of quarantine procedures and other measures for protecting against the possibility or probability of harmful back contamination promulgated or agreed to (such as those established by COSPAR) by the State rendering assistance, the minimum requirements would appear to be those of the launching State, or at least a prompt return of astronauts, personnel, and space equipment and objects to the launching State for the earliest implementation possible of quarantine procedures. By then, of course, the risk of contamination to others will have spread.

Even if the obligations of a State-Party under the Rescue and Return Agreement is reasonably clear, situations may occur in which the prompt return may either be physically impossible or legitimately argumentative as to the procedures for return. For example, this may occur in situations where the government rendering assistance is not recognized by the launching State, or the launching State does not recognize the State in a position to render assistance. In short, political relationships, as well as more practicable obstacles, can easily frustrate effective implementation of back contamination protection programs, especially those in which immediate notification and very prompt return of astronauts and space objects are deciding factors in the success of such programs.[115]

Dr. Gennady P. Zhukov early on emphasized the fact that the Return and Rescue Agreement is "in full conformity with the principles of the Space Treaty of...1967." [116] For this reason, stated Zhukov, "the regulations of the Agreement on the rescue are closely tied up with the principles of the Space Treaty of...1967, and should be regarded in the light of those principles."[117]

---

and examining the astronauts and their equipment, that the consequences of ignoring the Rescue and Return Treaty would be a small price to pay.

[115] Other issues that could easily frustrate back contamination control measures used to implement quarantine procedures, and the like, include (1) astronaut requests for political asylum, and (2) the diplomatic inflexibility to resolve problems when military personnel and equipment are involved in a highly classified mission and are the subject of a rescue and return situation.

[116] Gennady Petrovich Zhukov, *International Cooperation on the Rescue of Astronauts*, 11 COLLOQUIUM ON THE LAW OF OUTER SPACE 124 (1968).

[117] *Id.*

If States are required to interpret, as Zhukov implies, the provisions of the Rescue and Return Agreement within the dictates of the Outer Space Treaty, it appears that Article IX of the Outer Space Treaty would be one of the controlling provisions and that "all possible" steps and "all necessary" assistance would be rendered in a fashion to protect Earth's biosphere from harmful back contamination. For example, the most effective back contamination program and quarantine procedures available would be accommodated by the State effecting assistance to spacecraft personnel and space objects in distress.

Zhukov enhanced this possible interpretation of the Return and Rescue Agreement by observing that,

> one could not but take into account the fact that the technical facilities of different states are far from being the same and so not every state is capable of carrying out the necessary operations, ensuring a quick and effective rescue of the personnel of a spacecraft. It is possible that a spacecraft crew makes an emergency or unintended landing in territory of a state which will have the necessary technical facilities (for example helicopters) for the search and for the rescue, while the state, which launched the spacecraft, *has skilled personnel and corresponding transportation, technical, and other conveniences for the rescue operations*. The help of the state, which launched the spacecraft...may become necessary. The Agreement has provisions committing the state, which launched the spacecraft, to cooperate with the country, on whose territory the spacecraft landed, for the effective accomplishment of the search and rescue operations.[118]

---

[118] *Id.* at 128 (emphasis added). *See also* Hall, *Comments on Rescue and Return, supra* note 112, at 119 (wherein the author states that politics and the cost of assisting in rescue may be justifiable grounds for not honoring the Agreement on Rescue and Return). In anticipation of effective work and jurisdiction over back contamination programs in the future by COSPAR, Dr. G.P. Zhukov noted in 1967 that an international organization for the rescue of astronauts in outer space is justified on the basis of overwhelming costs and the time element of "emergency" in rescuing astronauts in distress. Gennady Petrovich Zhukov, *International Rescue Service for Space Travelers*, MOSCOW NEWS, No. 6, Feb. 18-25, at 6. It should be noted also that while the Return and Rescue Agreement does provide for the rescue and rendering of assistance to astronauts in distress in space and on celestial bodies, such provisions are clearly subordinate to those for the rescue and safe return of astronauts on the surface of Earth. They are inade-

Although back contamination criteria and quarantine protocols were not foremost in Zhukov's mind at the time, his observation remains valid and important for current outbound and back contamination programs of spacefaring nations. Its importance is threefold in nature. First, it recognizes that not all States have the technological capability and equipment to effect a rapid and efficient rescue, and that some States, at least the launching State, do have the capability. Second, it recognizes that more than simple recovery of astronauts is contemplated, that is, sophisticated equipment that could easily imply mobile-type quarantine facilities to implement a future back contamination program in situations involving errant and emergency landing procedures. Third, Zhukov's statement was closest to public recognition of the need of a State offering rescue assistance to accommodate quarantine procedures, if not attendant sanctions for criminal violations. The same would hold true for the launching State. One would suspect that COSPAR criteria and rules for quarantine and other aspects of a back contamination program would be sufficient to rectify these concerns, at least for United Nations signatories and those nations which adopt those criteria and rules. However in confirmation of the groping directions being pursued not only at the time of the *Apollo* missions, but also for the present circumstances in many respects, Zhukov described his prescient concern for the physical well-being of astronauts and cosmonauts when he stated that,

> [t]he personnel of a spacecraft should be under the Agreement on the rescue, safely and promptly returned to representatives of the state, which launched the spacecraft. But what is to be done if the health of one of the...crew does not permit him to be moved? It seems to us that in that case the state, on whose territory is the injured member of the crew, should provide the necessary care and give the government of his country the chance to send medical personnel and to render any other necessary help. *The question of the procedure and the time of the*

---

quate and ambiguous, and not at all responsive to accommodating any quarantine requirements established in furtherance of Art. IX of the 1967 Outer Space Treaty.

*return of such member of the crew home should be settled by the government of the country whose citizen he is.*[119]

From this, it would appear that at least one source recognized very early on the need for, if not efficacy of, international applicability of the quarantine protocol and implementing regulations promulgated by NASA. At this point in time, outbound back-contamination procedures to protect Earth and Mars from harmful contamination rests primarily on what NASA's Office of Planetary Protection and its foreign counterparts formulate and approve under the auspices primarily of the COSPAR. The great majority of that work is being conducted without a strong sense or awareness of the constraints imposed by existing international treaties and agreements, such as the Return and Rescue Agreement. The same holds true, at least in the United States, for the deficiencies in applicable domestic law.

### *G. The Space Liability Convention: Damages after the Damages*

The *Convention on International Liability for Damage Caused by Space Objects*[120] places liability on launching parties for damages caused by their space activities. The Treaty attempts to ensure that injured parties collect some form of damages from the launching party(ies). It also emphasizes to launching parties the need to conduct their space activities as safely as possible, particularly as it relates to absolute liability regarding people and property on Earth's surface. The Convention defines damage as "loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons".[121]

The Liability Convention also imposes absolute liability on a launching State for damage caused "on the surface of the Earth."[122] The concept of absolute liability arises in tort law

---

[119] Zhukov, *International Cooperation on the Rescue of Astronauts, supra* note 116, at 130 (emphasis added).

[120] Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 961 U.N.T.S. 187 [hereinafter Liability Convention].

[121] *Id.* at art. I.

[122] *Id.* at art. II.

when activities are deemed to be unreasonably dangerous and the party initiating the activity is held responsible for whatever damages occurs. The drafters of the Liability Convention prescribed absolute liability because of the inherent high risk involved in space activities. Absolute liability is the price for the unknown hazards such as disease resulting from contamination with extraterrestrial or other non-indigent pathogenic biota caused simply by going into space. Of course the phrase "unreasonably dangerous" is subject to a multitude of interpretations depending on a broad array of influential factors, such as budget, national defense, international politics, extent of international participation, and the like.

The Liability Convention further provides that,

> [i]f the damage caused by a space object presents *a large-scale danger to human life or seriously interferes with the living conditions of the population or the functioning of vital centres*, the States Parties, and in particular the launching State, shall examine the possibility of rendering appropriate and rapid assistance to the State which has suffered the damage, when it so requests.[123]

Here, the treaty presupposes that States-Parties already have adequate legal authority, both domestic and international, to quarantine and implement other contamination prevention or protection measures.

The Outer Space Treaty makes signatory nations internationally responsible for their activities in space, regardless of whether the activities are governmental or non-governmental.[124] This seems the only practical way of ensuring that (1) contamination control measures are developed and adopted at least by one nation, (2) they are truly enforceable as a matter of law and not just policy, and (3) an with adequate ability to provide compensation is available for the payment of any damages resulting from space missions, including hazardous and deleterious back contamination primarily of extraterrestrial biota, carbon based or not.

---

[123] *Id.* at art. XXI (emphasis added).

[124] Outer Space Treaty, *supra* note 2, at art. VI.

### *H. The Utility and Importance of the Registration Convention*

Under the aegis of the Registration Convention,[125] a launch registry is required to be established both within the United Nations, and also as an independent registry within the launching State or States. The Registration Convention requires registering certain launching and satellite parameters and characteristics, and also provides that,

> [w]here the application of the provisions of this Convention has not enabled a State Party to identify a space object which has caused damage to it or to any of its natural or juridical persons, or which may be of a hazardous or deleterious nature, other States Parties, including in particular States possessing space monitoring and tracking facilities, shall respond to the greatest extent feasible to a request...for assistance...in the identification of the object.[126]

Unfortunately, the effectiveness of this Convention is and always has been questionable in terms of identifying the State responsible for extraterrestrially contaminated persons and objects returned to Earth. While early on, both the United States and the former Soviet Union, and now certain other spacefaring nations, say they observe the Convention, however, they frequently provide a launch date with a generally unhelpful characterization of its purpose, and without other significant information provided by the launching state(s). The United States, Russia, China, and other nations have been known to cite the military purposes of some of their respective launches as justification for non-compliance with all the registry requirements. In Russia, China, the United States, the European Space Agency, and other intergovernmental organizations conducting space activities, military space requirements frequently find shared space on civilian platforms. This practice could be perilous to any effective internationally-oriented back contamination and quarantine program. It could even be the weakest link in any

---

[125] Registration Convention, *supra* note 110.

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

international planning and a back contamination control program, of course, is only as good as its weakest link.

### *I. The Moon Treaty*

The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies[127] is oriented towards commercial exploitation of space and is in force for a small number of States. As in the Outer Space Treaty, the Moon Treaty provides that "States Parties shall promptly inform the Secretary-General, *as well as the public* and the international scientific community, of any phenomena they discover in outer space, including the moon, which could endanger human life or health, as well as *any indication of organic life*."[128] For the first time in the space treaties, the issue of fully informed consent of the public is addressed, as well as the reality of potential problems of extraterrestrial organic life forms and Earth indigenous mutated biota. Unfortunately, the Moon Treaty has the same basic limitation as the Outer Space Treaty in that the duty to inform is invoked only when a potential danger becomes apparent. Nowhere is *candor*, in discussing potential dangers, required. States merely agree to pay "[d]ue regard...to interests of present and future generations".[129] Once again, no legal mechanism is provided for the international community, governmental or private, to *enforce* standards that protect Earth's biosphere.

## V. CONCLUSION

NASA's past quarantine regulations are viewed as lacking adequate legislative authority, even for domestic application, either from a single source such as NASA, or cumulative sources such as ICBC regulatory agency members with quarantine authority. The same is true at this point in time regarding potential quarantine regulations of NASA addressing MSR missions

---

[127] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, U.N. GAOR, 34th Sess., Supp. No. 46, at 77, U.N. Doc. A/34/46 (1980), 18 I.L.M. 1434 [hereinafter Moon Treaty].

[128] *Id.* at art. 5(3) (emphasis added).

[129] *Id.* at art. 4(1).

and a human mission to Mars and return. This does not mean, however, that formulation of adequate legislation would be either improper or difficult. Common sense and the Outer Space Treaty dictate that responsible measures with appropriate safeguards should be adopted to protect Earth and, therefore, the United States from potential adverse and harmful effects of back contamination.

Toward this end, legislation should be drafted that would provide the Administrator of NASA with full authority to promulgate and enforce necessary quarantine regulations to implement, in part, the domestic and international back contamination standards, including outbound contamination standards as a necessary component of establishing back contamination criteria. Such legislation also should establish specifically a Planetary Protection and Quarantine Committee (PPQC) that would assume many of the responsibilities of the previous ICBC, and provide advice and consent to NASA regarding the technical and legal validity of the quarantine regulations adopted, in addition to requiring approval of the President. The legislation should authorize the President to direct any federal department, including the Department of Defense, agency, or instrumentality of the executive branch to provide appropriate and available assistance, upon request, to NASA in executing and enforcing contamination standards and regulations promulgated pursuant to the legislation. Further, it should provide the President with authority to implement more effectively Article IX of the Outer Space Treaty, for example, to negotiate bilateral and multilateral agreements for requesting and accepting the assistance of, or the rendering of assistance to, any state, possession, commonwealth, territory, the District of Columbia, foreign government, or international organization in the implementation of domestic or foreign quarantine standards and procedures. Finally, non-voting members of the proposed PPQC should include representatives from COSPAR and any other public or private international organization deemed appropriate and useful by the President.

# LEGAL ASPECTS OF REUSABLE LAUNCH VEHICLES

*Varlin J. Vissepó*[*]

## I. INTRODUCTION

Since ancient times, humans have been the only species on Earth fascinated with the idea of traveling beyond the planet. Although nearly all uses of rockets up to the twentieth century were for warfare or fireworks, there is an interesting old Chinese legend that reports the use of rockets as a means of transportation. According to the legend, around the 16th century a Chinese official named Wan-Hu, which roughly translates as Crazy Fox, built a rocket powered flying chair in order to fly to the moon. Attached to the chair were two large kites. Fixed to the kites were forty-seven fire arrow rockets.

The Chinese official climbed into the chair and forty-seven assistants, each with a torch, lit the fuses of the fire arrow rockets. There was a blast-off and tremendous explosion, along with great clouds of smoke. After the smoke cleared, Wan-Hu had vanished; the assistants indeed believed that he was up there among the stars. History does not say what happened to Wan-Hu, but only the worst can be assumed. The fire arrows he used were as likely to explode as they were to fly. Whether this happened or not, Wan-Hu did make it to the Moon, as a crater on the Moon is named after him. Historian William E. Burrows said, "If it really happened, Wan-Hu had the triple distinction of being the first person to ride a rocket, the first to fly on a self-propelled, heavier-than-air device, and the first rocket pilot to get killed during a test flight."[1] Nevertheless, the ambition for space travel has never diminished and the dream of Wan-Hu

---

[*] Mr. Vissepó is an attorney, commercial pilot and flight instructor and holds an LL.M. from the Institute of Air and Space Law of McGill University. He currently works as a senior regulatory/aviation analyst for the aviation-consulting firm Phaneuf Associates in Arlington, Virginia.

[1] WILLIAM E. BURROWS, THIS NEW OCEAN: THE STORY OF THE FIRST SPACE AGE 21 (Random House ed., 1st ed. 1998).

became a reality when Neil Armstrong uttered his famous words from the lunar surface, "That's one small step for a man, one giant leap for mankind."[2] Today, people are becoming more dependent on critical technologies that require space transportation systems, including telecommunications, navigation and weather monitoring. Why has that dependency not extended to space transportation systems for other applications such as passenger and cargo transportation? The reason is simple: the space transportation systems that we have used so far are expendable and thus too expensive to operate. To become dependent on space transportation vehicles, a reusable space transportation vehicle needs to be developed, just like an aircraft. The primary difference being that a reusable space vehicle can operate in both outer space and airspace. To reflect this dual use, an appropriate title such as aerospace plane should be used.

The aerospace plane, which is a reusable launch vehicle (RLV), might seem like something of the future, but it is not. There are two types of aerospace planes. The first, the orbital type, is designed to orbit the Earth and it is more a spacecraft than an aircraft. The only orbital RLV ever developed was the *Space Shuttle*, which in fact is partly an RLV because its external tank is expendable, and after the February 1, 2003 *Columbia* accident, its days seem numbered. The second type is the suborbital RLV. This type of vehicle is not a novelty, as it has been around for more than forty years. The *X-15* of the United States was the first suborbital aerospace plane. It traveled to altitudes beyond 100 km at over six times the speed of sound.[3] Currently, there are nations and private companies working on different prototypes of suborbital RLVs that soon will be flying in the skies and beyond.

In practice, the aerospace plane will operate in both airspace and outer space, but currently there is no international legal regime that would specifically apply to them. The regime

---

[2] NEIL ARMSTRONG ET AL, FIRST ON THE MOON, 321 (Little Brown and Company, ed., 1970).

[3] U.S. OFFICE OF SPACE COMMERCIALIZATION, DEP'T OF COMMERCE, SUBORBITAL REUSABLE LAUNCH VEHICLES AND APPLICABLE MARKETS 11 (2002), *at* http://www.technology.gov/Space/library/reports/ 2002-10-suborbital-LowRes.pdf (last visited June 28, 2005).

for air transportation is very different and sometimes opposite to the one for the activities of outer space. An example is liability. Under the Convention on the International Liability for Damage Caused by Space Objects,[4] a State can be "liable...due to its fault" if damage occurs "elsewhere than on the surface of the Earth"[5] and absolutely liable if it occurs "on the surface of the Earth."[6] In addition, the launching State is liable, and unless otherwise provided for by contract, not the launch service provider. Whereas under the Convention for the Unification of Certain Rules Relating to International Carriage by Air,[7] applicable to air transportation, the liability is upon the air carrier without regards to the owner of the carrier and strict liability is the norm. Thus, it is very important that work begins on establishing a flexible legal foundation for an international regime that will apply to both aircraft and spacecraft. In the alternative, those reusable space transportation systems, or aerospace planes, that are going to operate in sub-orbit to carry us from one point on the Earth to another can be incorporated into the current international air law regime.

Additionally, there are three very good reasons to believe that aerospace planes are going to be part of the near future. First, private industry is very involved. The Space Transportation Association (STA)[8] is similar to what the International Air Transport Association (IATA) is to airline industry, and some of STA's members, like Boeing and Lockheed-Martin, are very important players in space technology development. Second, there is private investment by wealthy entrepreneurs like Jeff Bezos, Elon Musk, Paul Allen and Richard Branson among others, who are investing huge amounts of money in space projects and ve-

---

[4] Convention on the International Liability for Damage Caused by Space Objects, *opened for signature* Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention].

[5] *Id.* at art. III.

[6] *Id.* at art. II.

[7] Convention for the Unification of Certain Rules for International Carriage by Air, May 28, 1999, (entered into force Nov. 4, 2003) [hereinafter Montreal Convention] *available at* http://www.jurisint.org/pub/01/en/doc/417_1.htm (last visited July 1, 2005).

[8] *See* Space Transportation Association website, *available at* http://www.spacetransportation.us/ (last visited April 23, 2005).

hicles.[9] Finally, the United States, one of the biggest space powers and certainly the one with the largest space budget, is very interested in commercial reusable space transportation and is supporting efforts in the development of these systems.

Within the Federal Aviation Administration (FAA), the United States Government created an office of space transportation[10] that, in turn, has enacted regulations for reusable space transportation systems, and has even published various studies and reports regarding aspects like liability and the impact and benefits on the economy of these systems. Additionally, the Department of Commerce and the National Aeronautics and Space Administration (NASA) have created offices of space commercialization. The purposes of these offices are to ensure the growth and international competitiveness of the United States commercial space industry, including the RLV. The United States government is providing funds for this growth in the way of government contracts for the development of these space transportation systems.[11] These reasons provide enough support to conclude there is a need to determine the international legal status of these reusable space transportation systems, and to decide if there should be an eventual adoption of a new inter-

---

[9] *See* Brian Berger, *2004: The Year Space Tourism Finally Took Off*, SPACE NEWS, Dec. 29, 2004, *at* http://www.space.com/spacenews/business_tourism2004_041229.html (last visited June 29, 2005).

[10] The office is called the Associate Administrator for Space Commercial Transportation (AST), more information *available at* http://ast.faa.gov/ (last visited April 23, 2005).

[11] On its official website, the FAA-AST stated that: "The U.S. government does not directly subsidize the industry. However, the government recognizes the importance of space launch capability to science, military defense, communications, and the U.S. economy. As a result, the government supports the development of new vehicles and vehicle technologies. Examples of U.S. government programs intended to spur private sector development of new space vehicles and technologies include the Air Force's Evolved Expendable Launch Vehicle program and NASA's Space Launch Initiative. Monies for developments under these programs have been awarded to companies on a competitive basis and as a result of a specific U.S. government solicitation. Other federal government support for the commercial launch industry includes Air Force maintenance of federal launch ranges, which host many commercial launches, and financial backing in the case of excessive third-party claims for damages in the case of a commercial launch-related accident." Associate Administrator for Commercial Space Transportation, *About Commercial Space Transportation: FAQs*, *available at* http://ast.faa.gov/aboutcst/faq.htm (last visited July 17, 2005).

national regime or the incorporation of such vehicles into a current regime.

In the first section, the current and future legal status of aerospace planes will be examined under the applicable international law, mainly the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies[12] and the Convention on International Civil Aviation.[13] This section will also include the boundary issue, which consists of determining the delimitation of airspace and outer space. It will also address the spatial versus functional approaches to this issue. In the second section, liability and risk management issues of aerospace planes and other RLVs will be examined, paying particular attention to the Liability Convention[14] and the Montreal Convention,[15] as well as the national provisions of different nations regarding liability in space. The third section will include conclusions and recommendations.

## II. LEGAL ASPECTS OF THE AERSOSPACE PLANE AND OTHER REUSABLE LAUNCH VEHILCES

The RLV presents a legal challenge to the current international air and space law regimes. The legal differences of these two regimes are in terms of sovereignty, property rights, transit rights and liability consequences. In this section, the issue of delimitation of outer space and airspace and its relation to RLV operations will be addressed. The possible integration of the aerospace vehicle into the current international legal regime of air law and the need to establish a space transportation organization for orbital RLVs will also be discussed.

---

[12] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

[13] Convention on International Civil Aviation, Dec. 7, 1944, 61 Stat. 1180, 15 U.N.T.S. 295 [hereinafter Chicago Convention].

[14] Liability Convention, *supra* note 4.

[15] Montreal Convention, *supra* note 7.

### A. Delimitation of Outer Space and Airspace

The first article of the Chicago Convention firmly establishes the sovereignty of States over the airspace above their territories.[16] This principle has been paramount to the development of international air law and contrasts sharply with the regime for outer space. The Outer Space Treaty establishes the now international customary law principle of free space, which means that outer space is not subject to any claims of sovereignty or national appropriation.[17] These two different international regimes have created what some authors have called the "boundary problem".[18] This problem is the ongoing dispute of determining when airspace ends and outer space begins. Generally, the main issue is whether a boundary should even be established. Robert F.A. Goedhart summarizes the reasons for and against establishing a boundary.[19] Some of the reasons he presents against establishing a boundary include:

- Despite the lack of a boundary no international disputes have arisen so far;
- Delimitation attempts by means of a multilateral treaty would probably encourage some States to make excessive territorial demands;
- The boundary might be established too high so that several space activities could be hampered;
- Agreement on fixing the boundary at a lower altitude will definitely not lessen the fear of some States that their interests may come under threat;

---

[16] "The contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory." Chicago Convention, *supra* note 13, at art. 1.

[17] "Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means." Outer Space Treaty, *supra* note 12, at art. II.

[18] BIN CHENG, STUDIES IN INTERNATIONAL SPACE LAW 425 (Clarendon Press, 1997).

[19] ROBERT F.A. GOEDHART, THE NEVER ENDING DISPUTE: DELIMITATION OF AIR SPACE AND OUTER SPACE (Editions Frontières, 1996).

- Once a particular altitude is settled on, it will be very hard to reconsider that decision, especially if the boundary has to be lowered. Many States would of course be opposed to the reduction of its sovereign air space.[20]

Goedhart also presents some reasons for establishing a boundary between airspace and outer space, and these include:

- An international agreement on such a boundary would weaken the position of those States unfoundedly claiming the entire Earth's atmosphere above their territory to be national air space;

- A different interpretation of the present space treaties, denying for example the freedom of space exploration and space exploitation, could lead some States to detect 'air space violations' as a pretext for frustrating space activities of other States;

- Disputes over the extent of air space may create a lot of tension between States and at worst bring about the outbreak of war;

- Determining an upper limit of air space could further the development of space technology. [21]

Accordingly, these two different visions of dealing with the boundary problem each have a group of followers. Those who advocate establishing a defining line between airspace and outer space are called "spatialists". Those who argue that no definitive line should be established are called "functionalists".[22]

### 1. The Spatial Approach

The spatial approach, which "favors the establishment of a demarcation line between air and outer space",[23] would mean

---

[20] *Id.* at 6-7.

[21] *Id.* at 7-8.

[22] *See* CHENG, *supra* note 18, for a more detailed discussion between the functional and spatial approach to the boundary issue.

[23] Katherine M. Gorove, *Delimitation of Outer Space and the Aerospace Object – Where is the Law?*, 28 J. SPACE L. 11, 16 (2000).

that "when the aerospace plane is above the imaginary line and having orbital capabilities it is to be treated as a space object. When below the line the aerospace vehicle would be treated as an aircraft."[24] This approach means that for future RLVs, whether orbital or suborbital, two different legal regimes would apply to the same vehicle depending on its location: the airspace regime when below the line and the outer space regime when operating above it. This is already the reality in Australia, the only country so far to adopt a spatialist approach to the boundary issue. In 2000, the Australian government amended its Space Activities Act to require a space license for any vehicle flying higher than 100 km of altitude above mean sea level.[25] This means, for example, that if an aerospace plane is being operated to or from Australia and an accident occurs, both the Liability Convention [26] and the Montreal Convention [27] might apply, depending on where the vehicle is located. Some countries, like South Korea and Argentina, have argued that this approach would make it easier to decide the law to be applied if an accident occurs.[28] However, it could make determining applicable law more confusing because it may be difficult to determine where the accident occurred, especially if it occurred near the boundary. Another problem under the spatialist approach is that it maintains two different legal regimes operating at the same time for the same vehicle. This is not a major problem now, but in the future when aerospace planes and RLVs are more common, the idea of having two different regimes applying to the same vehicle might not be the best option. Most of those that favor the spatialist view argue that governments will have to create new international institutions to deal with hybrid vehicles, like aerospace planes. Some governments argue for new institutions because they "favour separate legal regimes based

---

[24] Carl Q. Christol, *Legal Aspects of Aerospace Planes*, *in* THE HIGHWAYS OF AIR AND OUTER SPACE OVER ASIA 77, 83 (Chia-Jui Cheng & Pablo Mendes De Leon eds., Martinus Nijhoff Publishers, 1991).

[25] Space Activities Act of 1998, § 8 (Austl.) (as amended through 2000).

[26] Liability Convention, *supra* note 4.

[27] Montreal Convention, *supra* note 7.

[28] Gorove, *supra* note 23, at 18.

on a determined boundary."[29] States would have to draft treaties and create an international organization similar to the International Civil Aircraft Organization (ICAO). However, this approach creates problems of logistics and communications that might affect safety issues. For example, if countries adopt the spatialist approach and an aerospace vehicle starts operating under two different legal regimes, it would have to be certified to operate under both regimes. It will have to comply with the current international standards and recommended practices (SARPs) of international air law[30] as well as the future standards and practices that countries adopt for outer space vehicles. This of course is not very practical. It is better to incorporate aerospace planes into the current air law system by amending the current rules rather than creating new ones.

On the other hand, it is easier to deal with traffic rights under the spatialist approach. For example, if the spatialist approach were adopted,[31] a flight from New York to Moscow would not be required to obtain over-flight traffic rights for those portions of the flight that an aerospace plane is above 100 km. In this case, the vehicle would be in outer space, where sovereign overflight permission is not required. It could also be in sovereign airspace where innocent passage is already permitted to commercial aircraft under the Chicago Convention,[32] and aerospace planes would only need to be incorporated into to this regime. The same situation would exist for an orbital RLV during re-entry operations, especially if it was launched from a country that is landlocked or partially landlocked.

In general, the spatial approach is not very practical, as having a vehicle operating under two legal regimes at the same time might create confusion. An approach that requires two le-

---

[29] Christol, *supra* note 24, at 84.

[30] Chicago Convention, *supra* note 13, at art. 37 (referring to adoption of international standards and procedures through Annexes to the Chicago Convention).

[31] For example, if the international community follows Australia's lead and adopts 100 km as the international boundary between airspace and outer space.

[32] Chicago Convention, *supra* note 13. Article I of the International Air Services Transit Agreement permits the innocent passage of foreign aircraft over another's State territory. International Air Services Transit Agreement, Dec. 7, 1944, art. I, *available at* http://www.iasl.mcgill.ca/airlaw/public.htm#chicago (last visited July 17, 2005) .

gal regimes would also probably hinder aerospace plane traffic management and navigation services. Maintaining two separate legal regimes has worked very well until now, but as technological advances develop, the need for a static defined boundary between airspace and outer space seems less relevant. This does not mean that the space treaties can be disregarded and the air treaties merely amended to incorporate these vehicles. Establishing a boundary will make it more difficult to harmonize the airspace and outer space legal regimes in order for them to work in unison.

### 2. The Functionalist Approach

The functionalist approach, on the other hand, "entails the application of laws, regardless of where they may take place."[33] This means that functionalists "place emphasis on the activity or activities of vehicles"[34] rather than on where the vehicle is located. In this sense, this approach seems more adaptable to aerospace planes and suborbital RLVs in general, because under the functionalist view a single legal regime can be chosen instead of having to apply two. This approach is also the most popular amongst most of the States that recently took part in a questionnaire conducted by the Committee on the Peaceful Uses of Outer Space (UNCOPUOS) of the United Nations.[35] Although, most States also stated that "it would be necessary to analy[z]e the technical aspects of air and outer space transport systems and the means of delivery of objects into outer space, prospects for the development of aerospace objects capable of missions in air and outer space, as well as data on the use of the

---

[33] Henri Wassenbergh, *The Art of Regulating International Air and Space Transportation: An Exercise in Regulatory Approaches to Analyzing Air and Space Transportation*, XXIII ANNALS AIR & SPACE L. 201, 206 (1998).

[34] Christol, *supra* note 24, at 84.

[35] *Questionnaire on Possible Legal Issues with Regard to Aerospace Objects*, U.N. COPUOS, 38th Sess., U.N. Doc. A/AC. 105/C.2/1995/CRP.3/Rev. (1995), *available at* http://www.oosa.unvienna.org/aero/ (last visited July 6, 2005). For a detailed summary of the States' replies to the Questionnaire, see *Report of the Legal Subcommittee on the Work of its Forty-Second Session* UN COPUOS, 42d Sess., UN Doc. A/AC.105/805 (2003), *available at* www.space.gov.za/COPUOS-GA.html (last visited July 6, 2005). *See also* Gorove, *supra* note 23, at 18.

only existing prototype of such an aerospace object, namely, the Space Shuttle."[36] Many scholars who have written on the topic also favor the functionalist approach.[37]

While the functional approach seems more adaptable to aerospace planes and RLVs in general, one major fault that this approach has is that with no defining line, different States could have different sovereignty claims in what other States might consider outer space. One clear example is the United States and its current space policy.[38] The United States, as a big supporter of the functionalist view, has always considered establishment of a defining line between airspace and outer space would limit their space operations and policies.[39] Indeed, the

---

[36] *Report of the Legal Subcommittee on the Work of its Forty-Second Session* UN COPUOS, 42d Sess., *supra* note 35, at 13.

[37] Some scholars have adopted a functionalist approach early in the discussion of the boundary problem. *See* MCDOUGAL ET AL., LAW AND PUBLIC ORDER IN SPACE (Yale University Press, 1963). Others include Wassenbergh who specifically stated that "the functionalist approach is especially apt" for reusable launch vehicles, *see* Wassenbergh, *supra* note 33, at 207. Scholar S.B. Rosenfield also has stated "the current functional approach to outer space is solving all [boundary] problems." *See* S.B. Rosenfield, *Some Thoughts on the Distinction between Air Space and Outer Space, in* 26 COLLOQUIUM ON THE LAW OF OUTER SPACE 93 (1983).

[38] The January 6, 2005 Fact Sheet for the January 21, 2004 "U.S. Space Transportation Policy" establishes that assured access to space "is a requirement for critical national security, homeland security, and civil missions and is defined as a sufficiently robust, responsive, and resilient capability to allow continued space operations, consistent with risk management and affordability", *available at* http://www.ostp.gov/ (last visited April 3, 2005).

[39] The United States statement on the Definition and Delimitation of Outer Space And The Character And Utilization Of The Geostationary Orbit before the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space, 40th Session states in part:

> With respect to the question of the definition and delimitation of outer space, we have examined this issue carefully and have listened to the various statements delivered at this session. Our position continues to be that defining or delimiting outer space is not necessary. No legal or practical problems have arisen in the absence of such a definition. On the contrary, the differing legal regimes applicable in respect of airspace and outer space have operated well in their respective spheres. The lack of a definition or delimitation of outer space has not impeded the development of activities in either sphere. We have not been persuaded by the reasons put forth for undertaking such a definition or delimitation. For example, some delegations support the notion of such a definition for its own sake. But without a practical problem to address, undertaking such a definition would be a risky exercise, as explained more fully below. Other delegations suggest that a definition or delimitation is somehow necessary to safeguard the sovereignty of states. However, we are aware of no issue

United States has asserted that it will deny space to other States, if required, in order to advance its interests in space.[40] This is why some States, especially those without space capabilities; prefer to choose the spatialist view. Prof. Christol explains other drawbacks of the functionalist approach in the following:

> To facilitate the legal controls over such vehicles, presumably in the interests of simplicity, this approach [functionalist] has called for a single law regime. Proponents argue that since the principal goal of this vehicle is to be in orbit it should be governed by a unitary regime rather than by separate space and air law regimes.[41]

Although a unitary regime might be the best solution for suborbital RLVs, in particular for aerospace planes, it might not be the best solution for orbital RLVs which most of the time will be operating in outer space. Outer space is not subject to sovereign control and it would be very difficult, if not impossible, to implement a regime for outer space like the one for aviation,

---

> of state sovereignty that would be solved by defining outer space. Even if there were a problem the resolution of which a definition or delimitation of outer space would help to address, the Legal Subcommittee should still proceed with all due caution. Whatever definition or delimitation were ultimately agreed upon would by its nature be arbitrary at worst, or, at best, be constrained by the current state of technology. For example, technological advances have increased the height at which aircraft can sustain flight, while they have decreased the height at which the orbital flight of space vehicles is possible. These technological advances will likely continue. It would be dangerous for the Legal Subcommittee to agree to an artificial line between air space and outer space, when it cannot predict the consequences of such a line. Mr. Chairman, to conclude with respect to the definition or delimitation of outer space, our position continues to be that the Legal Subcommittee should not take on this issue until practical problems have been identified so as to make it absolutely necessary to do so.

For the complete statement *see* OFFICE OF THE LEGAL ADVISER, DEP'T OF STATE, U.S. Statement, Definition and Delimitation of Outer Space And The Character And Utilization Of The Geostationary Orbit, Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space at its 40th Session in Vienna from April 2-13, 2001. in DIGEST OF THE UNITED STATES PRACTICE IN INTERNATIONAL LAW, ch. 12, sub. ch. 85 (2001), *available at* http://www.state.gov/s/l/22718.htm (last visited July 17, 2005).

[40] For more on the United States' space policy, *see* Nina Tannenwald, *Law Versus Power on the High Frontier: The Case for a Rule-Based Regime for Outer Space*, 29 YALE J. INT'L L. 363 (2004).

[41] Christol, *supra* note 24, at 81.

which is based on sovereign control of airspace. The functionalist approach is more favored and may likely prevail, but really does not seem to resolve the boundary problem.

### *B. A Different Approach*

In one of his articles from over ten years ago, Professor Christol proposed a new approach that could address the boundary problem in a more practical way:

> In order to obtain an applicable legal regime for hybrid vehicles [aerospace plane] attention should be focused on (1) the intended purposes, or (2) the effects of hybrid vehicular activity. Further, reference can be made to both purposes and effects. When the capabilities of the aerospace plane are taken into account separate subjective and objective approaches should also be posited. This suggests that if the vehicle's purpose or effect is that of an aircraft it should conform to the regime of air law. If its purpose or effect is that of a spacecraft it would fall within the regime of international space law. This approach, therefore, focuses on the identified purpose or effect of the vehicle. [42]

This proposal, which will be called the "effective approach", seems the most practical because it maintains the current regimes of air and space law like the spatial approach, but without establishing an international defining line between airspace and outer space like the functionalist approach. Prof. Christol does not determine under which regime (air or space law) the aerospace vehicle would fall.

If the two types of RLVs previously discussed follow Prof. Christol's approach, this proposal appears opportune. The suborbital RLV will more likely be used for space tourism, and for high-speed transportation of people and cargo between two points on Earth. This means that under Prof. Christol's approach, this vehicle would have to be operated under the current air law regime because it will operate more like an aircraft. Although the suborbital RLV will use parts of outer space to reach

---

[42] *Id.* at 87.

its destination, its effect, or purpose, is that of a high-speed, high-altitude aircraft. On the other hand, orbital RLVs, like Virgin Galactic's proposed orbital spacecraft, or NASA's proposed Crew Exploration Vehicle would fall under the regime of space law because its effect or purpose is that of a spacecraft.[43] Specifically, their main purpose would be to transport astronauts and cargo to orbital destinations, and even to the Moon, or to carry space tourists to orbit.

Prof. Christol also maintains that under his approach there is a need to establish a legal regime for aerospace planes. The proposed regime would "have as its central characteristic an allocative function" to determine if the vehicle will be governed by air law or space law.[44] Conversely, while maintaining Prof. Christol's approach, it also is possible to incorporate aerospace planes and other suborbital RLVs into the existing air law regime instead of creating a new legal regime.

### *C. Establishing a New International Regime for Reusable Launch Vehicles*

The following discussion is based on Prof. Christol's "effective approach" to the boundary problem. Under this approach, a new regime for RLVs would only have to be adopted for orbital RLVs using the international space law regime. Based on this, various authors suggest the creation of an international specialized workgroup in which to discuss the future of space vehicles. Some of the ideas also call for the private and scientific sector to be involved in the process by creating an independent International Spaceways Forum.[45] The Forum will be "coordinated with

---

[43] Virgin Galactic is a company established by Richard Branson's Virgin Group. The aims of the company include owning and operating privately built spaceships, modeled on the *SpaceShipOne* craft, designed by Burt Rutan of Scaled Composites. More on Virgin Galactic available at http://www.virgingalactic.com/en (last visited July 18, 2005). More on NASA's Crew Exploration Vehicle available at http://www.nasa.gov/centers/marshall/spacetransportation/index.html (last visited July 19, 2005) *See infra* Section III, for more on the *SpaceShipOne* Rocket by Scaled Composites.

[44] Christol, *supra* note 24, at 88.

[45] William A. Gaubatz et al., *International Rule Planning for Governing Space Transportation*, *in* 43 COLLOQUIUM ON THE LAW OF OUTER SPACE 220, 227 (2000).

the IAA [International Academy of Astronautics] Committee on Space Policies, Economics and the Law, with invitations to participate extended to appropriate government agencies and industry organizations in all interested countries, as well as national and international organizations."[46] There are two suggested frameworks that indeed would be the best.

The first one, suggested by Dr. Claire Jolly, would be "inspired by similar existing co-operation structures in the aviation community, could identify the main safety and liability issues that could arise when operating RLVs from different parts of the world. It might be created under the aegis of ICAO to facilitate interactions between the aviation and aerospace communities."[47] This view suggests the new regime should be formed. The following reasons are provided:[48]

> In a very practical manner, ICAO already provides a forum of discussion and a source of globally agreed regulations for the aviation community...extending this forum to the space launch sector could be practical in the short term. Indeed, cooperating with its members States and the International Air Transport Association (IATA), a non-governmental organization representing aviation companies, the ICAO deals already with key issues such as:
>
> -The aviation security
>
> -The establishment of air corridors and new air routes
>
> -The promulgation of common air traffic services (ATS) throughout regional airspace
>
> -The normalization of the management of regional air traffic
>
> -The protection of the environment, which constitutes a sensitive subject for aviation and space activities alike, where the focus remains on noise and particle emissions.

---

[46] *Id.* at 220.

[47] Claire Jolly, *Reusable Launch Vehicles Regulations: First Step Towards and International Framework*, *in* 43 COLLOQUIUM ON THE LAW OF OUTER SPACE 237, 243 (2000).

[48] *Id.* at 242.

All those issues could be related to future RLV operations.[49]

This approach, which calls for all RLVs to be incorporated into the air law regime, fits very well with Dr. Christol's "effective approach." However, Dr. Jolly's approach does not make the distinction between the orbital and suborbital craft. This distinction is very important because it indicates the appropriate legal regime for a vehicle. Based on this lack of distinction and the "effective approach," it appears that Dr. Jolly's approach would indeed be ideal, for suborbital vehicles but not for all reusable launch or orbital vehicles.

Dr. Nandasiri Jasentuliyana, former director of the United Nations Office for Outer Space Affairs (UNOOSA), suggests that it is up to UNCOPUOS and its Legal Subcommittee (LSC) and Scientific and Technical Subcommittee (STS) to conduct the initial research into the adoption of what he calls "Space Standards". These standards would be similar to the Annexes of the Chicago Convention.[50] The Chicago Convention establishes that each contracting State shall collaborate, to the highest practicable degree, in creating uniformity of regulations and standards that will facilitate and improve air navigation.[51] The Convention also establishes ICAO, which shall adopt and amend, as necessary, the international standards, recommended practices, and procedures in order to create this uniformity.[52] To this end, the Chicago Convention establishes, as one of the mandatory functions of the Council of ICAO, the task of adopting SARPs, designating them as Annexes to the Chicago Convention, and notifying all contracting States of the action taken.[53]

---

[49] *Id.* at 242.

[50] NANDASIRI JASENTULIYANA, INTERNATIONAL SPACE LAW AND THE UNITED NATIONS 381 (The Hague: Kluwer Law International, 1999).

[51] Article 37 of the 1944 Chicago Convention states in part "Each contracting State undertakes to collaborate in securing the highest practicable degree of uniformity in regulations, standards, procedures, and organization in relation to aircraft, personnel, airways and auxiliary services in all matters in which such uniformity will facilitate and improve air navigation." Chicago Convention, *supra* note 13, at art. 37.

[52] *Id.* at arts. 43 - 55.

[53] Article 54(l) states: "Adopt, in accordance with the provisions of Chapter VI of this Convention, international standards and recommended practices; for convenience, designate them as Annexes to this Convention; and notify all contracting States of the action taken." *Id.* at art. 54(l).

Dr. Jasentuliyana calls for something very similar to the described approach, although the described functions are of quasi-legislative nature.[54] Article 37 provides that the member States need only to comply with them to "the highest practicable degree", which means that the adopted standards are not self-executing and each State reserves the right to implement them or not, as it chooses.[55] In practice, States generally do comply with the standards. This compliance occurs because airlines of States that do not comply may be denied the right to fly into the airports of complying States due to safety concerns. States must comply with the standards of the Annexes if they want to "have any meaningful participation in international air navigation and air transport."[56]

On the other hand, the Chicago Convention provides for departures from the adopted international standards and procedures, and stipulates that States that cannot comply with them must notify ICAO of the differences between their national legislation and that of the standards.[57] States could apply the same principle to Dr. Jasentuliyana's space standards. This is known as the contracting out procedure, which allows States to avoid certain obligations under the standards. If a State does not notify ICAO of a difference, the State will be bound by the standard and it is understood that the State will implement the standard.[58] In 1993, ICAO indicated that only 25% of the member States have filed a difference to the Annexes, which sets a great example to follow in space law.[59] Unfortunately, this does

---

[54] Jasentuliyana, *supra* note 50.

[55] Michael Milde, *Enforcement of Aviation Safety Standards- Problems of Safety Oversight*, 45 ZEITSCHRIFT FÜR LUFT UND WELTRAUMRECHT 3, 5 (1996).

[56] *Id.* at 6.

[57] Article 38 of the Chicago Convention states in part: "Any State which finds it impracticable to comply in all respects with any such international standard or procedure, or to bring its own regulations or practices into full accord with any international standard or procedure after amendment of the latter, or which deems it necessary to adopt regulations or practices differing in any particular respect from those established by an international standard, shall give immediate notification to the International Civil Aviation Organization of the differences between its own practice and that established by the international standard." Chicago Convention, *supra* note 13, at art. 38.

[58] Milde, *supra* note 55, at 6.

[59] Michael Milde, *The Chicago Convention- Are Major Amendments Necessary or Desirable 50 Years Later?*, XIX-I ANNALS AIR & SPACE. L. 401, 426 (1994).

not mean that most of the States are following the standards. Some States do not file differences simply because they lack the personnel to understand what is required by the standards, while others simply do not have the resources or technical means to implement them. For these reasons, the lack of filing of differences must be handled with concern because it may put the safety of aviation at risk on a global scale.[60] In regards to space standards, this filing issue could represent an even bigger problem, because the technology for space transportation is very expensive and unaffordable for most countries. As an alternative, the future space organization could implement something similar to the ICAO Safety Oversight Program. Under this program, States are inspected and audited for compliance and given time to comply.[61] If they do not comply, ICAO publishes the results of the audits. Additionally, an office similar to ICAO's Technical Co-operation Bureau could be created in order to help States implement the space standards.

Following ICAO's model for space transportation is very practical. The standards are considered "soft law," not bound by the Vienna Convention on the Law of the Treaties adopted in Vienna in 1968,[62] and States can deviate from them. In practice, however, States comply with the standards. Non-compliance would mean the elimination of that State from any important participation in commercial aviation and air navigation in general. An example of this is Article 33 of the Chicago Convention establishing the duty of recognition of certificates and licenses of other member-States if they comply with the standards.[63] If one State does not comply with the standards, other States will not allow the non-complying States' personnel or aircraft into their territories. In this sense, one could argue that, in fact, the standards are "hard law" because if the State does not comply, it is excluded from international aviation. States could, and

---

[60] *Id.*

[61] Milde, *supra* note 55, at 12.

[62] Vienna Convention on the Law of Treaties, *opened for signature* May 23, 1969, 1153 U.N.T.S. 331, 8 I.L.M. 679.

[63] Milde, *supra* note 55, at 6. *See also* Jacques Ducrest, *Legislative and Quasi-Legislative Functions of ICAO: Towards Improved Efficiency*, XX-I ANNALS AIR & SPACE. L. 343, 354 (1995).

should, adopt these same principles for space vehicles. As time has shown, these principles are an effective tool for establishing worldwide standards that have advanced air transportation significantly.

After the creation of the space standards, Dr. Jasentuliyana suggests that the LSC of UNCOPUOS should draft a convention creating an international framework, not just for RLVs, but also for space vehicles in general.[64] All of this would be done under the direction of an expert group created within the scope of the convention, in which private persons and organizations could be invited to participate by the members of UNCOPUOS.[65]

This framework would be the best alternative because it makes use of the existing infrastructure of international space law. Not only that, by using the United Nations structure and following previous successful models like ICAO, the framework would follow very well known and tested procedures of international law making. In addition, the framework takes into account an additional important factor, the creation of standards for space law, which in air law have been essential. As Dr. Jasentuliyana observes:

> ...the Chicago Convention is one of the most successful international multilateral treaties in existence. However, its Annexes are the primary reason for this. ICAO's success in lawmaking is due to its success in separating the technical and political aspects of international civil aviation. This is exactly what is required in the field of outer space: the political and legal aspects of space sciences and technology need to be made distinct from the technical aspects.[66]

Dr. Jasentuliyana's approach would be more suitable for orbital RLVs because these vehicles would be considered spacecraft under Dr. Christol's effective approach. UNCOPUOS and its subcommittees, along with the UNOOSA, are the ideal forums for formulating this type of regime because they have the expertise and experience in space law. Furthermore, Dr. Jasen-

---

[64] Jasentuliyana, *supra* note 50.
[65] *Id.* at 382.
[66] *Id.* at 379.

tuliyana's approach will integrate satellites, expendable launch vehicles (ELVs), and space stations as well as orbital RLVs. Under the effective approach, all of these would fall into the category of spacecraft and thus under the space law regime.

Adoption of both approaches for establishing a new legal regime to include RLVs provides the best result. Ms. Jolly's approach would be suitable for suborbital RLVs while Dr. Jasentuliyana's rule-making approach would be ideal for orbital RLVs. These proposals would be in harmony with Dr. Christol's effective approach and would provide an excellent starting point towards the creation of an international law regime for space vehicles, and for the incorporation of aerospace planes into the air law regime. The result would be that States could adopt an international regime for orbital RLVs along with space standards. On the other hand, suborbital RLVs would fall into the regime of air law and States would have to amend the Chicago Convention and its Annexes to incorporate them.

### *D. The International Air Law Regime, Aerospace Planes and other RLVs*

In an address commemorating the 50th anniversary of the Société Internationale de Télécommunications Aéronautiques (SITA), Dr. Assad Kotaite, president of the ICAO Council, stated that ICAO "was the logical international institution to lead the way into space, and should work with its member States and other international organizations to provide the guidance on space management."[67] This statement, made in 1999, reflects the importance of ICAO in participating actively and directly in the future of space regulation. Other observers agree with Dr. Kotaite's statement. For example, Dr. Ruwantissa I.R. Abeyratne, in one of his most recent books, states:

> ...there is absolutely no difficulty from a commercial standpoint in applying exclusively principles of air law to the operations of an aerospace plane, which carries passengers and

[67] *Annual Review of Civil Aviation, Partnership Emphasized in Address Commemorating SITA's 50th Anniversary*, 54 ICAO JOURNAL 38 (1999), *available at* http://www.icao.int/icao/en/jr/1999/5406.djvu (last visited July 7, 2005).

goods from one state to another, while traversing outer space in the process.[68]

Following Dr. Kotaite's principle, the relevant articles of the Chicago Convention and its Annexes concerning aerospace planes, how this vehicle might fit within the regime of international air law, and the benefits of doing so will now be examined. This is a broad attempt at analyzing the following provisions, and in no way should be deemed an exhaustive study of all the provisions contained in the Chicago Convention or the Annexes that might affect the incorporation of aerospace planes into the regime of air law. Only the most relevant provisions will be discussed.

### 1. Definition of Aircraft and Aerospace Plane

The first step in incorporating aerospace planes into the current International Public Air Law regime is to amend the current definition of "aircraft" in the Chicago Convention. Aircraft is defined as "[a]ny machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface."[69] This definition, although very simple and straightforward, could represent a major obstacle in incorporating aerospace planes into the air law regime. The reason for this is that aerospace planes would operate outside the Earth's atmosphere, which means that it does not derive its support only from reactions with the air. Either a whole new concept for aircraft has to be developed or the current definition has to be amended to incorporate the aerospace vehicle. Maybe the answer can be found by looking at how some States define aircraft in their national air law regimes. For example, United States' air codes define "aircraft" as "a device that is used or intended to be used for flight in the

---

[68] RUWANTISSA I.R. ABEYRATNE, FRONTIERS OF AEROSPACE LAW 23 (Hants: Ashgate Publishing Limited, 2002).

[69] International Standards Rules of the Air Annex 2 to the Convention on International Civil Aviation, 34th Sess., at 1, ICAOOR (9th ed. 1990) [hereinafter Rules of the Air].

air."[70] The Air Code of the Russian Federation defines it as "a flight apparatus supported in the atmosphere due to the interaction with air, which differs from the interaction with air reflected from the surface of land or water."[71] Other States have similar definitions[72] or have adopted the ICAO definition and are not helpful for incorporating the aerospace vehicle or other suborbital RLVs into the regime of air law. However, the definition in Canadian air regulations is the only one seemingly useful in incorporating the suborbital RLV into the regime of air law. Canada defines "aircraft" as "any machine capable of deriving support in the atmosphere from reactions of the air, and includes a rocket."[73] This definition includes and refers to aircraft and rockets, a combination that could include the suborbital reusable launch vehicle. An example is the suborbital reusable launch vehicle designed by Scaled Composites, the White Knight a jet aircraft and *SpaceShipOne* a manned reusable rocket.[74] Regardless of this definition, however, other definitions are possible.

In the first attempt at creating a definition, Dr. Christol's effective approach would be accepted. In this case, the current definition of aircraft becomes obsolete and is replaced with a definition addressing the purposes or effects of the vehicles, instead of a vehicle's aerodynamic and physical properties. The potential definition could be the following: any machine that takes passengers, cargo, or both from one point on the Earth to another without making an orbit of the Earth. A second alternative would be to amend the current definition, keeping the aerodynamic and physical properties of both current aircraft

---

[70] 14 CFR § 1.1(2000).

[71] Air Code of RF 60-FZ of March 19, 1997, as amended, at ch. 5, art. 32 (Russian Air Code, 1997), *available at*, http://www.avia.ru/english/code/chapter5.shtml (last visited July 19, 2005).

[72] Other examples include the Joint Aviation Authorities (JAA) of Europe and the Civil Aviation Safety Authority of Australia (CASA), which adopted in their regulations the same definition for aircraft as ICAO, see Joint Aviation Requirements, JAA Reference No. 07/03-1, at § 1 (Nov. 1, 2004) *available at* http://www.jaa.nl/jars_npas/jars/500969.pdf, *see also* Civil Aviation Act, 1988, § 3(1) (Austl., 4th ed., 2004).

[73] Aeronautics Act, R.S.C., § 3(1) (1985) (Can.).

[74] *See infra* Section III, for more on the *SpaceShipOne* Rocket by Scaled Composites.

and aerospace planes. This definition could be the following: any machine that can derive support inside or outside the atmosphere from the reactions of the air other than the reactions of the air against the Earth's surface or that derives support from the mechanics of space flight.

Either definition would incorporate aerospace planes into the air law regime. However, the first option is preferable since it would avoid bringing into the debate physical and mechanical aspects of a vehicle. Under the Chicago Convention, it does not matter how the vehicle traverses the air, or in this case outer space, but where the vehicle traverses it and how this might affect the sovereignty of States and the general safety of people on the ground and in the air. These are the reasons why ICAO and the Chicago Convention were created and adopted in the first place.[75] Additionally, the benefit of adopting any of these definitions under the Chicago Convention Annexes is that States can easily implement them under an established international structure that already has the acceptance of the vast majority of States, which removes the need to draft a new international convention.

2. Registration Issues of Aerospace Planes and other RLVs

If aerospace planes and other suborbital RLVs are to be treated as aircraft by incorporating them into the air law regime using one of the proposed definitions, then the application of the Convention on Registration of Objects Launched into Outer Space becomes moot.[76] Nevertheless, the Convention will be considered briefly to illustrate that even if these vehicles are not treated as aircraft, the Convention is still inapplicable.

There is strong evidence for the inapplicability of the Convention to suborbital RLVs:

---

[75] It is important to remember the first Article of the Chicago Convention: "The contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory." Chicago Convention, *supra* note 13, at art. 1. In practice, States are more worried about their sovereignty and safety when a foreign aircraft approaches their airspace than of the mechanics and physical properties of the vehicle.

[76] Registration of Objects Launched into Outer Space, Nov. 12, 1974, 1976, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention].

> When a space object is launched *into earth orbit or beyond*, the launching State shall register the space object by means of an entry in an appropriate registry which it shall maintain.[77]

This explicitly makes the Registration Convention inapplicable to any type of object not launched into Earth orbit or beyond. Aerospace planes and other suborbital RLVs would be operated in sub-orbit and thus will not have to be registered under the terms of this Convention. This supports the position that aerospace planes and other suborbital RLVs should be operated under the air law regime. In addition, the article demonstrates the intention of the Convention's drafters to include only vehicles and objects capable of orbital flight into the regime of space law.

The Registration Convention is inapplicable to suborbital RLVs. This is not only because these vehicles should be treated like aircraft, but also because the Convention itself excludes this type of vehicle from its scope. In the case of orbital RLVs, the same vehicle would have to be registered for each launch; therefore even where the Convention is applicable, its implementation is impractical. Repeated registration of the same vehicle makes no sense and would require States to either amend the Convention or adopt a new one that is not so burdensome for RLVs, but most importantly would be the creation of space standards as mentioned before in Dr. Jasentuliyana's suggestions.[78]

3. Certification and Airworthiness of Aerospace Planes

Annex 8 of the Chicago Convention includes the SARPs for the Airworthiness of Aircraft.[79] Under the Annex, the ICAO policy for airworthiness is to ensure, among others, a "minimum ... basis for the recognition by States of Certificates of Airworthiness for the purpose of the flight of aircraft of other States into

---

[77] *Id.* at art. II (1) (emphasis added).

[78] *See supra* section II. C., above, for more on this topic.

[79] International Standards and Recommended Practices Annex 8 to the Convention of International Civil Aviation Airworthiness of Aircraft, 34th Sess., ICAOOR (9th ed. 2004).

or over their territories, thereby achieving, among other purposes, protection of other aircraft, third persons and properties."[80] This policy would be applicable to aerospace planes if the definition of aircraft were amended as discussed. For example, the policy refers to aircraft flying into and over their territories, which means flying an aircraft into and over the sovereign airspace of each State. This interpretation would mean that when flying an aircraft over the territory of another State, the vehicle would be flying in outer space just as aerospace planes or RLVs will.

Another example is the definition of "aeroplane" included in Annex 8. It defines "aeroplane" as "[a] power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces that remain fixed under given conditions of flight."[81] Assuming an amendment of the definition of "aircraft" to include aerospace plane operations, this definition would be entirely applicable to an aerospace plane. This does not mean that just by changing the definition of aircraft, Annex 8 would be applicable to aerospace planes. ICAO would still have to amend the technical standards of the Annex to include technical provisions specifically addressing the physical properties and characteristics of the aerospace plane. Nevertheless, these are easily overcome technical limitations that, in legal terms, do not represent any major obstacle for incorporating aerospace planes and other suborbital RLVs into the air law regime.

### 4. Air Traffic Rights and Aerospace Planes

The five freedoms of the air of air traffic rights, which are really privileges, are found in the International Air Services Transit Agreement of 1944.[82] An additional sixth freedom exists as the privilege to carry passengers and cargo between two

---

[80] *Id.* at vii. *See also* United Nations, *The Convention on International Civil Aviation: Annexes 1 to 18,* ICAO Doc. E/P1/8000, 14-16 (1991) [hereinafter *Annexes 1 to 18*].

[81] *Id.* at I-1.

[82] International Air Services Transit Agreement, *supra* note 32.

other States via the home country of an airline.[83] This is a combination of the third and fourth freedoms and, unlike the other five freedoms, is not based on an international agreement. Instead, it is based on a bilateral system for the exchange of traffic rights between and among different States. In his book *Frontiers of Aerospace Law*,[84] Dr. Ruwantissa I.R. Abeyratne discusses issues related to air traffic rights and aerospace planes, and mentions that aerospace planes will "inevitably create hubs whereby regional carriers would converge with passengers destined for carriage in the aerospace plane."[85] In his view, this would mean, "at least at the introductory stages of the aerospace plane, it would operate on a third and fourth freedom basis".[86] Dr. Abeyratne's view is correct. However, it should be noted that that the reasons for the initial use of aerospace planes on a third and fourth freedom basis only are technical reasons. Aerospace planes, which will operate at very high speeds and altitudes, would most likely be used only for intercontinental flights to city-pairs like London-New York or Los Angeles-Tokyo because it would be uneconomical or impractical to stop for fifth freedom traffic.

On the other hand, the open skies regime is revolutionizing air transport. This policy was developed in 1990-91 and is used to refer to the most liberal type of air transportation agreement between two countries, which provides free market competition and minimizes government intervention. Under this regime, States with mutual agreements grant complete commercial freedom (traffic rights) to each other's airlines. Prof. Henri Wassenbergh states, that not all airlines, especially regional ones, would be able to compete in such a regime and that the only way they will survive is through alliances.[87] This notion was recently reaffirmed at the ICAO Air Transport Seminar, where it was stated that the future of airlines in general lies

---

[83] H.A. Wassenbergh, *The Freedoms of the Air*, *in* 1 PUB. INT'L AIR L. 287, 286 (Michael Milde & Hodjat Khadjavi eds., Montreal: McGill University 2002).

[84] ABEYRATNE, *supra* note 68.

[85] *Id.* at 25.

[86] *Id.* at 25.

[87] Henri Wassenbergh, *De-Regulation of Competition in International Air Transport*, XXI 2 AIR & SPACE L. 83, 89 (1996).

with alliances.[88] For aerospace planes, this would mean that their survival would be dependent on alliances of national and regional carriers to bring passengers to the hubs from which aerospace planes will operate. Without future global alliances, aerospace planes may end up being more a novelty than a practical tool for air transportation.

5. Navigation in Airspace and the Reusable Launch Vehicle

The Associate Administrator for Commercial Space Transportation (AST) of the United States FAA recently published "Concept of Operations for Commercial Space Transportation in the National Airspace System."[89] It is a concept manual for operations of RLVs, both orbital and suborbital, within the National Airspace System (NAS) of the United States. In it, the AST recommends a model in which "an upper limit of the NAS is specified in order to demarcate the FAA's operational responsibilities."[90] The manual also describes operations above and below the NAS for point-to-point flights at hypersonic speeds, which is referring to the operations of the aerospace plane and indicating the necessity of establishing a limit to the NAS for these types of operations.[91]

The major problem with this manual is that it requires the designation of an upper limit for the national airspace in order

---

[88] In an article by Prof. Paul Dempsey published for the seminar prior to the ICAO Worldwide Air Transport Conference it was stated that the benefits of alliances for the airlines are very meaningful and that airlines will most likely try to continue to pursue such alliances under the open skies agreement. Paul Dempsey, *Intercarrier Agreements and Alliances- The Competitive Challenge, in* AVIATION STRATEGIES: CHALLENGES AND OPPORTUNITIES OF LIBERALIZATION 54, 57 (Ann Barco et al eds., Montreal, World Markets Research Centre 2003). The major problem that alliances represent, according to Prof. Dempsey, is the anticompetitive nature of them. This could represent a problem for the future of the aerospace plane because it will depend on alliances for its survival.

[89] OFFICE OF THE ASSOCIATE. ADMINISTRATOR FOR COMMERCIAL SPACE TRANSPORTATION, CONCEPT OF OPERATIONS FOR COMMERCIAL SPACE TRANSPORTATION IN THE NATIONAL AIRSPACE SYSTEM, Version 2.0 (Washington D.C., May 11, 2001) *available at* http://ast.faa.gov/files/pdf/CST_CONOPS_v2.pdf.

[90] *Id.* at 4.

[91] The manual states "The en-route trajectories for hypersonic missions departing from the U.S. may involve 1) ultra-high altitude flight within the NAS, and a transition directly to international airspace, or 2) flight above the NAS and re-entry into international airspace." *Id.* at 20.

to establish air traffic control (ATC) operational responsibilities. This is, in fact, establishing a defining line between airspace and outer space by adopting a spatialist approach.[92] The manual not only adopts a defining line between airspace and outer space, but it is also contrary to the public policy of the United States, which has always been opposed to the spatialist approach for resolving the boundary problem.[93] Instead of adopting an upper limit for the NAS, the manual needs to establish the operational responsibilities of the air traffic controllers according to the effective approach formulated by Dr. Christol.[94] Under this approach, the vehicle would be under air traffic control[95] depending on the purpose of its operations, no matter where it is located. For aerospace planes and other suborbital RLVs, this means they are always going to be under air traffic control just as commercial aircraft are today.[96] For orbital RLVs, they could also be under ATC control until they are ready to enter orbit, at which point ATC control would cease. Upon re-entry they could be under ATC control from the moment they initiate re-entry maneuvers, such as firing thrusters to slow down and re-enter the atmosphere.

Although adopting AST's position of establishing an upper limit to the national airspace for operational considerations sounds very appealing and convenient, especially from a controller's perspective, adopting this model would require applying two international law regimes to one vehicle. Thus, establishing appropriate air traffic control procedures instead of establishing

---

[92] *See infra* section II.A.1., for a description of the spatialist approach.

[93] According to Prof. Bing Cheng the principal reason for the United States to oppose the spatialist approach is "the inability of most countries to monitor such an altitude boundary; the lack of adequate examination of the relevant scientific, legal, technical and political factors; the possible inhibiting and even stifling effect of a fixed boundary on future efforts to explore and use outer space." Cheng, *supra* note 18, at 428.

[94] *See infra* section II, for a discussion on Prof. Christol's approach.

[95] According to Annex 2 of the Chicago Convention "air traffic control" means, "[a] service provided for the purpose of: a) preventing collisions: 1) between aircraft, and 2) on the manoeuvring area between aircraft and obstructions, and b) expediting and maintaining an orderly flow of traffic." Rules of the Air, *supra* note 69, at 2.

[96] Today, international commercial traffic is always under air traffic control when located inside the national airspace of a country. When flying over international waters they follow established international navigation routes. *See Annexes 1 to 18*, *supra* note 80, at 8, 24 .

a definite line between air space and outer space is a better decision because it subjects the vehicle's operations to only one legal regime instead of two.

Dr. Christol's effective approach is the best way to deal with the boundary problem, as it keeps all types of vehicles operating within one regime of international law. At the same time, the approach provides for the development of both the air and space law regimes. In addition, the approach effectively permits the incorporation of suborbital RLVs, like aerospace planes, into the regime of international air law. It also provides for the adoption of air law principles into space law for the further development of the regime in respect to orbital RLVs. Finally, the approach permits smooth transitions of vehicles from one regime to another by focusing on the purpose or effect of that vehicle, and does not restrict transitions from one medium to another based on the location or use of the vehicle.

## III. RISK MANAGEMENT, LIABILITY AND THE REUSABLE LAUNCH VEHICLE

### *A. Introduction*

The RLV has been compared to aircraft in terms of risk because like aircraft, the RLV can be used many times. Of course, the RLV is different than a typical aircraft because it can go into space. This difference sets the RLV apart from aircraft in terms of risk allocation, simply because going to space is more hazardous than flying within the Earth's atmosphere. In this section, those differences will be addressed as well as the differences between suborbital and orbital RLVs in terms of risk management and liability. The diverse national and international regimes and the possible application of the aviation liability regime to the RLV will also be examined.

### B. Risk Management and the Reusable Launch Vehicle

Risk management can be defined as "a process for identifying and addressing loss exposure of all kinds."[97] This definition gives rise to the different types of risk for RLVs, especially orbital ones, when compared to conventional aircraft. They include, but are not limited to, types of fuels, re-entry operations and velocities. For example, the proposed *Kistler K-1*, an orbital RLV, is going to have a take off weight similar to a Boeing 747 with fuels that are highly toxic and explosive, whereas the 747 fuels are not.[98] In addition, the take off speeds for the *K-1* are similar to those of an ELV, reaching orbital speeds, and it would have to withstand re-entry conditions that are high risk.[99] Although there is no data for the performance of RLVs, like that available for aircraft, the risks of reusable launch to those of the ELV can be compared. For example, launch failure probabilities for existing ELVs vary from approximately 3 in 50, to 1 in 483.[100] This is a very high failure rate when compared to commercial aircraft. Commercial aircraft have a takeoff failure probability estimated to be 1 in 2.3 million.[101]

The exposure for orbital RLVs to loss is greater than for aircraft. However, for suborbital RLVs it could be a different story. A suborbital RLV would not have to endure the same re-entry hazards as an orbital RLV. Though some of the proposed vehicles will use highly explosive and toxic fuels, others are not.

---

[97] Julian Hermida, Legal Aspects of Space Risk Management: The Allocation of Risks and Assignment of Liability in Commercial Launch Services 7 (2000) (unpublished LL.M. Thesis, Institute of Air and Space Law, McGill University) (on file with McGill University).

[98] *See* ASSOCIATE ADMINISTRATOR. FOR COMMERCIAL SPACE TRANSPORTATION, LIABILITY RISK-SHARING REGIME FOR U.S. COMMERCIAL SPACE TRANSPORTATION: STUDY AND ANALYSIS 7-13 (2002), *available at* http://ast.faa.gov/rep_study/sp_reports.htm (last visited July 9, 2005) [hereinafter LIABILITY RISK-SHARING REGIME]. The *Kistler K-1* is going to use RP-1 (a kerosene-based rocket fuel) which is similar to JP fuel (jet fuel) and like JP is usually not explosive, but when RP-1 is used in combination with liquid oxygen, which the *K-1* will, then it becomes highly explosive and toxic. For more information see Kistler Aerospace Corporation online at http://www.kistleraerospace.com (last visited June 5, 2005).

[99] LIABILITY RISK-SHARING REGIME, *supra* note 98, at 7-15, Table 7-1.

[100] *Id.* at 7-16, Table 7-2.

[101] *See* BOEING, Accident Rate History, *at* http://www.boeing.com/commercial/safety/pf/pf_accident_rate_history_cht.html (last visited June 5, 2005).

For example, on October 4, 2004 Burt Rutan of Scaled Composite launched *SpaceShipOne*, the first piloted, privately built reusable space ship to reach suborbital flight, winning the Ansari X Prize.[102] It operates as a two-stage system. The first stage vehicle, the *White Knight*, is a piloted twin turbojet aircraft used for high-altitude missions. The second stage vehicle is the piloted suborbital vehicle, *SpaceShipOne*. In this configuration, the *White Knight* is a high-altitude airborne launch platform for *SpaceShipOne*. The *White Knight* launches *SpaceShipOne* at 50,000 feet into suborbital flight and *SpaceShipOne* returns to land as a glider at light airplane speeds. The White Knight uses regular jet fuel and *SpaceShipOne* uses a hybrid rocket motor in which neither the fuel nor the oxidants are hazardous.[103] This means that for suborbital RLVs, risk management can be similar to that of commercial aviation. Of course, just as it took the aviation industry many years to establish the safety record it has today, it will take many years for RLVs in general to have a good safety record.

While risk management aspects can vary greatly between commercial aircraft and RLVs, there are similarities in the involved risks especially for suborbital RLVs. This means that in the near future, when suborbital flights become commonplace, the risk management process could be the same for commercial aircraft and suborbital RLVs. For orbital RLVs, the risk management process is going to be similar to that of the current expendable vehicle launch industry. In this industry, risk is "allocated among the participants by a means of a complex system of reciprocal waivers of liability, indemnification granted by states, commitments to obtain insurance, limitations of liability...and exclusions of liability clauses, among other legal instruments."[104] Although in the future, the operations of orbital RLVs may become so routine, like the operations of the aviation industry,

---

[102] For information on Scaled Composites and the Ansari X Prize, *see* http://www.scaled.com, and http://www.xprize.org/ (last visited June 5, 2005).

[103] *See* Scaled Composites, Oxidizer Tank and CTN, *at* http://www.scaled.com/projects/tierone/data_sheets/html/ox_tank.htm (last visited June 5, 2005).

[104] Hermida, *supra* note 97, at 9.

that these vehicles will be able to adopt a similar risk sharing regime.

### C. *Definition of Liability*

Liability can be defined as "a legal obligation to compensate for damage caused by action or inaction, intentional or negligent, or simply caused by an act without intention or negligence."[105] There are various types of liabilities and each of them affects the use of RLVs in general.

The first type of liability is strict liability. This type of liability has its origins in the English common law system and has been adopted in various forms by other common law systems.[106] In strict liability, there is no need to prove fault, as fault is presumed, and the victim only needs to prove a relation or causation between the damage suffered and the action or inaction of the defendant.[107] The second type of liability is fault-based liability in which negligence or fault must be proved. This type of liability requires the claimant to prove that the defendant owed him a duty of care, that the defendant breached that duty of care, and that there is causation between the breach and the damage caused.[108]

The third type of liability is absolute liability in which the defendant is liable without the need to prove any fault. The ma-

---

[105] Idorenyin Edet Amana, The Montreal Convention of 1999: Problems and Prospects 15 (2002) (unpublished LL.M. Thesis, Institute of Air and Space Law, McGill University) (on file with McGill University).

[106] The case that established strict liability as a doctrine was *Rylands v. Fletcher* whereby a mill owner ordered construction of a dam to get waterpower. Rylands v. Fletcher, L.R. 3 H.L. 330 (1868). The resulting reservoir lay over ancient abandoned coalmines. The mill owner had no reason to suspect that these old diggings led into an operating colliery, but they did. When the dam was closed, water ran down the old shafts, seeping into and flooding the colliery. The mill owner obtained the water for his own use without drainage facilities. The mill owner's use was classified as a "non-natural user" and was found liable.

[107] For example, in *Greenman v. Yuba Power Prods.*, the court established strict liability for product manufacturers in the United States when it stated: "A manufacturer is strictly liable in tort when an article he places on the market, knowing that it is to be used without inspection for defects, proves to have a defect that causes injury to a human being." Greenman v. Yuba Power Prods., 377 P.2d 897, 900 (Cal. 1963).

[108] 1 LEE S. KREINDLER, AVIATION ACCIDENT LAW 103 (Albany: Mathew Bender, 1998).

jor difference between this type of liability and strict liability is that the defendant cannot raise any defenses and the liability is usually imposed in ultra hazardous activities (e.g. nuclear reactors).[109] All three types of liability currently used allocate responsibility in different national and international liability regimes, and as will be explained, will or may apply to RLVs operations.

### *D. International Liability Regimes*

The Outer Space Treaty imposes international responsibility on member States for the activities of their private entities engaged in space activities.[110] The Liability Convention is based upon Article VII of the Outer Space Treaty, and states that this responsibility shall be upon the launching State.[111] This responsibility shall result in absolute liability if damage is caused on the surface of the Earth or to aircraft in flight, and fault-based liability if damage is caused in space.[112] Absolute joint and several liability applies when the space object of one State causes damage to another State's space object that subsequently causes damage to a third State on the surface of the Earth or to its aircraft in flight.[113] Fault based joint and several liability also applies when the damage is caused to a third State's space ob-

---

[109] In *Caveney v. Raven Arms Co.*, the federal district court stated that for the imposition of absolute liability, the activity for which the liability is imposed must be an ultra hazardous one. Caveney v. Raven Arms Co., 665 F. Supp. 530 (S.D. Ohio 1987). The court then proceeded to define them as "those activities that pose a danger to persons in close proximity to the activity such as blasting, storing water and storage of explosives." *Id.* at 531. Ultra hazardous activities have also been defined as "those with a risk of serious harm, which cannot be eliminated by exercise of the utmost care." LIABILITY RISK-SHARING REGIME, *supra* note 98, at 5-3.

[110] Outer Space Treaty, *supra* note 12, at art. VI. Article VI of the Outer Space Treaty states, "[p]arties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities". *Id.*

[111] Liability Convention, *supra* note 4, at art. I(c). The "launching State" is defined as "a State which launches or procures the launching of a space object", or "a State from whose territory or facility a space object is launched". *Id.*

[112] *Id.* at arts. II-III.

[113] *Id.* at art IV.

ject.[114] Finally, joint and several liability also applies when two or more States jointly launch a space object.[115]

Absolute and fault-based liability, are imposed for the damage caused by a launching State's space object.[116] The problem with application of these concepts is that the Liability Convention does not define "space object", therefore, it is unclear as to what type of vehicle or object it refers to. However, the Liability Convention does include the term "launch vehicle" as part of the term "space object", but not as a space object itself.[117] The Liability Convention states, "[t]he term 'space object' includes component parts of a space object as well as *its* launch vehicle and parts thereof."[118] From this, it appears that the drafters of the Liability Convention did not want to apply its provisions to the launch vehicle itself, but only if it was part of a space object. In other words, the Liability Convention is inapplicable to a launch vehicle itself, but it is applicable to a launch vehicle that is carrying, or is part of, a space object, whatever that is.

For current ELVs, this does not seem to be a major issue because we can easily argue that the purpose of these vehicles is to carry a space object like a communications or remote sensing satellite. In fact, very few would argue that the term "space object" as stated in the Liability Convention does not include all types of satellites launched into or beyond orbit, as well as space debris.[119] However, for RLVs, this represents an interesting dilemma: if the RLV is not to be used to carry any satellite or ob-

---

[114] *Id.* at art. IV(1)(a)-(b).

[115] *Id.* at art. V(1). Nevertheless, States can also have agreements in which one of the launching States assumes all responsibility as a launching State. One example is the Baikonur in Kazakhstan where Russia has agreed to assume responsibility as a launching State. For more on this topic, *see* infra section III.E.4.

[116] *Id.* at arts. II – IV.

[117] *Id.* at art I.

[118] *Id.* at art I(d). (Emphasis added.)

[119] However, Prof. Foster and others have argued that the term "space object" "does not apply to damage sustained by permanent installations, or the persons or property occupying them, on the moon or other celestial bodies." *See* W.F. Foster, *The Convention on International Liability for Damage Caused by Space Objects*, 1972 CAN. Y.B. INT'L L.137, 145-146. *See also* Frans G. von der Dunk, *The 1972 Liability Convention, Enhancing Adherence and Effective Application*, *in* 41 COLLOQUIUM ON THE LAW OF OUTER SPACE 366, 368 (Mar, 23, 1998). Prof. von der Dunk argues for the inclusion of space debris as a space object under the Liability Convention. *Id.*

jects that will become space objects, is the Liability Convention applicable? When referring to a suborbital RLV, the answer is negative. However, the answer is positive when referring to orbital RLVs. For example, if RLVs were used to place satellites in orbit, eventually replacing ELVs, the Liability Convention would be applicable. Of course a RLV capable of placing objects in orbit would have to be an orbital one.[120] However, if the RLV is used for transporting passengers, cargo, or both, and travels in outer space without placing anything in orbit, then it could be argued that this vehicle is not a space object, therefore making the Liability Convention inapplicable.[121] An example is the current type of RLVs being designed for space tourism. These vehicles are not going to be carrying any space objects, unless we consider space tourists space objects. Another example is the future aerospace plane, which will transport cargo and passengers from one point on Earth to another using outer space, but without carrying any space objects. This means that for suborbital RLVs the Liability Convention is inapplicable because they are not going to be part of a space object.

### *E. National Liability Regimes*

The responsibility imposed on States-Parties to the Outer Space Treaty and the Liability Convention has required them to promulgate national laws and regulations. In turn, these national laws require private companies involved in the launching of space objects to assume financial responsibility or to acquire insurance to reimburse the State-Party in case of an interna-

---

[120] The reusable launch vehicles that companies like Kelly Space & Technology and Kistler Aerospace, among others, are designing are for delivering payloads into orbit and are going to orbital reusable launch vehicles.

[121] Various authors have excluded some types of reusable launch vehicles, like sounding rockets, from the application of the Liability Convention because they are not objects "designed for movement in outer space." *See* W.F. Foster, *supra* note 119. *See also* Thomas Beer, *The Specific Risks Associated with Collisions in Outer Space and the Return to Earth of Space Objects-The Legal Perspective*, XXV AIR & SPACE L. 42, 47 (2000). Still, there are others like Prof. Cheng who argue that "a space object, whatever this may be, is a space object within the meaning of the Convention only when it is in its operational state, i.e. 'from the time of its launching (or attempted launching) or at any stage thereafter until its descent,' including at the one end the 'planned launching' phase and at the other end the 'recovery phase.'" Cheng, *supra* note 18, at 325-26.

tional or national claim for an accident or incident involving a space object. In this subsection, the national provisions relevant to the liability regime of several space faring nations are discussed.

### 1. Australia

In 1998, the Australian Parliament enacted the Space Activities Act (SAA).[122] The SAA provides a detailed regulatory framework for space activities, including space vehicle launches. Although it contains some similarities also contained in the United States regulatory framework, it also has some major differences, reflecting the interpretations given by the Australian Government to International Space Law.[123]

In terms of risk management, the SAA is very similar to the United States laws and regulations. The applicant must demonstrate financial responsibility or meet certain insurance requirements, which are based on the maximum probable loss (MPL) that may occur from the launch.[124] In addition, as in the United States law, the licensee of the launch is not liable for claims in excess of the insured amount, except in the case of gross negligence.[125] For claims in excess of the insured amount, the Australian Government assumes liability and pays the corresponding compensation.[126] As for specific MPL amounts for ELVs and RLVs, the Australian Government has not yet determined this because no launch company has applied for a license.[127]

In general, Australia is an ideal place to conduct both ELV and RLV launches because of its geographical position, good weather and extensive unpopulated territory that would make the insurance amounts far less than in other States. However, Australia has not been able to sustain its own launch vehicle capabilities that began with the launch of its first satellite in

---

[122] Space Activities Act, *supra* note 25.
[123] For the United States insurance regulatory framework, see infra section III.E.5.
[124] Space Activities Act, *supra* note 25, at § 47.
[125] *Id.* at §§ 67-68, 69(3).
[126] *Id.* at § 64(2).
[127] LIABILITY RISK-SHARING REGIME, *supra* note 98, at 4-3.

1967.[128] This means Australia would have to rely completely on attracting foreign launch providers to build its space industry. Although this has not yet materialized, it is a real possibility because of the advantages of launching from Australia. In fact, Kistler Aerospace has shown interest in launching its future RLV from Woomera, Australia's current spaceport.[129] Nevertheless, without their own launch vehicles, Australia might have difficulties in attracting foreign launch vehicle manufacturers and operators because most of them already have access to well established facilities in their own countries.

### 2. China

China has proven a good contender for commercial launches even though they entered the international trade in launch services less than fifteen years ago.[130] All commercial launches are conducted by the China Great Wall Industry Corporation, a government owned corporation.[131] This company offers the *Long March* rocket family of launchers, all of which are ELVs.

In terms of insurance and liability, the People's Insurance Company of China provides coverage which is actually underwritten in Europe.[132] For liability, the risk sharing report of the United States Associate Administrator for Commercial Space Transportation (AST) summarizes the requirements very well:

> Third-party liability insurance is in effect for a period of two years following launch. The PRC [People's Republic of China] Government will cover any claims above $100 million. The PRC Government, not a jury, would determine the amount of

---

[128] "In 1967, Australia became the fourth country to successfully launch its indigenous WRESTAT satellite, designed and constructed in Australia using a U.S. Redstone rocket from the Woomera launch site." *Id.* at 4-2.

[129] *Id.* at 4-3.

[130] China entered the international trade in launch services when the United States agreed to sign a bilateral launch agreement with China permitting United States commercial satellite manufacturers and operators to launch with China. For more on the United States bilateral launch agreements see PETER VAN FENEMA, INTERNATIONAL TRADE IN LAUNCH SERVICES: THE EFFECTS OF U.S. LAWS, POLICIES AND PRACTICES ON ITS DEVELOPMENT 183 (Leiden: International Institute of Air and Space Law, 1999).

[131] For more on the China Great Wall Industry Corporation, *see* http://www.cgwic.com/ (last visited June 6, 2005).

[132] LIABILITY RISK-SHARING REGIME, *supra* note 98, at 4-5.

> any third-party claims, although a third party can theoretically file claims if he or she does not believe the amount of the government-determined settlement is sufficient. If a client is concerned that the $100 million is not adequate, the CGWIC [China Great Wall Industry Corporation] can arrange for an additional $300 million in third-party launch liability insurance paid for by the client. The CGWIC estimated that an additional $300 million in insurance would cost a client approximately $900,000.[133]

China is only developing ELVs that have good launch failure records. Combining the good records with the low launch cost, they offer very good prices in the current launch industry. As for RLVs, China does not seem very interested and is really putting their other space efforts on human space flight using ELVs, not on RLV technology.[134]

### 3. Europe

In 1975, several European nations cooperated to create the European Space Agency (ESA) in order to integrate resources and maintain competitiveness in the growing launch industry.[135] The result of this cooperation was *Arianespace*, a private company organized under French law.[136] According to the AST, *Arianespace* is the biggest competitor for United States service

---

[133] *Id.*

[134] On October 15, 2003, China became the third nation in the world to independently send humans into space, launching taikonaut Col. Yang Liwei into Earth orbit atop its own Long March 2F rocket. *See* Jim Banke, *China Launches Its First Piloted Spaceflight*, (Oct. 15, 2003), *at* http://www.space.com/missionlaunches/shenzhou5_launch_031014.html (last visited June 6, 2005).

[135] ESA is an organization comprised of 15 European countries (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and United Kingdom) that is headquartered in Paris, France. For more information see http://www.esa.int (last visited June 6, 2005).

[136] Arianespace is the production, marketing, and operations organization for the Ariane expendable launch vehicle. The Centre National d'Études Spatiales (CNES), the French space agency, owns the Kourou Space Center from which Arianespace launches and provides site maintenance, operations, and technical support along with payload processing. ESA develops the Ariane rockets and owns launch infrastructure, payload processing and Ariane V production facilities, as well as down-range tracking stations. For more see http://www.arianespace.com (last visited June 6, 2005).

launch providers, and in the past has been the leader in worldwide internationally competed launches.[137]

In terms of liability insurance requirements, the United States study on risk sharing liability regimes best summarizes *Arianespace's* policies as a French-based company:

> Arianespace obtains primary third-party launch liability insurance on behalf of its customer in the amount of 400 million French francs, the equivalent of approximately $53 million U.S. at the current exchange rate (Arianespace 2001b). Insurance covers the liability of the liability of the French Government, CNES, ESA, Arianespace, their contractors and subcontractors, in addition to the launch customer and its contractors, arising out of the launch. This indemnification coverage is in effect for a period of three years following the launch. Any third-party claims exceeding this insurance coverage are the responsibility of ESA (ultimately, the European government owners, principally France). Any damage to the launch site or property owned by ESA is the sole responsibility of ESA and is not covered by any launch-specific insurance requirements.[138]

Neither the French government nor any other European government member of ESA has to cover third party losses beyond the specified amount.[139] Clearly, the liability regime in Europe is a far simpler one when compared to the United States. This, in part, may be because *Arianespace* is not evolving with the market and has little interest in developing RLVs that are expected to increase insurance premiums because of re-entry operations. The future re-entry operations are likely the primary reason for the United States' establishment of a minimum 100 million dollars for liability insurance, which is almost double the amount provided by *Arianespace.*

---

[137] *See* ASSOCIATE ADMINISTRATOR FOR COMMERCIAL SPACE TRANSPORTATION. FEDERAL AVIATION ADMINISTRATION, COMMERCIAL SPACE TRANSPORTATION: 2003 YEAR IN REVIEW 14 (2003), *available at* http://ast.faa.gov/files/pdf/YIR03.pdf (last visited July 9, 2005). This document also defines an internationally competed launch contract as "one in which the launch opportunity was available in principle to any capable launch service provider." *Id.* at 2.

[138] LIABILITY RISK-SHARING REGIME, *supra* note 98, at 4-2.

[139] *Id.*

4. Russia

In Russia, all space activities are grouped under one all-inclusive law known as the Law of the Russian Federation on Space Activity, Decree No. 5663-1(hereinafter Decree)[140] This law is a complex set of rules that also provides the foundation for a liability regime regarding the launch of space vehicles. The Decree stipulates that government offices, their officials, as well as citizens of the Russian Federation shall be held liable if found guilty of violating it.[141] The Russian government guarantees, "full compensation for direct damage inflicted as a result of accidents while carrying out space activity in accordance with legislation of Russian Federation."[142] The Decree, contrary to United States regulations, does not set a maximum amount for compensation related to a liability claim arising out of an accident. In addition, the responsible organizations or citizens "shall" pay the compensation, not the government.[143] Finally, the law specifies that liability shall be imposed when a Russian Federation space object, which is not defined in the law, causes damage within the territory of the Russian Federation or outside the jurisdiction of any State (except outer space), regardless of who might be at fault.[144]

In regards to insurance, the Decree is the foundation of a complex insurance regime also based on two other laws of the Russian Federation. The Decree requires compulsory insurance when carrying out any space activities, including space launches.[145] This is contrary to the United States and Australian regimes that provide for alternatives of meeting the financial responsibilities of liability requirements, such as demon-

---

[140] Law of Russian Federation on Space Activity, Aug. 20, 1993, Decree No. 5663-1 of the Russian House of Soviets, *available at* http://www.oosa.unvienna.org/SpaceLaw/national/russian_federation/decree_5663-1_E.html (last visited July 9, 2005).

[141] *Id.* at art. 29.

[142] *Id.* at art. 30(1).

[143] *Id.* at art. 30(2).

[144] *Id.* at art. 30(3).

[145] *Id.* at art. 25.

strating financial reserves.[146] There are two other laws that affect the insurance requirements of space launches in Russia. The first is the Civil Code of the Russian Federation, which "defines an insurance contract, explains third-party insurance requirements, and addresses the rights of insurance companies to assess risk."[147] The second is the Russian Federation Law on Organizing the Insurance System in Russia, which "establishes the general principles of state oversight of insurance practices and regulates relations between insurance companies and citizens or other organizations."[148]

Although the customer is the one who usually buys third party liability insurance, the Russian Government will pay claims in excess of the insurance if specified in the launch contract. Third party liability insurance in Russia depends largely on the type of vehicle used in the launch and ranges from 80 million to 300 million USD.[149] It is also interesting to note that for the launches made from the Baikonur spaceport, Kazakhstan is not considered a launching state under the provisions of the Outer Space Treaty and the Liability Convention, and Russia accepts all responsibility for such launches.[150] All of these requirements are based on ELV technology, as Russia does not have current plans for reusable orbital or suborbital launch vehicles. Thus, Russia is like *Arianespace* and does not have to deal with re-entry operations.

### 5. The United States

Currently the United States has the most complex and developed liability risk-sharing regime for ELVs and RLVs of any

---

[146] *Id.* at art. 25(1). For Australia, *see supra* section III.E.1, and for the United States, *see infra* section III.E.5.

[147] Civil Code of the Russian Federation, Part Two, GK RF No. 14-F3 (1996), *amended by* GK RF No. 133-F3 (1997) (Russ.). *See* LIABILITY RISK-SHARING REGIME, *supra* note 98, at 4-7.

[148] Russian Federation Law on Organizing the Insurance System in Russia, No. 4015-1 (1992), *amended by* No. 157-F3 (1997), and *by* No. 204-F3 (1999). *See* LIABILITY RISK-SHARING REGIME, *supra* note 98, at 4-7.

[149] *See* LIABILITY RISK-SHARING REGIME, *supra* note 98, at 4-8. For a detailed description of the insurance requirements for third party liability for each of the different types of Russian expendable launch vehicles see *infra*, Table 1.

[150] *See* LIABILITY RISK-SHARING REGIME, *supra* note 98, at 4-8.

country. The regime is comprised of a three-tier system. Under the first tier, license applicants must prove financial capability to compensate for MPL for damages caused to a third party for death, bodily injury, property damage, or loss resulting from an activity carried out under the license. The licensee must also compensate the United Sates Government for damage or loss to Government property resulting from an activity carried out under the license.[151] MPL is defined as "the greatest dollar amount of loss for bodily injury or property damage that is reasonably expected to result from licensed launch activities."[152] The Associate Administrator for AST makes the MPL determination that is the basis for financial responsibility requirements under the license. The MPL has statutory ceilings not to exceed the lesser of $500 million for third party liability, or the maximum available on the world market at reasonable cost and $100 million for United States Government property, or the maximum available on the world market at reasonable cost.[153]

The second tier is catastrophic loss protection that includes claims exceeding liability insurance and financial responsibility requirements, also known as indemnification.[154] Subject to congressional appropriations, the United States Government may pay successful third party liability claims in excess of required MPL based insurance, up to $1.5 billion (as adjusted for post-1988 inflation) above the amount of MPL based insurance.[155] Additionally, the United States Government waives claims for property damage above required property insurance.[156]

The third tier is for claims above MPL based insurance plus indemnification, which by regulation, the financial responsibility of such claims remains with the licensee or legally liable party.[157] In addition, the United States Government, as an exception, will not indemnify a party's willful misconduct, and

---

[151] Commercial Space Launch Act, 49 U.S.C. § 70112(a)(1) (2000 & Supp. 2005).
[152] 14 C.F.R. § 440.3(a)(11) (2000).
[153] 49 U.S.C. § 70112 (a)(3).
[154] *Id.* at § 70113 (2000 & Supp. 2005).
[155] *Id.* at § 70113(a)(1)(B).
[156] *Id.* at § 70113(a)(1)(A).
[157] *Id.* at § 70112(b)(2).

may pay claims from the first dollar of loss in the event of an insurance policy exclusion that is determined to be usual.[158]

The applicant can choose to meet the financial responsibility of MPL through one of the following: financial reserves or; escrow account or; liability insurance, which is the most common and preferred method. An example is Sea Launch, an international partnership of companies from the United States, Russia, Ukraine and Norway.[159] Sea Launch launches rockets from international territory, the Pacific Ocean, and was required by the United States Government to obtain insurance and a license from the Department of Transportation for the launch of its vehicles because a United States company, Boeing, was deemed to hold a "controlling interest"[160] as defined under the Commercial Space Launch Act of the United States. Specifically, Boeing Launch Services owns 40 percent of the company, which makes Boeing the majority shareholder with a controlling interest.[161] By requiring Boeing to obtain sufficient insurance, the United States could protect itself in case an international claim was made under the provisions of the Liability Convention.

One final aspect that distinguishes the United States regime from that of other States is the expiration date for the liability regime established under the Commercial Space Launch Act. Under the current extension, the provisions pertaining to claims exceeding the minimum insurance amounts (government indemnification) and financial responsibility requirements will expire on December 31, 2009.[162] For licenses submitted after this date, the United States government will not provide in-

---

[158] *Id.* at § 70113(a)(2).

[159] For more on Sea Launch, see http://www.sea-launch.com/ (last visited June 7, 2005).

[160] Under United States regulations "controlling interest" means "ownership of an amount of equity in such entity sufficient to direct management of the entity or to void transactions entered into by management. Ownership of at least fifty-one percent of the equity in an entity by persons described in paragraph (1) or (2) of this definition creates a rebuttable presumption that such interest is controlling." 14 C.F.R. § 401.5 (2000).

[161] The other companies in Sea Launch are S. P. Korolev Rocket and Space Corporation Energia of Russia (25 percent), Kvaerner of Norway (20 percent), and SDO Yuzhnoye/PO Yuzhmash of Ukraine (15 percent). Sea Launch, Organization, *at* http://www.sea-launch.com/organization.htm (last visited June 7, 2005).

[162] 49 U.S.C. § 70113(f) (2001 & Supp. 2004).

demnification for claims above the insurance coverage amounts. Congress has been extending this sunset provision, expiration date, since 1988 through amendments to the Act. It is probably the biggest factor affecting United States competitiveness in the launch industry right now, and will most likely be amended before the next expiration date.

### 6. Other Countries

Other countries that currently have space launch capabilities and that also have some kind of liability regime for space launches include: Brazil, India, Israel, Japan, South Africa, Sweden, Ukraine and the United Kingdom.[163] For the regimes of these States and the regimes of States previously discussed, the following table provides a comparison of each of them.[164]

Table 1 Comparison of National Liability Regimes

| Country | Commercial Space Launch Capability ELV Name(s) (launcher affiliation) | Insurance Requirements for Third Party Liability | Number of Tiers of Licensee Government Third Party Risk Sharing | Launch Licensee's Required Amount of Third Party Liability Insurance | Government Supplied Third Party Liability Indemnification |
|---|---|---|---|---|---|
| Australia | No, but foreign interest (foreign commercial) | Yes | 2 | MPL, similar to U.S. method | No Limit |
| Brazil | Under development VLS (government) | Draft | 2 (Proposed) | Not Specified (but launch risk-based) | Unknown |
| China | Yes, Long March (government) | Yes | 2 | $100 million (client can request another $300 million) | No Limit |

[163] For detailed information on the liability regime of these countries, see *Annexes 1 to 18*, *supra* note 80, at ch. 4.

[164] All data from the table was adopted from Table 4-4 of the AST report on risk sharing liability, LIABILITY RISK-SHARING REGIME, *supra* note 98, at 4-13.

| | | | | | |
|---|---|---|---|---|---|
| Europe (ESA) | Yes, Ariane (government) | Yes | 2 | $53 million at current exchange rate (400 million French francs) | No Limit |
| India | Yes, GSLV (government) | Yes | 2 | Not Specified | No Limit |
| Israel | Under Development Shavit (commercial) | No | N/A | Not Specified | None |
| Japan | Yes, H-IIA (government) | Yes | 2 | $50 million or $200 million (depending on launch vehicle) | No Limit |
| Russia | Yes, Cosmos, Dnepr, Rockot, START, Soyuz, Zenit, Proton, Molniya, Tsyklon, Strela (government) | Yes | 2 | $80 million to $500 million(depending on launch vehicle) | No Limit – By contract only |
| South Africa | No | Yes | 1 | Not Specified | None |
| Sweden | No | Yes | 2 | Not Specified | None |
| Ukraine | No, but affiliated with foreign ventures – Zenit (commercial) | Yes | N/A | Not Specified | Not Specified |
| United Kingdom | No | Yes | 1 | $142 million | None |
| United States | Yes, Atlas, Delta, Minotaur, Taurus, Pegasus (commercial) Athena | Yes | 3 | MPL (but not more than $500 million). Current licensed ELVs have MPLs of from $0.25 million to $261 million (Delta IV) | $1.5 billion above the MPL (as adjusted post-1988 inflation) |

ESA = European Space Agency; MPL = maximum probable loss; ELV = expendable launch vehicle; GSLV= Geostationary Launch Vehicle; VLS = Vehiculo Lancador de Satelites; N/A=Not available. All amounts in USD, unless specified.

Table 1 illustrates that the United States is the only State with a three-tier system for third party liability, making it the most complex system. Additionally, the United States is the only State with an expiration date and a cap for government indemnification, which affects the United States' competitiveness. On the other hand, Australia and the United States are the only States in which the required amount of insurance is based on MPL. This is advantageous because it provides a flexible way of determining the insurance amounts based on the type of operations conducted under the license. This flexibility is an excellent way to incorporate RLVs into the current risk-sharing regime. Finally, under some of the liability regimes, notably the United States and Australia, steps have been taken to incorporate the RLV into the current ELV regime. Although this seems like a logical step, it only impacts orbital RLVs. They will have operations similar to ELVs, with the difference that they can re-enter the Earth's atmosphere to be used again. Since suborbital RLVs operate differently, they will be examined in the next section as to the viability of incorporating them into the current aviation liability risk regime.

### *F. International Air Carrier Liability and the Reusable Launch Vehicle*

The Montreal Convention[165] will be in force when RLVs begin operation.[166] Under the Montreal Convention, the liable

---

[165] Montreal Convention, *supra* note 7.

[166] "Warsaw system" refers to the Convention for the Unification of Certain Rules Relating to International Carriage by Air and all its protocols, additional protocols and agreements. Convention for the Unification of Certain Rules Relating to International Transportation by Air, opened for signature Oct. 12, 1929, 49 Stat. 3000, 137 L.N.T.S. 11, This system was replaced by the Convention for the Unification of Certain Rules Relating to International Carriage by Air, 28 May 1999, (1999 Montreal Convention), which incorporates all of the protocols, additional protocols and agreements of the Warsaw System. Montreal Convention, *supra* note 7. The Montreal Convention entered into force on November 4, 2003 and as of July 10, 2005, there were 65 parties to the Convention. For list of parties to the convention, see http://www.icao.int/icao/en/leb/mtl99.htm (last visited July 10, 2005). For more on the new Montreal Convention see Amana, *supra* note 105.

party is the operating carrier because liability arises from a contract in which the carrier has the obligation to transport passengers in a safe manner.[167] The State where such airline is registered is never held liable. This principle contrasts sharply with the one contained in the Liability Convention regarding space objects, where liability is placed upon the launching State of the space object and no contractual relationship is required.[168] Additionally, the type of liability under the Montreal Convention is strict liability, whereas under the Liability Convention it is a mix of absolute and fault liability.[169] Finally, the Montreal Convention is applicable to international carriage by air, whereas the Liability Convention applies only to the launching of space objects.[170]

The two drastically different regimes raise two questions. First, which applies to RLVs? Second, can the principles of the aviation liability regime be applied to them? There cannot be a definitive answer because there are insufficient experience, statistics and data regarding suborbital RLV performance. However, some theories can be posited. Following the theory that the Liability Convention would only be applicable to orbital

---

[167] Article 17 of the Montreal Convention stipulates, "[t]he carrier is liable for damage sustained in case of death or bodily injury of a passenger upon condition only that the accident which caused the death or injury took place on board the aircraft or in the course of any of the operations of embarking or disembarking." Montreal Convention, *supra* note 7, at art. 17. Thus, the liability is imposed upon the carrier and not the State. It is interesting to note that the term "bodily injury" is defined in the United State's regulations as, "physical injury, sickness, disease, disability, shock, mental anguish, or mental injury sustained by any person, including death." 14 C.F.R. § 440.3(a)(1) (2000), In the definition, mental anguish is included as being a form of bodily injury, an interpretation that caused much litigation under the Warsaw system, because the term bodily injury was never defined, not even in the new Montreal Convention of 1999. Maybe, in the future, International Public Air Law attorneys can borrow from these regulations, at least as a parallel or example in the United States, in order to support their views or influence a judicial decision.

[168] Liability Convention, *supra* note 4, at arts. II – V.

[169] The Liability Convention Articles II and III clearly establish both types of liability. *Id.* at arts. II – III. The strict liability in the Montreal Convention arises from the contract of carriage where the general rule is duty of care. See *supra* section III.C, for more on the types of liability.

[170] *See* Liability Convention, *supra* note 4, at arts. II - III. *See also* Montreal Convention, *supra* note 7, at art. 1.

RLVs but not suborbital ones,[171] the only choice is to incorporate suborbital RLVs into the air law regime or establish a new regime. For international liability purposes only the applicable possibilities for suborbital RLVs will be discussed, as orbital vehicles would have to be included under the provisions of the Liability Convention.

The option of incorporating the suborbital RLV into the international regime of air law produces some major obstacles in the Montreal Convention. The Montreal Convention states, "[t]his Convention applies to all international carriage of persons, baggage or cargo performed by *aircraft* for reward."[172] The word "aircraft" seems to exclude the suborbital RLVs. Although not defined in the Montreal Convention (international private air law), it would be easy to argue that the word "aircraft" as used in the Montreal Convention has the same definition as the one used in the Chicago Convention (international public air law). That is, an "aircraft" is "[a]ny machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface."[173] The application of this definition to the international private air law regime would make the Montreal Convention inapplicable to the suborbital RLV. This means that either a definition for the international private air law regime that would include suborbital RLVs has to be adopted, or the second option of establishing a new RLV international liability regime is necessary. It would be more practical to adopt a definition of "aircraft" to include suborbital RLVs.[174] In this sense, suborbital RLVs, like future aerospace planes, would have the same protection in terms of liability that other air carriers would. Furthermore, this action will protect the new suborbital RLV industry while it grows and

---

[171] In this theory the term "space object" does not refer to the launch vehicle, unless it is part of it. *See infra* section III.D, for more on this topic.

[172] Montreal Convention, *supra* note 7, at art. 1(1) (emphasis added).

[173] Rules of the Air, *supra* note 69. *See also supra* section II.D.1, for more on the definition of aircraft under the international air law regime.

[174] For the International Public Air Law regime this article suggested various definitions of aircraft that would include suborbital reusable launch vehicles. *See supra* section II.D.1, for the suggestions given.

develops, just as the Warsaw Convention protected the emerging airline industry in the 1930s.

Another reason for incorporation is that there is currently only one suborbital RLV in use, *SpaceShipOne*. As in 1929, when there was little information about the risks of the emerging airline industry, there is insufficient information on the risks associated with suborbital RLVs. Incorporating them into an existing regime would provide further protection for the industry to develop. According to some scholars, the emerging industry could turn out to be a highly profitable business if prices become accessible to most people.[175] Of course, it will be years before suborbital RLV operations become as common and safe as current airline operations, and even longer for the risks of both operations to be comparable.[176] A transition period is needed for these vehicles in which they would be treated under the same standards as ELVs in terms of risk management, and not the standards used for commercial aviation.

The transition period is essential because the safety record of suborbital RLVs can not be expected to be as good as the aircraft industry's record. During the transition period, risks of suborbital RLVs should be associated with risks of ELVs. National laws dealing with launch vehicle liability, such as the Commercial Space Launch Act of the United States,[177] should be applicable. In this transition period, the performance of the expendable launch vehicle industry should be used to calculate risk instead of using the risks associated with the aircraft industry. This is important because it is probable that RLVs will have similar risks to ELVs, at least in the beginning. In addition, the transition would ensure the protection of suborbital RLVs as an industry while it develops. After this transition period, the current international private air law regime might be well suited because of the similarities between these vehicles and commercial aircraft, and because it will continue to protect

---

[175] If the prices of tickets comes down to 10,000 USD per person "...space travel by 'ordinary' people or 'average' people could become possible in the near future." Ram Jakhu & Raja Bhattacharya, *Legal Aspects of Space Tourism*, 45 COLLOQUIUM ON THE LAW OF OUTER SPACE 112 (2002).

[176] *See supra* section III.B, for more on the associated risks of airline operations.

[177] Commercial Space Launch Act, *supra* note 151.

the industry. Finally, while national insurance requirements for future suborbital RLVs are adequate for the time being,[178] these vehicles might see a rapid development. It would be wise if we decide in a legal sense early on where we are going to place these vehicles before they start flying across national borders, which inevitably will bring liability claims arising out of incidents and accidents related to the operations of these vehicles.

## IV. CONCLUSIONS AND RECOMMENDATIONS

The best method for classifying RLVs is to divide them into two categories: orbital and suborbital. Orbital RLVs would be governed under the space law regime. Suborbital RLVs would be governed by the air law regime, with the addition of some major amendments, and with a transition period during which they would be treated under standards specially designed for them.

The transition period would calm the concerns of suborbital RLV investors who are concerned that the FAA's Office of Regulation and Certification, and not the AST, would obtain jurisdiction over such vehicles. On July 24, 2003, in a Joint Hearing of Congress on Commercial Human Space Flight before the Subcommittee on Space and Aeronautics, Dennis Tito testified, "[a]s far as sub-orbital space flight, we don't know who will regulate us. And it looks like the FAA might be involved in regulating us, at least on the aviation side, and that is very, very scary. The third area that I think is important is that there should be a clear distinction between the Office of Commercial Space Transportation and the aviation side of FAA, because if the aviation side of FAA gets involved, we're going to go on to a bureaucratic deadlock that's going to go beyond my life expectancy,

---

[178] In the United States, a recent study on liability risk sharing regimes found the current U.S. liability regime "adequate". According to the AST, "The current liability risk-sharing regime for commercial space transportation is judged to be adequate based on historical acceptability of statutory risk allocation, including risk-based insurance requirements; support of U.S. obligations under relevant treaties; and the ability of the U.S. launch industry to compete for a share of the commercial space launch market." LIABILITY RISK-SHARING REGIME, *supra* note 98, at 10-3.

and, therefore, be very difficult to invest." [179] In the same hearing Elon Musk testified, "We recommend reaffirming the authority to the AST office of the FAA as the primary regulatory agent for space vehicles." [180]

Their concern is that if the FAA Office of Regulation and Certification, which has dominion over the certification of commercial and experimental aircraft, obtains jurisdiction over suborbital RLVs, it will apply the same standards used for aircraft in terms of safety and liability. This "would ensure that commercial space flight never gets off the ground."[181] Suborbital RLVs in the United States should be under AST jurisdiction, even after the initial transition period. AST has the experience and personnel to deal with these vehicles, which in the beginning would be similar in risks and operations to current ELVs. The same should be for other States that have established similar laws and offices for the regulation of space activities.

On the other hand, some members of the emerging space tourism industry, an industry that will initially depend on suborbital RLVs, think these vehicles should never be treated as aircraft. Jeff Greason, president of XCOR Aerospace, has gone a little further and has asked the United States Congress to "shield the fledgling industry from excessively burdensome regulation, establish a formal definition of suborbital rocket that makes clear they are not airplanes, and affirm an individual's right to waive liability before becoming a passenger of one of the planned services."[182] However, it is not necessary to go so far in order to protect the suborbital RLV or space tourism industry while it develops. For example, the airline industry was protected internationally against liability claims. From its be-

---

[179] *House Science Subcommittee on Space and Aeronautics and Senate Commerce, Science, and Transportation Subcommittee on Science, Technology, and Space, Joint Hearing on Commercial Human Spaceflight*, 108th Cong. 18 (2003) (statement of Dennis Tito) [hereinafter *Joint Hearing on Commercial Human Spaceflight*]. *See also*, Brian Berger, *Dennis Tito Ready to Invest in Suborbital Rocket, But Wary of Government Regulators*, SPACE NEWS (July 24, 2003), *at* http://www.space.com/missionlaunches/tito_regulations_030724.html (last visited June 6, 2005).

[180] *Joint Hearing on Commercial Human Spaceflight*, *supra* note 179, at 22.

[181] *Id.* at 27.

[182] *Id.*

ginnings through today, it did not have to go as far as waiving complete liability for passenger claims against airlines for accidents in international travel.

Manufacturers and operators of suborbital RLVs should be held liable for damage or injury caused to passengers, but liability should be limited, not waived, as the industry develops. A good precedent is establishing strict liability for the emerging airline industry under the provisions of the Warsaw Convention. Similar provisions could be established for suborbital RLVs used in space tourism. Alternatively, these vehicles can be incorporated into the international air law liability regime, protecting the industries while they grow and develop.

On the boundary issue, the effective approach is the most practical way to resolve this issue. Under this approach, unlike the functionalist or spatialist approaches, both air and space law regimes are maintained without establishing a defining line between airspace and outer space. For suborbital RLVs, the approach means that these vehicles would fall under the regime of air law. These vehicles will be used for space tourism, sounding, and for high-speed transportation of people and cargo between two points on Earth, meaning their effects or purposes are those of a high speed, high altitude aircraft. For orbital RLVs, this approach means they would fall under the regime of space law because their effect or purpose is that of a spacecraft, carrying cargo and people between earth and space.

For registration and certification issues, orbital RLVs should remain within the regime of space law. Space standards similar to the international SARPs contained in the Annexes to the Chicago Convention should be established for these vehicles and all other space vehicles or objects. The Registration Convention should be amended to accommodate orbital RLVs, and a definition of space object should be adopted which would include these vehicles. Suborbital RLVs should be included under the regime of air law. The international framework for these vehicles should be created under the auspices of the ICAO by either amending existing conventions or establishing new ones.

In terms of national liability and risk management of orbital RLVs, the current system of insurance requirements or financial reserves for States involved in space launches should

be maintained. The operations of these vehicles are going to be very similar to the operations of ELVs. The current systems are appropriate. For international liability, the Liability Convention should be amended to include orbital RLVs. In the case of national liability for suborbital RLVs, the current national systems of risk management and liability should also be maintained, but only during the transition period. In the long term, it would be appropriate to incorporate these vehicles into the regime of air law once they become commonplace and operate as safely as conventional aircraft. For international liability of suborbital RLVs, the Montreal Convention should be amended to include these types of operations.

Finally, scientists, engineers, policy makers, and law experts should work together both at ICAO and at UNOOSA to begin establishing rules and parameters defining the different types of RLVs. Differentiating orbital and suborbital RLVs would resolve much of the debate of where to place these vehicles. This distinction is a logical way to determine the applicable regime for each of the different types of RLVs. Nevertheless, one thing is certain; RLVs are going to be part of our near and far future and just like every other activity that in which humankind has been engaged, this one will also need regulation. Ideas and knowledge must be exchanged so one day the dream of one ancient Chinese official can be fulfilled and "boldly go where no one has gone before."[183]

[183] Gene Roddenberry, creator of "Star Trek", coined this famous phrase in his popular science fiction series.

# THE EVOLUTIONARY STAGES OF THE LEGAL SUBCOMMITTEE OF THE UNITED NATIONS COMMITTEE ON THE PEACEFUL USES OF OUTER SPACE (COPUOS)

*Sergio Marchisio*[*]

## I. GENERAL

International space law has undergone a deep evolution since it first began in the 1950s. Space activities and globalisation now underline a profoundly changed legal framework. On the one hand, we have seen new paths and inputs; the evolution of space activities in a number of fields emerging from scientific and technological development; an increased number of Nation-States involved in space activities; the commercialisation and privatisation of some space activities; and partnerships between and among Nation-States, international organisations and private entities.[1] On the other hand, we have also seen the consolidation of new sectors, where space activities have an impact: protection of the environment and natural resources management; prevention of natural and human-induced disasters; global communications; and, space industry development in a drive towards growth.[2]

---

[*] Prof. Sergio Marchisio is Chairperson of the Legal Subcommittee of the United Nations Committee on Peaceful Uses of Outer Space (UNCOPUOS). He is also professor of International Law and Airspace Law at the University "La Sapienza" of Rome and Secretary General of the Italian Society of International Law. This article reflects the views of the author.

[1] *See International Organisations and Space Law: Their Role and Contributions*, 3 PROC. ECSL COLLOQUIUM 6-7 (Noordwijk, 1999).

[2] On the beginning of space law, *see* Eilene Galloway, *The History and Development of Space Law: International Law and United States Law*, VII ANNALS OF AIR AND SPACE LAW 295- 317 (1982).

To be sure, the world is vastly different today than it was when the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), was first established. At that time, the complex issues that had to be resolved had the additional complication of the intense Cold War rivalry. It is to be recalled, in fact, that shortly after the launching of the first artificial Earth orbiting satellite, the Soviet *Sputnik I*, the Permanent Representative of the United States to the United Nations wrote to the Secretary-General, requesting that an item, "Programme for International Co-operation in the Field of Outer Space", be placed on the 1958 General Assembly agenda. The letter called for the Assembly to establish an *ad hoc* committee to make the necessary detailed studies and recommendations as to what specific steps the Assembly might take to further humanity's progress in outer space and to assure that outer space [would] be used solely for the benefit of all humankind.

On 13 December 1958 the U.N. General Assembly established the UNCOPUOS, as an *ad hoc* body with eighteen members.[3] One year later, on 12 December 1959, the General Assembly gave it the status of a permanent body and reaffirmed the mandate given to it by U.N. member States.[4] From a juridical point of view, the UNCOPUOS was qualified as a standing subsidiary organ of the General Assembly, in accordance with the Charter of the United Nations (U.N. Charter).[5]

In considering the legal nature of the UNCOPUOS, two elements are indeed to be taken into account. Firstly, the Committee was not established as an independent international organization founded on a treaty, like the specialized agencies of the United Nations, but as an organ of the General Assembly. Sec-

---

[3] Question of the Peaceful Use of Outer Space, G.A. Res. 1348, 13th Sess. (1958) [hereinafter G.A. Res. 1348], *available at* http://www.un.org/documents/ga/res/13/ares13.htm (last viewed July 17, 2005).

[4] International Co-operation in the Peaceful Uses of Outer Space, G.A. Res. 1472, 14th Sess. (1959), *available at* http://www.un.org/documents/ga/res/14/ares14.htm (last viewed July 17, 2005).

[5] "Such subsidiary organs as may be found necessary may be established in accordance with the present Charter." Charter of the United Nations, June 26, 1945, art. 7(2), 59 Stat 1031 [hereinafter U.N. Charter]. "The General Assembly may establish such subsidiary organs as it deems necessary for the performance of its functions." *Id.* at art. 22.

ondly, its composition and functions are established by a decision of the plenary organ, which can always modify UNCOPUOS membership and its mandate by an act of the same nature, without amending the United Nations Charter. The idea of creating an international space organisation, based on an *ad hoc* treaty, was not considered at the time UNCOPUOS was established. Although the idea was circulated as a proposal within the U.N., it did not raise support. UNCOPUOS was intended to be more of a political organ devoted to strenghtening international cooperation among spacefaring Nations with their national space programmes, rather than as a technical organization with the competency to realize direct operational activities in space. At present, the creation of a world space organization is still often advocated by academic voices and scientific institutions.[6]

Furthermore, due to its specialized scope of action, UNCOPUOS was originally established as an organ with a restricted membership of eighteen Members.[7] However, the membership has been expanded several times to achieve more balanced participation among U.N. member Nation-States. It now includes sixty-seven States,[8] which constitute approximately one-third of the entire U.N. membership. From the beginning the Committee also allowed, on the basis of unilateral concessions, the participation of observer entities. They include a

---

[6] See Simone Courteix, *Towards a World Organization?*, *in* OUTLOOK ON SPACE LAW OVER THE NEXT 30 YEARS ESSAYS PUBLISHED FOR THE 30TH ANNIVERSARY OF THE SPACE TREATY 421-427 (Gabriel Lafferranderie & Daphné Crowther, eds. 1997).

[7] They were: Argentina, Australia, Belgium, Brazil, Canada, Czechoslovakia, France, India, Iran, Italy, Japan, México, Poland, Sweden, the Union of Soviet Socialist Republics, the United Arab Republic, the United Kingdom of Great Britain and Northern Ireland, and the United States of America. G.A. Res. 1348, *supra* note 3.

[8] They are: Albania, Algeria, Argentina, Australia, Austria, Belgium, Benin, Brazil, Bulgaria, Burkina Faso, Cameroon, Canada, Chad, Chile, China, Colombia, Cuba, Czech Republic, Ecuador, Egypt, France, Hungary, Germany, Greece, India, Indonesia, Iran, Iraq, Italy, Japan, Kazakhstan, Kenya, Lebanon, Libyan Arab Jamahiriya, Malaysia, Mexico, Mongolia, Morocco, Netherlands, Nicaragua, Niger, Nigeria, Pakistan, Peru, Philippines, Poland, Portugal, Republic of Korea, Romania, the Russian Federation, Saudi Arabia, Senegal, Sierra Leone, Slovakia, South Africa, Spain, Sudan, Sweden, Syrian Arab Republic, Thailand, Turkey, the United Kingdom of Great Britain and Northern Ireland, the United States of America, Ukraine, Uruguay, Venezuela and Viet Nam, *available at* http://www.oosa.unvienna.org/COPUOS/members.html (last visited June 7 2005).

number of international organizations, both intergovernmental and non-governmental, which are dedicated to the development of international space cooperation.

Looking at the founding resolutions, one might easily understand that the main tasks of the Committee were not legal or institutional. In fact, it was established in order to consider the activities and resources of the United Nations; the specialized agencies and other international bodies relating to the peaceful uses of outer space; international cooperation; and, programs in the field that could appropriately be undertaken under United Nations auspices and within its organizational arrangements to facilitate international space cooperation. From this perspective, UNCOPUOS has been the focal point for all space-related cooperative programmes furthered by the United Nations since the early 1960s.

However, the first General Assembly resolution also opened the way for considering "legal problems which may arise in the carrying out of programmes to explore outer space."[9] Along this line, an important step was taken in 1961. The General Assembly requested the Committee to "maintain close contact with governmental and non-governmental organizations concerned with outer space matters;...to provide for the exchange of such information relating to outer space activities as Governments may supply on a voluntary basis...;...[and] to assist in the study of measures for the promotion of international co-operation in outer space activities."[10] These terms of reference have since provided "general guidance for the activities of the Committee in promoting international cooperation in the peaceful uses and exploration of outer space."[11]

From the legal point of view, it is worthy to note that the Resolution also requested the Secretary-General to maintain a

---

[9] G.A. Res. 1348, *supra* note 3, at 1(d).

[10] International Co-operation in the Peaceful Uses of Outer Space, G.A. Res. 1721, 16th Sess., at B(3)(a) - (c) (1961) [hereinafter G.A. Res. 1721], *available at* http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_16_1721.html (last visited July 17, 2005).

[11] Office for Outer Space Affairs, United Nations Committee on the Peaceful Uses of Outer Space: History and Overview of Activities, *available at* http://www.oosa.unvienna.org/COPUOS/cop_overview.html (last visited June 7, 2005).

public launch registry based on information supplied by States launching objects into orbit or beyond.[12] It called also upon launching States to "furnish information promptly" to the COPUOS, through the Secretary-General, for the registration of launchings.[13] This recommendation, though non-mandatory, has not been superseded by the Registration of Objects Launched into Outer Space[14] and is still followed on a voluntary basis by some States that have not yet ratified the Convention, for example, Algeria, Israel and Italy.[15]

The internal structure of the UNCOPUOS also deserves some attention. Like many other subsidiary organs of the United Nations, it has two Subcommittees. They are the Scientific and Technical Subcommittee (STS) and the Legal Subcommittee (LSC). They were created at the second session of UNCOPUOS in 1962 and each subcommittee is composed of the same member States that comprise the parent body. These internal bodies, which are, legally speaking, the expression of the inherent power of self-organisation of the UNCOPUOS, were created to assist it in the study of the many specific proposals and suggestions concerning, on the one hand, the scientific and technical aspects of space activities, and, on the other hand, the legal matters raised by member States for the development of international cooperation in space exploration for peaceful purposes. The STS held its first session from 28 May to 13 June 1962, and the LSC first convened in Geneva on 28 May 1962. This latter date may be considered as the starting point of the evolutionary stages of the UNCOPUOS. The LSC has since then made a remarkable contribution to the development of international space law. It has succeeded in adopting five treaties, four sets of Principles, and other relevant documents.

Currently, the UNCOPUOS and its two Subcommittees meet annually in Vienna, each for two-week periods. They con-

---

[12] G.A. Res. 1721, *supra* note 10, at B(1)-(2).

[13] *Id.*

[14] Registration of Objects Launched into Outer Space, Nov. 12, 1974, 1976, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention].

[15] *See Practice of States and International Organizations in Registering Space Objects*, A/AC. 105/C.2/L. 255, UNCOPUOS 44th Sess. (April 2005) (background Paper by the Secretariat).

sider questions put before them by the General Assembly, reports submitted to them, and issues raised by the member States. The UNCOPUOS and the Subcommittees, adopt, without voting - that is, by *consensus* - conclusions and reports and, if it is the case, other draft documents, including treaties, declarations of principles and resolutions containing recommendations, to be finally approved by the General Assembly. The General Assembly is the principal organ of the United Nations and has the competence for dealing with space and related matters. It debates the outcome of the UNCOPUOS's deliberations and adopts annually, at its ordinary session, a specific resolution on international cooperation in the peaceful uses of outer space (that is to say, an *omnibus* resolution), giving general guidance for the work the UNCOPUOS, and any other decision that may be suitable according to the nature of the drafts submitted by it.

## II. THE THREE EVOLUTIONARY STAGES OF THE COPUOS LEGAL SUBCOMMITTEE: THE LAW-MAKING PHASE

The major role of the UNCOPUOS and its Subcommittees is the development and strengthening of international cooperation in the field of space exploration and exploitation has been underlined. This role might be accomplished by different kind of activities, which essentially include study and documentation, on the one hand, and, on the other hand, recommendatory action for member States to take in order to direct their behaviours. This second category covers the assessment of legal problems that arise as a result of the exploration of outer space, the development of international cooperation in the legal field and the promotion of international space law. By examining the LSC accomplishments in the field of international space law, it is easy to identify three evolutionary phases.

The first phase I will call the *law-making era* of the LSC. It began just after LSC's creation and ended in the 1980s. The second phase is the *soft-law* phase, and was signed by the adoption of five sets of principles and ended in the middle half of the 1990s. The third, and current, phase is characterized by efforts to broaden the acceptance of the U.N. space treaties and to as-

sess their application. Each of these stages has been characterized by specific features and results.

In the first stage, when the LSC began its work, no binding instrument was in force within the international community for regulating the exploration and exploitation of outer space. Some authors argued that instant customary law was born, as was evidenced by a rapid practice of the spacefaring States, rather than by a general practice accepted as law, according to the traditional definition of international custom contained in Article 38 of the Statute of the International Court of Justice.[16] Apart from these doctrinal views, the General Assembly felt it necessary to give some guidance to member States conducting space activities. This was realized thanks to a declaration of principles, belonging to the *genus* of Assembly recommendations, which are endowed, in legal terms, with a merely hortatory value, as the General Assembly does not have a legislative or quasi-legislative function. However, the Assembly's "Declaration of Principles" or "Principles" *tout court*, are at the same time considered important tools in the process of evolving international law.[17]

Moreover, a legal foundation for space activities was needed as a matter of urgency in order to avoid the development of practices dictated exclusively by national interests. In this context, a *corpus* of general principles, to be translated later into a binding treaty, was the best way for coping with the Superpowers and their emerging space activities. In this way, the General Assembly adopted a resolution containing the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space.[18] The universal acceptance of these principles has consolidated their customary value, which can hardly be questioned even by the strictest and most positivistic test of legal effectiveness. International custom is generally considered to have two elements: *diuturnitas* and *opinio iuris*. The first refers to general and consistent conduct by States, while the

---

[16] Bin Cheng, STUDIES IN INTERNATIONAL SPACE LAW, 191-196 (Oxford, 1997).

[17] See Gaetano Arangio-Ruiz, *The Normative Role of the United Nations and the Declaration of Principles of Friendly Relations*, *in* 137 RECUEIL DES COURS DE L'ACADEMIE DE DROIT INTERNATIONAL DE LA HAYE 419 (1972).

[18] Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, G.A. Res. 1962, 18th Sess. (1963).

second means that the practice stems from a belief of legal obligation. This definition helps to immediately underline the importance, in establishing the legal *status* of the Principles, of the conduct of States, international organizations, and private entities acting under the States' control and supervision according to international space law. In this regard, it can be argued that the practice of States seems to have confirmed the general aspects of the legal regime set forth in 1963 by the Principles.

While the adoption of an instrument not binding *per se* was seen as a first step towards a new legal regime for outer space, the time seemed mature for entering into multilateral treaties for clarifying and to progressively develop the rules to be applied to space activities. The LSC become the most appropriate forum for reaching consensus on the major issues involved and transforming such consensus on mandatory norms of international law.

These were the origins of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, generally called the Outer Space Treaty.[19] The LSC represented evidence of the commitment of States to the principle that international cooperation and the rule of law should always govern the exploration and peaceful uses of outer space.

The Outer Space Treaty became one of the outstanding lawmaking treaties of contemporary international law as a whole. It significantly contributed to the progressive development and codification in the meaning of Article 13 of the UN Charter.[20] By

---

[19] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 (entered into force on Oct. 10, 1967) [hereinafter Outer Space Treaty].

[20] U.N. CHARTER, *supra* note 5, at art. 13.

> 1. The General Assembly shall initiate studies and make recommendations for the purpose of:
>
> a. promoting international co-operation in the political field and encouraging the progressive development of international law and its codification;
>
> b. promoting international co-operation in the economic, social, cultural, educational, and health fields, and assisting in the realization of human

the Outer Space Treaty, an attempt was made at finding a balanced compromise between the common interests of all nations, the aims of humankind as a whole, and the interests of individual States as members of the world community and traditional subjects of international law. It was agreed that "[t]he exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind."[21]

The Outer Space Treaty establishes significant principles such as freedom in the exploration and use of outer space; freedom of scientific investigation in outer space; and, international cooperation in scientific investigation. The principle of non-appropriation,[22] relates to outer space as a whole, no exception having been admitted, and therefore no part of outer space, including the Moon or any other celestial body, can be exempted from the impact of this principle. It is indeed clear that space belongs to the category of *res communes omnium*, free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law.

The Outer Space Treaty also codified the principle of the denuclearisation of outer space, requiring States Parties "not to place in orbit around the earth any objects carrying nuclear weapons or any other kind of weapons of mass destruction, install such weapons on celestial bodies..." It also codified the principle of using the Moon and other celestial bodies exclusively for peaceful purposes.[23]

A special significance must be attached to the principle that State Parties "shall bare international responsibility for na-

---

rights and fundamental freedoms for all without distinction as to race, sex, language, or religion.

2. The further responsibilities, functions and powers of the General Assembly with respect to matters mentioned in paragraph 1 (b) above are set forth in Chapters IX and X.

*Id.*

[21] Outer Space Treaty, *supra* note 19, at art. I.

[22] *Id.* at art. II.

[23] *Id.* at art. IV.

tional activities in outer space...whether such activities are carried on by governmental agencies or by non-governmental entities", and for "assuring that national activities are carried out in conformity with the provisions" of the Treaty.[24] This principle goes farther than the rules of general international law relating to State responsibility in the traditional sense. It is inappropriate, indeed, to interpret this notion by exclusive reference to the concept of responsibility of States for internationally wrongful acts, as it is addressed in the process of codification by the International Law Commission (ILC) of the United Nations. The ILC adopted, on second reading in 2001, the Draft Articles on the Responsibility of States. The Commission seeks to formulate, by way of codification and progressive development, the basic rules of international law concerning the responsibility of States for their wrongful acts.[25] Here, the emphasis is on the secondary rules of State responsibility, namely, the general conditions under international law for which States are responsible for wrongful actions or omissions and the legal consequences that flow from them.

Such interpretation appears too narrow, because the scope of Article VI would be only to include private activities that are carried out for governmental agencies and this would not be new. This inclusion also occurs under certain conditions at general international law. In fact, according to the customary rules on international responsibility for wrongful acts, States do not respond for private conduct, except for having neglected to take all reasonable measures to prevent private offensive acts from being committed or for having instructed or controlled private actions. Concerning the conduct directed or controlled by a State the ILC Draft establishes that "The conduct of a person or group of persons shall be considered an act of a State under international law if the person or group of persons is in fact acting

---

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

[25] International Law Commission, *Report on the Work of its Fifty-Third Session*, G.A. A56/10, at 29-365 (23 April - 1 June and 2 July - 10 August 2001).

on the instructions of, or under the control of, that State in carrying out the conduct."[26]

International responsibility, or better accountability according to Article VI, encompasses all the legal consequences of national activities in outer space, as provided for by international space law. It covers not only the obligation of reparation in case of violations of international obligations by public or private entities, but also the obligation to compensate for damage according to the special regime set forth in the Outer Space Treaty.[27] This is detailed in the Convention on International Liability for Damage Caused by Space Objects,[28] which depicts a victim-oriented discipline of absolute responsibility/strict liability for damages caused by space objects on the surface of the Earth or to aircraft in flight.[29] This responsibility – continues Article VI – pertains to assuring that national activities are carried out in conformity with the provisions set forth in the Outer Space Treaty. There is indeed a further consequence arising from the accountability provided for by Article VI, namely the recourse by a State to take legislative action at the national level in order to answer for private space activities and their legal consequences for which the State is internationally responsible. The general legal framework set up by the Outer Space Treaty has been complemented by four other treaties, all negotiated within the LSC, and following a method of a progressive elaboration of appropriate space law instruments.[30] In addition to the Regis-

---

[26] Responsibility of States for Internationally Wrongful Acts, *id.* at art 8, p. 45 (draft text adopted by the International Law Commission at its fifty-third session. *See also* Luigi Condorelli, *La réparation des dommages catastrophiques causés par les activités spatiales*, LA REPARATION DES DOMMAGES CATASTROPHIQUES 270 (Bruxelles, 1990).

[27] Outer Space Treaty, *supra* note 19, at art. VII.

[28] Convention on the International Liability for Damage Caused by Space Objects, opened for signature Mar. 29, 19172, 24 U.S.T. 2389, 961 U.N.T.S 187 [hereinafter Liability Convention].

[29] *See* Armel Kerrest, *The Liability Convention and Liability for Space Activities*, *in* WORKSHOP ON CAPACITY BUILDING IN SPACE LAW, PROCEEDINGS ON CAPACITY BUILDING IN SPACE LAW, ST/SPACE/14, 27-32 (2003). *See also* MARCO PEDRAZZI, DANNI CAUSATI DA ATTIVITÀ SPAZIALI E RESPONSABILITÀ INTERNAZIONALE 259-267 (Milan, 1996).

[30] *See* Vladimir Kopal, *Introduction to the United Nations Treaties and Principles on Outer Space*, *in* WORKSHOP ON CAPACITY BUILDING IN SPACE LAW, PROCEEDINGS ON CAPACITY BUILDING IN SPACE LAW, ST/SPACE/14, 11-25 (2003).

tration Convention[31] and the Liability Convention[32] mentioned above, they also include the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space;[33] and, the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies.[34] Under the legal framework of these treaties, space exploration by nations, international organizations and private entities has flourished. As a result, space technology and services might better contribute to economic growth and improvements in the quality of life around the world.

However, it must be said that the world remains far from general acceptance of the United Nations space law instruments. Many non space faring States have not yet accepted the key treaties, including some members of COPUOS. This is the reason why one of the main functions of the LSC is broadening the universal acceptance of the core space law treaties, inviting States to consider the reasons why their ratification and implementation should be considered highly beneficial. At the same time, the LSC should also encourage States that have accepted these conventions to look at the sufficiency of their national laws to implement them.

The Moon Treaty is a case apart. It has been accepted but by 10 States, failing to collect wider support. Notwithstanding that, like the other United Nations space treaties, it was adopted in the UN General Assembly by consensus. There are many reasons for the hesitation shown by a great number States to adhere to the Moon Treaty, but the most evident is perhaps the contradiction between the legal qualification of outer space, including the Moon and other celestial bodies, as *res communis omnium* under the Outer Space Treaty and the

---

[31] Registration Convention, *supra* note 14.

[32] Liability Convention, *supra* note 28.

[33] Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, U.N. GAOR, 22nd Sess., Supp. No. 16, at 5, U.N. Doc. A/6716 (1968), 19 U.S.T. 7570, 1968 U.S.T. LEXIS 584 [hereinafter Rescue Agreement].

[34] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, U.N. GAOR, 34th Sess., Supp. No. 46, at 77, U.N. Doc. A/34/46 (1980), 18 I.L.M. 1434 [hereinafter Moon Treaty].

legal regime of the Moon and its resources provided for by the Moon Treaty. The latter utilizes the concept of common heritage of humankind, which in principle excludes any other type of exploitation but collective through an international authority.[35] The notion of the common heritage of humankind has been adopted in the United Nations Convention on the Law of the Sea[36] for qualifying the sea bed and ocean floor and subsoil thereof beyond national jurisdiction and for setting up the International Sea Bed Authority, the body through which States Parties organise and control the activities concerned with seabed minerals.[37] The Moon Agreement requires also the exploitation of the natural resources of the Moon to be governed by a future "international legal regime,"[38] and its full establishment has been postponed until "such exploitation is about to become feasible."[39]

In this sense, it is a matter of fact that at the end of the 1970s the LSC concluded its law-making era with one of the most controversial legal regime of all international space law.

## III. THE SECOND PHASE: THE SOFT LAW PRINCIPLES

Though the elaboration of further United Nations space treaties was discontinued after 1979, the work of the LSC in the progressive development of the juridical regime of outer space was not interrupted. The five main United Nations treaties exhausted the basic issues on which States would consent to undertake international legal obligations. During the following period, sets of United Nations Principles adopted by the General Assembly became a suitable form for regulating some special categories of space activities for which the international community was not yet prepared to negotiate legally binding instruments.[40]

---

[35] See KEMAL BASLAR, THE CONCEPT OF THE COMMON HERITAGE OF MANKIND IN INTERNATIONAL LAW (The Hague-Boston, London, 1998).

[36] United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 3 (entered into force Nov. 16, 1994).

[37] R.R. CHURCHILL & A.V. LOWE, THE LAW OF THE SEA, 236-253 (Manchester, 2002).

[38] Moon Treaty, *supra* note 34, at art. 11(5).

[39] *Id.*

[40] STEPHEN GOROVE, DEVELOPMENTS IN SPACE LAW. ISSUES AND POLICIES 293-302 (Dordrecht, Boston, London, 1991).

A new phase began, which witnessed the adoption of declarations of principles as the viable solution to regulate more specific issues, such as the use of artificial satellites for international direct television broadcasting, remote sensing, and the use of nuclear power sources in outer space.[41] In this sense, the intention of the drafters of the Principles was exactly to adopt mere declarations not binding *per se*.[42]

During this period, four sets of Principles were negotiated by the LSC and then approved, through the main Committee, by the General Assembly of the United Nations. They are the Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting;[43] the Principles Relating to Remote Sensing of the Earth from Outer Space;[44] the Principles Relevant to the Use of Nuclear Power Sources in Outer Space[45] and the Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the needs of Developing Countries.[46]

As regards the legal *status* of these Principles, although being merely recommendations, they can pave the way for the consolidation of customary rules of international law. In this perspective, the decisive element comes from the practice of States prior to, concomitant with, and following the United Na-

---

[41] *See* United Nations, Office for Outer Space Affairs, *United Nations Treaties and Principles on Outer Space: Text and Status of Treaties and Principles Governing the Activities of States in the Exploration and Use of Outer Space*, A/AC.105/572/rev. 3 (2000).

[42] See Vladimir Kopal, *The Role of the United Nations Declarations of Principles in the Progressive Development of Space Law*, 16 J. SPACE L. 5-20 (1988).

[43] Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, Dec. 10, 1982, UN Doc. A/Res/37/92. G.A. Res. 37/92, U.N. GAOR, 37th Sess., Supp. No. 51, at 98, U.N. Doc. A/37/51 [hereinafter DBS Principles].

[44] Principles Relating to Remote Sensing of the Earth from Outer Space, Dec. 3, 1986, U.N. GAOR, 41st Sess., Supp. No. 53, at 115, U.N. Doc. A/41/53 (1986) [hereinafter Remote Sensing Principles].

[45] Principles Relevant to the Use of Nuclear Power Sources in Outer Space, Dec. 14, 1992, U.N. Doc. A/Res/47/68 [hereinafter NPS Principles].

[46] Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries, Dec. 13, 1996, U.N. Doc. A/Res/51/122 [hereinafter Benefit Principles].

tions recommendation process. Therefore, some of them seem more firmly established in law, like the freedom of Earth's observation from space, while others seem to be less consolidated, and still in the process of gaining complete legal relevance.

If we look for instance at Remote Sensing Principles, they seem to be a successful achievement in which a fair compromise was found between the interests of the sensing States and the needs of the sensed States, including most of the developing countries.[47]

At the time of their adoption, the Remote Sensing Principles did not prohibit activities that had been going on for a long time. On the contrary, they accepted the fact that sensing States were committed to the view that their activity required no consent, including no preliminary consent from sensed States. Therefore, the Remote Sensing Principles merely codified well-established conduct of States prior to 1986 and the General Assembly Resolution created no new law, but simply gave greater legitimacy to the already existing practices.

Additionally, practice seems to have confirmed the general and main aspects of the legal regime set forth in 1986. United States legislation has incorporated the principle of non-discriminatory access in both the Land Remote Sensing Commercialization Act of 1984 and the Land Remote Sensing Policy Act of 1992.[48] Other countries have followed this general tendency. The official policies of the European Space Agency (ESA) concerning ERS/ENVISAT distribution of data, respectively of 1994 and 1998, are unequivocal. The provision of data to users is regulated as follows: "ERS/ENVISAT primary data shall be available in an open and non-discriminatory way, in line with the UN Principles on remote sensing."[49]

---

[47] Sergio Marchisio, *The 1986 United Nations Principles on Remote Sensing: A Critical Assessment*, *in* II SCRITTI IN ONORE DI GAETANO ARANGIO-RUIZ 1311-1340 (Naples, 2004).

[48] *See* Joanne Irene Gabrynowicz., *Defining Data Availability for Commercial Remote Sensing Systems under United States Federal Law*, 23 ANNALS OF AIR AND SPACE LAW 95 – 96 (1998).

[49] Marco Ferrazzani, *The European Distribution System (ERS)*, *in* DROIT, TELEDETECTION ET ENVIRONNEMENT 115 (Strasbourg, Actes Du Colloque International: Le Droit Face Aux Tecniques De Teledetection Par Satellite Au Service Du Developement, June 2-4, 1993).

Similar clauses have been included in multilateral agreements concluded by national space agencies, *inter se*, the Co-operation Agreement concerning the Vegetation program on SPOT 4, signed by the French *Centre National d'Etudes Spatiales* (CNES), the European Commission, the Italian Space Agency (ASI), the Belgian Federal Office for Scientific, Technical and Cultural Affairs (OSTC) and the Swedish National Space Board (SNSB) on 25 May 1994, and the following agreement of 1997-98 concerning the exploitation phase of the same program. The preambles to both agreements contain explicit recognition of the "Principles governing the exploration and use of outer space defined by the United Nations treaties and the principles adopted by the General Assembly relating to the remote sensing of the Earth from space."[50]

On the one hand, a cursory look at the practice of States and international organizations shows a situation in which the core tenets of the Remote Sensing Principles have maintained their importance, even in an emerging commercialized remote sensing system of services.[51] Indeed, they appear relevant to the expansion of those very services, and have been consistently reaffirmed. The basic international regime of remote sensing is recognized and must be preserved, promoting the broadest possible use of data.

On the other hand, it is true that some of the most prominent issues connected to recent and ongoing developments in the field of remote sensing, mainly societal demands and technological developments, are not fully regulated by the UN code on remote sensing.[52] The Remote Sensing Principles do not provide clear and specific regulations for new issues, such as the focus on global systems, access to data by sensed States and the

---

[50] The Co-operation Agreement Concerning the Vegetation program on SPOT 4, signed May 25, 1994, and the subsequent agreement of 1997-98, were provided by the Italian Space Agency to the author and are on file with the author.

[51] PROCEEDINGS OF THE FIRST INTERNATIONAL CONFERENCE ON THE STATE OF REMOTE SENSING, (Joanne Irene Gabrynowicz ed., University of Mississippi School of Law, 2002).

[52] Joanne Irene Gabrynowicz, *Expanding Global Remote Sensing Services: Three Fundamental Considerations. Discussion Paper*, in PROCEEDINGS OF THE WORKSHOP ON SPACE LAW IN THE TWENTY-FIRST CENTURY 99 (International Institute of Space Law & United Nations Office for Outer Space Affairs, New York, 2000).

legal protection of data, which is increasingly necessary to promote the costly investments required by remote sensing activities and the expansion of the related market. Nor do they provide an adequate discipline as regards the production, use and treatment of highly sophisticated and detailed imagery, especially in relation to their potential implications for national security and individual privacy.[53]

As it has been pointed out, the UN Principles took the form of a General Assembly resolution and not, as was hoped by some States, a treaty, with the result that the principles, instead of being intended to constitute conventional rules legally binding as such upon those that accepted them, are merely guidelines. However, the compromise enshrined in the principles was intended by the drafters to serve as a first step in a law-making process that would eventually conclude in a formal treaty. In this regard, the practice of States seems to have confirmed the general and main aspects of the legal regime set forth in 1986 by the Principles and that some of them seem more firmly established in international customary law, while others seem to be less consolidated.[54]

Apart from that, there are two main reasons why the transposition of the Remote Sensing Principles into a binding treaty has never been concretely discussed, despite repeated proposals to the LSC for such discussion. First, the LSC is not in a law-making phase: that era of its activity ended at the beginning of the 1980s, and there currently is no political will to enter into new agreements. Rather, the current goal is to broaden the acceptance of the treaties in force or to better define issues relating to them. Secondly, although the Remote Sensing Principles were adopted by *consensus*, the agreement reached stemmed from several compromises, and not from a uniformity of views. Therefore, there are risks in starting discussions about incorporating the Remote Sensing Principles into a new treaty.

---

[53] *See* JOHN C. BAKER ET AL., COMMERCIAL OBSERVATION SATELLITES. AT THE LEADING EDGE OF GLOBAL TRANSPARENCY (Rand Corporation, Arlington, 2001).

[54] *See* Sergio Marchisio, *Remote Sensing for Sustainable Development in International Law*, *in* AN OUTLOOK ON OUTER SPACE LAW IN THE COMING 30 YEARS 335-350 (Gabriel Lafferranderie, Dordrecht, Boston, London, 1997).

There is of course another option and this is to re-open a debate on a more limited issue, namely the desirability of reviewing the Remote Sensing Principles. This option has the merit of not questioning the soft-law character of the Principles. Probably, a third option could be presented, concerning the analysis of the current practices of both sensing and sensed States in a more limited perspective, with a view to assess how the key statements contained in the Remote Sensing Principles have been implemented and identifying the obstacles that hamper their full application. These options are currently before the LSC for future potential action in this field.

The NPS Principles was but a limited achievement in space legislation. Some innovative elements were brought into the regulation of these activities, such as the storing NPS objects in sufficiently high orbits after the operational part of their missions ends and providing for a safety assessment and notification of re-entry. The NPS Principles, however, must apply, only to "nuclear power sources devoted to the generation of electric power on board space objects for non-propulsive purposes, which have characteristics generally comparable to those of systems used and missions performed at the time of the adoption of the Principles".[55]

Therefore, the NPS Principles are not applicable to the NPS serving other purposes, including nuclear propulsion for long-distance flights into interplanetary space and to the celestial bodies of our solar system. The expected reopening of the NPS Principles, which was promised to be effected no later than two years after their adoption,[56] has been delayed several times.

The final document of this series, the Benefit Principles, mostly reflects the existing practice of international space cooperation and does not include new regulatory principles.

---

[55] NPS Principles, *supra* note 45, at Preamble,

[56] *Id.* at Principle 11.

## IV. THE THIRD PHASE AND FURTHER POSSIBLE DEVELOPMENTS WITHIN COPUOS

It is commonly understood that the current phase of the UNCOPUOS LSC is mainly devoted to the assessment of the existing legal regimes and undoubtedly oriented towards the formulation of non-binding documents that are based upon the rights and obligations as provided by the treaties already in force. Such trend is of a broader character in the United Nations system. After the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III),[57] some objectives for further development of legal matters to be initiated through the LSC were agreed upon. A more flexible agenda-structure in the LSC Subcommittee, as well as in the STS, was adopted. At the same time, however, it was reaffirmed that the structure did not allow the LSC to elaborate any proposals for the revision of existing legal norms or to provide authoritative interpretations to the space treaties. On the contrary, the new input for the LSC was limited to carry out the analysis of problems and shortcomings with respect to the application of existing rules of space law.

In this perspective, the LSC has moved toward the assessment of several regular items of relevance, beginning with the *status* and application of the five United Nations treaties on outer space. The review of the implementation of the treaties has confirmed that several obstacles hamper their universal acceptance especially by non-space-faring States and has certainly contributed to the further increase of ratifications.

Among regular items, for years the LSC has had in its agenda the issue of the definition and delimitation of "outer space". But attempts to adopt a legally binding delimitation between airspace and outer space, or at least to agree on a recommended interpretation of these notions, have failed. The attempts at bringing new light to consideration of these issues by studying the legal aspects of aerospace objects and sub-orbital

---

[57] For information on the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) (Vienna, July 19-30, 1999), *see* http://www.oosa.unvienna.org/unisp-3/index.html (last visited June 13, 2005).

flights, which was undertaken in COPUOS' LSC in recent years, have not led thus far to any generally accepted conclusions.

Under the scope of the same item, definition and delimitation of outer space, the LSC has also been occupied for years by discussions on the legal status of the Geostationary Satellite Orbit (GSO). In this vein, I would like to mention the importance of the agreement reached in 2000 within the LSC on some aspects concerning the use of the geostationary orbit and making reference to the ITU rules.[58] In my opinion, this agreement evidenced the tacit abandonment by the equatorial States of their previous claims of sovereignty over the GSO.

Another important initiative concerned the draft UNIDROIT[59] Protocol on Space Assets to the 2001 Cape Town Convention on International Interests in Mobile Equipment,[60] introduced within the LSC at the request of Italy. In fact, from the beginning space law has been mostly involved with international and national law of a public nature (treaties, customary international law, national legislation). But the commercialisation of space activities has progressively led to a new dimension characterised by the emergence of private law regimes applicable to the relations among State actors and private entities or private entities *inter se*. The involvement of private law regulations (civil law, contracts) has also had consequences from the perspective of private international law, for the determination of the applicable law to a certain space activity, or to an element of it, and to the corresponding legal relations between the parties. At the same time, international practice shows a tendency toward the harmonisation or unification of civil law regimes

---

[58] Some Aspects Concerning the Use of the Geostationary Orbit. April 2000, paper adopted by the COPUOS Legal Subcommittee, U.N. Doc. A/AC.105/738, at Annex III.

[59] UNIDROIT is the acronym for International Institute for the Unification of Private Law, an intergovernmental organization based in Rome which aims at the unification of private law among member States. On the 2001 Cape Town Convention, *see* ROY GOODE, OFFICIAL COMMENTARY ON THE CONVENTION ON INTERNATIONAL INTERESTS IN MOBILE EQUIPMENT AND PROTOCOL THERETO ON MATTERS SPECIFIC TO AIRCRAFT EQUIPMENT (International Institute for the Unification of Private Law, Rome, 2002).

[60] Convention on International Interests in Mobile Equipment, Nov. 16, 2001, *available at* http://www.unidroit.org/english/conventions/mobile-equipment/mobile-equipment.pdf (last visited July 18, 2005).

among States in order to facilitate private relations in space activities.

The Protocol is in fact concerned with private law issues. It will also be, as the Convention is, an instrument of public international law. However, it is more a tool for establishing a set of *uniform* rules for the protection of private investments in space activities of a transnational character (that is, rules of identical content within the internal legal systems of the States Parties), rather than as an instrument of private international law. It aims to redress the situation under which the legal regimes of many countries do not at provide enforceable and protective systems for the creation, perfection, prioritization and enforcement of security interests, mortgages and hypothecs over space equipment, such as satellites, and their component parts, such as transponders. In order to facilitate the financing of space assets that were manufactured, transported and ultimately located outside the jurisdiction of a country, there is a need for clear rules governing the granting of security where the collateral is located and where the borrower has its place of business. The Protocol intends to fill the gap originated by the lack of such clear rules that makes satellite financing more difficult and more expensive for satellite operators to secure.[61]

In order to achieve its aims, the Protocol provides (together with the Cape Town Convention, which will apply only if not derogated by the *lex specialis* contained in the Protocol) uniform rules to cover the period right through from the start of manufacturing to launch and thereafter. The underlying principles of this international instrument are indeed the agreements covered by the Protocol, the requirements for creating an international interests, the connection factors (private international law), the priorities of registered interests and the basic remedies provided for (possession or control, sell or lease of the object, income or profits from use of it) and the procedures established by the applicable law for the institution of proceedings before the courts to exercise remedies.

---

[61] Sergio Marchisio, *Le protocole spatial d'Unidroit*, 12 GEO-OBSERVATEUR 30-34 (Sept. 2002).

The LSC has been involved with the Protocol dealing with two main issues: the relation between the Protocol and space law, and the possibility for the United Nations to act as the Supervisory Authority of the Registration system. The consideration of the first set of problems by the LSC focussed on the consistency of this regime of private law with the basic tenets of international space law. In this perspective, it opened for discussion on the most critical issues, such as the definition of space assets, liability, jurisdiction, limitations on transfers of controlled space assets and public law regulations regarding operating space objects, namely the public services regimes. At the same time, the LSC has considered the registrar and the supervisory authority from an institutional point of view, taking into account the process of negotiation currently going on for the identification of the most appropriate supervisory authority and the most viable system of registration for international interests in space assets. For the time being, however, no *consensus* could be reached among LSC member States on the appropriateness of the United Nations, through the Office for Outer Space Affairs, to act as the supervisory authority for the Protocol.

Another issue on the agenda of the LSC that has been considered in recent years was the "Application of the concept of the 'launching State'". The purpose of this work was to clarify all aspects of the "launching State" concept as contained in the Liability and the Registration Conventions, and as applied by States and international organizations, in the light of new and expected practices in space activities.

In 2004, during the first year of my chairmanship, a draft resolution on the application of the concept of the "launching State" was adopted by the LSC and finally approved.[62] The resolution reminds that it did not constitute an authoritative interpretation of, or proposed amendments to, the Liability and Registration Conventions. It mainly recommends that States consider enacting national legislation on authorization and supervision of space activities by private entities and the conclusion of agreements with respect to joint-launches.

---

[62] Application of the Concept of the "Launching State", G.A. Res. 59/155 (Dec. 10, 2004).

From 2004, under a new three-year-work plan, the LSC is now considering the practice of States and international organizations in registering space objects, a sensitive issue, and characterized by a practice that shows the existence of certain *lacunae iuris* in the Registration Convention, mainly due to the commercial uses of outer space as well as to the privatisation of space activities.[63] The assessment of current practice by States reveals strong disparities regarding information concerning the territory of launch, the basic orbital parameters and the general function of a spacecraft. Moreover, practice shows that there are still several unregistered space objects or registered by more than one State. The debate is now open on how to fill these gaps and to obtain a more uniform application of the Registration Convention, the main aim of which, it must be recalled, is to help the identification of space objects and of the launching State.

Apart from that, the LSC is now looking for its *raison d'etre* in the new Millennium. This tendency is evidenced by the difficulty among member States to reach agreement on new issues to be considered: protection of the space environment; space debris; space tourism; a comprehensive convention on space law; commercialization of space activities; property rights for extracted resources of the Moon and other celestial bodies; the so-called militarization of space; intellectual property rights in space; the development of an international convention based on the Remote Sensing Principles; updating those Principles and to develop rules for the situations resulting from technological innovations and commercial application. In this perspective, I think we must consider that re-opening a new law-making phase of the LSC seems hardly feasible.

There are two main reasons, in my opinion, why the elaboration of new binding treaties has never been accepted, despite repeated proposals for such discussions. First, the existing treaties stemmed from several compromises, and not from a uniformity of views. Therefore, there are risks in starting discus-

---

[63] Stephan Hobe et.al., *Current Issues in the Registration of Space Objects, in* PROJECT 2001 PLUS GLOBAL AND EUROPEAN CHALLENGES FOR AIR AND SPACE LAW AT THE EDGE OF THE 21ST CENTURY, PROCEEDINGS OF THE WORKSHOP 20-21 (Jan. 2005).

sions about new treaties, as this may re-open the debate on the already agreed upon issues. Only exceptional events could lead the LSC to reconsider its role as law-maker in the current phase of its evolution.

Secondly, the soft-law seems better able to accommodate the ongoing evolution in the field of technology. As the experience of specialised institutions shows, a real drive in this sense can come by technical norms. Specialised agencies have truly contributed, and continue to do so, to the evolution of law, by means of regulatory standards and recommended practices. Some of them have binding effectiveness, others have to be implemented by States through domestic acts. Probably the LSC should consider its possible role in the elaboration of technical norms on space matters.[64] The idea of drafting by both COPUOS sub-committees on an ordinary functional basis of international recommendations and standards is certainly fascinating, but would require profound changes from the institutional point of view.

In conclusion, the activity of the LSC has been of fundamental importance for space law. It has been the cradle where the basic principles and concepts of space law have been created and enshrined in the general founding treaties. The role of the LSC is certainly not over. It continues to form the most suitable environment to promote the assessment of existing space law and, potentially, the development of new norms by virtue of its universality and overall competence.

In its work the LSC should always reflect the goals and priorities pursued by the entire United Nations system. It should highlight the legal implications of those space activities that support sustainable development for all.

---

[64] See Nasindiri Jasentulyana, *Strengthening International Space Law: the Role of the United Nations, in International Organisatons and Space Law: Their Role and Contributions*, 3 PROC. ECSL COLLOQUIUM 87-95 (Noordwijk, 1999).

# SPACE LAW AND RELEVANT PUBLICATIONS

*Keishunna Randall*[*]
*Jamie Rutland*[**]

## A. ARTICLES

Bin Cheng, *A New Era in the Law of International Carriage by Air: From Warsaw (1929) to Montreal (1999)*, 53 INT'L & COMP. L.Q. 833-859 (2004).

Paul Stephen Dempsey, *Compliance & Enforcement in International Law: Achieving Global Uniformity in Aviation Safety*, 30 N.C. J. INT'L L. & COM. REG. 1 (2004).

Joanne Irene Gabrynowicz, *Space Law: Its Cold War Origins and Challenges in the Era of Globalization*, 37 SUFFOLK U. L. REV. 1041 (2004).

Jayson Haile, Comment, *The New Age of Conquest and Colonialism: How Admiralty Will be Used on the Final Frontier*, 29 TUL. MAR. L.J. 353-367 (2005).

Justin L. Koplow, Note, *Assessing the Creation of a Duty Under International Customary Law Whereby the United States of America Would be Obligated to Defend a Foreign State Against the Catastrophic but Localized Damage of an Asteroid Impact*, 17 GEO. INT'L ENVTL. L. REV. 273-306 (2005).

R. Brooke Lewis, *Trends in Insurance for Light General Aviation Aircraft*, 19 WTR AIR & SPACE LAW 4 (2005).

Joseph J. MacAvoy, Note, *Nuclear Space and The Earth Environment: The Benefits, Dangers, and Legality of Nuclear Power and Propulsion in Outer Space*, 29 WM. & MARY ENVTL. L. & POL'Y REV. 191-233 (2004).

---

[*] Keishunna Randall is a third-year law student at the University of Mississippi School of Law, and serves as a Student Editor for the *Journal of Space Law*.

[**] Jamie Rutland is a third-year law student at the University of Mississippi School of Law, and serves as a Student Editor for the *Journal of Space Law*.

James F. Rodriguez, Note, *Tort Reform & GARA: Is Repose Incompatible With Safety?* 47 ARIZ. L. REV. 577-607 (2005).

Charity Trelease Ryabinkin, *Let There be Flight: It's Time to Reform the Regulation of Commercial Space Travel*, 69 J. Air L. & Com. 101 (2004).

Major Elizabeth Seebode Waldrop, *Integration of Military and Civilian Space Assets: Legal and National Security Implications*, 55 A.F. L. REV. 157 (2004).

Andrew B. Steinberg & James W. Tegtmeier, *Dealing with Airport Congestion: The Regulatory Challenges of Demand Management*, 19 WTR AIR & SPACE LAW 1 (2005).

David Y. Stevens, Note, *Tort liability after the dust settles: an economic analysis of the Airline Defendants' duty to ground victims in the September 11 litigation. (In re Sept. 11 Litig., 280 F. Supp. 2d 279, S.D.N.Y. 2003.)*, 80 IND. L.J. 545-569 (2005).

## B. COMMENTS/NOTES

April Greene Apking, *The Rush to Develop Space: The Role of Spacefaring Nations in Forging Environmental Standards for the Use of Celestial Bodies for Governmental and Private Interests*, 16 COLO. J. INT'L ENVTL. L. & POL'Y 429 (2005).

Heather A. Douglas, *Death in Pursuit of Space Travel: An Analysis of Current Methods of Recovery for Families of Astronauts and the Need for Reform*, 26 WHITTIER L. REV. 333 (2004).

Brandon C. Gruner, *A New Hope for the International Space Law: Incorporating Nineteenth Century First Possession Principles into the 1987 Space Treaty for the Colonization of Outer Space in the Twenty-First Century*, 35 SETON HALL L. REV. 299 (2004).

Patrick Korody, *Satellite Surveillance Within U.S. Borders*, 65 OHIO ST. L.J. 1627 (2004).

Joseph J. MacAvoy, *Nuclear Space and the Earth Environment: The Benefits, Dangers, and Legality of Nuclear Power and Propulsion in Outer Space*, 29 WM. & MARY ENVTL. L. & POL'Y REV. 191 (2004).

## C. BOOKS

PAUL STEPHEN DEMPSEY, EUROPEAN AVIATION LAW (2004).

PAUL STEPHEN DEMPSEY & LAURENCE E. GESELL, AIR COMMERCE AND THE LAW (2004).

GEO-SPATIAL TECHNOLOGIES IN URBAN ENVIRONMENTS, (Ryan R. Jensen, et al. eds., 2005).

J. SCOTT HAMILTON, PRACTICAL AVIATION LAW (4th ed. 2005).

JULIAN HERMIDA, LEGAL BASIS FOR A NATIONAL SPACE LEGISLATION (2004).

N.A. ARMAND & V.M. POLYAKOV, RADIO PROPAGATION AND REMOTE SENSING OF THE ENVIRONMENT (2005).

REAL LAW @ VIRTUAL SPACE: COMMUNICATION REGULATION IN CYBERSPACE, (Susan J. Drucker & Gary Gumpert eds., 2d ed. 2005).

ROGER M. MCCOY, FIELD METHODS IN REMOTE SENSING (2005).

## D. UNITED STATES' PENDING LEGISLATION

National Weather Services Duties Act of 2005, S. 786, 190th Cong. (2005).

Remote Sensing Applications Act of 2005, H.R. 426, 109th Cong. (2005).

NASA Authorization Act of 2004, S.2541, 108th Cong. (2004).

## E. AGREEMENTS

Basic Exchange and Cooperative Agreement concerning Global Geospatial Information and Services Cooperation, with Annexes, May 18, 2004, U.S.-Lat., State Dept. No. 04-103, *available at* 2004 WL 1809731.

Addendum to the Protocol of June 11, 1996 Regarding the Balance of Their Contributions and Obligations to the International Space Station, September 9, 2004, U.S.-Russ., State Dept. No. 05-76, *available at* 2005 WL 1017566.

Amendments of the Agreement Relating to the International Telecommunications Satellite Organization 'Intelsat' of

August 20, 1971, November 30, 2004, State Dept. No. 04-778, *available at* 2004 WL 3214809.

Amendment of Article 23 of the Operating Agreement Relating to the International Telecommunications Satellite Organization 'Intelsat' of August 20, 1971, December 12, 2004, State Dept. No. 04-779, *available at* 2004 WL 3214810.

Agreement for the Design, Development, Operation and Utilization of Three Mini Pressurized Logistics Modules for the International Space Station, with Memorandum of Understanding, U.S.-Italy, January 11, 2005, State Dept. No. 05-54, *available at* 2005 WL 856824.

Agreement Amending the Agreement of August 26, 1993, as Amended and Extended, Concerning Cooperation in the Elimination of Strategic Offensive Arms, U.S.-Russ., January 14, 2005, State Dept. No. 05-63, *available at* 2005 WL 856828.

Agreement Extending the Agreement of October 27, 1994 for Education Cultural and Scientific Cooperation, May 5, 2005, U.S.-Maldives, State Dept. No. 05-118, *available at* 2005 WL 1520844.

# JOURNAL OF SPACE LAW

Reprints of vols. 1-13 of the
JOURNAL OF SPACE LAW
Contact
William S. Hein & Co., Inc., 1285 Main Street, Buffalo, New York 14209

**Subscriptions** should be made payable to the JOURNAL OF SPACE LAW and paid for by check drawn on a U.S. bank or money order in U.S. dollars or by VISA/Mastercard:

**Mail Order** JOURNAL OF SPACE LAW
1 Grove Loop
558 Lamar Law Center
University, MS 38677-1858 USA

**Fax Order:** 1.662.915.6921
**Email:** jsl@olemiss.edu
**Tel:** 1.662.915.6857

**The 2005 subscription rate** for two issues, incl. postage and handling:

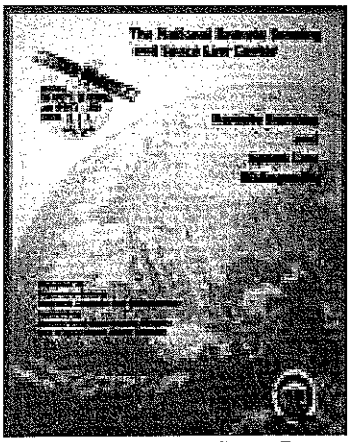
| | | | |
|---|---|---|---|
| Domestic USA individuals | $100.00 | | |
| Domestic organizations | $120.00 | | |
| Foreign individuals, regular mail | $105.00; | air mail | $125.00 |
| Foreign organizations, regular mail | $125.00; | airmail | $145.00 |

Single issues vols. 14-30: $70.00
Single article prints vol. 31: $70.00
Single article prints vols. 14-30: 1-20 pages: $10.00 20-up: $20.00

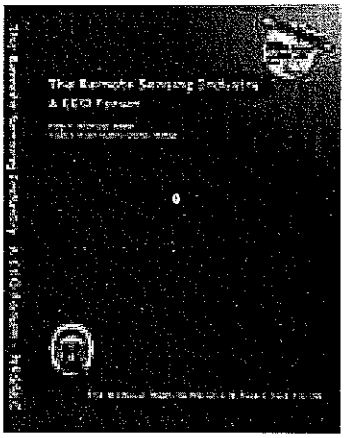
Order for 2005 Volume 31 (Nos. 1 & 2) $_____.____
Order for 2006 Volume 32 (Nos. 1 & 2) $_____.____
**TOTAL** $_____.____

Name:_____
Company/Organization: _____
_____
Address:_____
_____
City: _____ State: _____
Country: _____ Zip:_____
Telephone No: (____) _____; Fax No: (____) _____
Email:_____
**For Credit Order** (please add 5%) _____ VISA _____ MASTERCARD
No: _____ Exp Month: _____ Year: _____
Name as it appears on card_____

The NATIONAL REMOTE SENSING AND SPACE LAW CENTER has the following books available for purchase. For book descriptions and ordering information, please visit our website at: http://www.spacelaw.olemiss.edu/store.htm

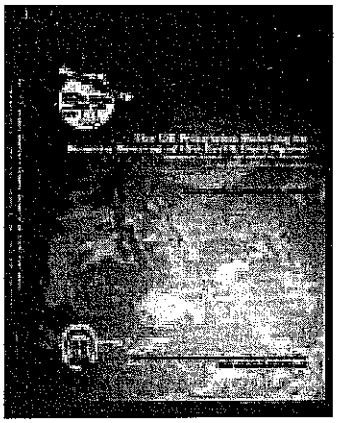


**Remote Sensing and Space Law Bibliography $45.00**



**The Remote Sensing Industry: A CEO Forum $45.00**

**Landsat 7: Past, Present, and Future $50.00**



**The UN Principles Related to Remote Sensing of Earth from Space $45.00**

**Proceedings, The First International Conference on the State of Remote Sensing Law $80.00**