

JOURNAL

OF

SPACE

LAW

VOLUME 37, NUMBER 2

Winter 2011

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 37	WINTER 2011	NUMBER 2
------------------	--------------------	-----------------

Editor-in-Chief

Professor Joanne Irene Gabrynowicz, J.D.

Executive Editor

Jacqueline Etil Serrao, J.D., LL.M.

Faculty Editing Staff

P.J. Blount

Sara M. Langston

Business Manager

Michelle Aten

Student Editors

Ryan T. Noble

Ian Burke Perry

Senior Staff Assistant

Melissa Wilson

Founder, Dr. Stephen Gorove (1917-2001)

All correspondence with reference to this publication should be directed to the JOURNAL OF SPACE LAW, University of Mississippi School of Law, 481 Coliseum Drive, 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 2011 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.

Copyright © Journal of Space Law 2011. Suggested abbreviation: J. SPACE L.
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 37	WINTER 2011	NUMBER 2
-----------	-------------	----------

CONTENTS

Foreword	<i>Joanne Irene Gabrynowicz</i>	iii
Call for Papers		v
Articles		
The Application of the Death on the High Seas Act (DOHSA) to Commercial Space Flight Accidents.....	<i>Jeffrey Robert Kuhns</i>	279
Suborbital Flights: A Comparative Analysis of National and International Law	<i>Sara M. Langston</i>	299
Book Reviews		
National Regulation of Space Activities, edited by Ram Jakhu (Springer, 2010), 457 pages	<i>Review by Michael Dodge</i>	393
Space Law: A Treatise, by Francis F. Lyall and Paul B. Larsen (Ashgate, 2009), 596 pages	<i>Review by Stephen E. Doyle</i>	401
Who Owns the Moon? Extraterrestrial Aspects of Land and Mineral Resources Ownership, by Virgiliu Pop (Berlin: Springer, 2009), 175 pages	<i>Review by Chris Kalantzis</i>	405

Bibliography:

Aviation and Space Law: Relevant Publications	<i>P.J. Blount</i>	409
Aviation		
Laws and Regulations		409
Cases.....		409
Articles		412
Books and Reports		418
Space		
Laws, Regulations, and Policies		419
Cases.....		420
Articles		421
Books and Reports		424

FOREWORD

SOMETHING OLD AND SOMETHING NEW: THE APPLICATION OF COMPARATIVE LEGAL ANALYSIS TO THE LAW OF COMMERCIAL HUMAN SPACE FLIGHT

*By Joanne Irene Gabrynowicz**

This volume of the JOURNAL OF SPACE LAW demonstrates that space law has reached another milestone in its development. The evolution of space law at the national and international level has reached such a degree of development that it invites analytical comparisons. The subject of this volume's articles is comparative law as applied to the law of commercial human space flight.

Comparative law has long been accepted as an important analytical device in determining the overall development in the content and application of law and legal principles in any given corpus of law. Comparing the differences and similarities among laws yields a greater understanding of some of the qualities valued in the law and by its practitioners. Is there enough uniformity to be able to articulate a valid precedent? Are there significant enough differences to call into question the credence of an ostensible principle? Are the differences or similarities the product of culture, jurisprudence, or both?

In his article, *The Application of the Death on the High Seas Act (DOHSA) to the Commercial Space Flight Industry*, Jeffrey Robert Kuhns compares the application of jurisdictional princi-

* Joanne Irene Gabrynowicz is the Editor-in-Chief of the JOURNAL OF SPACE LAW. She is also a professor of space law and remote sensing law and the Director of the National Center for Remote Sensing, Air, and Space Law at the University of Mississippi School of Law. Prof. Gabrynowicz was the recipient of the 2001 Women in Aerospace Outstanding International Award and the 2011 International Institute of Space Law's Distinguished Service Award. She is a Director of the International Institute of Space Law and a member of the American Bar Association Forum on Air and Space Law.

ples within U.S. federal law to maritime and aviation law and considers its potential applicability to space law. Mr. Kuhns observes how U.S. Federal admiralty jurisdiction was originally intended to address marine disasters and was later applied by courts to aviation accidents. To do this, Mr. Kuhns notes where a court reasoned that DOHSA could apply in both a horizontal and vertical direction. Therefore, argues Mr. Kuhns, using this same line of reasoning, DOHSA should be interpreted vertically to also encompass space flight.

In a more classic example of a comparative legal analysis, Sara M. Langston analyzes the development of space law concerning suborbital flight by addressing the similarities and differences among the national laws of various States and international law. Ms. Langston's comparison highlights international air and space law regimes as applied by five States with an interest in conducting commercial space transportation. Using the United States' regulations as a basic blueprint, Ms. Langston provides insight into the background and current status of national space law frameworks. Through this analytical work, she presents the main legal issues, approaches, and arguments for legislating and regulating commercial human space flight.

This volume of the JOURNAL OF SPACE LAW contains reviews of three of the most recently published books in space law: *National Regulation of Space Activities*¹, edited by Ram Jakhu, reviewed by Michael Dodge; *Space Law: A Treatise*², by Francis F. Lyall and Paul B. Larsen, reviewed by Stephen E. Doyle; and *Who Owns the Moon? Extraterrestrial Aspects of Land and Mineral Resources Ownership*³ by Virgiliu Pop reviewed by Chris Kalantzis. A bibliography that contains the most recent developments in laws, regulations, cases, administrative decisions, articles, books, and reports in aviation and space law completes the volume.

¹ NATIONAL REGULATION OF SPACE ACTIVITIES (Ram Jakhu ed., Springer 2010).

² FRANCIS F. LYALL AND PAUL B. LARSEN, SPACE LAW: A TREATISE (Ashgate Publishing, 2009).

³ VIRGILIU POP, EXTRATERRESTRIAL ASPECTS OF LAND AND MINERAL RESOURCES OWNERSHIP (Springer, 2009).

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 38, Number 1

The National Center for Remote Sensing, Air, and Space Law of the University of Mississippi School of Law is delighted to announce that it will publish Volume 38, issue 1 of the JOURNAL OF SPACE LAW in the first half of 2012.

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 to:

jsl@olemiss.edu

Or, alternatively, a hardcopy of the manuscript and abstract, along with a computer diskette containing them in Microsoft Word 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 March 16, 2012. However, the JOURNAL OF SPACE LAW will continue to accept and review submissions on an on-going basis.

THE APPLICATION OF THE DEATH ON THE HIGH SEAS ACT (DOHSA) TO COMMERCIAL SPACE FLIGHT ACCIDENTS

Jeffrey Robert Kuhns^{*}

I. INTRODUCTION TO THE DEATH ON THE HIGH SEAS ACT (DOHSA)

The Death on the High Seas Act (DOHSA), 46 U.S.C. §§ 30301-30308¹ confers federal admiralty jurisdiction on a maritime death caused by wrongful acts, neglect, or default on the “high seas” more than three nautical miles (also called a “marine league”²) from United States shores. Originally targeted at marine disasters, courts have consistently applied DOHSA to aviation accidents since the 1941 decision of *Choy v. Pan American Airways Co.*, 1941 A.M.C. 438 (S.D.N.Y.) where the court reasoned that DOHSA could apply in a both a horizontal and vertical direction.³ Therefore, using this same line of reasoning, DOHSA should be interpreted vertically to also encompass space flight. In 2000 DOHSA was redrafted to include provisions specifically relating to commercial aviation accidents which expand the distance requirement to twelve nautical

^{*} State Bar of California; LL.M. Candidate, Chapman University School of Law, 2012; J.D. Whittier Law School, 2010; B.S. University of Southern California, Marshall School of Business, 2007; B.A. University of Southern California, College of Letters Arts and Sciences, 2006.

¹ Pub. L. 109-304, §6(c). Formerly 46 U.S.C. App. § 761 *et seq.*

² A marine league is a marine unit of measurement equal to three nautical miles; also called a sea league. BLACK’S LAW DICTIONARY (9th ed. 2009). *See also* In re Air Crash Off Long Island New York on July 17, 1996, 209 F.3d 200, 202 n.2 (2d Cir. 2000) (“A marine league is three nautical miles.”) and In re Air Crash Disaster Near Peggy’s Cove, Nova Scotia on September 2, 1998, 210 F.Supp.2d 570, 579 n.8 (E.D.Pa. 2002) (“A marine league is equivalent to three nautical miles (nm).”). One nautical mile is equal to 6,076.12 feet. As aviation altitudes are customarily given in feet, all calculations in this paper with respect to aviation analysis will be given in feet rounded the nearest whole foot. Accordingly, one marine league is equal to 18,228 feet. Originally, DOHSA used the term “marine league” but in 2006 substituted the words “three nautical miles” for clarity. H.R. REP. NO. 109-170 (2006), *reprinted in* 2006 U.S.C.C.A.N.972.

³ *Choy v. Pan American Airways Co.*, 1941 A.M.C. 483, 484 (S.D.N.Y.).

miles.⁴ Using these principles, this paper will argue the legislative history of DOHSA and the *Choy* line of cases make this law applicable to wrongful death arising from commercial space flight.

A. *A Historical Summary of Wrongful Death Actions
Leading up to DOHSA*

At common law, there was not a remedy for wrongful-death on the high seas.⁵ A wrongful-death action allows the victim's dependents to recover for the harm the dependent actually suffered as a result of the victim's death, independent of any action the decedent may have for his or her own personal injuries. The harsh effects of the common law rule were first modified by statute, originally in England with the 1846 adoption of Lord Campbell's Wrongful Death Statute.⁶

In 1886, the United States Supreme Court held in *The Harrisburg* that, absent statutory authority, the general maritime law did not recognize a cause of action for wrongful maritime deaths.⁷ After *The Harrisburg*, some courts in admiralty began to apply state wrongful death statutes to accidents in state and territorial waters as well as the high seas, because there was no applicable federal statute.⁸ The power of a state to create an enforceable cause of action for death on the high seas was up-

⁴ Wendell H. Ford Aviation Investment and Reform Act for the 21st Century., Pub. L. 106-181, §404, 114 Stat. 61, 131 (Apr. 5, 2000), amending 46 U.S.C. §§ 761-762. The amendment's application to DOHSA was retroactive to any death occurring after July 16, 1996, one day before TWA Flight 800, a Boeing 747-400 crashed off Long Island, New York and litigated as *In re Air Crash Off Long Island, New York, on July 17, 1996*, 209 F.3d 200, 2000 A.M.C. 1217.

⁵ *Offshore Logistics, Inc. v. Tallentire*, 477 U.S. 207, 212 (1986), on remand 800 F.2d 1390 (5th Cir. 1986). For more information on the early history of admiralty wrongful death see *Moragne v. State Marine Lines, Inc.*, 398 U.S. 375 (1970), on remand 446 F.2d 906 (5th Cir. 1971). See also, John W. Sims, *The American Law of Maritime Personal Injury and Death: An Historical Review*, 55 TUL. L. REV. 973 (1981); Paul S. Edelman, *Recovery for Wrongful Death Under General Maritime Law*, 55 TUL. L. REV. 1123 (1981).

⁶ Lord Campbell's Act, 9 & 19 Vict. C. 93, An Act for Compensating the Families of Persons Killed by Accidents (Aug. 26, 1846); see also 2 BENEDICT ON ADMIRALTY, § 81a (7th ed., revised, 2010).

⁷ *The Harrisburg*, 119 U.S. 199, 213-214 (1886).

⁸ See generally *Offshore Logistics*, 477 U.S. 207; *Moragne*, 398 U.S. 375; and Paul S. Edelman, *supra* note 5.

held in *The Hamilton*,⁹ when the United States Supreme Court held the Delaware Wrongful Death Statute was proper when two vessels owned by Delaware Corporations collided on the high seas. Thus, by the early 20th Century, there was a significant degree of inconsistency with maritime wrongful death.

Accordingly, DOHSA was enacted to fill this void in maritime law and provide a remedy for wrongful death where none existed before.¹⁰ DOHSA was originally drafted as a maritime statute designed to protect sailors on ships. DOHSA's principal advocate, the Maritime Law Association, led in the creation of a bill providing a uniform federal right of action for wrongful death upon the high seas in 1915.¹¹ The bill was introduced in the House and Senate in the 64th Congress.¹² The bill was favorably reported in both houses but did not reach a vote.¹³ The same bill was reintroduced in the House early in the 65th Congress in 1917 but did not reach a vote because the United States entered World War I four days after its introduction.¹⁴ After World War I, the bill was again reintroduced in the 66th Congress.¹⁵ Congress finally enacted DOHSA in 1920.¹⁶ While DOHSA provided a cause of action for wrongful maritime deaths, it was not until 1970 that *The Harrisburg* was overruled.¹⁷

B. DOHSA's Limitation on Liability

A DOHSA aviation claim is unique because it avails the defendant of the benefit of limitation of liability to pecuniary damages and strictly defines permitted non-pecuniary damages. Under DOHSA, there is no limit to the categories of persons who may be sued as defendants. The plaintiff may sue the ves-

⁹ *The Hamilton*, 207 U.S. 398 (1907).

¹⁰ *In re Air Crash Off Long Island New York, on July 17, 1996*, 209 F.3d 200, 203 (2d Cir. 2000).

¹¹ Robert M. Hughes, *Death Actions in Admiralty*, 31 YALE L.J. 115, 118 (1921).

¹² H.R. 9919, S. 4288, 64th Cong. (1916).

¹³ S. REP. NO. 741 (1916), H. REP. NO. 1419 (1917).

¹⁴ H.R. 39, 65th Cong. (Apr. 2, 1917).

¹⁵ S. 2085, 66th Cong. (Nov. 19, 1919).

¹⁶ 41 Stat. 537 (1920) amended by 46 U.S.C. § 30302 (2006).

¹⁷ *Moragne v. State Marine Lines, Inc.*, 398 U.S. 375, 378 (1970).

sel or aircraft *in rem*, as well as any person or corporation that would have been liable.¹⁸ DOHSA authorizes the decedent's "spouse, parent, child, or dependent relative" to sue as the personal representative in admiralty court.¹⁹ Maritime claims under DOHSA limit recovery to pecuniary damages.²⁰ State wrongful-death statutes are not permitted to supplement DOHSA claims with non-pecuniary damages²¹ and bars the plaintiff from any state law survival rights.²² Perhaps most importantly, DOHSA prohibits recovery of punitive damages.²³

In the case of a commercial aviation accident, DOHSA provides additional compensation for non-pecuniary damages in addition to the pecuniary damages. Non-pecuniary damages are strictly defined to mean "damages for loss of care, comfort, and companionship."²⁴ In *Dooley v. Korean Air Lines Co.*, the United States Supreme Court held that aviation DOHSA claims preclude any general maritime law survival action that would permit recovery for pre-death pain and suffering.²⁵

C. Test for DOHSA Applicability to Aviation Accidents

DOHSA's 2000 amendments require that in the case of an aviation accident, the wrongful act, neglect, or default must occur on (1) at least twelve (12) nautical miles from shore and (2) on the high seas.²⁶

¹⁸ 46 U.S.C. § 30302.

¹⁹ 46 U.S.C. § 30302.

²⁰ 46 U.S.C. § 30303; *see also* *Miles v. Apex Marine Corp.*, 498 U.S. 19, 31 (1990). For a detailed discussion of calculation of damages with DOHSA litigation, *see Matter of Adventure Bound Sports*, 858 F. Supp. 1192 (S.D.Ga. 1994).

²¹ *In re Korean Airlines Disaster of Sept. 1, 1983*, 117 F.3d 1477, 1481 n.4 (D.C. Cir. 1997), *aff'd* 524 U.S. 116 (1988).

²² *Jacobs v. Northern King Shipping Co.*, 180 F.3d 713, 717, 170 A.M.C. 967 (5th Cir. 1999).

²³ 46 U.S.C. § 30307(b).

²⁴ 46 U.S.C. § 30307(a); *see Zicherman v. Korean Airlines Co., Ltd.*, 516 U.S. 271, 230 ("...petitioners cannot recover for loss-of-society damages under DOHSA. Moreover, where DOHSA applies, neither state law, . . . nor general maritime law, . . . can provide a basis for recover of loss-of-society damages.").

²⁵ 524 U.S. 116 (1998).

²⁶ 46 U.S.C. § 30307; *see also* THOMAS J. SCHOENBAUM, ADMIRALTY AND MARITIME LAW 429 (West Publishing Co., 4th ed., 2001).

1. Distance

DOHSA currently requires that in the case of an aviation accident, the wrongful act or omission leading to the accident must occur at least twelve nautical miles from shore. Prior to the 2000 Amendments, this distance, for both marine and aviation accidents were only three nautical miles.

2. High Seas

Courts have interpreted the term “high seas” broadly. Interpretations of this term have been relative to the shoreline of the United States and include waters within the jurisdiction of foreign states and foreign state’s inland lakes, seas, and navigable waterways.

a. Historical Views of the “High Seas”

Historically, the high seas have been defined to include those areas that are outside the territory of a national state. Originally, the United States defined that distance as one sea league, or three nautical miles. The Court of Appeals for the Second Circuit explained that:

In 1793, seeking to remain neutral in the war between France, Britain and Spain in the Atlantic Ocean, Secretary of State Thomas Jefferson claimed the ‘smallest distance’ for the extent of American territorial seas. Relying on ‘the utmost range of a cannon ball, usually stated at one sea league,’ Jefferson made a claim for three nautical miles.²⁷

One of the first judicial definitions of the high seas, from Justice Story, characterized the “high seas” as “the open,

²⁷ *In re Air Crash Off Long Island New York, on July 17, 1996*, 209 F.3d 200, 205 (2d Cir. 2000). See also Note from Secretary of State Jefferson to the British Minister on the Subject of the U.S. Territorial Sea (Nov. 8, 1793), reprinted in *THE EXTENT OF THE MARGINAL SEA* 636 (Henry G. Crocker ed., 1919) (conveying to the British Minister President George Washington’s instruction to fix the United States territorial sea to a “distance of one sea league, or three geographical miles.”); *U.S. v. California*, 332 U.S. 19, n.16, 1947 A.M.C. 1579, 1590 n.16 (1947) (characterizing Secretary of Jefferson’s note as “the first official American claim for a three-mile zone which has since won general international acceptance”).

un[e]nclosed ocean, or portion of the sea, which is without the *fauces terre* on the sea coast.”²⁸ This viewpoint is based on the position that the “high seas” should be defined by geographic features.

However, subsequent definitions by courts shifted towards the theory of governmental control. One of the first cases to articulate this view was *United States v. Morel* in 1834, which held that “[t]he open sea, the high sea, the ocean, is that which is . . . under the particular right or jurisdiction of no sovereign.”²⁹

During the nineteenth and early twentieth century, the Supreme Court holdings continued with this jurisdictional approach and definition, focusing on governmental control as opposed to geography for defining the “high seas.” In *The Hamilton*, Justice Holmes of the United States Supreme Court characterized the “high seas” as “outside the territory, in a place belonging to no other sovereign.”³⁰ The Supreme Court also defined the “high seas” as “where the law of no particular State has exclusive force, but all are equal.”³¹ Phrased another way, “[t]he high sea is common to all nations and foreign to none.”³² Shortly after DOHSA’s enactment, although it was targeted at the enforceability of a Prohibition statute, in *Cunard S.S. Co. v. Mellon*, 262 U.S. 100, 122-23 (1923), the Supreme Court held, likely for further clarity, that the high seas included international waters.

These holdings frame the general principal that the United States has historically interpreted the “high seas” to be a place not under the control of a specific government, but as the following cases show, in the context of DOHSA aviation actions, this also includes foreign state’s waters.

²⁸ *United States v. Grush*, 26 F.Cas. 48, 51 (D.Mass. 1829) (emphasis added). *Fauces terre* literally means “the jaws of land,” which are “narrowed headlands and promontories, including a portion or arm of the sea within them.” BLACK’S LAW DICTIONARY 485 (2nd ed. 1910).

²⁹ *United States v. Morel*, 26 F.Cas. 1310, 1312 (C.C.E.D.Pa. 1834).

³⁰ *The Hamilton*, 207 U.S. 398, 403 (1907).

³¹ *The Scotland*, 105 U.S. 24, 29 (1882); see also *La Bourgogne*, 210 U.S. 95 (1908) (quoting *The Scotland*).

³² *Maul v. United States*, 274 U.S. 501, 511 (1927).

b. Expansion to Include Territorial Waters of Foreign States

Three cases, *In re Air Crash Disaster Near Peggy's Cove, Nova Scotia on September 2, 1998*,³³ *Jennings v. Boeing Co.*,³⁴ and *In re Air Crash Disaster Near Bombay, India on Jan. 1, 1978*,³⁵ held DOHSA applies to aviation accidents occurring on the waters of a foreign state because that territory constituted the “high seas” relative to the United States.

In the crash of Swissair Flight No. 111, litigated under the caption *In re Air Crash Disaster Near Peggy's Cove, Nova Scotia on September 2, 1998*, while the exact location of the crash was undetermined, it was stipulated by all parties that it was outside the three nautical mile limit of Nova Scotia's territorial waters claimed by Canada at the time DOHSA was enacted in 1920 but within the twelve nautical mile territorial waters limit then claimed by the Canadian government.³⁶ The District Court concluded that “DOHSA, as amended, applies to aviation accidents in foreign territorial waters.”³⁷ In *Jennings*, the District Court applied DOHSA to a plane crash two and a half miles off of the coast of the Shetland Islands, Scotland. The District Court, when adjudicating *In re Air Crash Near Bombay, India on Jan. 1, 1978*, observed that “[n]othing in [DOHSA] or its legislative history supports the position that Congress intended to limit the scope of this remedy to deaths occurring in international waters” and thus held DOHSA applied.³⁸

This holding is not specific to aviation accidents because in terms of maritime accidents, the term “high seas” for the purposes of DOHSA applies to nautical accidents that occur within

³³ *In re Air Crash Disaster Near Peggy's Cove, Nova Scotia on September 2, 1998*, 210 F.Supp.2d 570, (E.D. Pa. 2002).

³⁴ *Jennings v. Boeing Co.*, 660 F. Supp. 796 (E.D. Pa. 1987) *aff'd. without op.*, 838 F.2d 1206 (3d Cir. 1988).

³⁵ *In re Air Crash Disaster Near Bombay, India on Jan. 1, 1978*, 531 F. Supp. 1175 (W.D. Wash. 1982).

³⁶ *In re Air Crash Disaster Near Peggy's Cove, Nova Scotia on September 2, 1998*, 210 F.Supp.2d at 572.

³⁷ *Id.* at 586.

³⁸ *In re Air Crash Disaster Near Bombay, India on Jan. 1, 1978*, 531 F.Supp. at 1183.

foreign territorial waters.³⁹ As summarized in *Benedict on Admiralty*: "It appears to be settled that the term 'high seas' within the meaning of DOHSA is not limited to international waters, but includes the territorial waters of a foreign nation as long as they are more than a marine league away from United States shore."⁴⁰ In light of DOHSA's 2000 Amendments, in the context of aviation accidents, the phrase "marine league" as used in *Benedict on Admiralty* should be replaced with "twelve nautical miles".

D. The Origin of Aviation DOHSA Claims Prior to Statutory Language

While actions arising from aviation torts are generally not cognizable in admiralty, there are two specific exceptions.⁴¹ The first is in situation where the wrong bears a significant relationship to a traditional maritime activity.⁴² The second is when there is specific legislation authorizing a claim, such as DOHSA.

³⁹ Compare with *Howard v. Crystal Cruises, Inc.*, 41 F.3d 527, 529 (9th Cir. 1994) (territorial waters of Mexico are "high seas" under DOHSA); *Azzopardi v. Ocean Drilling & Exploration Co.*, 742 F.2d 890, 892 (5th Cir. 1984) (English Channel is "high seas" under DOHSA); *Kuntz v. Windjammer "Barefoot" Cruises, Ltd.*, 573 F. Supp. 1277, 1280-81 (W.D. Pa. 1983), aff'd 738 F.2d 423 (3d Cir. 1984) (Scuba diving off Berry Islands, Bahamas); *First & Merchants Nat'l Bank v. Adams*, 1979 A.M.C. 2860 (E.D. Va.) aff'd in part, rev'd in part on other grounds, 644 F.2d 878 (4th Cir. 1981) (Canadian territorial waters are high seas); and *Moyer v. Klosters Rederi*, 645 F. Supp. 620 (S.D.Fla. 1986) (Jamaican territorial waters are high seas).

⁴⁰ *BENEDICT ON ADMIRALTY*, *supra* note 6, at §81 n. 8.

⁴¹ See generally AM. JUR. AVIATION §§ 189, 190.

⁴² *Executive Jet Aviation, Inc. v. City of Cleveland, Ohio*, 409 U.S. 249 (1972). In *Executive Jet*, the Supreme Court held that federal courts lacked admiralty jurisdiction over a situation where an airplane on a flight solely within the continental United States crashed into Lake Erie, a public navigable waterway, shortly after departing Cleveland's Burke Lakefront Airport reroute to Portland, Maine, with a final destination of White Planes, New York because it did not have a sufficient nexus to a traditional maritime activity. See also, *Hayden v. Krusling*, 531 F. Supp. 468 (N.D. Fla. 1982); *Brons v. Beech Aircraft Corp.*, 627 F. Supp. 230 (S.D. Fla. 1985); *City of New York v. Waterfront Airlines, Inc.*, 620 F. Supp. 411 (S.D.N.Y. 1985); see generally Robert A. Brazener, *What Constitutes Significant Relationship to Traditional Maritime Activity to Support Federal Court's Admiralty Jurisdiction in Aviation Tort Cases*, 30 A.L.R. FED. 759; ROBERT FORCE AND MARTIN J. NORRIS, *THE LAW OF MARITIME PERSONAL INJURIES* §1:15 (5th ed. 2004).

1. *Choy v. Pan-American*

The first case to apply DOHSA to aviation accidents was *Choy v. Pan-American Airways Co.*⁴³ In 1941, DOHSA, then codified as 46 U.S.C. § 761 et seq., did not include specific provisions relating to aviation accidents. In *Choy*, the plaintiff administrator sued Pan-American Airways (Pan Am) following the crash of a seaplane in the Pacific Ocean.⁴⁴ The plaintiff brought causes of action under: (1) DOHSA, (2) the Death Statute of Nevada, the place of defendant's incorporation, (3) the Death Act of New York where Pan-Am had a place of business and where plaintiff purchased his ticket, (4) the Warsaw (International Airline) Convention, and (5) the laws of the Commonwealth of the Philippine Islands.⁴⁵

Noting that “[t]he language of [DOHSA] is broad” the United States District Court for the Southern District of New York found that “beyond a marine league from shore” should be construed to extend in both a horizontal and vertical direction:

The statute certainly includes the phrase ‘on the high seas’ but there is no reason why this should make the law operable only on a horizontal plane. The very next phrase ‘beyond a marine league from shore of any State’ may be said to include a vertical sense and another dimension.⁴⁶

2. Subsequent Cases Confirmed *Choy*

With *Choy* serving as the genesis of DOHSA application to aviation accidents “beyond a marine league from shore” by applying the law in a vertical direction, courts consistently followed this holding and firmly entrenched DOHSA as the substantive law for aviation accidents occurring on the “high seas.”

In *Wilson v. Transocean Airlines*, a plane traveling from Guam to Oakland, California, fatally crashed 325 miles east of Wake Island.⁴⁷ The passenger's spouse brought an action for loss

⁴³ *Choy v. Pan-American Airways Co.*, 1941 A.M.C. 438 (S.D.N.Y.).

⁴⁴ *Id.* at 483.

⁴⁵ *Id.*

⁴⁶ *Id.* at 484-485.

⁴⁷ *Wilson v. Transocean Airlines*, 121 F. Supp. 85, 86 (1954).

of companionship and support under the governing California law but Transocean, the carrier, argued that DOHSA represented the sole and exclusive remedy because the accident occurred on the "high seas" and more than a marine league from shore.⁴⁸ The *Wilson* court noted: "[i]t is clear that the scope of [DOHSA], within the geographical area of its operation, was intended to be as broad as the traditional tort jurisdiction of admiralty."⁴⁹ As a result, the court concluded DOHSA "affords a right of action for deaths resulting from airplane crashes on the high seas."⁵⁰

In *Noel v. Linea Aeropostal Venezolana*, Cashin, J. held:

Neither authority, the language of the Statute nor the dictates of common sense sustain a holding that the fulfillment of the jurisdictional requirements of the Federal Death on the High Seas Act is to be governed by the determination of such elusive fact as whether a person died above, on or in the sea.⁵¹

Thus, using *Noel*, the exact place of the decedent's death is irrelevant provided the wrongful act or omission occurred within the situs of DOHSA.

The principal that DOHSA is the substantive law for aviation accidents was also articulated in the 1983 Korean Airlines Flight 007 Disaster when the Soviet Union shot down a Korean Airlines 747 that veered off course. As litigated, *Zicherman v. Korean Airlines Co. Ltd.*, 516 U.S. 217 (1996), the Supreme Court held that when "an airplane crash occurs on the high seas, DOHSA supplies the substantive United States law."⁵²

The 2000 DOHSA Amendments have not negated the *Choy* line of cases but, in addition to being on "the high seas," also replaced the three nautical mile requirement with a new situs

⁴⁸ *Id.* at 94-95.

⁴⁹ *Id.* at 92

⁵⁰ *Id.* at 93; referencing *Sierra v. Pan American World Airways, Inc.*, 107 F. Supp. 519 (D.C.P.R. 1952); *Lacey v. L.W. Wiggins Airways, Inc.*, 95 F. Supp. 916 (D.C.Mass. 1951); *Choy v. Pan American Airways*, 1941 A.M.C. 438 (S.D.N.Y.).

⁵¹ *Noel v. Linea Aeropostal Venezolana*, 154 F. Supp. 162, 164 (S.D.N.Y. 1956), *aff'd* 247 F.2d 667 (2d Cir. 1957).

⁵² *Zicherman v. Korean Airlines Co., Ltd.*, 516 U.S. 217, 231.

requirement of the accident occurring at least twelve nautical miles off of the United States shoreline.

E. DOHSA's Inconsistent Drafting and TWA Flight 800

The statutory language of DOHSA has previously given rise to problems with regards to the boundaries of DOHSA in regards to aviation litigation. If there is a commercial space accident, similar problems will arise as to where the “high seas” begin as did in the litigation following the crash of Trans World Airlines (TWA) Flight No. 800 in 1996, the most recent DOHSA aviation accident case before an appellate court to interpret the term “high seas.”

TWA 800, a Boeing 747-400, crashed shortly after takeoff in the Atlantic Ocean from New York's John F. Kennedy International Airport reroute to Charles de Gaulle airport in Paris, France.⁵³ The crash, litigated under the caption *In re Air Crash Off Long Island, New York, on July 17, 1996*, killed all 230 passengers and crew and occurred approximately eight nautical miles off the shore of Long Island, New York.⁵⁴ The subsequent litigation addressed the problem of how to address accidents that occur between DOHSA's then three nautical boundary but within the twelve nautical mile boundary claimed by the United States. The Court found that in order for DOHSA to apply (as this case was decided before the 2000 DOHSA Amendments), the accident must take place both on “the high seas” and “beyond a marine league from shore of any state.”⁵⁵

The problem in TWA 800 arose because under Presidential Proclamation No. 5928, issued on December 27, 1988 by President Reagan, the territorial waters of the United States were extended from three nautical miles to twelve nautical miles.⁵⁶ Thus TWA 800 crashed outside of what was DOHSA's three nautical mile boundary but still within the United States terri-

⁵³ *In re Air Crash Off Long Island, New York, on July 17, 1996*, 209 F.3d 200, 201 (2d Cir. 2000).

⁵⁴ *Id.*

⁵⁵ *Id.*

⁵⁶ Proclamation No. 5928, 54 Fed. Reg. 777 (Dec. 28, 1988); *In re Air Crash Off Long Island, New York, on July 17, 1996*, 209 F.3d 200, 202.

torial waters. Thus the court considered whether the proclamation, by increasing the territorial waters from three to twelve miles, had also increased the boundary of the “high seas.”

As the Court of Appeal for the Second Circuit observed, “once the United States or any state or territory thereof has asserted sovereignty over certain waters, DOHSA does not give the remedies available in those waters.”⁵⁷ Therefore by examining historical interpretations of the “high seas” the court found the “background and legislative history of DOHSA demonstrate Congress’ intent to exclude all state and federal territorial waters from its [DOHSA’s] scope” because they were not the high seas.⁵⁸ Therefore, “DOHSA does not apply to United States territorial waters where the crash in this case occurred.”⁵⁹

F. Summary of DOHSA Principles for Aviation Accidents

In summary, to apply DOHSA in an aviation accident setting, the accident must occur more than twelve nautical miles off United States shoreline and on the “high seas” – often referred to as the *situs*. Second, the *Choy* line of cases have consistently applied DOHSA in a vertical direction and the location of the decedent’s death is irrelevant as long as the wrongful act or omission occurred while the aircraft is within the DOHSA *situs*. Finally, under the TWA 800 holding, once the United States asserts jurisdiction over any body of water, that body of water is removed from DOHSA’s jurisdiction. With this foundation, it is now appropriate to survey why wrongful death in space poses a novel issue.

II. A BRIEF HISTORY OF WRONGFUL DEATH AND U.S. SPACE OPERATIONS

While at its infancy, the commercial space industry will emerge as a significant industry within the coming years. Early space exploration, dominated by the United States and the Soviet Union during the 1950’s and 1960’s, arguably culminated

⁵⁷ *In re Air Crash Off Long Island, New York, on July 17, 1996*, 209 F.3d at 215.

⁵⁸ *Id.* at 213.

⁵⁹ *Id.* at 215.

with the *Apollo 11* Moon landing in 1969. However, such exploration has not been without human sacrifice as the United States National Aeronautics and Space Administration (NASA) has lost three spacecraft to accidents. *Apollo 1* caught fire during a 1967 test killing three astronauts. *Space Shuttle Challenger* exploded shortly after liftoff in 1986 and *Space Shuttle Columbia* disintegrated upon re-entry in 2003, each killing seven astronauts. In all of these cases, wrongful death claims were non-actionable.

In two cases, *Smith v. U.S.*,⁶⁰ and *Smith v. Morton Thiokol, Inc.*,⁶¹ the widow of astronaut Michael J. Smith, a member of the *Challenger* crew, brought suit against NASA for this death. In these companion cases, the courts held that the astronauts were NASA employees acting within the course and scope of their employment so the claims must be brought under the Federal Tort Claims Act,⁶² and that suits are barred under the Federal Tort Claims Act by the *Feres* doctrine,⁶³ because astronauts are military personnel assigned to NASA and the injuries arose from an activity incident to military duty, even though the astronauts were killed in a mission for NASA, a civilian agency.⁶⁴ Thus, as long as space flight was conducted by a government entity, the problem of wrongful death actions by the survivors was non-actionable because of the application of the *Feres* doctrine.

However, now that private enterprise is set to commence commercial space flight operations within the immediate future, history suggests that it is inevitable that accidents will happen

⁶⁰ *Jane J. Smith v. U.S.*, 877 F.2d 40 (11th Cir. 1989), cert. denied, 493 U.S. 1069 (1990).

⁶¹ *Jane J. Smith v. Morton Thiokol, Inc.*, 712 F. Supp. 893 (M.D.Fla. 1988), aff'd 877 F.2d 40 (11th Cir. 1989), cert. denied 493 U.S. 1069 (1990).

⁶² 28 U.S.C. §§ 1291, 1346(b), (c), 1402(b), 2401(b), 2402, 2671-80.

⁶³ *Feres v. United States*, 340 U.S. 135 (1950). In *Feres*, the executor of a soldier who had died when his barracks caught fire alleged that the United States had been negligent in housing the soldier in barracks with a known defective heating system. The US Supreme Court noted that although the Federal Tort Claims Act allows persons intentionally or negligently injured by a government employee to sue the government for their injuries, the federal government could not be held liable for injuries to members of the armed forces arising from activities incident to military service.

⁶⁴ *Jane J. Smith v. U.S.*, 877 F.2d 40; *Jane J. Smith v. Morton Thiokol, Inc.* 712 F. Supp. 893.

and wrongful death actions will arise which will not have the *Feres* immunity NASA enjoys. *SpaceShipOne* became, in 2004, the first privately built spacecraft to exceed an altitude of 100km twice in succession.⁶⁵ After *SpaceShipOne*'s success, Virgin Atlantic announced it had acquired the design rights to *SpaceShipOne* with the intent of creating a space tourist vehicle.⁶⁶ Furthermore, with the retirement of the *Space Shuttle* fleet in 2011, NASA will no longer have the ability to conduct human spaceflight operations. Thus, as private spaceflight business operations appear highly likely in the immediate future, it is safe to anticipate that there will be emerging legal issues which need to be addressed

III. AIRSPACE AND AERONAUTICAL NAVIGATION

The United States has claimed exclusive sovereignty of its airspace.⁶⁷ In doing so, the United States has vested power with the Federal Aviation Administration (FAA) for developing the airspace of the United States.⁶⁸

First, the FAA has created sets of "flight rules"—Visual Flight Rules (VFR) and Instrument Flight Rules (IFR)—which govern aviation navigation. Next, FAA has established two forms of airspace: controlled and uncontrolled. Both are defined and governed by the Federal Aviation Administration in Part 71 of the Federal Aviation Regulations (FAR).⁶⁹ All classes of airspace are assigned a letter: A, B, C, D, E, or G and some contain

⁶⁵ MARK WILLIAMSON, *SPACE: THE FRAGILE FRONTIER* 9 (2006).

⁶⁶ *Id.* at 133.

⁶⁷ 49 U.S.C. § 40103(a)(1) ("The United States Government has exclusive sovereignty of airspace of the United States."); This law consistent with Article 1 of the 1944 Chicago Convention whereby the major World War II Allied powers agreed that a nation should have "...complete and exclusive sovereignty over the airspace above its territory." Convention on International Civil Aviation, art. 1, Dec. 7, 1944, 61 Stat. 1180, 15 U.N.T.S. 295 [hereinafter Chicago Convention].

⁶⁸ 49 U.S.C. § 40103(b)(1) ("The Administrator of the Federal Aviation Administration shall develop plans and policy for the use of navigable airspace and assign by regulation or order the use of the airspace necessary to ensure the safety of aircraft and efficient use of airspace.").

⁶⁹ Federal Aviation Regulations are codified in the Code of Federal Regulations (C.F.R.), Title 14. See 14 C.F.R. § 71 et seq. for specific guidance regarding United States controlled airspace.

a specific flight rule requirements.⁷⁰ All altitudes listed in the FARs are given in feet as mean sea level (MSL), or the distance above the mean level of the ocean and above 18,000 feet, as Flight Levels (FL).⁷¹

A. *Visual Flight Rules and Instrument Flight Rules*

There are two types of regulations governing the weather conditions and licensure under which a pilot may operate an aircraft: VFR and IFR. VFR is a set of regulations which allow a pilot to operate an aircraft in weather conditions meeting certain minimum visibility requirements. Permission from FAA controllers is not required to operate under VFR in certain categories of airspace. However, under IFR, the pilot must be in two way radio communications with, and receive permission from, Air Traffic Control (ATC), and have a transponder.⁷²

B. *Uncontrolled Airspace*

Class G is the only form of uncontrolled airspace. Although specifically designed by FAA Order JO 7400.9V, *Airspace Designation and Reporting Points* dated August 9, 2011, it generally extends to either 700 feet above ground level or 1,200 feet above ground level at certain fixtures.

C. *Controlled Airspace from Surface to FL180*

The FARs establish five classes of controlled airspace as defined by letter: A, B, C, D, and E. All flight operations within controlled airspace has some limitations or restrictions. Such restrictions include, but not limited to, radio communication, altitude restrictions, and position reporting.⁷³

⁷⁰ *Id.*

⁷¹ A Flight Level (FL) is a standard altitude of in aircraft in hundreds of feet. Flight Levels are usually designed in writing as FLxxx where xxx is a three-digit number indicating the pressure altitude in units of 100 feet (e.g., 18,000 feet = FL 180). For example, flight level 250 represents a barometric altimeter indication of 25,000 feet; flight level 255, an indication of 25,500 feet. 14 C.F.R. § 1.1.

⁷² 14 C.F.R. §§ 91.126 - 91.135.

⁷³ *Id.*

Class A airspace exists between FL180 and FL600. Classes B, C, D, E, and F airspace exist below FL 180 (the lower limit of Class A airspace), and are specifically defined by FAA Order JO 7400.9V, *Airspace Designation and Reporting Points* dated August 9, 2011. This order specifically lists coordinates of airspaces that fall into the Class B, C, D, E, and F airspace. Additionally, Class E airspace is also defined by exclusion when below FL 180. Therefore, if airspace is not designated Class A, B, C, D, F, or G, then by exclusion, it is defined as Class E airspace.⁷⁴

D. Controlled Airspace from FL180 to FL600

Class A airspace is defined as all “airspace overlying the waters within 12 miles of the coast of the 48 contiguous States, from 18,000 feet MSL to and including FL 600 . . .”⁷⁵ In order to operate in Class A airspace, the pilot must be flying under Instrument Flight Rules (IFR) receive a clearance, or permission from Air Traffic Control (ATC), have altitude reporting equipment, and maintain two-way radio communication with ATC.⁷⁶

E. Airspace above FL600

Airspace above FL600 is Class E airspace.⁷⁷ Thus, Class E airspace exists both below FL180 and above FL600. In Class E airspace, radio communications, and ATC clearance are not required and in limited situations, below 10,000 feet, altitude reporting near Class B airspace is required.

⁷⁴ FAA Order JO 7400.9V, *Airspace Designation and Reporting Points*, August 09, 2011; §6000, pg. E-1. “Generally, if the airspace is not Class A, Class B, Class C, or Class D, and it is controlled airspace, it is Class E airspace.” See also 14 C.F.R. § 71.1.

⁷⁵ FAA JO Order 7400.9V, *supra* note 74. See 14 C.F.R. 71.81.

⁷⁶ 14 C.F.R. § 91.135.

⁷⁷ 14 C.F.R. § 71.71.

IV. DOHSA SHOULD APPLY WHEN A COMMERCIAL SPACE
ACCIDENT OCCURS MORE THAN TWELVE NAUTICAL MILES ABOVE
EARTH BECAUSE ABOVE FL600 CONSTITUTES THE “HIGH SEAS”
FOR THE PURPOSES OF DOHSA

In order to satisfy the traditional aviation requirements for DOHSA, the *situs* of the accidents must be twelve nautical miles from shore and on the “high seas.” Here, the distance from shore is interpreted in the vertical direction and above FL600 is equivalent to the “high seas.”

A. *Twelve Vertical Nautical Miles (72,913 Feet)*

The *Choy* line of DOHSA cases has consistently held that DOHSA applies in a “vertical sense” as well as a horizontal sense. Therefore, twelve vertical nautical miles above the earth would equivocate to an altitude of 72,913 feet. Accordingly, any accident above this altitude should, if taken literally as the *Choy* line of cases suggests, meet this distance requirement of DOHSA.

B. *Above FL600 the Airspace is the “High Seas”*

Above FL600, the airspace shares many similarities to the “high seas.” As previously discussed, jurisprudence has, for the better part of 200 years focused on government control as an approach for whether a locale qualifies as “the high seas.”⁷⁸ Using this test, there is evidence that the United States is not exercising governmental control above this altitude sufficient to claim jurisdiction that would prevent it from being considered the “high seas.”

In order to show that the United States government is not exercising control over the airspace above FL600, it is first necessary to compare the governmental involvement with the class A airspace directly below it. When operating in Class A airspace, a pilot is required to be operating IFR, obtain ATC clear-

⁷⁸ See *United States v. Morel*, 26 F.Cas. 1310 (C.C.E.D.Pa. 1834); *The Hamilton*, 207 U.S. 398 (1907); *The Scotia*, 81 U.S. 170 (1871); *The Scotland*, 105 U.S. 24 (1882); *La Bourgogne*, 210 U.S. 95 (1908); and *Maul v. United States*, 274 U.S. 501 (1927).

ance, be in two-way radio communications, and have a transponder with altitude encoding ability (often referred to as Mode C transponder).⁷⁹ Some of these requirements may seem repetitive because under IFR, a pilot must be in contact with ATC. Class A airspace, as previously mentioned, is the only airspace which mandates IFR procedures.⁸⁰

However, within classes B, C, D, E, and G, a pilot may chose to operate under VFR or IFR.⁸¹ Thus, when a pilot goes above the Class A ceiling of FL600 and enters into the Class E airspace above FL600, the pilot is no longer obligated to operate IFR and can operate VFR and have no contact with ATC. While it remains possible for the pilot to continue to operate under VFR, the regulations permit VFR flight rules, which do not mandate continued ATC clearance, altitude reporting, or two-way radio communications – symbolic of the fact that United States is not exercising control over aviation activities above this altitude.

Further, as a practical note, the Class E airspace, as written in the FARs above FL600 extends indefinitely into space which places it into conflict with International Law. The United States claims exclusive sovereignty over its airspace in connection with the principles of the Chicago Convention, a 1944 conference on developing post World War II international air travel standards.⁸² However, Article II 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 (Outer Space Treaty) prohibits any nation from claiming sovereignty over Space.⁸³ As the Class E airspace extends indefinitely, it at some point violates this treaty.

⁷⁹ 14 C.F.R. § 91.135(a)-(c).

⁸⁰ 14 C.F.R. §§ 91.126 - 91.135.

⁸¹ 14 C.F.R. §§ 91.126 - 91.135.

⁸² Chicago Convention, *supra* note 67.

⁸³ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, *opened for signature* Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205. Outer Space is “not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.” *Id.* at art. II.

V. OBSERVATIONS AND CONCLUSIONS

Given the history of space flight, fatalities, while uncommon, have occurred. Since May 5, 1961, when Alan Sheppard became the first American in Space, in the sixty years that have since passed, NASA lost sixteen Americans (and one Israeli) to spaceflight accidents. The Soviet Union has also suffered at least six fatalities with *Soyuz 1* in 1967 and *Soyuz 11* in 1971. Therefore, there is a likely probably that as commercial space flight operations enter private industry, fatalities will happen and DOHSA should be included in any litigation.

A. DOHSA Will Also Apply if the Circumstances from the Commercial Operation Contribute to the Deceased Passing While the Spacecraft is on the High Seas

If the deceased does not pass during the actual flight, but rather from factors attributed to their travels, DOHSA's provisions are drafted so that the tort is deemed to occur, not where the wrongful act or omission has its inception, but where the impact of the act or omission produced such injury that gives cause to the rise of the cause of action.⁸⁴

In *D'Aleman v. Pan American World Airways, Inc.*,⁸⁵ the wife of the decedent brought suit against Pan American after her husband "became so terrified by the feather of the engine [a malfunction causing the propeller to stop spinning] and the announcement of the unscheduled landing at Norfolk that he went into a state of shock which, four days later, in New York, resulted in his death" after his flight from Puerto Rico to New York was forced to make an unscheduled landing in Norfolk, Virginia because of engine trouble.⁸⁶ Noting that "[t]o give passengers on ship protection [of DOHSA] and deny similar rights to passengers in the air would amount to an unjustifiable and highly technical discrimination," the Court of Appeal for the Second Circuit held that DOHSA "grants a right of action in

⁸⁴ See generally *Middleton v. United Aircraft Corp.*, 204 F. Supp. 856 (S.D.N.Y. 1960).

⁸⁵ *D'Aleman v. Pan American World Airways, Inc.*, 259 F.2d 493 (2d Cir. 1959).

⁸⁶ *Id.* at 494.

admiralty for death caused by wrongful act, neglect or default occurring in the air space over the high seas ...”⁸⁷ Thus, while the actual death occurred on land, since the cause of death happened while the aircraft was within DOHSA’s jurisdiction, DOHSA is still applicable.

Accordingly, if by some phenomenon, a commercial space tourist develops a medical condition directly attributable to their space flight, returns to earth, and subsequently passes, then following the precedent in *D’Aleman*, DOHSA is the applicable law.

B. To Prevent a Similar TWA Flight 800 Congress Should Proactively Amend DOHSA to Include Commercial Space Flight

The simplest solution to this hypothetical question would be for Congress to amend DOHSA to include special provisions for commercial space operations above a designated altitude. Doing so would avert what predictably could be a similar case as happened in the TWA Flight 800 litigation when DOHSA’s maritime boundary was not extended consistently with Presidential Proclamation. In doing so, Congress would be well served to include a provision, clarifying what altitude for the purpose of commercial spaceflight satisfies the “high seas” requirement of this act.

However, until such time as either Congress amends DOHSA or a spacecraft crashes and a court opinion is delivered on the topic, there is a compelling argument that in the context of DOHSA, the *Choy* line of cases should continue to apply vertically and above FL 600 is the boundary for the “high seas.”

⁸⁷ *Id.* at 495-496.

SUBORBITAL FLIGHTS: A COMPARATIVE ANALYSIS OF NATIONAL AND INTERNATIONAL LAW

Sara M. Langston^{*}

I. INTRODUCTION

The nature of suborbital space flight activities inherently involves multiple regimes of regulation and international agreements. It also traverses established spheres and governing bodies, from land to air to space, giving rise to a complex system of inter-regulation. The purpose of suborbital flights is another issue. While commercial suborbital flights are commonly referred to as “space tourism” this term is legally dissatisfactory on several accounts. First, there is no uniformly accepted definition of “space tourism.” As such, it represents more of a cultural interpretation of private space access than an industry term of art. Secondly, suborbital flight transcends pure entertainment value, with the expectation that commercial suborbital activities will provide transportation services in the near future, not to mention providing scientific opportunities in a microgravity environment. Lastly, launch licensing regulations are not concerned with in-space activities, only the launch and reentry operations. Thus, a distinction amongst commercial customers (tourist versus experimenter for example) is not legally relevant. Consequently, this article will address the legal implications of commercial suborbital flights as a whole, not merely for entertainment purposes. In addition, air launched suborbital flights implicate more complex legal issues over traditional

^{*} Sara M. Langston is Research Counsel at the National Center for Remote Sensing, Air, and Space Law, University of Mississippi School of Law. Ms. Langston received her B.S. at Woodbury University, her J.D. at Golden Gate University School of Law, and her LL.M. from Leiden University. This paper is an excerpt of Ms. Langston's LL.M. Thesis, submitted at Leiden University. She also holds a Space Studies Certificate from the International Space University and is a member of the New York Bar.

rocket launches. As a result, the following analysis is geared toward clarifying these issues.

Beginning with the relevant international law, treaties, and State obligations, this article will highlight the pertinent air and space treaties applicable to commercial suborbital flights. A comparative analysis will then follow addressing the relevant regulatory mechanisms of five States Parties to the air and space law regimes, namely, the United States, Australia, the United Kingdom (on behalf of the Isle of Man), the Netherlands (on behalf of the former Dutch Antilles), and Sweden. These national legislations were particularly selected due to the national and industry interest in conducting commercial human space flight from these jurisdictions for tourism and other commercial interests.

II. INTERNATIONAL LAW

It is a well-established rule of customary international law that a signatory State to a treaty must act in good faith and in conformity with its obligations under the treaty.¹ With regard to aerospace activities, it is significant to note that a State Party to a relevant treaty may consist of a unitary nation State or a State with accompanying territories. In which case, a State may sign the treaty on behalf of all the kingdom and territories.² For instance, when the Kingdom of the Netherlands signs an international treaty, it does so on behalf of the whole Kingdom, to include the Dutch Antilles and Aruba, unless, a specific stipulation provides otherwise. Thus, treaty accession and succession are relevant factors for consideration when analyzing the international responsibilities and liabilities of governments. The following section provides an overview of the relevant multilateral

¹ This principle is codified in the Vienna Convention on the Law of Treaties, art. 26, May 26, 1969, 1155 U.N.T.S. 331, 8 I.L.M. 679.

² For example, many former colonial/ imperial nations still represent the newly independent territories in the U.N. and with regards to international relations. The US, UK, and the Netherlands, just to name a few, are among such states that represent related territories in the international arena, and therefore, sign international agreements and conventions on the (former) territories' behalf.

international treaties in air and space law and defines the applicability of these treaties to State Parties.

A. Space law

1. Outer Space Treaty

The foundational instrument governing outer space activities is the 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).³ Signed on January 27, 1967, it promptly entered into force on October 10, 1967. Building on the Legal Principles previously adopted by the UN General Assembly in 1963, the Outer Space Treaty establishes ideal parameters for the utilization of space. Specifically, the treaty establishes that space is to be used for peaceful purposes; that space exploration is to be carried out for the benefit of all countries; and that outer space is not subject to national appropriation. The Treaty also stipulates State obligations with regard to nations' space activities. Obligations such as astronauts shall be regarded as envoys of mankind; that States are internationally responsible for national space activities whether conducted by governmental or non-governmental entities; and significantly, that States are liable for damage caused by their space objects are codified in the treaty. As of January 1, 2008, ninety-eight States have ratified, and twenty-seven States have signed this treaty, confirming worldwide recognition and adherence to these principles.

The Outer Space Treaty codifies international State responsibility for national space activities based on the established international precepts of State sovereignty and jurisdiction over one's territory and airspace. State sovereignty also includes the right to exercise jurisdiction based on quasi-territory and nationality.⁴ At the time the Outer Space Treaty was drafted only

³ 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].

⁴ Quasi-territory is a term that has been extended to infer the right of a State to exercise jurisdiction over an area that is not strictly within its territory. *See e.g.* Bin

State governments had the capital and resources to conduct space activities, not private entities. However, without referring directly to “private” entities, Article VI of the Outer Space Treaty does apply State responsibility to “nongovernmental” entities, which logically infers private entities.

Specifically, under the space law regime, States are internationally responsible for private companies in three ways. First, State *authorization* is required for private entities to conduct space activities. Secondly, States must *continually supervise* the private entity’s space activities. Lastly, the State is responsible for *ensuring compliance* with the principles of the Outer Space Treaty.⁵

In addition, three distinct issues are raised with regard to State responsibility.⁶ First, there is a distinction between responsibility and liability. While no definitive interpretation has yet been officially recognized, explanations for responsibility include a State’s answerability for acts or omissions under the law, whereas liability implies the consequences that a State must bear for such acts or omissions.⁷ Secondly, the space law regime identifies who the State is responsible for. Under Article VI of the Outer Space Treaty, States are responsible for both government and private entities conducting national space activities.⁸ What constitutes “national space activities” is not

Cheng, STUDIES IN INTERNATIONAL SPACE LAW 73 (1997). For instance, a nationally registered ship, airplane or spacecraft have been construed as the quasi-territory of a State and subject to that State’s jurisdiction, regardless of the physical location of the vessels. Nationality, on the other hand, infers the right of a State to legislate, regulate and exercise jurisdiction over individuals and legal entities (companies) who are deemed to be citizens of that State.

⁵ Outer Space Treaty, *supra* note 3, at art. VI; *see also*, VALERIE KAYSER, LAUNCHING SPACE OBJECTS: ISSUES OF LIABILITY AND FUTURE PROSPECTS 78 (2001).

⁶ *See* KAYSER *supra* note 5.

⁷ *See e.g.* KAYSER, *supra* note 5, at 31; Bin Cheng, *Article VI of the 1967 Space Treaty Revisited: “International Responsibility”, “National Space Activities”, and “The Appropriate State”*, 26 J. SPACE LAW 7, 9 (1998).

⁸ Outer Space Treaty, *supra* note 5, at art. VI. This does not necessarily imply that the State where the space activities take place will always be the appropriate State to regulate the activities where another State’s company is concerned. However, regardless who is held to be the launching State or other appropriate State, the flag State of the territory concerned must have a mechanism for either regulating the space activity or deferring/ waiving authority to the other state, for instance, based on the company’s incorporation (e.g. as US law permits) or via the nationality principle, etc.

clearly defined under the Treaty so this element may be subject to interpretation. However, in practice, many States treat national space activities to include those space activities arising from the territory of that State, to include its airspace and quasi-territory. Some States, like the US take a step even further and extend this State responsibility obligation based on the principle of nationality.⁹ Lastly, the Convention on International Liability for Damage Caused by Space Objects (Liability Convention)¹⁰ identifies four options for assigning liability for damages, based on the definition for a “launching State.”

2. Liability Convention

The Liability Convention was adopted by the UN General Assembly in 1971 and entered into force on September 1, 1972. Furthering the State responsibility principles in the Outer Space Treaty, this Convention delineates the specific liability for damage arising from space activities conducted by States individually or jointly and severally.¹¹ It also iterates that a “launching State” is inescapably responsible for third party liability, whereas, absolute or strict liability applies where a launching State’s space activities result in damage anywhere on the earth’s surface, or to an aircraft in flight.¹² Fault-based liability applies to damage occurring elsewhere than on earth, for example, in outer space or onboard a space object.¹³

Article I of the Liability Convention identifies three significant terms for liability, they are: “launching State,” “space object,” and “damage.” First, there are four classifications of a

⁹ 49 U.S.C. § 70104 (2006), *transferred to* 51 U.S.C. § 50904 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010); *See also*, KAYSER, *supra* note 5, at 43.

¹⁰ Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention]. As of 2010, eighty-seven States have ratified the Liability Convention, twenty-three States have signed it, and three international organizations have declared their acceptance of the Convention. They are the European Space Agency (ESA), EUMETSAT and EUTELSAT. *See, Treaty Signatures*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, <http://www.oosa.unvienna.org/oosatdb/showTreatySignatures.do?statusCode=&d-8032343-p=1&treatyCode=LC&stateOrganizationCode=> (last visited Nov. 16, 2011).

¹¹ *Id.* at arts. IV, V.

¹² *Id.* at art. IV.

¹³ *Id.*

“launching State”: 1) a State which launches a space object; 2) a State who procures a launch; 3) a State whose territory a space object is launched from; or 4) a State whose facility a space object is launched from.¹⁴ The purpose of this multiple classification is to provide a victim State with fair and equitable means of receiving prompt compensation for damage incurred from at least one liable State.¹⁵ As a matter of international and practical importance, this Convention only applies to States. Thus, the claimant must be a State, not an individual person/ entity. However, a claimant State may bring the claim based on damage resulting to either its territory and/or its nationals.¹⁶

Additionally, Article I(d) defines the term “space object” to include “component parts of a space object as well as its launch vehicle and parts thereof.” As of yet, there is no universal definition of “space object”¹⁷ and States may impose their own interpretations of this term in their national legislation. However, the scope of this term becomes particularly important with regard to air launched suborbital space flights due to the combined configuration of the carrier plane and reusable launch vehicle (RLV) prior to separation or launch. Specifically because, by strict definition the combined configuration may be interpreted by some to be a space object under the Liability Convention, with the carrier plane being defined as a launch vehicle. Or, alternatively the configuration may be deemed an aircraft and not under the Convention’s scope. While arguments exist on both sides, the issue remains subject to national interpretation. This author suggests that for purposes of clarifying and drafting future space legislation for commercial suborbital space flight, the term “space object” should apply to the RLV alone and should not be extended to the carrier plane.

Moreover, Article I(a) defines “damage” to mean “loss of life, personal injury or other impairment of health; or loss of or dam-

¹⁴ *Id.* at art I.

¹⁵ See KAYSER, *supra* note 5, at 36.

¹⁶ See the *Nottebohm case* concerning jurisdiction based on nationality for international claims brought before the International Court of Justice. The Court held that a genuine link must exist between the claimant State and the injured individual. *Nottebohm Case (Liech. v. Guat.)* 1955 I.C.J. 4 (Apr. 6).

¹⁷ KAYSER, *supra* note 5, at 45.

age to property of States or of persons, natural or juridical, or property of international governmental organizations.” An adequate and clear legal definition, this term is usually adopted as is, with some States providing further elaboration in the national space law.

3. Registration Convention

The Convention on Registration of Objects Launched Into Outer Space (Registration Convention)¹⁸ requires launching States to provide information on their launched space objects to the UN Secretary-General. This Convention was adopted in 1975 and entered into force on September 15, 1976.¹⁹ The Registration Convention specifically requires the furnishing of certain information “as soon as practicable,” to include the identity of the launching State, the space object registration number and/or designator, time and location of the launch, basic orbital parameters, as well as the general function of the space object.²⁰ An alternative option exists under General Assembly Resolution 1721, which allows for the registration of launched space objects when the appropriate State is not a signatory to the Registration Convention.²¹ In practice, the real issue of registration is intrinsic to the determination of whether an aerospace vehicle is classified as either an aircraft or a spacecraft.²²

¹⁸ Convention on Registration of Objects Launched into Outer Space, Nov. 12, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention].

¹⁹ As of 2010, fifty-three States have ratified the Registration Convention, four States have signed it, and two intergovernmental organizations have declared their acceptance of it, in accordance with the Outer Space Treaty. The two organizations are ESA and EUMETSAT. *Treaty Signatures*, *supra* note 10.

²⁰ Registration Convention, *supra* note 18, at art IV.

²¹ G.A. Res. 1721 (XVI), U.N. GAOR, 16th Sess., (Dec. 20, 1961). International Cooperation in the Peaceful Uses of Outer Space, 1085th plenary meeting, 20 Dec. 1961. As Resolution 1721 was passed in 1961, the first registry of space objects was initiated in 1962. Consequently, the UN Secretariat maintains this registry separate from the registration created under the Registration Convention. So, there remains two possible methods for State registration of space objects.

²² See e.g. Gerald J. Mossinghoff & George P. Sloup, *Legal Issues Inherent in Space Shuttle Operations*, 6 J. SPACE L. 47 (1978).

B. Air law

The dual function of suborbital flight requires an analysis under both air and space law. The following air law analysis is specifically pertinent to air launched space vehicles and shuttle-like space vehicles capable of acting as aircraft, or gliders, upon their reentry and descent. The pertinent questions addressed in the following discussion concern the applicability of the UN treaties and national air law to the air travel portion of the sub-orbital flight.

1. Private air law

Private air law generally concerns the contractual and liability issues of air carriers (airlines) with regards to passengers, cargo, and third parties. Two sources of law govern air carriers: treaties and national legislation. The relevant treaties include international, regional, and inter-carrier agreements concerning rules of carriage for air carriers on specific types of flights. For example, European Community (EC) regulations set the minimum requirements for services and information to be provided by Community carriers, and for intra-Community flights. Whereas, national law fills in the gaps left open in the agreements concerning domestic flights or local regulation, interpretation or implementation issues, derived from treaty provisions. Examples of issues for national regulation not covered under the international agreements on carriage may concern insurance limits and requirements for domestic air carriers (at or above the minimum provided for in the agreement), products liability, criminal law, contracts, torts, etc.

Air transportation regulations for air carrier liability and responsibility for international flights is specifically governed by the air law regime established under the Convention for the Unification of Certain Rules Relating to International Carriage by Air (Warsaw Convention)²³ signed in Warsaw, Poland, on October 12, 1929. Several other instruments have been promul-

²³ The Convention for the Unification of Certain Rules Relating to International Carriage by Air, Oct. 12, 1929, ICAO Doc. 7838, 9201, 137 L.N.T.S. 11 (1933), 49 Stat 3000 (1929) [hereinafter Warsaw Convention].

gated over the years to update the Warsaw Convention and further finesse the liability of the parties (to include air carriers, tour operators, and travel agents) for different types of personal (passenger) injury and property damage as a result of international air carriage.

The applicability of the air law conventions, international liability requirements, and passenger rights are far from solidified as pertaining to the future of commercial suborbital flights. However, several arguments stand against the applicability of the Warsaw/Montreal Regime to initial suborbital space flights. For example:

— Suborbital flights conducted from and to the same spaceport are unlikely to trigger the international requirements necessary for the application of the Warsaw regime. Especially, without an international component to the flight, such as crossing international air boundaries. Some lawyers argue that reaching space qualifies as an international point for purposes of triggering the Convention, but this position is not widely accepted.

— The Warsaw/Montreal regime does not apply to passengers on a space vehicle (e.g. after the RLV separates from the carrier plane in an air launch, or throughout the duration of the flight in a rocket launch), as an RLV is a space object.²⁴

— Interpreting a suborbital flight operator as an “air carrier” for “international air carriage” purposes, under the Convention, is also questionable because the current nature of the suborbital flight is more in line with a company providing extreme sport activities, not a commercial transportation company. This further prompts the debate of whether suborbital flight operators should be classified as air rather than space transportation, and whether they should incur carrier liability.

²⁴ See e.g. Herbert Grallert, et al., *Conceptual Approach to a Space Tourism Vehicle With Respect to Technical, Commercial and Legal Aspects*, IAC-04-U.1.05 (AIAA 2004); Stephan Hobe, *Conference on Security and Risk Management in a New Space Era: Military, Commercial, and Tourism Dimensions: Legal Aspects of Space Tourism*, 86 NEB. L. REV. 439 (2007).

2. Public air law

Public air law refers to the sovereign rights of States to govern and protect the airspace above its territory and territorial waters, including the right to implement national legislation to regulate civil aviation. This implementing regulation takes effect in safety standards, licensing requirements for aircraft, pilots and crew, ground infrastructure, and air traffic management. Some States also allocate partial or shared responsibility for air traffic control and management operations between its civil aviation authority (CAA) and military sector.²⁵

CAAs are generally responsible for the licensing and safety management of national aircraft and aviation related activities. In some regions, additional supranational directives and standards may be applicable and incorporated into national aviation legislation. For instance, in Europe, the European Aviation Safety Agency (EASA),²⁶ advises the European Commission in promulgating EC rules and standards applicable to all Community carriers.²⁷ On the broader international level, the International Civil Aviation Organization (ICAO) also establishes industry practices (SARPs) and guidelines in Annexes, to ensure safety in civil aviation matters through the uniformity of regulations, standards (to include environmental protection), procedures, and organization.²⁸ As a result, aviation requirements may vary depending on the classification of the flight as a domestic (including intra-Community flights) or international flight.

²⁵ For example, the Netherlands shares ATC responsibility between civilian and military components.

²⁶ Prior to 2009, the regional aviation authority was the Joint Aviation Authority (JAA), which fulfilled the rulemaking advisory function for the European Commission.

²⁷ See EUROPEAN AVIATION SAFETY AGENCY, <http://easa.europa.eu/rulemaking/rulemaking-directorate.php> (last visited Nov. 3, 2011).

²⁸ See INTERNATIONAL CIVIL AVIATION ORGANIZATION, http://www.icao.int/icao/en/strategic_objectives.htm (last visited Nov. 3, 2011).

3. Applicability of international conventions on air law to suborbital flights

International air law plays a significant role in the air transport industry for several key reasons. First, it creates uniformity of standards for the safety and security of international air transportation. Secondly, it provides a remedies framework for claimants that have been injured due to an accident. Lastly, it sets liability limits for the airlines when an accident occurs resulting in injury/damage to the passenger/cargo. Consequently, international air law is comprised of a series of international agreements representing the various evolving issues presented in the air transportation industry and technological developments. Two main treaties on air law provide the underlying legal framework for international aviation issues: the Convention on International Civil Aviation (Chicago Convention)²⁹ signed in Chicago on December 7, 1944, and entered into force on April 4, 1947, and the Warsaw Convention *supra*.

The purpose of the Chicago Convention “was to design a blueprint for the world-wide regulation of post-war international civil aviation”³⁰ and provide a uniform framework establishing the freedoms of the air, rights, and participation conditions for all State Parties. The Convention, which was originally signed by fifty-two states, included two key additional agreements: the International Air Services Transit Agreement (IASTA) and the International Air Transport Agreement (IATA).³¹ Since 1944, several other Protocols and Annexes (including Industry Standards) have been added to the Chicago Convention system. As of 2011, the Chicago Convention has been reviewed nine times, with corrigendums added in 2007 and 2010, and currently claims 190 contracting State Parties.³²

²⁹ The Convention on International Civil Aviation, Dec. 7, 1944, 15 U.N.T.S. 295, ICAO Doc. 7300/5, 61 Stat.1180, T.I.A.S. No. 1591 [hereinafter Chicago Convention].

³⁰ P.P.C. HAANAPPEL, THE LAW AND POLICY OF AIR SPACE AND OUTER SPACE 43 (2003).

³¹ I.H.P. DIEDERIKS-VERSCHOOR, AN INTRODUCTION TO AIR LAW 14-16 (2006).

³² ICAO Documents, <http://www.icao.int/icao/net/dcs/7300.html> (last visited Nov. 3, 2011).

The Warsaw Convention governs contract conditions of carriage for international air transportation, including documentation requirements (e.g. passenger tickets, air waybills) and established a system of limited liability for the airlines with regards to passengers and cargo for death, personal injury, loss, damage, and delay.³³ The Convention works by placing a presumption of fault for damage with the air carrier.³⁴ The air carrier may compensate the claimant under the limited liability scheme, or it may rebut the claim by proffering evidence that it did take "all necessary measures" to avoid the accident which caused the damage.³⁵ However, States have discretion in interpreting many of the terms in the Treaty provisions. This is significant because these differences in interpretation can often indicate whether the Warsaw regime even applies to the case, and can affect the outcome of the case depending on the *lex loci*, the *lex situs* where applicable, and the legal system.³⁶

Subsequent amendments and protocols to the Warsaw Convention include the 1999 Convention for the Unification of Certain Rules for International Carriage by Air, which came into force in 2003 (Montreal Convention).³⁷ This Convention effectively updated the liability system provided under the Warsaw regime.³⁸ The Guadalajara Convention of 1961 for the Unification of Certain Rules Relating to International Carriage by Air Performed by a Person Other than the Contracting Carrier (Guadalajara Convention)³⁹ attempted to extend contractual liability to agents of air carriers, like travel agents. The specific interest of this Convention was to cover charter flights.⁴⁰ However, this Convention has not been widely signed or ratified.

³³ DIEDERIKS-VERSCHOOR, *supra* note 31, at 100.

³⁴ *Id.* at 117.

³⁵ Grallert, *supra* note 24. Hobe, *supra* note 24.

³⁶ DIEDERIKS-VERSCHOOR, *supra* note 31, at 116.

³⁷ The Convention for the Unification of Certain Rules for International Carriage by Air, May 28, 1999, ICAO Doc 9740 [hereinafter Montreal Convention].

³⁸ DIEDERIKS-VERSCHOOR, *supra* note 31, at 102-103.

³⁹ Convention Supplementary to the Warsaw Convention for the Unification of Certain Rules Relating to International Carriage by Air Performed by a Person Other than the Contracting Carrier, Sept. 18, 1961, 500 U.N.T.S. 31, ICAO Doc. 8181[hereinafter Guadalajara Convention].

⁴⁰ DIEDERIKS-VERSCHOOR, *supra* note 31, at 102.

The United States only signed the 1999 Montreal Convention, thus this is the binding treaty on the US with respect to the air carrier's duties and liability limits for international air accidents. Whereas when the western European States signed the Convention, they accepted it as a replacement of the earlier 1929 Warsaw Convention system. The European Community also promptly adopted the Montreal Convention⁴¹ and subsequently implemented measures applying the new provisions to domestic and international flights within the European Union.⁴²

With regard to commercial suborbital flights, the Montreal Convention regime would only apply to a suborbital flight under the current provisions if: 1) there is an international carriage element to the flight, and 2) if the suborbital configuration is (a) deemed to be an "aircraft" and (b) operated for transportation/air carriage purposes (c) for reward. If the regime were to apply this would raise questions concerning the validity of passenger liability waivers and any conflicts concerning the freedom to contract under the applicable laws. Some experts advise that the Warsaw/Montreal regime should apply to the suborbital flight up until the time the RLV is separated from the carrier plane, but not after, and that it still must satisfy the international carriage requirement.⁴³

Until an international consensus is reached on this issue, the national legislation of the State where suborbital flight activities are to take place, or the jurisdiction with supervisory

⁴¹ Press Release, ICAO, ICAO News Release, La Convention de Montréal de 1999 Entrera Prochainement en Vigueur dans Toute la Communauté Européenne et en Norvège [The Montreal Convention of 1999 Will Soon Come in Force Throughout the European Community and Norway], ICAO Press Release PIO 05/04 (Apr. 29, 2004), http://www.icao.int/icao/en/nr/2004/pio200405_f.pdf.

⁴² See Council Dec. 2001/539/EC of 5 April 2001 on the conclusion by the European Community of the Convention for the Unification of Certain Rules for International Carriage by Air (the Montreal Convention).

⁴³ See Grallert et al., *supra* note 24. Hobe, *supra* note 24. Note that the Montreal Convention, Article 1, defines "international carriage" as "any carriage in which, according to the agreement between the parties, the place of departure and the place of destination, whether or not there be a break in the carriage...are situated either within the territories of two States Parties [to the Convention], or [other agreed State not a party]...". Essentially, this means that the applicable flight must involve a stopping place in two different State territories. This element is not present in the current suborbital space flight proposal.

authority, would determine whether international air law would even apply to the suborbital flight. This author does not believe that the Warsaw/ Montreal regime would be applicable under the current proposals of space companies, such as Virgin Galactic, for spaceport operations and suborbital flights. Only if passengers were to board the carrier plane itself, and an international carriage component was added to the flight route, then there may be a question of the applicability of these conventions to the passengers onboard the aircraft. However, the liability regime provided under the Warsaw and supplementary Conventions currently does not apply to space objects nor does it apply to space related activities.

Other questions of Warsaw/ Montreal applicability may arise for territories or constituencies of EU states, such as the former Dutch Antilles, with regard to EC regulations. Specifically, if the territory is covered under the same legislative framework of the EU state and involve Community registered technology, there may be a link in the applicability of Community regulations to the country activities. Another factor to be considered may be whether the European state signed the treaty/EC regulation on behalf of the entire kingdom or merely on its own behalf.

4. Geographic location of the flight

The basic principle that every State has sovereign authority over its territory and over the airspace above its territory was codified in Article 1 of the Chicago Convention. Consequently, any flights conducted solely from within the territory of a State, is the responsibility of that State. In application this indicates that suborbital flights that commence and end solely within the airspace of the State, should remain solely within the jurisdictional boundaries of that territory. Thus, not triggering State obligations under international air law. The same applies to non-stop flights conducted from within national airspace and over international waters (high seas), and returning to the same local point of origin. This non-stop element is significant, because if the carrier plane or RLV were to return to a different point of origin this supports the presupposition that the air-

/spacecraft is acting as an air carrier, and therefore, may trigger the application of the international air law conventions.

In situations where the flight path crosses other island territories or States, consideration for international law, bilateral agreements, and space law must be taken. In some cases, like the European Union, Community aircraft need not ask permission to enter the airspace of another Community member for aviation purposes. Generally, however, State sovereignty implicates two distinct considerations when conducting suborbital space flights: the airspace regulations of the second State, and the space policy of the second State. The importance of this issue arises in the fact that not all States have a national space legislation or regulatory framework to govern the launch or re-entry of an air-launched or rocket launched RLV, which it would be obliged to supervise under the Outer Space Treaty, since the activity is arising from its territory.

Alternatively, the State/territory may have a negative or non-space activities policy. Meaning, the State has made the determination that it is in its best interests not to conduct any national space activities, and not to permit others to conduct space activities from its territory(s) either. Consequently, an air launch over this State/territory would not be allowed. An example of this situation is in the former Dutch Antilles, where Curacao is keen on constructing a spaceport for commercial suborbital space activities, whereas its neighbor, Aruba, has stated its intention to exclude space activities from its territory.⁴⁴ Thus, air launches must avoid the neighboring airspace of Aruba.

C. Nationality

The international principle of a State's sovereign right to exercise jurisdiction over nationally registered aircraft was first codified in Article 6 of the 1922 Paris Convention Relating to the Regulation of Aerial Navigation (Paris Convention),⁴⁵ and

⁴⁴ See the Netherlands' Space Activities Act, Explanatory Memorandum (June 13, 2006) [hereinafter Dutch Explanatory Memorandum] (unofficial translation) (on file with author).

⁴⁵ Convention Relating to the Regulation of Aerial Navigation, Oct. 13, 1919, 11 LNTS 173 [hereinafter Paris Convention].

has subsequently been reiterated in a number of international air law agreements.⁴⁶ This is an extension of the principle of “quasi-territory” as applied to sea vessels. The significance of this principle lies in the air-/sea vessel’s right to protection and jurisdictional authority of the State of registry regardless of its physical location around the globe.

The Chicago Convention also articulated the nationality principle in terms identical to the Paris Convention. Specifically, Article 17 of the Chicago Convention clearly stipulates that aircraft have the nationality of the State where it is registered. Additionally, Article 18 provides that only one State of registry can exist at any given time. Articles 19 through 21 provide for the transfer of aircraft registration between States, and delineate the notification requirements and procedures to include the aircraft markings and information to be given to ICAO. The Chicago Convention also took into account regional or joint cooperation for the operation and registration of aircraft. More specifically, under the Chicago Convention regional aviation authorities may create a joint register for all the States involved and the single State marking on the aircraft may be substituted for a communal marking, etc.⁴⁷

The prime importance for identifying the State of registry for an aircraft/carrier plane is the implication of State rights, responsibility, and especially liability for the State of Registry over its nationals and aerospace activities. Traditionally, nationality also confers on the flag State the right to participate in aviation accident investigations or to undertake criminal or civil matters arising from onboard the aircraft or aviation related activities. The relevance and liability under the principle of nationality with regard to commercial suborbital flights may particularly concern instances where there are 1) multi-national enterprises and joint ventures; 2) where flight activities are

⁴⁶ See DIEDERIKS-VERSCHOOR, *supra* note 31, at 22-23.

⁴⁷ Such was the case in *Air Afrique*, a regional African air carrier, in 1961. *Id.* at 23-24.

conducted over international territory--air, sea, or land; and 3) aircraft leasing.⁴⁸

Multinational corporations

Another emerging issue in the commercial space sector is multi-national corporations. These companies raise particular issues of jurisdiction and how to apply international conventions based on State party signatories. This issue is also heightened when the launch activities occur in international territory such as on the high seas or in international air space, which are areas of non-jurisdiction. Clarity of jurisdictional authority is pertinent to commercial space flight as under the Outer Space Treaty space activities must occur under the supervision of an authorizing State.

A prime example of this issue is embodied in the Sea Launch case. A multinational corporation, created in April 1995, Sea Launch was established to provide launch services to place commercial payloads into Earth orbit via a sea-based launching system.⁴⁹ The company was organized and registered in the Cayman Islands. However, the US partner, Boeing, maintains launch operation facilities in Long Beach, California.⁵⁰

The predominant questions raised by this scenario include: who is the appropriate or supervising State in a multi-national corporation? Most importantly, who is the launching State for purposes of international responsibility and liability? Who is the State of registration? Who is the procuring State? And, how many and from whom will national permits and licenses be required? Moreover, permits, licenses, or restrictions will inevitably vary under different national laws and for different par-

⁴⁸ It is possible, however, that issues arising from a lease may be curable through specific contract provisions.

⁴⁹ The partner corporations were: the US Boeing Commercial Space Company at 40% ownership, Russian RSC Energia at 25%, Norwegian Kvaerner Maritime at 20%, and two aerospace companies from the Ukraine, Production Association Yuzhmashzavod and M.K.Yangel Design Bureau Yuzhnoye at 15%. See *The Sea Launch Partnership*, ENERGIA, <http://www.energia.ru/english/energia/sea-launch/partner.html> (last visited Nov. 3, 2011).

⁵⁰ See *Cruising to Orbit*, SEA LAUNCH, <http://www.sea-launch.com/slfacilities.htm> (last visited Nov. 3, 2011).

ties, for instance, launch procurers versus actual launching companies. This results in the possibility for forum shopping and allowing for discrepancies in licensing standards and procedures obtainable from less restrictive/ regulated States.

Sea Launch was the first of its kind with regard to commercial space ventures and consequently raised many theoretical and academic questions as to the multiplicity of possible launching partners. In fact, some have argued that incorporation in the Cayman Islands placed the corporation under the jurisdiction of the United Kingdom.⁵¹ But this debate remained mostly academic because, while, generally, the place of incorporation will provide for *in personam* jurisdiction, this issue became moot when Boeing/Sea Launch established a home port in California and received a launch operator license from the Federal Aviation Administration (FAA), clearly putting Boeing/Sea Launch under the jurisdiction and authority of the United States. Moreover, in July 1998, the US exercised jurisdiction over Boeing/Sea Launch when technical information was exported (shared) with its partners in violation of the US International Traffic in Arms Regulations (ITAR).⁵² Thus, US long-arm jurisdiction extended over Boeing despite the diverse places of business and the foreign nationality of the ship/sea platform.⁵³ It is also significant to note that corporate majority ownership did not exist here. It was a US company with a controlling interest in a multinational corporation involved in launch activities taking place mostly outside US territory. This highlights the broad scope of the US launch license regime as applicable to US citizens and entities whose activities extend abroad.

⁵¹ In 1998 the UK extended its 1996 Act on Outer Space Activities to apply to the Cayman Islands for particularly this purpose. See JULIAN HERMIDA, *LEGAL BASIS FOR A NATIONAL SPACE LEGISLATION* 125 (2004).

⁵² The State Department withdrew Boeing's export license pending investigation for two months, but reinstated it after Boeing paid part of the \$10 million fine, and promised to put the rest towards implementation measures for ensuring export compliance. See Press Release, Boeing, State Department Reinstates Sea Launch License (Sept. 30, 1998), http://www.boeing.com/news/releases/1998/news_release_980930c.html.

⁵³ See e.g. Jim Wilson, *Sea Launch*, 176 (8) *POPULAR MECHANICS* 67 (Aug. 1999). Note that Boeing built the Sea Launch platform and the operation control ship, but registered both of them in Monrovia, Africa, not in the United States, adding further complexity to the issue.

D. Right of innocent passage

Air law has its basis in traditional maritime law and a firmly established principle of the law of the sea is the *right of innocent passage* through territorial waters.⁵⁴ As such, innocent passage has been a time-honored right of seafarers for centuries past. In fact, the United Nations Conventions on the Law of the Sea specifically stipulate that coastal States have a duty not to hinder the innocent passage of foreign vessels moving through their territorial waters.⁵⁵ Naturally, not all passage is considered innocent. A vessel is granted innocent passage when its transit is not deemed “prejudicial to the peace, good order or security of the coastal State.”⁵⁶ A military warship may be denied transit rights within the territorial waters of a coastal State or archipelago, as its intentions may be deemed questionable under certain political circumstances. On the other hand, merchant vessels, cargo cruisers, and transportation vessels are routinely granted innocent passage through territorial waters.

Further comparison of maritime law with air and space law has instigated legal acknowledgement that the emergence of commercial space travel will likely require a similar concept to apply to national airspace. Since airspace is a particularly sensitive issue in today’s current environment, due to terrorist threats and national security issues, no international or national policies and regulations currently exist that grant innocent passage for space travel. While air routes are routinely negotiated between States for ordinary air transit needs, this issue has not yet been determined for commercial suborbital flight activities, which include both an air and space component to the flight.

⁵⁴ United Nations Convention on the Law of the Sea, art. 17, Dec. 10, 1982, U.N. Doc. A/CONF.62/122, 1833 U.N.T.S. 3, 21 I.L.M. 1261 [hereinafter UNCLOS III]; See also PHILLIP JESSUP, THE LAW OF TERRITORIAL WATERS AND MARITIME JURISDICTION 120 (1927).

⁵⁵ Convention on the Territorial Sea and Contiguous Zone, art. 15, Apr. 29, 1958, 516 U.N.T.S. 205; UNCLOS III, *supra* note 54, at art. 17.

⁵⁶ Convention on the Territorial Sea and Contiguous Zone, *supra* note 55 at art. 14(4); UNCLOS III, *supra* note 54, at art. 19.

The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects launched into Outer Space (Rescue Agreement)⁵⁷ deals with a variation of innocent passage for spacecraft, but only in cases of emergency where the situation calls for States to render assistance to astronauts and spacecraft in distress. In addition, it is not clear whether the Rescue Agreement applies to non-professional or civilian space flight participants (SFPs). Thus, the Rescue Agreement is not an adequate basis for relative authority to build upon a right of innocent passage for regular airspace use. A new regime or agreement is required specifically addressing the nature of commercial suborbital space flights and the function of RLVs. This is a ripe issue for international discussion, since some countries proposing to join the spaceport phenomenon, such as Curacao, Singapore, and the UAE have a limited territorial airspace, and thus, may by necessity or emergency require the use of another State's airspace to complete a commercial suborbital launch and reentry safely.⁵⁸

III. NATIONAL RESPONSIBILITY & LIABILITY

In accordance with the air and space law treaties, State Parties have a right to interpret treaty obligations and a duty to issue implementing legislation on the definitions, scope, and compliance mechanisms of incurred obligations. Or alternatively, a State may exclude the scope of the activities from its national regulatory framework. The following discussion highlights key definitions and topics determinable under national space law on suborbital flights.

⁵⁷ 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 [hereinafter Rescue Agreement].

⁵⁸ Initially, bilateral agreements may suffice such as those concluded by the US with Brazil and Spain for emergency shuttle landings. However, as the suborbital space transportation system develops an international regime would be more effective to deal with this issue and to standardize emergency principles and standards for rescue and emergency assistance.

A. Defining "launch"

A clear definition of "launch" is pertinent under any State space legislation. While a rocket launch is the traditional method, the dual nature of an air launch creates a different type of space launch operation. Functionally, air launches inherently combine air and space operations, while legally, the classification is not so clear. The primary factor to be determined is when the "launch" is deemed to take place for purposes of international law and State obligations, national State regulation, and for purposes of establishing the limits or parameters of liability waivers for commercial passengers. Consequently, the questions arise: Does the launch occur at the time the carrier plane leaves the spaceport runway? Or, does the launch occur when the RLV detaches from the carrier plane in flight?

A logical argument for launch in this scenario is that the launch only occurs at the time of separation of the RLV from the carrier plane. There are several reasons for this argument.

1. *Intent.* Any recognized definition of launch inherently incorporates an intention to place the launch vehicle, crew, flight participants, or payload from earth into a suborbital trajectory, Earth orbit, or otherwise in space. Whereas the aircraft is never intended to leave regular airspace, only the RLV is operated for this intention.

2. *Classification of Vehicle.* The RLV and carrier plane, when combined as one and flying in the regular airspace *may* be deemed to be an aircraft for purposes of air law and airworthiness certification under national and international aviation requirements. However, once separated, the carrier plane retains its classification as an aircraft, as it cannot be considered a "space object" on its own. Only an individual RLV fits this description. Therefore, the point of vehicle separation inherently changes the classification of the vehicle, marking it as the ideal point for determining a "launch."⁵⁹ In addition, the US specifically distinguishes the RLV from the aircraft classification by

⁵⁹ Hobe, *supra* note 24, at 443.

defining the RLV's "use of rocket propulsion for thrust, as opposed to wing-generated lift."⁶⁰

3. *Conflict of Legal Regimes.* A delimitation must exist between the applicability of air law and space law for purposes of regulation, licensing, supervision, liability, and passenger rights.⁶¹ An aircraft in flight cannot be deemed to be governed by international space law. Neither is it expedient for a defined space object to be governed by the international treaties on air law. One inherent conflict of law lies in the fact that air law is governed by the concepts of sovereignty and jurisdiction, whereas outer space is governed by a regime of non-sovereignty and non-jurisdiction.⁶² Moreover, the national and international regulatory and supervisory requirements differ depending on which regime applies. Consequently, the applicable legal regime turns on the classification of the vehicle.

4. *Liability.* The conflict of legal regimes is particularly obvious with regard to the international treaties concerning State and private (e.g. air carrier) liability for damage arising from the relevant air and space activities. Experts in this field have already acknowledged the potential conflict of which liability regime to apply if "launch" is deemed to take place at any time other than in the air.⁶³

To clarify, if the launch is deemed to take place at the moment the combined aircraft configuration takes off from the runway, then space law would attach to the aircraft—a vehicle never intended to leave airspace or to enter outer space—resulting in a conflict with the regular air law regime governing the aircraft's flight. For example, third party liability is governed by different legal regimes depending on the classification and location of the aircraft. The Rome Convention of 1952 on Damage Caused by Foreign Aircraft to Third Parties on the Sur-

⁶⁰ 49 U.S.C. § 70102(19), *transferred to* 51 U.S.C. § 50902 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

⁶¹ See e.g. I.H. PH. DIEDERIKS-VERSCHOOR & V. KOPAL, AN INTRODUCTION TO SPACE LAW 83-85 (3 ed. 2008).

⁶² Note that the two legal regimes may apply at the same time where two vehicles, an aircraft and a space object, are concerned. But experts agree that only one legal regime should apply to one vehicle at any given time. See Hobe, *supra* note 24.

⁶³ See *id.*

face⁶⁴ may apply where the configuration is deemed to be an aircraft, or the Liability Convention for Damage Caused by Space Objects will apply to the total configuration as a space object. Other liability discrepancies in regimes include insurance coverage requirements for aviation versus space activities. Some states, like Australia, may have no third party liability insurance requirement for aircraft, unlike mandatory insurance requirements in States like the US, or regions like Europe.⁶⁵ Under space law the launching State/appropriate State is held ultimately accountable for third party liability. Consequently, the definition of launch must be clarified for air launches.

B. Defining “space object”

No universal definition of “space object” currently exists. Thus, while the Liability and Registration Conventions stipulate that a “space object” “includes component parts of a space object as well as its launch vehicle and parts thereof,”⁶⁶ many of the existing national space legislations add a functional element to their definitions. The functional element defines the purpose of the vehicle: a vehicle that is launched or intended/destined to be launched into outer space. While such a definition may indeed be broad in scope, it is a legally sufficient description of RLVs for purposes of commercial suborbital space flights.

The classification of a spacecraft as a space object also triggers the registration requirement under the Registration Convention, and applicable national law, which would require the registration of a space object launched into space. Consequently, if a State determines that the RLV is a space object, and the scope of the national space legislation governs commercial human space activities (because some do not), then the State may be obliged under national and international law to register the RLV. In which case there are still two possible mechanisms for registration, as discussed previously, the Registration Conven-

⁶⁴ See Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface, Oct. 7, 1952, 310 UNTS 181, ICAO Doc. 7634.

⁶⁵ See Gallert et al., *supra* note 24, at 10.

⁶⁶ Liability Convention, *supra* note 10, at art. 1(d); Registration Convention, *supra* note 18, at art. 1(b).

tion and Resolution 1721. Thus, the applicable parties for registration remain at least one out of three categories: the launching State, the procuring State, or appropriate State (based on the corporation's nationality, launch locality or facility location).

Alternatively, a State may argue that the suborbital vehicle/RLV is not a space object but an aircraft. Here it may be argued that the suborbital vehicle is not intended for space purposes, in that the altitude of such flight does not reach sufficient altitude as to enter space. In this scenario national authorities could capitalize on the lack of a uniform consensus of where air space ends and outer space begins, and could deem the flight of the air-craft to be conducted solely within the airspace of the relevant territories or high seas. Therefore, reaching the crux of the issue, the State need not register the RLV under the applicable national and UN space object registries.

However, this argument fails with the application of the definition of launch to the physical flight activity. The use of a rocket engine on a RLV intended for the use of placing the object at the outer limits of airspace or beyond, under current space legislations and in industry practice, is recognized as a launch.⁶⁷ In fact, space law expert, Bin Cheng, has expounded on the Liability Convention's Article 1(b) definition on "launch activities," and reiterates its meaning as "the launching of space objects, including attempted launching."⁶⁸ Additionally, "space object", he says, "is the generic term used to cover spacecraft, satellites, and in fact anything that human beings launch or attempt to launch into space."⁶⁹ Essentially, this means a vehicle intended or attempted to be launched, is a "space object." Therefore, if an RLV is deemed to be "launched" by its physical char-

⁶⁷ In the US, for instance, the FAA has recognized the dilemma in reaching a definition of outer space and suggests outer space means "something more than orbit" but for purposes of suborbital space flights the FAA has stated, "[a]lthough a suborbital rocket does not reach the velocity necessary to orbit the Earth, the vehicle can reach altitudes sufficient to be considered outer space." Description of Final Rule and Discussion of Comments, Experimental Permits for Reusable Suborbital Rockets, 72 Fed. Reg. 17001, 17002 (Apr. 6, 2007).

⁶⁸ Bin Cheng, *International Responsibility and Liability For Launch Activities*, in *THE USE OF AIR AND OUTER SPACE COOPERATION AND COMPETITION* 182 (Chia-Jui Cheng ed., 1998).

⁶⁹ *Id.* at 160.

acteristics and purpose, then it becomes at the moment of launch, a “space object” for purposes of commercial suborbital space activities.⁷⁰

In fact, following decades of debate a conservative estimate of 100-110 km in altitude has repeatedly emerged as a good legal delimitation for marking outer space. If the RLV reaches around this altitude, arguments negating its status as a “space object” are weak.⁷¹ Regardless of the exact altitude that the RLV reaches or where space actually starts, for purposes of suborbital space flights it is quite certain from a technological and legal standpoint that an RLV, independently, is a vehicle intended for launch, and therefore should be deemed a space object.⁷²

C. Launch liability/insurance requirements

The right and duty to set launch liability and insurance requirements usually fall under the jurisdiction of the State where the space activities are taking place. Alternatively, the State of the corporation’s registration may also impose liability and insurance requirements on the corporation conducting or procuring the launch. Supranational requirements may also apply, such as, Community requirements imposed on EU air carriers. Other States, like the Netherlands, provide for a variable liability scheme, with insurance requirements to be determined on a case-by-case basis.⁷³ This is a beneficial approach for addressing a new and unprecedented industry. However, this

⁷⁰ See Grallert et al., *supra* note 24, and Hobe, *supra* note 24. (Hobe and Cloppenburg write, “[t]he space vehicle only becomes a ‘space object’ at the moment of separation from the aircraft, as the separation should be considered the launch. The aircraft retains its status....Suborbital vehicles using rocket propulsion for thrust should not be regarded as aircraft”). Grallert et al., *supra* note 24, at 11.

⁷¹ Cheng, *supra* note 68, at 163 (Cheng remarks, “...the conclusion must be that there exists already a rule of general international law recognizing the lowest perigee of any existing or past artificial earth satellites as marking the beginning of outer space. In absolute terms, this point may be put at 94km from the surface of the earth. Conservatively, the figure may be put at 100 or 110 km”).

⁷² Note that while the combined air carrier/RLV configuration is flying in regular airspace, some experts argue that the rules regarding air carriage should apply. But once the RLV is launched, the RLV becomes a space object, thereby, triggering the space law regime.

⁷³ Dutch Explanatory Memorandum, *supra* note 44, at 15.

method also raises two points for caution that are worthy of mentioning. First, the amount to be determined by the appropriate authority must take into account what a company can reasonably obtain in insurance coverage for the suborbital activities. Secondly, this generalized approach may not provide adequate limitations (cap) on State indemnification, where applicable, for space activities conducted by the private entity.

The first point of caution is straightforward. The private human space transportation industry is new, and commercial suborbital space flights have yet to commence. Consequently, commercial space companies have limited options for finding insurance companies who will cover experimental and novel space activities, and as such, will have a limited choice of coverage. The United States has addressed this issue in its regulations. US legislation requires launch operators and licensees to have liability coverage based on the maximum probable loss (MPL), which usually implies operator liability of up to \$500 million. Then the government indemnifies any damage exceeding that amount up to \$1.5 billion. This US liability scheme applies to both rocket launches and air launches.

The second point pertains to the possibility of an accident, especially where it involves aspects of international liability and responsibility. If no cap is set on any State indemnification contribution, then the State risks being held fully liable for damages without recourse to the private entity/ license holder for reimbursement (usually from the license holder's insurance proceeds). While this issue may not pose a great danger to some States with limited or no commercial launch capabilities, it is still a noteworthy consideration.

Moreover, as in a traditional rocket launch, air launched suborbital flights still involve the same categories of parties. Liability requirements depend on the specific activities performed by each identifiable party and related risk assessment for the activity. Needless to say, different parties are necessarily involved in different aspects of the project, such as the administration, management, logistics, and physical operations of a spaceport and RLV. Thus, different liability requirements will

likely apply based on an activity-specific basis. Specifically, the four main parties to a regular launch include:⁷⁴ 1) launch service providers; 2) launch customers (usually, those who provide the satellite or payload); 3) launch facilities provider (the entity that provides the launch site and related service; usually, the launch facilities provider is a state government); and 4) Numerous other contractors and subcontractors of the above three groups.

With regard to spaceports and air launches for suborbital flights, the same groups may be distinguished. For illustration purposes, Virgin Galactic would be a launch service provider, providing launch services onboard *SpaceShipTwo*. The launch customer would be the launch procurer/payload owner or the commercial SFP. The launch facilities provider may be Spaceport America in New Mexico. The contractors and subcontractors, a large portion of any space business endeavor, may include spaceport ground service providers, air traffic controllers, aircraft and spacecraft maintenance crew, spaceport shop workers, transportation services to and from the spaceport, the RLV pilot and crew, and so forth.

In addition, under the US space regime, the US also requires cross-waivers between the launch operator, contractors, and subcontractors. This waiver scheme does not eliminate the need for liability protection, but acts to enhance collaboration by providing a system of self-responsibility amongst parties. Traditionally, this cross-waiver system is based on the “best efforts” of the parties.⁷⁵ Only the SFP is excluded from the traditional liability protections of a passenger, as well as additional Government liability protection through the personal cross-waiver and indemnification requirements.

D. Environmental protection

The environmental implications of conducting any type of space activity are also a major consideration. The mechanics of flight and space transportation inherently involve environ-

⁷⁴ KAYSER, *supra* note 5, at 262.

⁷⁵ *Id.* at 151-52.

mental risks and legal issues pertaining to environmental depletion of the ground area, natural resources and vegetation, environmental contamination, noise disturbances and nuisance, etc. In addition to flight related risks, the inescapable consequences of a building spaceport infrastructure to support additional commercial enterprises (e.g. stores and restaurants) will bring further environmental damage to the location by bringing additional contamination from mass parking lots and vehicles, spaceport commercial activities, and pollution from ordinary human behavior (e.g. littering), to name just a few. The situation can become further strained for spaceport locations situated on islands, which have limited resources in terms of airspace, land, noise barriers, as well as native animal life and vegetation. Desert locations also implicate natural resource issues, such as water access and environmental changes due to the scope of the proposed space activities.

States regulating spaceport and suborbital activities need to take into account the environmental impact that such activities will produce. Existing national or local environmental law and property law may form the basis for establishing basic parameters for environmental provisions in the space licensing regime. It is also crucial for the spaceport operator to confirm the appropriate restrictions, regulations, and zoning requirements on the use and development of land in the area to include expanding any existing and future infrastructure. Special attention should also be given to regulations pertaining to any hazards, harmful conditions, or by-products that may develop as a result of spaceport ground operations, infrastructure building and maintenance, noise, nuisance (e.g. vibration), emissions, etc. In the United States, the Office of Commercial Space transportation (FAA/AST) established an environmental assessment and review as part of the launch site operator license application. In this case, the operator must not only demonstrate that the proposed activities do not pose an unacceptable danger to the natural environment, but the delegated authorities also supervise the commercial launches in order to ensure environmental and regulatory compliance. Australia likewise has a similar environmental policy in place under its national space legislation.

IV. UNITED STATES

The current US commercial space legislation derives from a plethora of government regulations and agencies spanning the last fifty years. The evolution of US space legislation and authoritative bodies trends the continuous development of technology and science, as well as the growth of commercial interests in this industry sector. The first significant piece of national space legislation arose with the National Aeronautics and Space Act of 1958 (NAS Act). This Act provided for the creation of NASA and articulated the US official policy on the peaceful use of outer space. It also formulated NASA's mission objective to encourage and promote public knowledge, participation of the scientific community and conduct aeronautical and space activities.⁷⁶

However, as time passed, an increase in commercial and private participation in space related activities called for updated legislation and commercial licensing schemes. Congress acknowledged NASA's inherent limitations in this respect due to its nature as a government agency.⁷⁷ In 1985, President Reagan initiated the establishment of the Office of Commercial Space Transportation (OCST) with the particular mandate to regulate private rocket launches for commercial purposes, especially with regard to the emerging telecommunications industry. In 1995, the OCST was merged under the FAA with a new title, Office of the Associate Administrator for Commercial Space Transportation (FAA/AST).⁷⁸ One decade later, under the Clinton Administration, the first Commercial Space Act was passed in 1998, which among other things, granted the FAA the definitive authority to regulate space launches and landings, although this pertained to expendable launch systems only.⁷⁹

⁷⁶ See National Aeronautics and Space Act of 1958, *transferred to* 51 U.S.C. § 20101 et seq. by Pub. L. No. 111-314, 124 Stat. 3328 (Dec. 18, 2010); *See also*, Harvard College, *Commercialization of Space Commercial Space Launch Amendments Act of 2004*, 17 HARV. J.L. & TECH. 619 (2004).

⁷⁷ See Harvard College, *supra* note 76, at 624-626.

⁷⁸ *Id.* at 626.

⁷⁹ *Id.*

To deal with the new commercial and technological phenomena that emerged with the concept and practical capability of commercial human (suborbital) space flight Congress proceeded to amend and update the law as required. Thus, the Commercial Space Launch Amendments Act (CSLAA) was passed in 2004. Notable updates in this Act include: recognition of human space flight as a distinctive industry from commercial payload launches; updated definitions on launch vehicles, reentry, and flight participants; and licensing requirements for experimental and operational permits.⁸⁰ As a result, the CSLAA of 2004 governs all commercial space launch activities, with the particular inclusion of suborbital spacecraft and human flight activities. Moreover, the jurisdictional authority for space related activities conducted in the United States, or by US nationals, currently fall under purview of the FAA/AST.

A. *Scope and key definitions*

The US legislation⁸¹ clearly outlines its jurisdiction and scope with regard to applicability to persons and entities. The FAA also expounded on the issue, stating that the statute “requires a US citizen to obtain a license or permit to launch, regardless of whether he does so outside the United States or not.”⁸² A citizen of the United States is defined in 49 USC §70102 (1) as:

- (A) An individual who is a citizen of the United States;
- (B) An entity organized or existing under the laws of the United States/or a State; or
- (C) An entity organized or existing under the laws of a foreign country if the controlling interest (as defined by the Secretary of Transportation) is held by an individual or entity described in sub-clause (A) of (B) or this clause.

⁸⁰ *Id.* at 627.

⁸¹ Note that as of December 2010, all US Space legislation has been consolidated and transferred to a new Title 51 of the United States Code. The next official Code publication is expected to occur in 2012.

⁸² Experimental Permits for Reusable Suborbital Rockets, *supra* note 67, at 17003; 49 U.S.C. § 70104 (a), transferred to 51 U.S.C. § 50904 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

Note that the US entity need not be the majority shareholder in a multinational enterprise, it need only have a controlling interest.⁸³ An example of this can be seen in the Sea Launch venture, where Boeing, a US corporation had a controlling but not majority interest in the corporation (at forty percent). Consequently, where a multinational corporation is concerned, the United States legislation is clear in as to its jurisdiction over US controlling shareholders and launch activities conducted by US nationals.

Moreover, the scope of the license requirements is stipulated under §70104 (a) Restrictions on launches, operations and reentries. The pertinent issues presented under this section are summarized as follows:

A license/ permit is required for:

1. In the US: Any person to launch a launch vehicle/ operate a launch site/ operate a reentry site/ reenter a reentry vehicle.

2. Outside the US: Any US citizen to conduct the above activities.

3. US Waiver: A waiver for the US requirement to obtain a license may be possible when the above stated space activity(s) occurs outside the US or foreign country territory and an agreement exists between the States that the foreign State has jurisdiction over the launch/operation/reentry activity. Alternatively, where the activity occurs within the territory of the foreign State and an agreement exists between the States as to the United States right to exercise jurisdiction for the related launch/ site operation/ reentry activities.⁸⁴

Key definitions

Definitions provide the scope and parameters for implementing and applying the regulation and often aim to clarify otherwise ambiguous terms. The following are key terms essential to commercial suborbital space regulations and activities:

⁸³ For further definition of “controlling interest” see 14 C.F.R. § 401.5 (2011).

⁸⁴ 49 U.S.C. § 70104(a) transferred to 51 U.S.C. § 50904 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010); 14 C.F.R. § 413.3.

- *Crew* – Crew is “any employee of a licensee or transferee, or of a contractor or subcontractor of a licensee or transferee, who performs activities in the course of that employment directly relating to the launch, reentry, or other operation of or in a launch vehicle or reentry vehicle that carries human beings.”⁸⁵

- *Launch* – Launch “means to place or try to place a launch vehicle or reentry vehicle and any payload, crew, or space flight participant from Earth--(A) in a suborbital trajectory (B) in Earth orbit in outer space; or (C) otherwise in outer space, including activities involved in the preparation of a launch vehicle or payload for launch, when those activities take place at a launch site in the United States.”⁸⁶

- *Launch site* – A launch site is “the location on Earth from which a launch takes place (as defined in a license the Secretary issues or transfers under this Chapter) and necessary facilities at that location.”⁸⁷ Although, not a regulatory definition, the FAA also defines “commercial spaceport” as a “private or state-operated launch, re-entry, and processing site.”⁸⁸

- *Launch vehicle* – A launch vehicle is “(A) a vehicle built to operate in, or place a payload in, outer space; and (B) a suborbital rocket.”⁸⁹

- *Payload* – A payload is “an object that a person undertakes to place in outer space by means of a launch vehicle or reentry vehicle, including components of the vehicle specifically designed or adapted for that object.”⁹⁰

⁸⁵ 49 U.S.C. § 70102(2) transferred to 51 U.S.C. § 50902 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

⁸⁶ 49 U.S.C. § 70102(4), transferred to 51 U.S.C. § 50902 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010); 14 C.F.R. § 401.5 (the CFR states that for a license, “launch begins with the arrival of a launch vehicle or payload at a U.S. launch site” whereas for a permit, the four part test is applied as discussed below).

⁸⁷ 49 U.S.C. § 70102(7), transferred to 51 U.S.C. § 50902 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010); 14 C.F.R. § 401.5.

⁸⁸ FAA website, *Commercial Space Transportation Industry*, FEDERAL AVIATION ADMINISTRATION, http://www.faa.gov/about/office_org/headquarters_offices/ast/industry/ (last visited Nov. 3, 2011).

⁸⁹ 49 U.S.C. § 70102(8), transferred to 51 U.S.C. § 50902 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010); 14 C.F.R. § 401.5.

⁹⁰ 49 U.S.C. § 70102(10), transferred to 51 U.S.C. § 50902 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

• *Reentry* – Reentry means “to return or attempt to return, purposefully, a reentry vehicle and its payload, crew, or space flight participants, if any, from Earth orbit or from outer space to Earth.”⁹¹

• *Reentry Vehicle* – A reentry vehicle is “a reusable vehicle designed to return from Earth orbit or outer space to Earth, or a reusable launch vehicle designed to return from Earth orbit or outer space to Earth, substantially intact.”⁹²

• *Suborbital rocket* – A suborbital rocket is defined as “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 ascent.”⁹³

• *Suborbital trajectory* – Suborbital trajectory is defined 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.”⁹⁴

• *Space flight participant* – A space flight participant is “an individual, who is not a crew, carried within a launch vehicle or reentry vehicle.”⁹⁵

B. Licenses and Permits

There are several types of legal authorization provided for under the CSLAA. First, the permit or license may be based on the characteristics of the launch vehicle in question. Traditionally, launch vehicles were expended in due course after launch.

⁹¹ 49 U.S.C. § 70102(13), transferred to 51 U.S.C. § 50902 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

⁹² 49 U.S.C. § 70102(16), transferred to 51 U.S.C. § 50902 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

⁹³ 49 U.S.C. § 70102(19), transferred to 51 U.S.C. § 50902 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

⁹⁴ 49 U.S.C. § 70102(20), transferred to 51 U.S.C. § 50902 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010). “The impact point is identified as the location on Earth where a vehicle would impact if it were to fail, calculated in the absence of atmospheric drag effects.” Experimental Permits for Reusable Suborbital Rockets, *supra* note 67, at 17002; 14 C.F.R. § 401.5; See also 14 C.F.R. § 437.3 on the similar definition for Reentry Impact Point.

⁹⁵ 49 U.S.C. § 70102(17), transferred to 51 U.S.C. § 50902 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

Thus, the previous licensing regimes covered ELVs only. However, due to innovative technology the scope of the Act has been amended to include activities performed by a reusable launch vehicle (RLV). Secondly, the type of legal authorization depends on the classification of the activity, for initial operations there is an experimental permit with more relaxed standards for a restricted set of purposes. Launch licenses are available for regular and standard launches, and established under strict standards. Operator licenses regulate operation activities with strict requirements.

1. Experimental permits

The FAA issued amendments to the 2004 CSLAA licensing regulations, effective 5 June 2007, “establishing application requirements for an operator of a manned or unmanned reusable suborbital rocket to obtain an experimental permit.” Moreover, the FAA delineated the “operating requirements and restrictions on launch and reentry of reusable suborbital rockets operated under a permit.”⁹⁶

According to the FAA, the new experimental permit is designed to “provide an alternative to licensing for operators of reusable suborbital rockets.”⁹⁷ However, the permit is not a prerequisite to obtaining an operator’s license, but the FAA holds that the “data obtained while operating under a permit may be useful in applying for a license.”⁹⁸ Moreover the eligibility requirements for an experimental permit are limited for the sole purposes of:

- Research and development to test new design concepts, new equipment, or new operating techniques,
- Showing compliance with requirements to obtain a license under 49 USC §701, or
- Crew training before obtaining a license for the same design. 49 USC §70105(a)(d).⁹⁹

⁹⁶ Experimental Permits for Reusable Suborbital Rockets, *supra* note 67, at 17001.

⁹⁷ *Id.* at 17002.

⁹⁸ *Id.* at 17003.

⁹⁹ *Id.* at 17002; 14 C.F.R. § 437.5.

The final requirement is that the RLV must be flown in a suborbital trajectory.¹⁰⁰ Moreover, special notice should be taken of the prohibition on obtaining an experimental permit for commercial purposes, meaning the receipt of compensation for transporting payloads or SFPs. This permit is intended solely for experimental purposes, meaning research and development.¹⁰¹

The regulatory scope of the experimental permit is to authorize the launch and/or reentry of a reusable suborbital rocket, to include the “pre- and post-flight ground operations” necessary for flight safety.¹⁰² There are no restrictions on the number of experimental permits that the FAA can issue.¹⁰³ Moreover, the duration of the permit lasts for one year from date of issue, and is renewable on an annual basis.¹⁰⁴ Lastly, an experimental permit is non-transferable,¹⁰⁵ and the FAA reserves the right to modify or amend the permit terms and conditions at any time to ensure regulatory compliance.¹⁰⁶

The requirements to obtain an experimental permit include providing proof of documentation and information on five pertinent points. In summary, the requirements are:

- *Program description*, including a flight test plan and operational safety documentation.¹⁰⁷
- *Applicable Regulations*:
 - o Environmental – the applicant must provide sufficient information to enable the FAA to analyze the environmental impacts associated with suborbital flights, so as to ensure compliance with the National Environmental Policy Act.¹⁰⁸

¹⁰⁰ Experimental Permits for Reusable Suborbital Rockets, *supra* note 67, at 17002; 49 U.S.C. § 70102, *transferred to* 51 U.S.C. § 50902 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

¹⁰¹ Experimental Permits for Reusable Suborbital Rockets, *supra* note 67, at 17010; 14 C.F.R. § 437.91.

¹⁰² 14 C.F.R. § 437.7.

¹⁰³ 14 C.F.R. § 437.9.

¹⁰⁴ 14 C.F.R. § 437.11.

¹⁰⁵ 14 C.F.R. § 437.15.

¹⁰⁶ 14 C.F.R. §§ 405.3, 437.13.

¹⁰⁷ 14 C.F.R. §§ 437.23 - 437.95.

¹⁰⁸ 14 C.F.R. § 437.21(b)(1).

- o Financial – the applicant must provide sufficient information to enable the FAA to conduct a MPL assessment.¹⁰⁹

- o Human Space Flight – the applicant must prove compliance with the regulations (provisions are specified) in order to propose flights with crew and SFPs onboard.¹¹⁰

- *Safety Approval*¹¹¹

- *Pre-certification Inspection* – before issuing a permit, the FAA requires the RLV to be made available for inspection. The FAA will make a determination whether the RLV has been constructed in accordance with the description listed in the application.¹¹²

- The FAA has 120 days to make a determination on issuing an experimental permit once it has received a complete application.¹¹³

Launch and reentry

In line with the licensing authority permitting the reentry of RLVs, the FAA has also legally stipulated the authority for reentry under the experimental permit regime and stated that reentry may be allowed under a single flight permit or license.¹¹⁴ Specifically, the FAA has marked a distinction between “launch” and “reentry” authorization. Traditionally, the FAA included the entire flight journey in the launch, because it did not receive the authority for reentry activities until 1998.¹¹⁵ Now the two are distinguished, although for regular US based suborbital flights, the permit will include authorization for both launch and reentry.

The definition of “launch” has been clarified specifically for the experimental permit. The FAA applies the following four-part test for determining “launch” activities: 1) activities that

¹⁰⁹ 14 C.F.R. § 437.21(b)(2).

¹¹⁰ 14 C.F.R. § 437.21(b)(3).

¹¹¹ 14 C.F.R. § 437.21(c).

¹¹² 14 C.F.R. § 437.21.

¹¹³ 14 C.F.R. § 413.15.

¹¹⁴ Experimental Permits for Reusable Suborbital Rockets, *supra* note 67, at 17002; 14 C.F.R. § 437.

¹¹⁵ Experimental Permits for Reusable Suborbital Rockets, *supra* note 67, at 17002 (See particularly footnote 3).

are closely proximate in time to flight; 2) entail critical steps preparatory to initiating flight; 3) are unique to space launch; and 4) are inherently so hazardous as to warrant the FAA's regulatory oversight.¹¹⁶ However, two things are still vividly unclear from the rule: 1) whether this extended definition of "launch" will be extended to the license as well and 2) whether the carrier plane's takeoff from the runway constitutes a "launch" or whether the in-air rocket launch is legally deemed to constitute the "launch." If the runway takeoff is deemed to be a "launch" under the four-part test, this convolutes the issue further, as the carrier plane does not meet the regulatory definition of a "launch vehicle" or derivative definition of "space object." Only the suborbital rocket can meet those definitions. Thus, the issue of "launch" in an air launch scenario still requires further regulatory specificity and clarification.

For reentry purposes, launch termination occurs "after reaching apogee if the flight includes a reentry, or otherwise after vehicle landing or impact on Earth and after activities necessary to return the reusable suborbital rocket to a safe condition on the ground."¹¹⁷ The FAA intentionally distinguished the reentry permit from a launch permit in anticipation of commercial suborbital flights launched "from a foreign country by a foreign entity" wishing to land in the United States.¹¹⁸ Note, however, that this scenario transfers the status of the flight into a suborbital hop, which potentially raises additional legal issues on international carriage as discussed previously.

Airworthiness certificates

The requirements for aircraft/suborbital rocket permits and licenses are based on the definition of the intended activity.¹¹⁹ Thus, where an initial stage flight uses solely jet power for test flight purposes, a special "experimental airworthiness certificate" may be obtained instead of an experimental permit.¹²⁰

¹¹⁶ *Id.* at 17011; 14 C.F.R. § 401.5.

¹¹⁷ 14 C.F.R. § 401.5.

¹¹⁸ Experimental Permits for Reusable Suborbital Rockets, *supra* note 67, at 17002.

¹¹⁹ See above for the definitions for "suborbital trajectory" and "suborbital rocket."

¹²⁰ Experimental Permits for Reusable Suborbital Rockets, *supra* note 67, at 17003.

However, this special airworthiness certificate is not a prerequisite for experimental permit or operator license applications.

2. *RLV operating licenses*

There are two types of licenses for RLV operations: an “operator license” and a “launch- or reentry-specific license.” The license is intended to identify, “by name or mission, each activity authorized under the license.”¹²¹ The “operator license” may be a launch or reentry license, which authorizes “launches or reentries from one launch or reentry site within a range of operational parameters of launch or reentry vehicles from the same family or vehicles transporting specified classes of payloads or performing specified activities.”¹²² The operator license remains in effect for two years to five years, from the date of issue. The “launch- or reentry-specific license” (mission specific) authorizes “only a specific launch or reentry activity.”¹²³ This license will permit the operator to “perform multiple launches or reentries of the same or similar type.”¹²⁴ Moreover, termination of the authority takes effect 1) at the end of all launches/ reentries authorized under the license or 2) on the expiration date stipulated in the license, whichever occurs first.¹²⁵ Note that different requirements may be imposed based on whether the space vehicle is an RLV or and ELV.

The specific documents required under the RLV licensing regime are also highlighted on the FAA website. The regulatory procedure for both launch and reentry applications require the same seven steps:¹²⁶

1. Pre-application Consultation – serves to open a dialogue between the company and the FAA in order to familiarize the parties with the launch license proposal and the licensing process. The proposal should contain information on the following

¹²¹ 14 C.F.R. § 431; *Launch or Reentry Vehicles*, FEDERAL AVIATION ADMINISTRATION, http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_reentry/ (last visited Nov. 5, 2011).

¹²² *Launch or Reentry Vehicles*, *supra* note 121; 14 C.F.R. § 431.3(b).

¹²³ *Launch or Reentry Vehicles*, *supra* note 121; 14 C.F.R. § 431.3(a).

¹²⁴ *Launch or Reentry Vehicles*, *supra* note 121.

¹²⁵ *Id.*

¹²⁶ 14 C.F.R. § 431.

sections below, although this information may be submitted separately or all together. This pre-application consultation also allows the potential applicant to identify unique aspects of its proposal and establish a timeline for submitting the proposal.¹²⁷

2. Policy Review and Approval – during this interagency review, the FAA consults with the Department of Defense, Department of State, NASA, and other relevant government agencies to determine whether the launch license proposal affects national security, foreign policy interests, or international legal obligations.¹²⁸

3. Safety Review and Approval – determines whether the proposed activities can be conducted safely. The applicant must show that it understands the hazards involved, that it is responsible for public safety, and must demonstrate how it will perform the operations safely.¹²⁹ The analysis includes reliability of critical safety systems, risks to nearby public and public property, launch safety policies, communications systems and processes, key personnel qualifications. Additionally, a Flight Safety Plan and Post-Launch Report must be submitted.¹³⁰

4. Payload Review and Approval – the FAA reviews and determines whether the license applicant, payload owner, or operator has obtained all required licenses, authorizations, and permits (unless the payload is exempt from review). Additionally, before launch, the payload is subject to compliance monitoring by the FAA (unless otherwise exempt).¹³¹

5. Financial Responsibility Determination – applicants must demonstrate financial responsibility to compensate for the MPL, in case of lawsuits.¹³² The MPL is the dollar value assessment of government and third-party properties at risk of damage from the launch-related activities or conduct. Applicants can meet the established requirement by several means: (i) applicant can prove that it has financial reserves equal to or exceed-

¹²⁷ 14 C.F.R. § 413.5.

¹²⁸ 14 C.F.R. §§ 431.21 - 431.30.

¹²⁹ 14 C.F.R. §§ 431.31 - 431.47.

¹³⁰ 14 C.F.R. § 431.79.

¹³¹ 14 C.F.R. §§ 415.51 - 415.63.

¹³² 14 C.F.R. § 431.81.

ing the amount specified; (2) place the amount in escrow; or (3) purchase liability insurance equal to the amount specified.¹³³

6. Environmental Review – the applicants must adequately demonstrate that the proposed launch activities present no unacceptable dangers to the natural environment. Additionally, the granting of a license requires compliance monitoring for analyzing the environmental impacts, preparing relevant assessments, and complying with any other federal, state, or local environmental requirements.¹³⁴

7. Compliance Monitoring (post-issuance of license) – the FAA monitors licensees compliance with the CLSA, the Commercial Space Transportation Licensing Regulations, and the specific license requirements. Additionally, the FAA is tasked to ensure no illegal, un-licensed, or misrepresented commercial space transportation occurs.¹³⁵ Importantly, federal officers must be allowed access to observe any activities—including contractors and subcontractors, associated with the licensed launch.¹³⁶

Human spaceflight requirements

The FAA regulations also implement the CSLAA requirements for crew and SFPs.¹³⁷ These regulations only apply to commercial launch activities conducted for compensation or

¹³³ 14 C.F.R. § 450.15.

¹³⁴ FAA AST will review compliance with national environmental laws and regulations under the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 et seq.; The Council on Environmental Quality (CEQ) Regulations for Implementing NEPA, 40 C.F.R. §§ 1500-1508; and the FAA Environmental Impacts: Policies and Procedures, FAA Order 1050.1E, Change 1, available at http://www.faa.gov/documentLibrary/media/order/energy_orders/1050-1E.pdf (last visited Nov. 5, 2011).

¹³⁵ 49 U.S.C. §§ 70104, 70115, transferred to 51 U.S.C. §§ 50904, 50917 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010); 14 C.F.R. §§ 405, 406; additional applicable rules and regulations are available at *Expendable Launch Vehicle Compliance Monitoring*, FEDERAL AVIATION ADMINISTRATION, http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_reentry/expendable/compliance/ (last visited Nov. 5, 2011).

¹³⁶ 49 U.S.C. §§ 70104, 70115, transferred to 51 U.S.C. §§ 50904, 50917 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010); 14 C.F.R. §§ 405, 406. *Expendable Launch Vehicle Compliance Monitoring*, *supra* note 135.

¹³⁷ 49 U.S.C. § 70105, transferred to 51 U.S.C. § 50905 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010); 14 C.F.R. §§ 431.8, 460.

hire—including commercial suborbital flights. The pertinent requirements are:

— The crew must receive training and meet medical or other standards as specified in the license.¹³⁸ The Secretary of Transportation may also require SFPs to undergo physical/health examinations.¹³⁹

— The crew/ spaceflight participant must be informed in writing of the safety record of the launch or reentry vehicle type (to include the fact that the US government has not certified the launch vehicle as safe for carrying crew or SFPs).¹⁴⁰

— The space flight participant must provide informed written consent to participate in the launch/reentry.¹⁴¹

— License suspension. A license may be suspended when a previous launch or reentry under the license has resulted in serious or fatal injury and continued operations are likely to cause additional serious or fatal injury.¹⁴²

International compatibility

In keeping with its international obligations the FAA intends for its regulations to comply with the ICAO aviation requirements to the maximum extent possible. However, the FAA concluded that there were no appropriate Standards and Recommended Practices that corresponded to these US regulations.¹⁴³

¹³⁸ 49 U.S.C. § 70105(b)(4)(a), *transferred to* 51 U.S.C. § 50905 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

¹³⁹ 49 U.S.C. § 70105(b)(6), *transferred to* 51 U.S.C. § 50905 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

¹⁴⁰ 49 U.S.C. § 70105(b)(4), (b)(5), *transferred to* 51 U.S.C. § 50905 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

¹⁴¹ 49 U.S.C. § 70105(b)(5), *transferred to* 51 U.S.C. § 50905 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

¹⁴² 49 U.S.C. §§ 70105, 70107, *transferred to* 51 U.S.C. §§ 50905, 50908 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

¹⁴³ 14 C.F.R. §§ 415, 430; *Experimental Permits for Reusable Suborbital Rockets*, *supra* note 67, at 17012.

3. Launch site operator license

The Code of Federal Regulations, Part 420, deals with the license requirements for operating a launch site. The primary concern here is for the safety of the public and natural environment. For clarification purposes the definition of “public” provided in this regulation is as follows:

The public means people and property that are not involved in supporting a licensed or permitted launch, and includes those people and property that may be located within the boundary of a launch site, such as visitors, any individual providing goods or services not related to launch processing or flight, and any other launch operator and its personnel.¹⁴⁴

Moreover, the FAA has stipulated that it will not approve the location of the proposed launch site if the estimated expected casualty exceeds 30×10^6 .¹⁴⁵

Procedurally, the FAA has stipulated five requirements for a launch site license or permit application.¹⁴⁶ The requirements are similar to those for an operator license. The launch site requirements include:

1. Pre-Application Consultation – this consists of meetings, communications and draft applications submitted to the FAA, prior to an official application. The purpose of this consultation is to allow for both parties to become familiar with the launch site proposal and procedural requirements, and allow for the applicant to identify the unique aspects of its proposal and to develop a schedule for submitting its application.¹⁴⁷

2. Policy Review and Approval – during this interagency review, the FAA consults with the Department of Defense, Department of State, NASA, and other relevant government agencies to determine whether the launch site proposal affects national security, foreign policy interests, or international legal

¹⁴⁴ 14 C.F.R. § 420.5.

¹⁴⁵ 14 C.F.R. § 420.25.

¹⁴⁶ 14 C.F.R. §§ 401, 417.9, 420.

¹⁴⁷ 14 C.F.R. §§ 413.5, 420; See *Launch Site Pre-Application Consultation*, FEDERAL AVIATION ADMINISTRATION, http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_site/preapp_consult/ (last visited Nov. 5, 2011).

obligations, etc. Note that applicants may submit the required data on policy, safety, and payload review together or separately.¹⁴⁸

3. Safety Review and Approval – the purpose of this review is to determine whether the proposed operations can be safely conducted. The applicant must understand that it is responsible for public safety, understand the hazards involved, and be able to discuss how the operations will be performed safely. For a Launch Site Location Review, the applicant must demonstrate that, an ELV and/or RLV can be flown safely from each proposed launch point.¹⁴⁹

4. Environmental Review – this evaluation ensures that the proposed commercial space transportation activity does not pose an unacceptable danger to the natural environment. The FAA may grant a license once the environmental review component of the license is satisfied. The review is based on the information supplied by the applicant and the information provided must be statutorily sufficient. AST officials also oversee launches to ensure environmental and regulatory compliance.¹⁵⁰

5. Compliance Monitoring (after the license is granted) – the FAA monitors licensee's compliance with the CLSA, the Commercial Space Transportation Licensing Regulations, and the specific license requirements. Additionally, the FAA is tasked to ensure no illegal/un-licensed/misrepresented commercial space transportation occurs.¹⁵¹ Importantly, federal officers must be allowed access to observe any activities—including contractors and subcontractors, associated with the licensed launch. AST's enforcement mechanisms also include li-

¹⁴⁸ 14 C.F.R. § 420; See *Launch Site Policy Review and Approval*, FEDERAL AVIATION ADMINISTRATION, http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_site/policy/ (last visited Nov. 5, 2011).

¹⁴⁹ 14 C.F.R. § 420; See *Launch Site Safety Review and Approval*, FEDERAL AVIATION ADMINISTRATION, http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_site/safety/ (last visited Nov. 5, 2011).

¹⁵⁰ 14 C.F.R. § 420.15; additional environmental regulations and orders are available on the FAA website at *Environmental Review for Licensed/Permitted Commercial Space Transportation Activities*, FEDERAL AVIATION ADMINISTRATION, http://www.faa.gov/about/office_org/headquarters_offices/ast/environmental/review/ (last visited Nov. 5, 2011).

¹⁵¹ 49 U.S.C. §§ 70107, 70115, transferred to 51 U.S.C. §§ 50908, 50917 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010); 14 C.F.R. § 420.49.

cense/permit suspensions, revocations, emergency orders, and civil penalties.¹⁵²

Launch site permit

The regulations do allow for the FAA to approve a launch site permit solely for launches conducted under an experimental permit, where the FAA has already approved an “operating area” for the experimental permit under 14 C.F.R. Part 437.57.¹⁵³ The experimental permit requires “an operating area containment” under the Safety Requirements section.

Operating area containment

The FAA regulations hold that permitted flights must be conducted within this “operating area” designated area for safety purposes. Therefore, this area:

- (1) Must be large enough to contain each planned trajectory and all expected vehicle dispersions;
- (2) Must contain enough unpopulated or sparsely populated area to perform key flight-safety events as required by Part 437.59;
- (3) May not contain or be adjacent to a densely populated area or large concentrations of members of the public; and
- (4) May not contain or be adjacent to significant automobile traffic, railway traffic, or waterborne vessel traffic.
- (5) The FAA may designate “exclusion areas” where necessary to protect public health and safety; safety of property; or foreign policy or national security interests of the US. Moreover, the “exclusion area” designation may also be confined to a specific phase of flight.¹⁵⁴

¹⁵² 49 U.S.C. § 70107, transferred to 51 U.S.C. § 50908 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010); 14 C.F.R. § 420; For enforcement mechanisms and authorities see also *Launch Site Compliance Monitoring*, FEDERAL AVIATION ADMINISTRATION, http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_site/compliance/ (last visited Nov. 5, 2011).

¹⁵³ *Experimental Permits for Reusable Suborbital Rockets*, *supra* note 67, at 17006.

¹⁵⁴ 14 C.F.R. § 437.57.

C. Launch liability and insurance scheme

The liability limits provided for by the CSLAA state that the liability coverage of the commercial space launch operators must cover all space flight participants, including the US government. The actual dollar amount is based on the maximum probable loss (MPL), capped at \$500 million, or the maximum amount available at reasonable cost.¹⁵⁵ This requirement is also discussed above under the licensing procedures for demonstrating financial responsibility. Beyond the MPL insurance requirement, the government then has discretion to conditionally indemnify spaceflight operators for third party liability up to \$1.5 billion beyond the required insurance. Any amount exceeding the private insurance and government indemnification is the sole responsibility of the private operator.

However, the applicability of the two tier liability scheme provided above is strictly limited. The CSLAA liability scheme only covers the activities governed by the FAA, this means that the licensing requirements and indemnification scheme only apply to the space vehicles while they are engaged in launch or reentry activities, and thus is not applicable to on-orbit or other space activities. Consequently, parabolic and suborbital flights in the US are included in the liability scheme and are governed by FAA regulations and federal law. However, orbital and outer space journeys to the *ISS* are not covered by the CSLAA.

The CSLAA also contains a provision on reciprocal waiver of claims (cross-waivers). The waiver provision specifically requires:¹⁵⁶ (1) the licensee of a launch/reentry license to make a cross waiver with its contractors, subcontractors, customers, and contractors and subcontractors of the customers, who are involved in launch/ reentry services; (2) regarding responsibility for damage/ loss to property, or for personal injury to, death of, or property damage/ loss sustained by its own employees resulting from an activity carried out under the applicable license; and (3) the Secretary of Transportation will provide a similar

¹⁵⁵ 49 U.S.C. § 70112, *transferred to* 51 U.S.C. § 50914 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

¹⁵⁶ *Id.*

cross waiver for the US government and the above parties. However, the legislation notes that “the waiver only applies to the extent that claims are more than the required amount of insurance or demonstration of financial responsibility.”¹⁵⁷

D. Export licenses

A significant issue for multi-national ventures interested in conducting commercial space transportation, suborbital or otherwise, is the effect that US export laws can have on their space activities. Since the early 1980s, the US has imposed strict export controls and licensing regimes for defense services as well as particular pieces of advanced technology, information, space equipment deemed to be defense items, and sensitive items or items capable of military use (also called “significant military equipment”).¹⁵⁸ The US has cited the basis of this policy on protecting both national and international security by preventing advanced and sensitive technology/information from falling into the hands of criminals and terrorists. In practice, the policy has put a strain on the emerging and developing commercial space industry by limiting the transfer of space technology, services, and equipment and by instituting a lengthy formal process for requesting authorization for all exports, sales, and re-transfers of dual use/defense items to a foreign company/ person.¹⁵⁹ In the last five years, regulatory amendments have been adopted to facilitate and streamline the process amongst allied nations, but ITAR and export controls still remain a hot issue in the space industry. While this remains an interesting and relevant topic to commercial space, the scope of the issue exceeds that of the current discussion and therefore cannot be addressed in detail here.

¹⁵⁷ 49 U.S.C. § 70112(b)(2), transferred to 51 U.S.C. § 50914 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

¹⁵⁸ 22 C.F.R. § 120.7 (Specifically, the Code of Federal Regulations defines “significant military equipment” as: “articles for which special export controls are warranted because of their capacity for substantial military utility or capability.”).

¹⁵⁹ 22 U.S.C. § 2778 (2006); See also, Art Dula, *Export Controls Affecting Space Operations*, 51 J. AIR L. & COMM. 927, 938 (1986); P.J. Blount, *The ITAR Treaty and Its Implications for U.S. Space Exploration Policy and the Commercial Space Industry*, 73 J. AIR L. & COM. 705 (2008).

V. AUSTRALIA

Australia has been involved in national and international space activities for the past forty years, mostly with regards to satellite activities, remote sensing, and international cooperative space endeavors.¹⁶⁰ In fact, Australia was the fourth nation to place a satellite into orbit and its advantageous location near the equator provides an ideal launching point for satellites placed in geostationary orbits.¹⁶¹ However, Australia still lacks a national launching company and industry, and continues to rely on commercial and foreign launching capabilities even when conducted from Australian territory.¹⁶² The first space department, the Australian Space Office (ASO) was established in 1987.¹⁶³ However, reorganization in 1996 led to the ASO being replaced with the smaller Space Policy Unit (SPU) housed within the Minister's Department of Industry, Science and Tourism (DIST), which is the authoritative body on space matters today.¹⁶⁴ The downsizing of the space budget and structural reorganization was reportedly due to a lack of government commitment for space activities.¹⁶⁵ Consequently, national space legislation was not passed until 1998. Nonetheless, Australia is a ranking member State to the three pertinent treaties discussed, namely, the Outer Space Treaty, the Liability Convention, and the Rescue Agreement.

The Australian Space Activities Act of 1998 is a comprehensive regulatory regime produced in consultation with local and state governments, as well as private industry in the re-

¹⁶⁰ See e.g. Steven Freeland, *Sensing a Change? The Re-launch of Australia's Space Policy and Some Possible Legal Implications*, 36 J. SPACE L. 381 (2010).

¹⁶¹ Following the USSR, US and France in 1967. See Matthew James, *Australia in Orbit: Space Policy and Programs* (Apr. 6, 1998), <http://www.aph.gov.au/library/pubs/cib/1997-98/98cib12.htm>.

¹⁶² *Id.*; See also *Spaceports Around the World: Australia's Woomera and Weipa Spaceports*, SPACE TODAY ONLINE, <http://www.spacetoday.org/Rockets/Spaceports/Australia.html> (last visited Nov. 5, 2011); HERMIDA, *supra* note 51, at 112. Note within the last couple of years there has been talk within the Australian government to reaffirm its national space policy and space industry, See Freeland, *supra* note 160.

¹⁶³ James, *supra* note 161.

¹⁶⁴ *Id.*

¹⁶⁵ *Id.*

lated space, legal, and insurance fields.¹⁶⁶ Its objective is to govern liability issues and licensing regulations with regard to commercial launches and launch facilities. The Space Activities Act does not currently address suborbital flights, neither is there any reference to human space flight commercial or otherwise. However, nothing within the Act would prohibit the extension of the Act to apply to commercial suborbital launches or spaceports as launch facilities. Naturally, however, the licensing regulations will need to incorporate new provisions to specifically address the new human component involved with commercial suborbital activities. In this regard, the US CSLAA is an ideal blueprint for legislative authorization on commercial human space flight since the structure of the Australian licensing regime is already very similar to the US space legislation.

Overall, the potential for human space flight in Australia is great. For years now commercial enterprise and the government have acknowledged that the enormous size of the country provides ideal uninhabited desert-like areas, which offer low risk for environmental and human factors as required for conducting rocket and suborbital space activities.¹⁶⁷ Not to mention, Australia has already established a legislative legal framework and demonstrated government support for soliciting foreign commercial launch opportunities. In fact, Australia is often raised in space community discussions as an ideal location for conducting commercial spaceport activities, with particular potential for space hops in the future. For these purposes, an analysis of the pertinent sections of the Australian Space Activities Act with regard to commercial space transportation is provided here.

¹⁶⁶ *Space Activities Regulations 2001 No. 186* (Cth) (Austl.), at Explanatory Statement, Part 1 [hereinafter Australian Explanatory Statement], available at http://www.austlii.com/au/legis/cth/num_reg_es/sar20012001n186303.html (last visited Nov 16, 2011)

¹⁶⁷ See e.g. James, *supra* note 161; Senate Standing Committee on Economics, *Lost in Space? Setting a new direction for Australia's space science and industry sector*, at 25-26 (Nov. 2008), available at http://www.aph.gov.au/senate/committee/economics_ctte/space_08/report/report.pdf.

A. Scope and key definitions

The scope of the Australian Space Activities Act applies generally to: 1) space activities conducted from Australian territory; 2) Australian nationals conducting or procuring launch services overseas; and 3) the return of nationally registered space objects to Australia (whether launched from inside/ outside Australia).¹⁶⁸ Furthermore, “Australian national” is defined in the Act as: “a) an Australian citizen; or b) a body incorporated by or under a law of the Commonwealth, of a State or of a Territory; or c) the Commonwealth, a State or a Territory.”¹⁶⁹ The entities that fall under the scope of this Act are deemed to be “responsible parties.”¹⁷⁰

Similar to the US CSLAA, the Space Activities Act allows for a license waiver, or exemption, in an overseas launch where there may be a conflict of regimes based on the nationality of the launching entity(s).¹⁷¹ The Minister may also grant exemption certificates to foreign entities covered by other national space licensing regimes.¹⁷² On the other hand, the Australian Act is more complex concerning long-arm jurisdiction for situations like Sea Launch. Where an Australian entity may share in a larger foreign multi-national corporation involved in space launch activities overseas, it may be identified as a “related party.” “A related party of a responsible party for the launch or return of a space object” is included in the scope of the Space Activities Act if: 1) the related party has financial/ownership interest in all/part of the space object; 2) helped prepare all/part of the space object for launch/return; 3) is a contractor, subcontractor, or supplier involved in the launch/return activities; or 4) is a director, officer, or direct employee/agent of the responsible

¹⁶⁸ *Space Activities Act 1998 No. 123* (Cth) ss 4, 10-15 (Austl.) [hereinafter Australian Space Activities Act].

¹⁶⁹ *Id.* at s 8.

¹⁷⁰ *Id.* The range of possible “responsible parties” is further defined and itemized in section 8.

¹⁷¹ *Id.* at ss 26, 35, 46.

¹⁷² *Id.* at ss 11, 13, 15.

party.¹⁷³ However, flexibility under the Regulations is granted for determining who may or may not be a “related party.”¹⁷⁴

With regards to implementing regulation on commercial suborbital space activities, the current definitions in the Space Activities Act will require some modification or regulatory elaboration to adequately address the following issues. First, the current definition of “launch” means to “launch the object into an area beyond the distance of 100km above mean sea level, or an attempt to do so.”¹⁷⁵ While this definition generically incorporates the intent of suborbital flights—thus, permissibly inferring an extension of the Act to suborbital flights—it does not adequately cover the intent and scope of commercial suborbital flights for legal purposes in contrast to other types of launches, for instance satellite launches. Alternatively, it may suffice to add a provision that defines the scope and trajectory of a suborbital space flight for this purpose, as the US has done, instead of modifying the current definition of “launch.”

Furthermore, “launch facility” is defined as “a facility (whether fixed or mobile) or place specifically designed or constructed as a facility or place from which space objects can be launched, and includes all other facilities at the facility or place that are necessary to conduct a launch.”¹⁷⁶ While this definition can be simplified for purposes of defining a spaceport, this definition does suffice for commercial suborbital space activities as it adequately describes the intent and legal scope of the facilities.

In addition, “launch vehicle” refers to “a vehicle that can carry a payload into or back from an area beyond the distance of 100km above mean sea level.”¹⁷⁷ Australia is unique in that it is the only State to legally incorporate a functional interpretation of the delimitation of outer space. In fact, there is no uniform consensus on the actual altitude from the earth’s surface, and this is a decades old debate. However, for purposes of suborbital

¹⁷³ *Id.* at s 9.

¹⁷⁴ *Id.*

¹⁷⁵ *Id.* at s 8.

¹⁷⁶ *Id.*

¹⁷⁷ *Id.*

flights and commercial astronaut wings, the emerging trend by the commercial sector and the US FAA seem to indicate that 100km is indeed a favorable point for drawing a line between the earth's atmosphere and outer space.

Other inherent problems, however, exist with particularly relevant terms provided under the Space Activities Act when applied to commercial suborbital flight, such as the terms "space object" and "payload." First, "space object" is defined as:

a thing consisting of: (a) a launch vehicle; and (b) a payload (if any) that the launch vehicle is to carry into or back from an area beyond the distance of 100km above mean sea level; or any part of such a thing, even if: (c) the part is to go only some of the way towards or back from an area beyond the distance of 100km above mean sea level; or (d) the part results from the separation of a payload or payloads from a launch vehicle after launch.¹⁷⁸

"Payload" is defined as "a load to be carried for testing purposes or otherwise on a non-profit basis."¹⁷⁹ Since the definitions of "launch vehicle" and "space object" are inextricably intertwined with the term "payload," and the latter subsequently excludes human passengers for profit, these definitions must be revisited for purposes of governing commercial suborbital space activities.

It may be argued that the RLV should be jointly defined under "launch vehicle" to include a commercial human launch vehicle. However, as discussed previously, at the point of detachment, whether from a rocket or carrier plane, the RLV will ultimately be a space object leading back to a need to redraft the problematic term "payload." Where the RLV is deemed under Australian law to be a space object to begin with, the same issue remains. As a result, the term "payload" must be modified incorporating two specific elements to adequately regulate commercial human suborbital space activities: a human passenger component and a commercial (for profit) launch component. Fortunately, amending the licensing regime to include the scope of

¹⁷⁸ *Id.*

¹⁷⁹ *Id.*

commercial human suborbital space flights should not provoke legislative hardship, since the legislature has already granted malleability in the broad scope of powers of the Governor-General to allow for the prescription of new regulations relating to future space activities as permitted under the Act.¹⁸⁰

B. Licenses and permits

The Space Activities Act, like the US CSLAA, provides several licenses and permit regimes depending on the nature of the activity. With great detail the Space Activities Act of 1998 and Space Activities Regulations of 2001¹⁸¹ set out the requirements and procedures for requesting and obtaining the requisite space license, permit, or exemption. Overall, the Australian legislation stipulates a licensing system very similar to the US regime although there are some distinct structural differences. Here, a space license is required for constructing and/or operating a launch facility (spaceport).¹⁸² A space license is also required for each “particular kind of launch vehicle and particular flight paths.”¹⁸³ Whereas, a launch permit is required for each launch/series of similar launches.¹⁸⁴ Furthermore, an overseas launch certificate is required for Australian nationals launching or procuring the launch of a space object overseas.¹⁸⁵ Likewise, an authorization is required to return a space object to Australia from overseas, whether it was launched from overseas or Australian territory.¹⁸⁶ Another interesting and unique aspect of Australian space law is that a space license may be valid for a period of up to twenty years—a duration unheard of in other national space legislations.¹⁸⁷ Consequently, a mechanism is provided whereby permit and license holders can transfer the permit/ license to

¹⁸⁰ *Id.* at s 110.

¹⁸¹ *Space Activities Regulations 2001 No. 186*, *supra* note 166. The Regulations provide further procedural and administrative requirements and definitions for the legislated activities.

¹⁸² *Space Activities Act 1998 No. 123*, *supra* note 168, at ss 18-25A.

¹⁸³ *Id.* at s 18.

¹⁸⁴ *Id.* at ss 26-34.

¹⁸⁵ *Id.* at ss v35-41.

¹⁸⁶ *Id.* at ss 42-45C.

¹⁸⁷ *Id.* at s 19 (space license).

another. Generally, the Minister may authorize a transfer where the new entity would be individually eligible to apply for the permit/ license.¹⁸⁸

The requirements for obtaining a space license simulate the FAA requirements for a facility operator's license and RLV launch experimental permit and license. Specifically, the following six key elements must meet the Minister's satisfaction for the granting of a space license:

1) The applicant must demonstrate competence to operate the launch facility or particular launch vehicle and flight path;

2) An environmental plan must be submitted in accordance with national environmental law and authorization for the construction/ operation of the launch facility;

3) The applicant must demonstrate that it has sufficient funding to construct and operate the launch facility;

4) The applicant must demonstrate that the launch facility construction and operation pose the lowest risk to public health and safety and property, as reasonably practicable;

5) National security caveat: the Minister may deny a space license on grounds of national security, foreign policy, or international obligations.

6) Any and all criteria for the launch facility, launch vehicle, and flight path have been satisfied.¹⁸⁹

For the granting of a launch permit the Space Act repeats the same financial and competency and safety requirements stipulated above, but also require the applicant to already hold a space license.¹⁹⁰ Further, this section identifies two launch specific elements. First, it distinguishes between a launch permit for a particular space object, and a space permit for a particular series of launches of space objects that may appropriately be authorized by a single launch permit. The essence of this provision is likewise found in the US FAA regulations. Secondly, it covers launch permits for space objects to be returned to Australia as connected with a launch/ series of launches.¹⁹¹

¹⁸⁸ *Id.* at s 22 (license transfer), s 31 (permit transfer).

¹⁸⁹ *Id.* at s 18.

¹⁹⁰ *Id.* at s 26.

¹⁹¹ *Id.* at s 26.

A pertinent clause on risk probability and safety embedded in both the licenses and permits establishes the threshold for “substantial harm” to the public and property to be “as low as is reasonably practicable.”¹⁹² Another interesting element threaded throughout the Space Activities Act and the Regulation is the prohibition of nuclear weapons or weapons of mass destruction contained within the space object(s).¹⁹³ Moreover, fissionable materials contained in the space object are also prohibited without prior written authorization from the Minister.¹⁹⁴ These stipulations are unique in that they are contained within the general national space legislation, which is largely aimed at commercial space endeavors. However, in contrast with the US, for instance, the Space Activities Act was not intended to include human capable space objects. Consequently, the incorporation of general statements on the non-proliferation of weapons in space, via satellites (space objects), is understandable.

Furthermore, a primary objective of this space legislation is third party safety and safety precautions. Consequently, the launch permit application includes detailed reports on maintenance, compliance issues, and other technical details that must conform to the safety standards as established by the Flight Safety Code.¹⁹⁵ Supporting documentation to be provided to the Launch Safety Officer includes a detailed analysis concerning the launch/ return, the payload, personnel involved with the launch, risk and hazard analysis, a program management plan, a technology security plan, environmental plan, flight safety plan, and an insurance compliance plan.¹⁹⁶ Overall, however, the Australian licensing regime is generally recognized as providing more flexibility to launch applicants than the US regime,

¹⁹² *Id.* at s 29.

¹⁹³ *Id.* at ss 26, 29.

¹⁹⁴ *Id.* at s 29.

¹⁹⁵ The Australian Explanatory Statement elucidates that the Flight Safety Code provides the safety standards for operators of space launch facilities for conducting all space launch activities, as stipulated by field experts. See Australian Explanatory Statement, *supra* note 166. Note that both the Flight Safety Code and MPL Methodology have been incorporated by reference into the Regulations 2001 and therefore carry the same weight of authority as the Regulations.

¹⁹⁶ See *id.* at 2.

thereby creating an incentive for foreign space industry involvement.

C. Liability and insurance scheme

The liability and insurance scheme promulgated under the Space Activities Act focuses predominantly on protecting the Australian government and Commonwealth from damages arising from international issues of State responsibility and liability under international law. Since Australia does not conduct launch operations on its own, the insurance requirements are less particular than the US legislation, although the Australian scheme is very similar to the CSLAA.¹⁹⁷

The Space Activities Act holds the “responsible party” liable for damages resulting from a space object to a third party (whether on the ground or in the air), except where the third party is culpable of gross negligence.¹⁹⁸ The “responsible party” is further defined as the: (1) the permit holder; (2) holder of authorization for a return; (3) other person as defined by an agreement between the Minister and this other person; or (4) exemption certificate holder.¹⁹⁹ In practice, the responsible party will likely be the launch service provider or launch operator.

The insurance scheme is also divided into a two-tier regime. The first tier requires the launch operator to demonstrate financial ability or obtain insurance in the total amount of \$750 million or the MPL figure, whichever is less, for third party liability.²⁰⁰ This is to cover any damages that arise from the launch or return of a space object. With regard to the liability relationship between the launch parties (e.g. the launch operator, contractors and launch procurer) the Space Activities Act is silent as to the allocation of risk. Consequently, the parties are free to determine the allocation of risk between them without restriction. At least that is the idea in theory. In practice, some experts

¹⁹⁷ Note that US nationals engaged in launch activities must still comply with the stricter CSLAA liability requirements, such as cross-waivers, as provided for in the Space Activities Act sec. 65.

¹⁹⁸ *Space Activities Act 1998 No. 123*, *supra* note 168, at s 67.

¹⁹⁹ *Id.* at s 8.

²⁰⁰ *Id.* at ss 47-49.

have stipulated that the stronger position of power for risk allotment still remains with the launch provider as seen in customary US and Arianespace launch procurement contracts.²⁰¹ In any case, the Act permits the liability waiver for damage caused by space objects amongst the responsible party and its employees, contractors, and subcontractors.²⁰²

The second tier of the insurance scheme is applicable to both the third party liability and second party liability. The second tier also provides for any damages to Australian nationals, specifically, which exceed the insurance/MPL to be covered by the Australian government up to \$3 billion. However, there is no general provision for or cap on government indemnification towards non-nationals, unlike the US CSLAA cap. Australia also specifically acknowledges its potential liability for international claims that arise under the Liability Convention.²⁰³

D. Environmental requirements

There is no particular provision delineating the specific environmental concerns under the Act, other than to stipulate that the space license applicant for launch facilities satisfactorily demonstrate compliance and approvals with Australian environmental laws.²⁰⁴ However, the Regulations 2001 provide further detail for the environmental requirements for facilities and launch operations that must be submitted with a space license application. In sum, the Regulations provide that the potential launch operator must satisfy inherent environmental concerns by making arrangements for:

- monitoring and mitigating any adverse effects of the construction or operation of the facility on the environment and for implementing the plan;
- reporting on the implementation of and reviewing the plan; and

²⁰¹ See HERMIDA, *supra* note 51, at 115.

²⁰² *Space Activities Act 1998 No. 123*, *supra* note 168, at ss 64-65.

²⁰³ *Id.* at s 64.

²⁰⁴ *Id.* at s 18.

— ensuring all environmental requirements under Australian law for protection of the environment are met.²⁰⁵ The Regulations further stipulate that this environmental plan is subsequent to the initial permission to construct and operate such facilities under the other applicable laws of Australia.

E. Regulatory compliance

The Space Activities Act provides for a Launch Safety Officer at every launch facility. Furthermore, the Launch Safety Officer is broadly empowered to supervise the launch, as well as ensure the overall safety of the launch activities.²⁰⁶ Where accidents or incidents occur, the Act likewise authorizes an investigatory body to conduct an investigation into the matter and provide a report to the Minister.²⁰⁷ The Act also promulgates a list of offenses with regard to the investigations and vests the Launch Safety Officer with particular enforcement authority.²⁰⁸ For instance, the Office may take custody of the space object for purposes of the investigation, but only in extreme circumstances. With regard to the space license, the Minister has discretion to review the license on an annual basis to ensure compliance with the license conditions,²⁰⁹ and may suspend/ revoke the license due to an infraction of the license terms, or due to concerns of Australian national security interests, foreign policy, or international obligations.²¹⁰

EUROPE

Private commercial ventures in several European countries have already announced intentions to participate in commercial human space transportation. Consequently, the EU has initiated discussions for establishing a regulatory framework. EASA

²⁰⁵ *Space Activities Regulation 2001 No. 186*, *supra* note 166, at ss 2.17, 3.12; Australian Explanatory Statement, *supra* note 166, at 11, 13.

²⁰⁶ *Space Activities Act 1998 No. 123*, ss 50-58.

²⁰⁷ *Id.* at ss 84-103.

²⁰⁸ *Id.* at ss 50-58.

²⁰⁹ *Id.* at s 25A.

²¹⁰ *Id.* at s 25.

certification for carrier craft is one example.²¹¹ Nonetheless, any EU/EASA regulations would pertain only to the air portion of aerospace activities, not space. When this occurs, and it is uncertain when it will, EU States will have to account for these changes in their domestic laws. Thus, this section provides an outline of the current legislative status of three pertinent commercial space-faring States and their effect on commercial space enterprise. The three States addressed here are the Isle of Man, the Netherlands, and Sweden.

VI. ISLE OF MAN

The Isle of Man, a Crown Dependency of the United Kingdom, presents a unique situation for the applicability of international air and space law. The Isle has an autonomous government, but similar to other territories and constituent countries, authority to conduct external or foreign affairs, such as concluding international agreements, is deferred to the UK government with the right of consultation.²¹² Consequently, as per the UK's membership in the outer space treaties, the Isle of Man is likewise bound to the treaties.²¹³ This self-governing Isle also has a unique legal status in that it is neither a member of the UK nor of the EU.²¹⁴ However, through UK membership in the EU it obtains certain advantages with regard to trade and commerce with EU States.²¹⁵

Moreover, with relaxed tax codes (e.g. no corporate income tax) and its singular location in the heart of Great Britain,

²¹¹ See Rob Coppinger, *EASA's space tourism approach requires certification*, FLIGHTGLOBAL, (Oct. 28, 2008), <http://www.flightglobal.com/articles/2008/10/28/317902/easas-space-tourism-approach-requires-certification.html>.

²¹² *External Relations, Relationship with the United Kingdom*, ISLE OF MAN GOVERNMENT, <http://www.gov.im/cso/externalrelations/uk.xml> (last visited Nov. 5, 2011).

²¹³ The UK is a party signatory to the Outer Space Treaty, Liability Convention and Registration Convention. See UNITED NATIONS FOR OUTER SPACE ACTIVITIES, <http://www.oosa.unvienna.org/oosatdb/showTreatySignatures.do> (last visited Nov. 16, 2011).

²¹⁴ *External Relations, Relationship with European Union*, ISLE OF MAN GOVERNMENT, <http://www.gov.im/cso/externalrelations/eu.xml> (last visited Nov. 5, 2011).

²¹⁵ See *id.*

equidistantly situated between England, Ireland and Scotland in the Irish Sea, the Isle of Man has become a burgeoning nexus for international business and finance. In fact, the drive and economic necessity to identify itself as an international business hub led to a UK-Manx agreement in 2007 on international identity providing the Island government with some autonomy to negotiate international agreements with nations and organizations where it has an interest, instead of having to rely on the UK to carry out negotiations on its behalf.²¹⁶

In fact, for many years now the Manx government has encouraged aerospace industry and manufacturing on the Island. In 2004, the government specifically announced its intention to attract foreign satellite and aerospace industries to the Island.²¹⁷ As a result, several global aerospace companies have responded favorably to the financial incentives offered by the Isle of Man and established offices, corporate subsidiaries, and affiliations. They include Boeing, Sea Launch, Inmarsat, Loral Skynet, and SES Global.²¹⁸ In 2005, Excalibur Almaz Ltd., a nascent entrepreneur in the commercial space transportation industry, announced its intention to commence orbital human space flights for “exploration, research and science” purposes.²¹⁹ Excalibur Almaz Ltd. anticipates that it will commence its operations in 2013.²²⁰ In the meantime, local space regulations are being drafted and developed with particular regard to human space activities and international law, the outer space treaties, and the UK Outer Space Act.²²¹

The UK Outer Space Act was extended to the Isle of Man by an Order of Council in 1990.²²² However, other supporting legis-

²¹⁶ *Isle of Man in Focus*, ISLE OF MAN GOVERNMENT, <http://www.gov.im/lib/docs/cso/infocussummer2007.pdf> (last visited Nov. 5, 2011).

²¹⁷ *Isle Of Man Launches Zero Tax For Space Industry*, SPACE DAILY (Feb. 18, 2004), <http://www.spacedaily.com/news/industry-04e.html>.

²¹⁸ Andrew Corlett, *Isle of Man: Space Industry*, THELAWYER.COM (Jan. 23, 2006), <http://www.thelawyer.com/cgi-bin/item.cgi?id=118450&d=122&h=24&f=46>.

²¹⁹ EXCALIBUR ALMAZ, <http://www.excaliburalmaz.com/company-overview.php> (last visited Nov. 5, 2011).

²²⁰ *Id.*

²²¹ Outer Space Act, 1986, c. 38 (Eng.), available at <http://www.legislation.gov.uk/ukpga/1986/38/contents> [hereinafter UK Outer Space Act].

²²² The Outer Space Act 1986 (Isle of Man) Order 1990, Mar. 14, 1990.

lation is also needed, such as a local registry. One main benefit of constructing supporting legislation alongside the growth of commercial space flight is that the process allows for direct cooperation between the needs of the industry and the interests of the government. Furthermore, while Excalibur Almaz Ltd. has stated its interest in orbital space transportation, not suborbital space transportation, the issues raised by commercial human space flight of any kind raises the same basic issues pertaining to launch operator licenses, launch facility licenses, liability concerns, crew training, and passenger health and training issues. Thus, while many questions have yet to be answered here the UK Outer Space Act provides the legal foundation for sub-orbital and orbital space activities conducted under the supervision of the UK government.

A. *Scope and key definitions*

The UK Outer Space Act, passed in 1986, was drafted with the intention of establishing a regulatory regime for all national space activities, thereby ensuring compliance with the UK's international obligations "with respect to the launching and operation of space objects and the carrying on"²²³ of other space activities in outer space by persons connected with this country."²²⁴ Specifically, Article 1 of the UK Outer Space Act provides the scope of activities governed by this Act, which are: (a) launching or procuring a launch of a space object; (b) operating a space object; and (c) any activity in outer space. The Act applies regardless if the activities are conducted on UK territory or elsewhere.²²⁵ As to "persons," the Act applies to UK nationals, Scottish firms, and UK incorporated bodies.²²⁶ A "UK national" is further defined as a (a) British citizen, a British Dependent Ter-

²²³ To clarify, the UK Outer Space Act defines this further, stating that "a person carries on an activity if he causes it to occur or is responsible for its continuing." UK Outer Space Act, *supra* note 221, at art. 13(2).

²²⁴ UK Outer Space Act, *supra* note 221, at Preamble.

²²⁵ *Id.* at art. 1.

²²⁶ *Id.* at art. 2(1).

ritories²²⁷ citizen, or a British National or Citizen (Overseas); (b) a British subject by virtue of the British Nationality Act of 1981; or (c) a British protected person within the meaning of the Act.²²⁸ Thus, the scope of the Act's would inherently apply to both suborbital and orbital space activities.

In addition, Article 2(3) bestows authority on her Majesty to extend this Act to UK territories and islands by an Order in Council, as was seen in the case of the Isle of Man in 1990, and the Cayman Islands in 1998. This subsection in concert with Article 1 reaffirms the jurisdiction of the UK government over its nationals wherever they are conducting space activities, be it from land, sea, or air. This sweeping long-arm jurisdiction is similar to the broad jurisdiction demonstrated by the US, and it is exemplified in the case of the Cayman Islands, where the Act was extended to ensure regulatory compliance for Sea Launch's activities in the company's initial location of incorporation.

The UK Outer Space Act also uniquely differentiates between a launcher and a procurer of a launch.²²⁹ Most national space laws are not so specific in distinguishing the launch parties. Most importantly, however, is that any UK national, absent an authorized agreement to the contrary, would be covered by this legislation. This is particularly significant in the following scenarios which are relevant to orbital and suborbital space activities:

- Where the UK incorporated entity concerned has a partnership, of any standing, in a larger international conglomerate;

- Where a UK national/ entity owns, finances, or otherwise procures (e.g. has an interest in) the space object being launched into outer space;

- Where a UK national/ entity are contracted/ employed by foreign entities overseas (unless otherwise dictated by the Secretary of State).

²²⁷ "Dependent territory" is defined in art. 13(1) as "(a) a colony, or (b) a country outside Her Majesty's dominions in which her Majesty has jurisdiction in right of Her Government in the United Kingdom." *Id.* at art. 13(1).

²²⁸ *Id.* at art. 2(2).

²²⁹ *Id.* at art. 1.

— Where a UK national/ entity engages in ground control operations and activities related to the space object.

Moreover, the application of the UK Outer Space Act to commercial suborbital space flight would benefit from further clarification and specificity with regard to key terms and definitions inherent in space law. For instance, the UK Outer Space Act does not specify a definition of “launch.” The Space Activity license on the other hand does define it. “Launch” is “the point in time when an electronic signal is sent to command the opening of any first stage propellant valves.”²³⁰ However, this term is clearly defined with regard to licensing satellite activities only. It is not surprising since the UK does not engage in launch activities itself, and until quite recently was not considering human space flight.²³¹ However, given the recent government and commercial interest, this is an important term to define in future commercial human space flight regulations. In the very least, these terms should be clarified in local Manx regulations. Likewise, the Act’s definition of “space object” which does “include[] the component parts of a space object, its launch vehicle and the component parts of that,”²³² is inadequate for commercial RLV activities. While the Almaz capsule will qualify as a space object, a further stipulation should be added to distinguish the human aspect of this commercial payload. This is necessary as the requirements and standards are inevitably diverse for human verses nonhuman payloads. Moreover, if this Act were to be applied to air launched suborbital flights, further amendments would be required to distinguish an RLV and space activities from the air portion of the activities.

B. License requirements

Article 3, of the UK Outer Space Act requires that anyone interested in carrying on a space activity acquire a license from

²³⁰ Space Activities License, *available at* <http://www.bis.gov.uk/assets/bispartners/uk-spaceagency/docs/osa/osa2008example.pdf> (last visited Nov. 5, 2011).

²³¹ See e.g. British National Space Centre (BNSC), UK CIVIL SPACE STRATEGY: 2008-2012 AND BEYOND 11-12 (2008), <http://www.bis.gov.uk/assets/bispartners/ukspaceagency/docs/ukcss2008-2010.pdf> [hereinafter UK CIVIL SPACE STRATEGY].

²³² UK Outer Space Act, *supra* note 221, at art. 13(1).

the Secretary of State. Exceptions may be made for situations involving employees and agents of another, where an international agreement with another country is involved, or where the Secretary of State has determined that a license is not required to ensure compliance of UK international obligations.²³³ In essence, the Secretary of State is vested with discretionary powers to determine the suitability of a license to a case.

Article 4 on licensing procedures stipulates that the Secretary of State must be satisfied on three pertinent grounds before granting a license. These are similar to the US and Australian space legislations. In sum, the space activities must:

- not jeopardize the public health or safety of persons or property.
- be consistent with the UK's international obligations.
- not impair the national security of the UK.²³⁴

Moreover, the Secretary of State is specifically authorized to (1) prescribe the form and content of the license applications and other related documents; (2) regulate the application procedures and authorize the rectification of procedure irregularities; and (3) prescribe time limits and related extensions for application related tasks.²³⁵

It is interesting to note that the license conditions are not fixed in stone, but rather Article 5 lays out several particular license conditions that may apply, resting on the broad discretionary power of the Secretary of State. The existing conditions that may be extended to apply to a commercial human space flight license include:

- Inspections of the licensee's facilities by the Secretary of State, to include equipment inspections and testing, and information review and submission of copies of required documents.
- Mandatory reporting of licensee's launch and orbital data etc.

²³³ *Id.* at art. 3.

²³⁴ *Id.* at art. 4.

²³⁵ *Id.*

— Advance approval required for deviations in orbital parameters, and immediate notification to the Secretary of State of an unintended deviations.

— Operations conducted in such a way as to: “(i) prevent the contamination of outer space or adverse changes in the environment on earth, (ii) avoid interference with the activities of others in the peaceful exploration and use of outer space, (iii) avoid any breach of the UK’s international obligations; and (iv) preserve the national security.”²³⁶

— Licensee requirement to obtain insurance against third party liability for damage or loss, in the UK or elsewhere, as a result of the licensed activities.

— Termination of a license on a specified event.²³⁷

Article 6 further allows for the transfer of a license with written consent from the Secretary of State. The Secretary also has the power to revoke, vary or suspend the license with or without the licensee’s consent, where the Secretary deems it necessary for regulatory compliance or in the interests of public health, national security, or to comply with international obligations.²³⁸ Registration of space objects is also covered by the Act, under Article 7, where the Secretary is charged with the duty of maintaining the registry. In particular, the Act only requires the registration of space objects deemed appropriate by the Secretary of State in accordance with the UK’s international obligations.²³⁹ Thus, it is unclear whether a suborbital or orbital RLV, even if deemed a space object under UK/Isle of Man legislation, would be considered an “appropriate” item to be listed under the national registry of space objects.

C. Liability and insurance scheme

The liability provisions are stipulated briefly, under Article 10 of the UK Outer Space Act. In fact, this provision merely provides that the licensee must indemnify the UK government

²³⁶ *Id.* at art. 5(2)(e).

²³⁷ *Id.* at art. 5.

²³⁸ *Id.* at art. 6.

²³⁹ *Id.* at art. 7.

(e.g. possible insurance requirement under Section 5) for all damages arising from claims brought against the UK in relation to the space activities.²⁴⁰ Consequently, the licensee carries the full burden of liability to the national government, third parties and with regard to second parties. However, like the Australian Space Activities Act, and unlike the US CSLAA, the UK Outer Space Act is silent on the allocation of risk between the licensee and its contractors/sub-contractors. Moreover, the Act does stipulate two exclusions for the all-encompassing scope of this liability. Employees and agents of another are exempt from this provision, as is “damage or loss resulting from anything done on the instructions of the Secretary of State.”²⁴¹

Thus, similar to Sweden’s space legislation, the UK allocates all liability for the space activities on the licensed actors involved in the activity. Although this approach may seem harsh to the emerging private space industry, it is not inconsistent with the historical perspective and UK policy on human space flight. In fact, without a national launch industry, most UK space initiatives were international collaborations, for example involvements with ESA, and involved satellite and space robotic missions not human missions. Thus, negating legislative requirements for promoting private enterprise in space related activities. However, this may be changing in the near future, as the UK ponders its role in human space exploration out of fear that it may be left behind in the new commercial drive for human space activities.²⁴² Therefore, any future changes in commercial liability requirements are inherently dependent on the national interests and space policies of the UK and Isle Man.

D. Environmental requirements

Only one mention of environmental concern is provided in the UK Outer Space Act. Article 5(2)(e), simply provides that the Secretary of State may subject conditions on the license,

²⁴⁰ *Id.* at art. 10.

²⁴¹ *Id.* at art. 10(2).

²⁴² See e.g. Pallab Ghosh, *Ministers Consider UK Astronauts*, BBC NEWS (Feb. 14, 2008), <http://news.bbc.co.uk/2/hi/science/nature/7244028.stm>; UK CIVIL SPACE STRATEGY, *supra* note 231.

such as, “requiring the licensee to conduct his operations in a way as to (i) prevent the contamination of outer space or adverse changes in the environment of the earth.”²⁴³ The Act does not intimate what constitutes outer space contamination or adverse changes in the earth’s environment. However, these are issues that may be appropriately addressed in the implementing regulations and licensing regimes. While the Space Activity License is silent on environmental restrictions on a space license, the Secretary of States maintains broad supervisory and enforcement powers to ensure compliance with international obligations. Or as it may develop, authority for environmental protection during commercial human space operations may be delegated to an appropriate governmental authority on the Isle of Man or the UK Space Agency.²⁴⁴

E. Regulatory compliance

The Secretary of State has broad discretionary powers to prescribe regulations as needed, to ensure regulatory compliance and act in the interests of the public health and safety with regards to space activities.²⁴⁵ Article 8, stipulates the authority of the Secretary to take action where necessary to enforce regulatory compliance.²⁴⁶ The Act also authorizes the issuance of a warrant from a justice of the peace to enforce regulatory compliance on behalf of the Secretary of State.²⁴⁷ The UK Outer Space Act, like the Australian legislation, also provides a list of related offenses subject to criminal sanctions.²⁴⁸

The former civil space authority was the British National Space Centre (BNSC). The BNSC was a conglomeration of UK

²⁴³ UK Outer Space Act, *supra* note 221, at art. 5(2)(e). Specifically, subsection (e) includes two clauses taken from Article IX of the Outer Space Treaty, to prevent contamination of outer space and Earth and avoid interfering with others’ use of space. *Id.*

²⁴⁴ Formerly the purview of the British National Space Center (BNSC), the UK Space Agency was established on 1 April 2011, as an executive agency under the Department for Business, Innovation and Skills (BIS). *Who we are*, UK SPACE AGENCY, <http://www.bis.gov.uk/ukspaceagency/who-we-are> (last visited Nov. 16, 2011)

²⁴⁵ UK Outer Space Act, *supra* note 221, at arts. 5, 11.

²⁴⁶ *Id.* at art. 8.

²⁴⁷ *Id.* at art. 9.

²⁴⁸ *Id.* at art. 11.

government departments and research councils, representing the relevant interests of science, commerce, education, and space industry in the UK. Then on April 1, 2011 the UK Space Agency was established and replaced the BNSC as the leader of the civil space program. The Space Agency is advised by the Space Leadership Council, a conglomeration still representing industry, academia, and government.²⁴⁹ However, due to the unique legal status of the Isle of Man, it is not yet clear whether the UK Space Agency is the space authority for regulating commercial human space flights operated or procured by Manx industries, or whether the Isle of Man will instigate its own regulatory agency for space activities. This question has yet to be clarified.

VII. THE NETHERLANDS

The Kingdom of the Netherlands is a State Party to all five of the space treaties.²⁵⁰ However, it is only recently that it joined the ranks of States with national space legislations. Comparatively speaking, the Netherlands has limited national space experience with a primary commercial focus on engineering and satellite support services. Since it is not a launching State, it engages in space activities through ESA and other collaborative programs. As a result, the Dutch Space Activities Act²⁵¹ was recently published in 2007, with an enforcement date of 1 January 2008. This legislation, tightly based on the space treaties, was intended to establish liability and commercial licensing regulations for purposes of providing state supervision for specific space activities.²⁵² As such, there is room for further elaboration

²⁴⁹ See *How we work*, UK SPACE AGENCY, <http://www.bis.gov.uk/ukspaceagency/who-we-are/how-we-work> (last visited Nov. 5, 2011).

²⁵⁰ UN OFFICE OF OUTER SPACE ACTIVITIES, <http://www.oosa.unvienna.org/oosatdb/showTreatySignatures.do> (last visited Nov. 16, 2011). Note that the Dutch former territories are also parties to the space treaties via the Netherlands. For example, The Kingdom of the Netherlands ratified the Outer Space Treaty on behalf of the Dutch Antilles, Surinam (and Aruba as a separate entity in 1986). 270 U.N.T.S. 308; 672 U.N.T.S. 119.

²⁵¹ Wet ruimtevaartactiviteiten [Rules Concerning Space Activities and the Establishment of a Registry of Space Objects], 80 Staatsblad 1 (Jan. 24, 2007), available at <http://www.unoosa.org/oosadb/showDocument.do?documentUid=401&level2=none&node=NET1970&level1=countries&cmd=add> [hereinafter Dutch Space Activities Act].

²⁵² Dutch Explanatory Memorandum, *supra* note 44, at 1-9.

and development. For instance, the Space Activities Act acknowledges the possibility of “space tourism” in the future but such novel activities are not currently covered.²⁵³ This may change in the near future, however, as Dutch space companies, such as Space Horizon,²⁵⁴ are looking to enter the emerging industry of commercial human space transportation.

In addition to the new legislative developments, the Netherlands Space Office (NSO) was also established in 2008. The NSO leads the national space programs and serves internationally as the Dutch space agency.²⁵⁵ The NSO reports to the Netherlands Organization for Scientific Research and the Ministry of Transport, Public Works and Water Management, which is also the Dutch aviation regulatory authority.²⁵⁶ Interestingly, the administration responsible for drafting and enforcing the Space Activities Act, as well as the designated registrar for space objects, is the Ministry of Economic Affairs.²⁵⁷ Thus, the NSO is very much the result of a collaborative effort.

Other relevant plans involve conducting commercial suborbital flights in the former Dutch Antilles.²⁵⁸ These islands present another unique legal status as former Dutch territories. After much negotiation and a lengthy political process, the islands finally gained autonomous status in the fall of 2010.²⁵⁹ However, as constituent countries they are still subject to the international treaties to which the Kingdom of the Netherlands

²⁵³ *Id.*

²⁵⁴ See SPACE HORIZON, <http://www.spacehorizon.com/> (last visited Nov. 5, 2011).

²⁵⁵ See THE NETHERLANDS SPACE OFFICE, <http://www.spaceoffice.nl/en/The%20NSO/> (last visited Nov. 5, 2011).

²⁵⁶ *Id.*

²⁵⁷ Dutch Space Activities Act, *supra* note 251, §§ 1, 11; Dutch Explanatory Memorandum, *supra* note 45, at 15-16.

²⁵⁸ See SPACE EXPEDITION CURAÇAO, <http://www.spacexc.com/en/the-experience/the-caribbean/> (last visited Nov. 5, 2011); CARIBBEAN SPACEPORT, <http://caribbeanspaceport.com/> (last visited Nov. 5, 2011).

²⁵⁹ In 2010, constitutional changes finally took effect, leading to the dissolution of the Dutch Antilles. As a result, the islands of Curacao and St. Maarten gained country status within the Kingdom of the Netherlands. Aruba already gained this status back in 1986. The other islands have gained autonomy as special municipalities. Nonetheless, the Kingdom of the Netherlands retains some supervisory authority and remains responsible for the islands on the international level. See *Status Change Means Dutch Antilles No Longer Exists*, BBC News (Oct. 10, 2010), <http://www.bbc.co.uk/news/world-latin-america-11511355>.

is a State Party. Thus, the space law treaties remain in effect for island space activities.

Furthermore, it is expected that local space regulations will be passed soon.²⁶⁰ As it stands, the Dutch space law does not inherently extend to the islands but the local regulations are expected to be developed in conformity with the Dutch space law. Moreover, the Dutch space law provides a preliminary legal framework for governing human space flight. For these purposes, an analysis of the pertinent legal elements and issues presented by the Dutch Space Activities Act as applied to commercial human space flight is discussed here.

A. *Scope and key definitions*

The scope of the Space Activities Act extends to Dutch (1) citizens (this includes both natural persons and legal entities), (2) aircraft registered in the Netherlands, (3) Dutch ships, and (4) space objects “launched or destined for launch into outer space” from the territory of the Netherlands.²⁶¹ By an Order in Council, the Act can also be applied, in whole or part, to situations where Dutch citizens are engaged in space activities in a foreign jurisdiction which is not a party to the Outer Space Treaty.²⁶² The aim of this legislation is to create a “mandatory licensing system for the performance of space activities.”²⁶³ Specifically the activities covered are: launch, flight operations, or guidance control of space objects in outer space.²⁶⁴ Notably, a launch procurer is not required under the Dutch law to obtain a license or any authorization, unlike the UK or US.

On the other hand, the Space Activities Act excludes by intention two types of space activities: space activities which are “accomplished with the aid of space technology (e.g. telecommunications, earth observation or geo informatics),”²⁶⁵ as these ac-

²⁶⁰ See Dutch Explanatory Memorandum, *supra* note 44, at 21.

²⁶¹ Dutch Space Activities Act, *supra* note 251, §§ 1, 2.

²⁶² *Id.* § 2.

²⁶³ Dutch Explanatory Memorandum, *supra* note 44, at 1.

²⁶⁴ Dutch Space Activities Act, *supra* note 251, § 1.

²⁶⁵ Dutch Explanatory Memorandum, *supra* note 44, at 1, 22.

tivities are already governed by the national telecommunications and broadcasting regulations, and space tourism.

Concerning the latter, the Dutch Space Activities Act does not in and of itself exclude commercial human space flight activities from its scope. On the contrary, similar to the Australian space law, the Dutch Space Activities Act, Section 2 specifically stipulates that by Order in Council the Act can be broadened to apply to Dutch nationals conducting “designated space activities” overseas, as well as “organization of space activities” from within the Netherlands. Inherently, this could include commercial human space flight for tourism or other purposes.²⁶⁶ Neither does the Act or Explanatory Memorandum directly refer to “space tourism” or prohibit the operation of commercial human space activities and suborbital flights. Even the definitions of key terms in Section 1 of the Act are broadly construed. In the Explanatory Memorandum, the Ministry of Economics indicates that these “open provisions” in the space law framework are intended to allow future application to other potential space activities, including possibly “space tourism.”²⁶⁷

In point of fact, Drs. Heleen Brabander-Ypes, from the Dutch Ministry of Economic Affairs, confirmed that the Dutch Space Activities Act was not yet intended to apply to space tourism.²⁶⁸ However, the Statement by the Kingdom of the Netherlands to the UN Committee on Peaceful Uses of Outer Space (COPUOS), on 5 April 2007, leaves open the possibility of extending the scope of the legislation to space tourism activities when conducted by Dutch nationals.²⁶⁹ With regard to nationals as paying passengers, the current position of the Netherlands is that Dutch SFPs should be covered by the legislative regimes for commercial human space flight as required by the other

²⁶⁶ Dutch Space Activities Act, *supra* note 251, § 2; Dutch Explanatory Memorandum, *supra* note 44, at 22.

²⁶⁷ Dutch Explanatory Memorandum, *supra* note 44, at 2-3.

²⁶⁸ Interview with Drs. Heleen Brabander-Ypes, Dutch Ministry of Economic Affairs, Den Haag, the Netherlands (May 29, 2007).

²⁶⁹ Statement by the Kingdom of the Netherlands, UNCOPOUS Legal Subcomm., 46th Sess. (Mar. 26 – Apr. 5, 2007) (on file with author); *See also* Information on national legislation relevant to the peaceful exploration and use of outer space: reply of the Netherlands, COPUOS, Legal Subcomm., 49th Sess. (Mar. 22 – Apr. 1, 2010, A/AC.105/C.2/2010/CRP.11).

State(s) licensing the activities in question.²⁷⁰ This position is in keeping with the Netherlands' practice of relying on foreign jurisdictions for its (satellite) launch services, licensing and space object registration requirements. It is not surprising then, that the prior lack of a need for space legislation would result in new space law that still maintains ample room for definition and development.

As a result, several concerns are raised when interpreting the Act for future commercial human space transportation purposes, especially with regard to issues of State responsibility and international obligations under the Outer Space Treaty and Liability Convention. For example, Section 1 of the Space Activities Act defines "space activities" as "the launch, the flight operation or the guidance of space objects in outer space." By its very choice of words this definition could include the operation of commercial human suborbital flights. The issue exists in an ambiguous exclusion of commercial human space flight under the Act. It is an ambiguous exclusion because it is neither specifically prohibited nor allowed. While representatives of the Netherlands government have indicated their present intentions to exclude commercial human space flight, the law itself is silent on the matter.

This presents an interesting situation, as the lack of an explicit statutory prohibition usually implies permissible conduct. But even if commercial human space flight were specifically permissible, several regulatory issues remain. Specifically, Section 3 of the Act stipulates that the space activities referred to in Section 2 (the provision which would include commercial human space flight) are prohibited without a license issued by the Minister.²⁷¹ This requires that a regulatory procedure and licensing regime be established and tailored with regard to human space transportation. As of now, there is no provision that either prohibits or regulates commercial human space activities from being conducted from the ground, airspace, aircraft, or sea platform of the Netherlands or its constituencies (e.g. Curacao);

²⁷⁰ Statement by the Kingdom of the Netherlands, *supra* note 269.

²⁷¹ Dutch Space Activities Act, *supra* note 251, § 1(a). The Act clarifies that the "Minister" means the Minister of Economic Affairs.

although, such activities would ultimately attach international liability and responsibility to the Netherlands.

Defining “launch”

The Dutch Space Activities Act only defines seven terms, and a definition for “launch” is not one of them. The lack of a definition is likely connected to the Netherlands position that it is not, and is not likely to become a launching state.²⁷² However, when Dutch nationals engage in air or rocket launched suborbital flights, a provision defining this term should be added to the legislation or specifically clarified and distinguished in the license.

Defining “space object”

“Space object” is defined as “any object launched or destined to be launched into outer space.”²⁷³ The broad scope of this definition suffices to include an RLV for purposes of suborbital space flights, whether air or rocket launched. However, while this definition may be extended to also cover commercial human space flight as is, a particular reference to include a human payload is legally preferable.

Special notice should also be taken of the Registry requirement under Section 11 of the Act, which requires the registration of a space object “used in connection with space activities as referred to in Section 2.”²⁷⁴ Meaning, that if the RLV is deemed to be a space object for purposes of space activities under Section 2 then it will have to be registered in accordance with this Act. In November 2007 the Dutch government passed a Space

²⁷² Note that the Dutch Explanatory Memorandum, stipulates that due to geographical limitations, the Netherlands is only likely to become a launching state – as per the treaties – in the case of air launches or sea launches, although the government acknowledges that procuring a launch may also render it a launching state. Dutch Explanatory Memorandum, *supra* note 44, at 8, 12.

²⁷³ Dutch Space Activities Act, *supra* note 251, § 1(c).

²⁷⁴ *Id.* § 11.

Objects Registry Decree implementing the registration requirements.²⁷⁵

B. License requirements

The Dutch Space Activities Act Sections 3 through 5 requires a license for conducting space activities in general, and provides that the license application be submitted to the Minister (of Economic Affairs) to be approved thereafter within a six-month timeframe. Section 4 provides that the requirements for license eligibility will be imposed by the Minister or by Ministerial Order. In early 2008, the Minister of Economic Affairs published rules for license applications and the registration of space objects (License Rules).²⁷⁶ These License Rules consist of six short articles with an accompanying explanatory memorandum. It is significant to note that the regulations are specifically geared toward satellite operations. Consequently, the extension of this Space Activities Act to commercial human space flight activities would require a new regulatory and licensing regime governing both human and suborbital aerospace technology.

The License Rules do however cover some elementary regulatory aspects utilizing broad language. Article 2 of the License Rules articulates the accompanying information and documents required with the license application.²⁷⁷ The five major requirements are:

- a complete description of the space activities;
- financial documentation to include, a projected balance sheet with explanatory notes, profit/risk analysis, and cash-flow forecast;
- Evidence of liability insurance (which is a prerequisite to license approval),²⁷⁸

²⁷⁵ Decree of 13 Nov. 2007, containing rules with regard to a registry of information concerning space objects (Space Objects Registry Decree).

²⁷⁶ Order of the Minister of Economic Affairs dated 7 Feb. 2008, no. WJZ 7119929, containing rules governing license applications for the performance of space activities and the registration of space objects. [hereinafter License Rules].

²⁷⁷ *Id.* at art. 2.

²⁷⁸ *Id.* at 3 (Explanatory Notes).

— Evidence of frequency authorization (for navigation purposes);

— “An account of the applicant’s knowledge and experience with regard to the performance of space activities, and also documentary evidence demonstrating that this knowledge or experience is safeguarded during the performance of the space activities.”²⁷⁹

The business focus of these requirements may be more beneficial than necessary in commercial human space flight regulation but would not detract from the major requirements. Furthermore, Article 3 requires application materials to be made out to the Minister of Economic Affairs.²⁸⁰ Articles 4 and 5 require the registration or amendment of information for space objects in accordance with the Space Objects Registry Decree.²⁸¹

C. *Liability and insurance scheme*

In the event the Space Activities Act is extended to apply to commercial human space flight in the future, Section 3.4 provides the general statement on insurance coverage required under a space activities license. It specifically stipulates that the license-holder must “have and retain what Our Minister considers to be the maximum possible cover[age] for the liability arising from the space activities for which a license is requested.”²⁸² The amount of mandatory insurance is understandably an issue to be determined on a case-by-case basis, during the licensing process, as stipulated in the Explanatory Memorandum.²⁸³ In fact, the Memorandum states that “this insurance coverage depends on the purpose and nature of the proposed space activities and the scale on which they will be performed.” The Act also states “what can reasonably be covered by insurance” will be taken into consideration.²⁸⁴

²⁷⁹ *Id.* at art. 2.

²⁸⁰ *Id.* at art. 3.

²⁸¹ *Id.* at arts 4, 5.

²⁸² Dutch Space Activities Act, *supra* note 251, § 3.4.

²⁸³ Dutch Explanatory Memorandum, *supra* note 44, at 11.

²⁸⁴ Dutch Space Activities Act, *supra* note 251, § 3.

On the other hand, the Act does not provide for any limitations on State indemnification for space activities (e.g. as in the US),²⁸⁵ meaning that the State can be held accountable for the whole amount of compensation if the license-holder's insurance is insufficient. However, Section 10 regarding disasters and incidences requires the license-holder to immediately take reasonable measures to prevent, mitigate or rectify any consequences arising from the space activities.²⁸⁶ Moreover, Section 12 provides for the State's right of recourse to recuperate from the license-holder any compensation paid out under Article VII of the Outer Space Treaty.²⁸⁷ The Explanatory Memorandum explains this redress as the State's intention to collect the reimbursement from the license-holder's insurance proceeds.²⁸⁸

Another liability issue arises under State liability for nationally registered companies. Currently, the national Space Act excludes liability based on the principle of nationality outside the Netherlands (not in the "Kingdom of the Netherlands").²⁸⁹ This could present international liability issues arising from activities conducted overseas, on the high seas, international air space or in the Kingdom's constituencies (e.g. Curacao) involving nationals or nationally registered entities or aerospace-craft. While the Netherlands government acknowledges its potential liability to the international community under the treaties it has stated that "such broad jurisdiction [of the nationality principle] cannot be justified in the Netherlands."²⁹⁰ This is an interesting position to take, as it admittedly still does not shield the Netherlands from international liability. Even, Drs. Heleen de Brabander-Ypes from the Ministry of Economic Affairs has ac-

²⁸⁵ In the U.S., the CSLAA requires operators/licensees to have liability coverage based on the maximum probable loss (MPL). While this financial responsibility requirement may be proven through various means, this usually implies operator liability coverage of up to \$500 million, and the government indemnifies any damage exceeding that amount up to \$1.5 billion. 49 U.S.C. § 70112, *transferred to* 51 U.S.C. § 50914 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

²⁸⁶ Dutch Space Activities Act, *supra* note 251, § 10.

²⁸⁷ *Id.* § 12.

²⁸⁸ Dutch Explanatory Memorandum, *supra* note 44, at 14.

²⁸⁹ *See id.* at 11.

²⁹⁰ *Id.*

knowledge of the possibility of international claims in this regard based on the nationality principle.²⁹¹

D. Environmental requirements

The Dutch Space Act does not provide for environmental protection of the Earth. In fact, Section 3.3(b) merely stipulates that restrictions may be placed on a license for “protection of the environment in outer space.”²⁹² Additionally, Section 6 refers to the environment of outer space as one of the grounds for refusing a license, but declines mention of the Earth’s environment.²⁹³ On the other hand, the Explanatory Memorandum asserts one of the reasons for denying a license includes for the “safety of persons or goods” and “environmental protection” or where reasonable grounds exist for “non-compliance with regulations and restrictions that need to be observed in conducting the space activities.”²⁹⁴ But no further explanation is provided on environmental protection. The current License Rules and license application do not stipulate environmental requirements either, unlike the US and Australian licensing regimes.

E. Regulatory Compliance

Under the Act the Minister of Economic Affairs has the authority and ultimate responsibility to ensure regulatory compliance. Accordingly, the Minister is authorized to appoint officials to carry out enforcement duties.²⁹⁵ An interesting aspect of the Dutch Space Act is its predominant focus on the application of administrative law for license infractions. Ten provisions, in fact, cover the pecuniary penalties and procedures for listed infractions.²⁹⁶ A uniquely interesting element is the inclusion of provisions providing for a translator at the administrative hearing²⁹⁷ and for the translation of related written administrative

²⁹¹ *Supra* note 268.

²⁹² Dutch Space Activities Act, *supra* note 251, § 3.3(b).

²⁹³ *Id.* § 6.

²⁹⁴ Dutch Explanatory Memorandum, *supra* note 44, at 25.

²⁹⁵ Dutch Space Activities Act, *supra* note 251, § 13.

²⁹⁶ *Id.* §§ 13-23.

²⁹⁷ *Id.* § 20.

documents into the language of the perpetrator of the infraction(s), where deemed reasonably necessary to ensure linguistic understanding of the administrative proceedings.²⁹⁸ Such provisions are singular in nature in any national space legislation.

VIII. SWEDEN

Sweden presents a hybrid model of a European nation, while it is an EU Member State it has retained its own national currency and independence concerning military and defense matters. However, with regard to space research and development, Sweden has an extensive collaborative history. A founding member of the European Space Agency (ESA), Sweden continues to partner in numerous regional and international space initiatives. Most significantly, Spaceport Sweden, located in the Swedish sub-arctic city of Kiruna was inaugurated in 2007 as the first suborbital spaceport in Europe with a Virgin Galactic partnership.²⁹⁹ Commercial suborbital flights are scheduled to commence in 2012.³⁰⁰ This spaceport venture is a conglomeration of several national entities that include the State-owned Swedish Space Corporation,³⁰¹ the Kiruna Airport Authority (LVF), Progressum, a local business development company, and the ICEHOTEL.³⁰²

The unique characteristics of the sparsely populated wilderness region surrounding Kiruna has historically offered a vast and safe air and ground space for aerospace research, development, and testing since the early twentieth century. Activities conducted here include, for instance, aircraft test flights, rocket launches, and balloon and satellite activities.³⁰³ In fact,

²⁹⁸ *Id.* §§ 18, 21(2).

²⁹⁹ *EU Project*, SPACEPORT SWEDEN, <http://www.spaceportsweden.com/eu-project.aspx> (last visited Nov. 6, 2011).

³⁰⁰ *See About Us*, SPACEPORT SWEDEN, <http://www.spaceportsweden.com/about-us-1.aspx> (last visited Nov. 6, 2011) [hereinafter *About Us*].

³⁰¹ *About the SSC Group*, SSC, <http://www.ssc.se/about-the-ssc-group> (last visited Nov. 6, 2011); *Spaceport Sweden — FAQ*, SPACEPORT SWEDEN, <http://www.spaceportsweden.com/faq.aspx> (last visited Nov. 6, 2011) [hereinafter *Spaceport Sweden — FAQ*].

³⁰² *About Us*, *supra* note 300.

³⁰³ *History*, SPACEPORT SWEDEN, <http://www.spaceportsweden.com/?id=9513> (last visited Nov. 6, 2011). For example, aircraft engine tests were conducted from here in 1924, and the first Swedish rocket launch was conducted here in 1961.

from 1966 to 1972 the Esrange Space Center near Kiruna, Sweden, was the European Space Research Organization (ESRO) center for conducting space and launch activities for scientific purposes. In 1972, reorganization of ESRO, into what has now become ESA, led to the Esrange Space Center's nationalization under the Swedish Space Corporation.³⁰⁴ Upcoming commercial suborbital space flights at Kiruna promise unique flight plans, with seasonal flights through the aurora borealis.³⁰⁵ Consequently, the development and application of Swedish space law and policy is a pertinent issue for discussion.

Sweden is a Member State to the three main space treaties, the Outer Space Treaty, the Liability Convention, and the Registration Convention, and has a brief national space policy. In fact, very little legislation has been published by the Swedish government which would apply to the regulation of commercial human suborbital activities or space activities in general, for that matter. Like the Netherlands and the Isle of Man, there is still much for the Swedish authorities to develop and enact with regard to the upcoming suborbital space activities at Spaceport Sweden. Although, it is expected that regulations similar to those in the US will be developed.³⁰⁶

A. Scope and key definitions

The 1982 Swedish Act on Space Activities³⁰⁷ is unique in that it may well be considered the world's briefest Space Act. In truth, the Act consists of only six concise provisions. Consequently, it has been criticized for inadequate coverage of space activities and other issues.³⁰⁸ However, like the Netherlands'

³⁰⁴ *Esrange Space Center*, SSC, <http://www.ssc.se/about-the-ssc-group/ssc-companies/ssc/esrange-space-center-3> (last visited Nov. 6, 2011); *A European Vision*, ESA, http://www.esa.int/SPECIALS/About_ESA/SEM5TEVL2F_0.html (last visited Nov. 6, 2011).

³⁰⁵ *Spaceport Sweden – FAQ*, *supra* note 301.

³⁰⁶ See Peter B. de Selding & Tariq Malik, *Virgin, Swedish Spaceport Sign Deal for Suborbital Flights*, SPACE NEWS (Feb. 7, 2007), http://www.spacenews.com/archive/archive07/virginsweden_0205.html (last visited Nov. 6, 2011).

³⁰⁷ Swedish Act on Space Activities (1982:963) [hereinafter Swedish Space Act].

³⁰⁸ See e.g., HERMIDA, *supra* note 51, at 143 (In sum, criticisms of the Act point to four main points: (1) all liability risks are reallocated through the State to the license holder; (2) provisions are insufficient and imprecise for efficient legislation; (3) no de-

Act, it was drafted specifically in light of the State obligations under the space treaties. Thus, Section 1 of the Act provides a broad legislative scope governing all activities in outer space, to include the launch and maneuver of objects launched into space.³⁰⁹ While there is no particular reference to human space flight, without further restriction or exclusionary policy provisions this scope would inherently include the operation of commercial human suborbital space flights. The only two activities specifically excluded from the scope of this Act are the receipt of signals and information from objects in space, and the launching of sounding rockets.³¹⁰ Accordingly, Section 2 of the Act on Space Activities requires a license for conducting space activities from Swedish territory by non-State entities, and also mandates a license requirement for Swedish nationals (natural or juridical) to carry on space activities anywhere else.³¹¹

B. License requirements

The Act does not specify a regulating authority for space activities or licensing procedures. Consequently, the Act must be read congruently with the subsequent Decree on Space Activities³¹² for further clarification. More specifically, Section 3 of the Act briefly stipulates that space licenses are granted by the government, and that the government has authority to place restrictions on the license as deemed appropriate for the circumstances, as well as to invest an enforcement body with the authority to inspect the space activities of the license holders.³¹³ The Decree on Space Activities, also a very short document consisting of only four provisions, identifies the license granting authority as “the National Board for Space Activities,” also called the Swedish National Space Board (SNSB), and author-

lineated procedure/ legal grounds for the space license; and (4) The authority vested in the National Board for Space Activities are too broad without limitations on the discretionary powers). *Id.*

³⁰⁹ Swedish Space Act, *supra* note 307, § 1.

³¹⁰ *Id.*

³¹¹ *Id.* § 2.

³¹² Swedish Decree on Space Activities (1982:1069) [hereinafter Swedish Space Decree].

³¹³ Swedish Space Act, *supra* note 307, § 3.

izes the Board to “[...] exercise control of space activities carried on by those who have licenses for such activities.”³¹⁴

The SNSB is the primary government agency responsible for international and national space activities. Primarily a research and development agency, it acts as a research council and distributes government funds for space research.³¹⁵ However, with regard to the Spaceport Sweden case, it is unclear whether the role of commercial space regulator (e.g. the FAA in the US) will be performed in full capacity by the SNSB, under the Ministry of Education and Research, or in part by the SSC, under another appropriate Ministry.³¹⁶ In addition, under the Swedish space legislation any regulatory or licensing development authority is broadly granted to the Board and thus there is no regulatory stipulation for commercial enterprise or industry involvement, unlike the FAA approach in the U.S.³¹⁷ Nonetheless, the 2007 Memorandum of Understanding between the Swedish government and Virgin Galactic suggests an emerging trend for government and industry collaboration in future regulatory development.³¹⁸

Moreover, unlike the majority of national space legislations, the Act on Space Activities lacks a mandate for the registry of space objects. However, in the secondary legislation, the Decree on Space Activities Section 4 establishes a duty for the National Board of Space Activities to maintain “a register of the space objects for which Sweden is to be considered the launching State” and stipulates registry data in accordance with the Registration Convention.³¹⁹ From past policy perspectives, however, it is presently unclear whether Sweden would consider the RLV to be a space object for registration purposes, since the RLV is never to be placed or left in an orbital trajectory.

³¹⁴ Swedish Space Decree, *supra* note 312, § 2.

³¹⁵ *The Swedish National Space Board*, RYMDSTYRELSEN, <http://www.snsb.se/en/Home/Home/> (last visited Nov. 6, 2011).

³¹⁶ The government's ownership of SSC is administered by the Ministry of Finance, although SSC has operated under the Ministry of Industry, Employment and Communication in the past. See *Swedish Space Corporation*, NORDICBALTSAT, <http://www.nordicbaltosat.eu/node/20> (last visited Nov. 6, 2011).

³¹⁷ See HERMIDA, *supra* note 51, at 143.

³¹⁸ See Selding and Malik, *supra* note 306.

³¹⁹ Swedish Space Decree, *supra* note 312, at 4.

C. Liability and insurance scheme

There is no liability or insurance scheme stipulated under either the Swedish Act on Space Activities or the Decree on Space Activities, concerning private or commercial activities. The last provision in the Act on Space Activities, Section 6, summarily provides that if the Swedish State is held liable for damage under its international agreements, and which damage is caused by the persons conducting the space activities, then the State has recourse to compensatory reimbursement from the persons involved, unless special reasons dictate otherwise.³²⁰ This measure of allocating all State liability to the persons involved in the space activities has been criticized. This may appear more harsh where the government or government owned entity is also a space participant, providing the launch facilities and/or services, as in Spaceport Sweden. Even in the US, where commercial operators are required to indemnify the government, the liability scheme still does not eliminate all government liability. Perhaps this will be clarified in future regulations. This matter is particularly relevant to commercial suborbital space activities, as it relates to issues beyond the scope of operator liability, and includes passenger liability and personal liability waivers.

D. Environmental requirements

Due to the brief nature of this Space Activities Act and Space Decree, there are no provisions or comments concerning the protection of Earth's environment or that of outer space. This is noteworthy since Sweden otherwise maintains a sound reputation globally for Earth conservation and environmental awareness. As a result, it is only to be expected that such applicable requirements and regulations would become part of the license terms or stipulated in the forthcoming commercial space regulations.

³²⁰ Swedish Space Act, *supra* note 307, § 6.

E. Regulatory Compliance

Section 4 of the Act on Space Activities deals with regulatory compliance stating that the government may withdraw a license, permanently or temporarily, when “the conditions of the license have been disregarded” or for other particular reasons.³²¹ Section 5, furthermore, provides that willful or negligent misconduct in conducting space activities without a license, or violating the license requirements, is punishable by fine or a prison term of up to one year.³²² Additionally, the Act stipulates that criminal sanctions and prosecution may also await perpetrators of space related activities found within the country.³²³ The Decree on Space Activities follows suit and stipulates in Section 3 that suspected infringements of the Act and subsequent conditions will be reported to the Government by the National Board for Space Activities. This deferment of authority raises a question as to who the national regulatory enforcement body for space activities is, if not the SNSB. This is another issue that remains to be clarified.

IX. CREW & PASSENGER LIABILITY

A. National law

Commercial space transportation requires a supervising State to define certain additional terms and requirements for national legal purposes, such as private commercial contracts and liability. These definitions may be implemented by regulation (e.g. The U.S. Code of Federal Regulations) and/or specified in the national space license. Some of these terms may already be mentioned generally in the Outer Space Treaty and its progeny. However, due to the commercial aspect of this new industry some treaty stipulations may or may not be applicable to private and commercial enterprise or the civilian consumer, while other terms lack specificity creating legal ambiguities. Consequently,

³²¹ Swedish Space Act, *supra* note 307, § 4.

³²² *Id.* § 5.

³²³ *Id.*

the following terms and issues require national regulatory attention.

1. Definition of “astronaut”

A practical issue in commercial human space flight licensing and contracts is the distinguishing of parties for liability purposes. This infers international liability of the supervising State as well as party liability under national law. While the space law treaties do not contemplate who is an astronaut, Article V of the Outer Space Treaty declares that astronauts shall be regarded as “envoys of mankind in outer space.” However, this definition is not necessarily appropriate to commercial space operators or SFPs as the provision drafted was intended to apply to selected government professionals, not the average civilian, commercial or otherwise. Despite this intent, however, there is still no uniform definition of “astronaut” shared in the international community.

Thus, the obligations of States Parties to commercial astronauts under international law and space law remain unclear. For instance, both the Outer Space Treaty and the Rescue Agreement create an international obligation for Member States to render aid to astronauts when needed, return the astronauts or spacecraft personnel and discovered/ recovered space objects to the State of Registry.³²⁴ Nonetheless, the specific terms “astronaut” and “personnel of a spacecraft” are never defined. Moreover, as the treaties apply to States not private entities, how a State chooses to implement these vague terms nationally may vary considerably from State to State. For purposes of sub-orbital regulation, it is not necessary to distinguish between types of space flight passengers. But it is necessary to identify the operator, crew, government personnel, and commercial passenger from each other under national law, and treaty law where applicable, as these distinctions inherently impact differ-

³²⁴ Outer Space Treaty, *supra* note 3, at art. V; Rescue Agreement, *supra* note 57. Note that the Outer Space Treaty refers explicitly to “astronauts” whereas the Rescue Agreement acknowledges “astronaut” in the Preamble but also utilizes “personnel of a spacecraft” in the Agreement text.

ent legal obligations and remedies in the event of an accident or incident.

The US commercial space law framework, for instance, defines commercial civilian passengers as “space flight participants.” Notably, they are distinguished from commercial crew as well as from professional astronauts. Consequently, each category of personnel falls under a different liability regime stipulated under US law.³²⁵ While this is merely one method of implementation, this clarification serves its legal purpose.

On the other hand, various US agencies and private companies have already applied various determinations of “astronaut” for the purpose of awarding astronaut wings. For instance, starting in the 1960s the US Air Force and NASA awarded pilots with astronaut wings for X-15 suborbital flights in excess of 50 miles (80km) above the Earth.³²⁶ In 2005, the FAA awarded the two winning pilots of the X-Prize competition with astronaut wings for exceeding 62 miles (100km).³²⁷ It remains unclear, however, whether the FAA will extend these awards to participants other than pilots. Virgin Galactic also promises to award astronaut wings to its SFPs who reach the same altitude, although SpaceShipTwo is expected to reach around 68.3 miles (110km).³²⁸ Thus, the definition of astronaut for cultural and private commercial purposes is widely left up to individual interpretation. This practice carries no legal bearing as long as it is distinguished from the scope of legal terms, definitions and purposes.

³²⁵ For instance, the status of an individual or entity changes the scope of liability and remedies available, such as government versus private entity, employee versus customer.

³²⁶ Harvard College, *supra* note 76, at n. 7.

³²⁷ Scaled Composites won the Ansari X Prize of 2005 when pilots Brian Binney and Mike Melville successfully flew SpaceShipOne to altitudes of up to 70 miles (112 km) on three different flights, earning both of them FAA commercial astronaut wings, the first recipients of this award. See *Milestones of Flight*, SMITHSONIAN NATIONAL AIR AND SPACE MUSEUM, <http://www.nasm.si.edu/exhibitions/gal100/ss1.htm> (last visited Nov. 6, 2011); Marion Blakey, Administrator, Federal Aviation Administration, Statement Before the House Transportation Committee Hearing on Commercial Space Transportation (Feb. 9, 2005), <http://www.spaceref.com/news/viewsr.html?pid=15404>.

³²⁸ See *Experience*, VIRGIN GALACTIC, <http://www.virgingalactic.com/overview/experience/> (last visited Nov. 6, 2011).

2. Safety Regulations

The space industry is unique in that it is the first transportation sector that has been preceded by law. Other forms of transportation such as land, sea, air, and locomotive carriage only became regulated after these activities had existed for lengthy periods of time.³²⁹ Thus, the methods of these modes of transportation had already been tried and tested. However, given the ultra hazardous nature of conducting space activities, both to participating parties and third parties on the ground, national space legislations govern all aspects of accepted space operations. As the US is the first State to develop commercial human space flight regulations, these new human safety rules are being developed alongside and in collaboration with industry. This contemporaneous method of rule making requires regulatory flexibility, close consultation, and mutual cooperation between government and industry. However, even as new rules continue to emerge it will take some time before uniform standards can be applied to various space vehicles and flight patterns as widely as applied in civil aviation.

On the international level it has already been suggested that the scope of ICAO be expanded to include standardized regulations for safety and navigation in commercial suborbital space flight.³³⁰ Future consideration on this matter, however, will inherently have to incorporate two main elements: international transportation (space hops) and a determination of space operators as “common carriers” under the same standards as other public transportation carriers. The latter is an intriguing issue up for debate.³³¹ As a practical matter, however, this discussion extends the present scope of this paper. Meanwhile it will be interesting to review new U.S., European, or EASA stan-

³²⁹ For air regulation development, see e.g. Frank E. Quindry, *Airline Passenger Discrimination*, 3 J. AIR L. 479 (1932); Irwin S. Rosenbaum, *Regulation of Aircraft as Common Carriers*, 3 J. AIR L. 194 (1932); Carl Zollmann, *Liability of Aircraft*, 53 AM. L. REV. 879, 880 (1919).

³³⁰ See e.g. Paul S. Dempsey & Michael Mineiro, *The ICAO's Legal Authority to Regulate Aerospace Vehicles*, in PROCEEDINGS OF 3RD IAASS CONFERENCE (2008).

³³¹ See e.g. 150 Cong. Rec. H836 (daily ed. March. 4, 2004) (statement of Rep. Boehlert).

dards put in place this next year or two, as spaceport activities commence in the state of New Mexico and Sweden.

3. Crew training

Commercial crew training requirements for suborbital space flight are a work in progress. In the US, the FAA/AST has stipulated broad training and qualification requirements in 14 C.F.R. Part 460 for crew and pilots so as to ensure that each crewmember is capable of filling the function of his/her post.³³² Particular examples of requirement implementation have yet to be published, neither have Sweden or any other State released any commercial human space flight requirements at this time. Nonetheless, prior industry experience and frameworks for human space flight may also be gleaned from established collaborative astronaut programs and other "space tourist" visits to the *ISS*. Consequently, commercial suborbital flight presents national regulators with a new field for development both with regard to new vehicle types and human requirements.

4. Passenger health exams and training

Concerning SFPs, the US CSLAA provides for medical checks and training requirements as directed by the Secretary of Transportation and instituted by the FAA/AST.³³³ However, 14 C.F.R. Part 460 only covers broad training not medical requirements. As a result, uniform health standards and scope of examination have yet to be determined. It is still uncertain in the US whether the FAA/AST will promulgate these requirements or whether space states within the US (e.g. New Mexico and Florida) are permitted to promulgate their own legislative requirements and waivers on this issue. Without uniform standards, however, concerns about discriminate and/or disparate health standards and safety measures are likely to arise, just as

³³² 49 U.S.C. § 70105 transferred to 51 U.S.C. § 50905 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010); 14 C.F.R. § 460.5 (Crew qualifications and training), § 460.7 (Operator training of crew), § 460.51 (Space flight participant training).

³³³ *Id.*

they arose in commercial aviation.³³⁴ To date, no other Nation State has issued regulations or requirements on this matter.

Health requirements for commercial passengers may also trigger other issues of contracts and torts in the sale of tickets to potential SFPs.³³⁵ This concern is highlighted by the recent case of *Enomoto v. Space Adventures, Ltd.*, 624 F.Supp.2d 443 (2009). Here a Japanese businessman, Daisuke Enomoto, an intended “space tourist” to the *ISS* was ultimately denied his seat aboard the Russian *Soyuz* due to a worsened medical condition. Subsequently, he was denied a refund. Mr. Enomoto sued Space Adventures, Ltd., in state court for eight causes of action, including breach of contract, fraud, and violation of Virginia’s consumer protection law. The Virginia court, the state of incorporation for Space Adventures Ltd., dismissed some of the claims but granted others for trial.³³⁶ Even as the first case law example concerning a space flight participant, this situation highlights the potential for rising litigation pertaining to health, safety and contracts in commercial human space transportation.

From a business perspective, Virgin Galactic is instituting its own operational checks and safety measures, stating that it will conduct both health screenings and training sessions for all passengers. Again, the procedures have yet to be made public but the company asserts that the medical assessment “will be simple and unrestrictive,”³³⁷ anticipating few medical concerns that would restrict flight participation.³³⁸

³³⁴ See e.g. Quindry, *supra* note 329.

³³⁵ Note that while the US commercial space law refers to commercial space flight clients as “space flight participants” companies themselves, like Virgin Galactic, call their clients “passengers,” following the custom and terminology of commercial aviation.

³³⁶ *Enomoto v. Space Adventures, Ltd.*, 624 F.Supp.2d 443 (2009).

³³⁷ *Training*, VIRGIN GALACTIC, <http://www.virgingalactic.com/overview/training/> (last visited Nov. 6, 2011) [hereinafter *Training*].

³³⁸ Health risk questions and determinations are being prepared by consultation with aerospace medical experts. See *id.* The final medical determinations also promise to provide interesting and scientific insight into the tenability of the average human body (e.g. untrained/non-professional astronaut) in space. For instance, while initial concerns whether breast implants could explode during space flight have disappeared, other prominent health questions remain, such as cardiovascular and circulatory problems. See e.g. *Boob Job Ban On Virgin Space Flights*, SKY NEWS (Mar. 29, 2006), <http://news.sky.com/home/article/13516317>.

As the forerunner in commercial suborbital space flight, Virgin Galactic's approach in training and medical standards bears high scrutiny. Current press indicates that the passenger's preparatory training for the two and a half hour flight is scheduled to span three days at the spaceport.³³⁹ Training will include pre-flight briefings, basic emergency response training (as per regulation), parabolic flights, and exercise techniques to instruct and familiarize participants with G-forces, microgravity, and space environments.³⁴⁰ Even if stricter standards were to be enforced, the medical and training requirements for suborbital SFPs is certainly much shorter in duration and less rigorous than it has been for orbital participants.

B. Passenger Liability Waivers

The personal liability waiver for SFPs is another topical issue in commercial human space flight. While passengers on-board regular aircraft are entitled to an established set of rights as stipulated by the applicable national and international legal regimes on air carriage, SFPs are not yet extended these or similar rights. Apart from the question of whether commercial space transportation should be afforded a "common carriage" status like airlines in the near future, the concept of personal liability waivers is in itself diversely perceived worldwide. As the leading regulator of commercial human space flight, the US is the first State to institute mandatory cross-waivers for commercial SFPs. Thus, it has yet to be seen how other countries will address the issue, or even whether the following liability waivers will hold up absolutely in US courts should a case arise.

Currently, under the CSLAA a SFP is required to sign a cross-waiver or "reciprocal waiver of claims with the Federal Aviation Administration of the Department of Transportation"³⁴¹ for all potential damage or loss incurred by the SFP during the licensed activity. This cross-waiver applies where the Govern-

³³⁹ *Training, supra* note 337.

³⁴⁰ *Id.*

³⁴¹ 14 C.F.R. §460.49; *see also* 49 U.S.C. § 70112, *transferred to* 51 U.S.C. § 50914(b)(2) *by* Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

ment, its agents or subcontractors are involved in the launch and/or reentry activities.³⁴² However, there is no federal statutory requirement for a reciprocal waiver of claims in private contracts between the licensee/operator and the SFP. While Congress ultimately decided to exclude private contracts between the operator and SFP from the federal cross-waiver scheme, it acknowledged that it would be in the operator's interest to have the SFP sign a personal liability waiver.³⁴³ This issue becomes more complicated as individual states, such as Virginia, are issuing their own mandatory liability waiver legislation. It has yet to be determined whether these state laws will be enforceable, or whether the issue is preempted by the federal legislation.

Moreover, an SFP is required to indemnify the U.S. Government where third-party claims arise from harm "sustained by the spaceflight participant."³⁴⁴ Specifically, the law provides that the "Space Flight Participant shall hold harmless and indemnify the United States and its agencies, servants, agents, subsidiaries, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims brought by anyone for Property Damage or Bodily Injury, including Death, sustained by Space Flight Participant, resulting from Licensed/Permitted Activities."³⁴⁵ Indemnification does not, however, extend to claims resulting from the "willful misconduct of the Government or its agents."³⁴⁶ It is significant to note that the legislative intent behind this requirement is to insulate the Government from potential estate or third party claims arising from the loss of or harm to the SFP.³⁴⁷ Even so, the Regulation is

³⁴² Description of Final Rule and Discussion of Comments, Human Space Flight Requirements for Crew and Space Flight Participants, 71 Fed. Reg. 75616, 75627 (Dec. 15, 2006). Note that this mandatory cross-waiver with the U.S. Government also extends to the licensee/ operator, customer (customer is distinguished from an SFP in that the customer is a launch procurer with rights in the payload) and crew).

³⁴³ *Id.* at 75627-28.

³⁴⁴ 14 C.F.R. Part 440, app. E, § 5.; *see also* Human Space Flight Requirements for Crew and Space Flight Participants, *supra* note 342, at 75627 (2006).

³⁴⁵ 14 C.F.R. Part 440, app. E, § 5.

³⁴⁶ 49 U.S.C. § 70112(e), *transferred to* 51 U.S.C. § 50914 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010); *see also* 14 C.F.R. Part 440, app. E, § 6.

³⁴⁷ Human Space Flight Requirements for Crew and Space Flight Participants, *supra* note 342, at 75627.

not entirely clear on its face. A potential issue arises in the statutory language used, such as “by anyone,” which leaves open the possibility for this requirement to be construed or interpreted more broadly than was originally intended.

On a comparative international scale, it is clear that factors and issues affecting and shaping the legal scope of the liability waiver parameters for commercial suborbital flights will include the national legal inclinations to voluntary liability waivers, as well as the applicability of international law derived from the status of the flight and operation. Another legal question that arises is whether the carrier craft configuration (including the space object) while flying to its appropriate altitude for the air launch, is covered under the national aviation rules or not? If so additional questions are:

— Whether the national aviation rules, and thereby its passenger rights and protections (including any personal life insurance), apply to the SFPs at any time prior to launch, and/or after reentry until the point of disembarkation. A State may choose to define “launch” and “reentry” under the national space legislation to prescribe the parameters of the flight covered by the liability waiver. Although, this is a particularly convoluted issue for the air launch scenario as previously discussed.

— If the answer to the above is in the affirmative, there may be an issue with a complete waiver of liability concerning flight time in regular airspace, in which regular flight passengers would be protected. A review of the national or regional aviation regulations on liability waivers may help determine this issue.

— It is important to note that if any passengers were to board the carrier craft (e.g. as launch observers) then air law should strictly apply to these passengers, thereby likely negating the use of cross-waivers and liability waivers for those persons.³⁴⁸

³⁴⁸ The FAA has already declined to extend the CSLAA definition of “crew” to carrier craft crew. The FAA explained that the carrier craft crew is already covered by appropriate FAA regulations. This suggests that paying passengers on the carrier craft should also receive this treatment. Therefore, the statutory cross-waivers should not apply to crew or passengers onboard the carrier craft. See Human Space Flight Requirements for Crew and Space Flight Participants, *supra* note 342, at 75618 (see particularly n. 4).

Generally speaking, liability waivers seek to allocate the inherent risk of the activity amongst the parties involved. Thus, liability waiver clauses and the legal determination for what is permissible fall under the scope of national law.³⁴⁹ Another reason why it is necessary to look at the regional/national laws for the parameters of waivers, concerns liability issues arising from non-accidental conduct, for which the State and/or local government are responsible. For example, where criminal conduct, criminal negligence, misrepresentation, fraud, or other tortious acts arise on the part of the launch operator or its contractors and subcontractors, resulting in injury or damage to the space flight participant. In such cases, liability waiver provisions waiving this kind of liability are not likely to be upheld as valid, especially in common law jurisdictions where such provisions would be deemed to be unconscionable. However, in countries, like the Netherlands, where legislatures are just starting to draft and enact space legislation, it is helpful to look at existing or draft examples of liability clauses and agreements.³⁵⁰

Other interesting points raised by liability waivers are the concepts of human rights and ethics as applied to space travel or transportation. Lawyers outside the US, in particular, are already questioning whether a full liability waiver is ethical, or even in violation of human rights.³⁵¹ With regard to the latter, space transportation has yet to be accepted as inferring a fundamental human right. "Space travel" and "space transportation" are not defined terms under the CSLAA or other space law regimes. Much like the term "space tourism," they exist as social/cultural colloquialisms. Without a discernable right, this argument falls short under legal scrutiny.³⁵² Furthermore, cur-

³⁴⁹ On the other hand, if the carrier plane were to land in another State different from the point of origin with passenger observers on board, then international air law's rules of carriage on passenger rights are likely to be triggered and become applicable in case of injury or accident.

³⁵⁰ For space launch liability agreements see KAYSER, *supra* note 5, at 309-345; 14 C.F.R. § 450.

³⁵¹ Based on conversations and communications between international attorneys and the author.

³⁵² A suborbital flight for entertainment purposes may not constitute "travel" in the strictest sense, due to the inherent joyride feature of the flight conducted from a sole port of origin/departure. However, if the legal status of "common carriage" were to be

rent suborbital space flight plans simulate the risky and voluntary choice of participating in an extreme sport, an industry which traditionally practices the use of personal liability waivers.

This point leads to the next question, whether ethical considerations may interfere with mutually agreed upon contractual terms. The right to contract is an undisputed and fundamental rule under the law of contract. However, courts may set contracts aside, including personal liability waivers, if they are deemed to be unconscionable.³⁵³ To counter this risk, both the CSLAA and FAA/AST stipulate informed consent requirements. These requirements mandate that SFPs have full written disclosure of the risks of launch, reentry, and the safety record of the vehicle type,³⁵⁴ and written disclosure before payment that the US government “has not certified the launch vehicle as safe for carrying crew or space flight participants.”³⁵⁵ Lastly, the flight participant is required to also provide a written statement confirming his/her informed consent to participate in the activity and that he/she has complied with any applicable regulations.³⁵⁶ These precautions were legislatively set in place in order to ensure that the space flight participant is fully aware of the risks that he/ she is undertaking by participating in suborbital space activities.

Even commercial space companies have demonstrated trends toward full disclosure of the risks inherent in space ac-

extended to commercial suborbital flights as it is to air carriers, then US aviation case law would suggest that this discussion becomes moot, as even a sight-seeing flight is subject to the same liability standards as a point-to-point carrier. *See* *Kamienski v. Bluebird Air Service*, 321 Ill. App. 340, 53 N.E.2d (1st Dist. 1944); *Stewart v. Loughman*, 367 Pa. 486, 80 A.2d 715 (1951); 8A AM. JUR. 2D *Aviation* § 59. Also note that the Montreal Convention utilizes and defines the term “international carriage” not transportation. Montreal Convention, *supra* note 37, at art. 1.

³⁵³ *See e.g. Booth v. Santa Barbara Biplane Tours, LLC*, 158 Cal. App. 4th 1173 (2008).

³⁵⁴ 49 U.S.C. § 70105, transferred to 51 U.S.C. § 50905 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010); 14 C.F.R. §460.45; *See also* Laura Montgomery, *Space Tourism and Informed Consent: To Knowingly Go*, 51 FED. LAW. 26, 29 (2004).

³⁵⁵ 49 U.S.C. § 70105(5)(B), transferred to 51 U.S.C. § 50905 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

³⁵⁶ 49 U.S.C. § 70105(5)(C), transferred to 51 U.S.C. § 50905 by Pub. L. 111-314, sec. 4(d)(2), 124 Stat. 3440 (Dec. 18, 2010).

tivities. In fact, in 2004 the Executives of both the X Prize Foundation and X-Cor acknowledged that people should be strictly informed that space flight is an “ultra-hazardous activity,” noting that it has killed four percent out of the 433 people who have engaged in it.³⁵⁷ Moreover, due to practical factors, such as the proposed price tag of \$200,000 per ticket, not to mention pre-flight passenger training and instruction at the spaceport prior to flight, it is not likely that an innocent consumer would be easily swayed into signing a personal liability waiver without fully knowing all of the risks. Consequently, arguments for the unconscionability of personal liability waivers, at least at this stage in development, are not logically or legally persuasive.

X. SPACEPORTS

Commercial spaceport infrastructure and operations raise numerous other legal issues. For example, employment and labor law, contract law, tax law, environmental law, property law, tort law, and even competition law. Some states within the US are also instigating their own legislation and incentives for spaceport operators.³⁵⁸ However, since these issues are extensive and exceed comparative commercial space regulations they are not discussed in further detail here.

XI. CONCLUSION

National space legislations for commercial suborbital space flight, and specifically, commercial human space flight is in a state of evolution and development. Following the parameters established by the *corpus iuris spatialis*, national space legislations are being enacted to provide a legal framework for regulating non-governmental commercial space activities. Regulation of commercial suborbital flight is very much a combined effort of both governments and private enterprise, and it could not be

³⁵⁷ See Montgomery, *supra* note 354.

³⁵⁸ Nine states in the US already have or are developing local commercial space laws. These states are: Alaska, California, Florida, Hawaii, New Mexico, Oklahoma, Texas, Virginia and Wisconsin.

concluded any other way. This relationship is key to ensuring the safe development and operation of this new industry while avoiding overregulation that could stifle the industry. Space flight is the first area of transportation where the law precedes the commercial activity. In addition, this activity transcends traditional spheres of jurisdiction—ground, air, and space. Consequently, there is a heightened need for continuity in clarity and good will between the industry and lawmakers to achieve efficient and yet flexible regulatory standards that relate to the evolving technologies. Public awareness and support also play a role in legislative development and priorities.

The US, Australian, and European national space legislations discussed here provide a preliminary glance into the legal and regulatory backbone of commercial space activities to come. Additional nations with current intentions towards becoming spaceport States (e.g. United Arab Emirates and Singapore) have yet to solidify any national legislation or policy to accommodate a commercial space transportation industry. Thus, the US, as the forerunner in commercial human space initiatives, is currently setting the tone for future regulatory frameworks. As activities commence, the lessons learned here will undoubtedly provide a valuable contribution to the development of new industry customs and standards worldwide leading to safer skies and secure voyages to space.

Certainly, remaining obstacles must be overcome in order to achieve a viable commercial human space flight industry. While passion and vision are prime attributes of the individuals and companies involved here, US ITAR restrictions, economic constraints, and other challenges in science, technology, and research and development persist. Other countries may likewise find similar difficulties arising from either existing or lack of existing policies and regulations. Ultimately, it is the role of lawmakers and regulators to ensure public safety while simultaneously fostering economic and industry growth and technological progress. Space is not the first industry to require this balance, but its novel and ultra-hazardous nature make it a unique challenge.

BOOK REVIEW

NATIONAL REGULATION OF SPACE ACTIVITIES

Edited by Ram Jakhu
(Springer, 2010) 457 pages

*Review by Michael Dodge**

Prof. Ram Jakhu's text is a timely addition to the literature of space law. This ambitious project collects the expertise of several academics and legal practitioners, academics, collating their contributions into a format accessible to practicing attorneys, scholars, and policy makers alike. The chapters each attempt to explain the policy rationale, governmental legislative procedures, and statutory infrastructure of several of Earth's space faring States. The book not only discourses on what regulation exists, but also from whence it came, including the reality that some were resultant from national obligations under the international treaty regime, and others political acknowledgements of security and commerce issues.

The book is comprised of twenty-one chapters and an index. The first chapter provides the international basis for the space laws and regulations contained herein. The States covered include Argentina, Australia, Brazil, Canada, France, Germany, India, Japan, the Netherlands, the People's Republic of China, South Africa, the Russian Federation, Ukraine, the United

* Michael Dodge hails from Long Beach, Mississippi, USA. He earned his *Juris Doctor* from the University of Mississippi School of Law in Oxford, Mississippi. While at the University, Michael worked as a research assistant for the National Center for Remote Sensing, Air, and Space Law (Center). After earning his J.D., he was called to the Bar of Mississippi, after which he returned to the Center to work as Assistant Research Counsel. Desiring to continue his education in aviation and space law, he applied for and was accepted to study at the McGill University Faculty of Law, where he is now a candidate for an LL.M. in aviation and space law with the Institute of Air and Space Law. He is a *Boeing Fellow in Air and Space Law*.

Kingdom, and six chapters on regulation in the United States. The latter are divided into chapters on policy and law, private launch services, satellite communication, remote sensing, global navigation satellite services, and state and municipal aerospace regulation. One might think that dividing the book in to State specific chapter would render the text disjointed, but that effect is far from the end result. Indeed, the distinctive treatment of each provides an ideal reference format for legal, governmental, and historical researchers. This review will sample the chapters on international law, India, and the United States. These three are indicative of the quality and content to be found throughout the volume.

INTERNATIONAL LAW

The first chapter, "International Space Law: A Basis for National Regulation" is written by Ronald L. Spencer, Jr., and starts with a citation to Article VI of the Outer Space Treaty: "State Parties to the Treaty shall bear international responsibility for national activities in outer space...whether carried on by governmental agencies or by non-governmental entities...." He proceeds to discuss the outer space treaty regime, including the Liability and Registration conventions, as well as the International Telecommunication Union and Inter-Agency Debris Coordination Committee guidelines on the prevention of orbital debris. These bodies, along with guidance provided by the International Court of Justice (ICJ), shepherd space faring States across the globe in their ongoing legislative efforts to address critical issues in aerospace exploration and exploitation.

Indeed, Spencer reminds the reader that space activities are attributable to States via the Liability Convention and Registration Convention which, taken together, apply responsibility to the State(s) that launch, procure the launch, or from whose territory or facilities an object is launched, as well as, per Bin Cheng, over objects as they act in space.

Spencer notes that a unique feature of the modern age is that there now exists the possibility for activities to take place in or from a State by individuals or entities not controlled or adequately monitored by the State itself. The OST's Article VI,

in conjunction with the Resolution on the Application of the Concept of the “Launching State” could be read as requiring even previously independent, non-State actors to fall under the responsibility of State supervision, necessitating the proliferation of national regulatory regimes for space utilizing States. This, of course, prompts the crucial need for the national regulation of space activities, and the continued development of such regulations--especially in States traditionally devoid of clear, concise legal provisions.

Spencer points out other difficulties in regulating space activities, noting that despite the reference to the law of the sea or other common legal theories, space is a commons which has not had the benefit of centuries of gradual legal development.

The chapter includes discussion on the role of the International Telecommunication Union, as well as orbital debris mitigation guidelines (implemented at the national level by some States, such as the U.S.A.) and export control laws, all of which find variable levels of regulation in the national laws of space-faring States.

INDIA

Written by Ranjana Kaul and Ram Jakhu, the chapter on Indian space regulations tells a vivid tale of the development of that nation’s celestial ambitions. From the Thumba Equatorial Rocket Launching Station in 1963 to *Chandrayaan 1* in 2008 and beyond, the authors relate the vision of the burgeoning space industry of India. Beginning with discourse on decision making processes of the government, as well as the organization of State obligations, the reader is told that ultimately the Prime Minister heads the space program of India. Two agencies are responsible for the creation and implementation of space policy and its enforcement, the Space Commission and the Department of Space, respectively. The Indian Space Research Organization, Physical Research Laboratory, and the National Mesosphere-Stratosphere-Troposphere all contribute to the research critical for Indian efforts in space, and as such affect the projects that fall under governmental regulations. Yet, despite all of these agencies, we are told the Indian government has yet

to formulate a comprehensive national space policy. However, under Article 51 of the Constitution of India, there is a State obligation to not only promote international peace (a long stated goal of space law and regulation), but also to nationally implement the international treaty regime to which it finds itself bound.

The dearth of enveloping national policy aside, India has mechanisms in place to handle the licensing of launch services, the competitive enterprise surrounding launches, and the national security concerns that are felt as a result of aerospace work. While private launching service remains murky, what is clear is that future launches will need to conform to regulations provided by Procedures for SatCom Policy Implementation of 2000, and the Norms, Guidelines, and Procedures for Satellite Communications of 2000. Unfortunately, these policies fail to resolve the uncertainty surrounding issues such as continuous supervision, indemnification, insurance, and lease of assets. Thus, more work needs to be done by the government to resolve these problems.

Next tackled are the legal issues surrounding satellite telecommunications and broadcasting, with an eye towards licensing private satellite enterprises, leasing foreign satellite capacity, private Indian satellite systems, and other related issues. Recognizing that India's current infrastructure needed to change, to update with modern times and technology, the government submitted the Communications Convergence Bill in 2001 to parliament which, unfortunately, was never passed. As a result, regulations governing satellite communications and broadcasts fall under the mandate of the 1885 Indian Telegraph Act and the 1933 Indian Wireless Telegraphy Act, as they currently stand updated. For broadcasting, one instance of proactive work by the parliament includes the 1995 Cable Television Networks (Regulation) Act provides regulation to help foster the growth of that particular industry.

Further, the reader is exposed to India's Remote Sensing Data Policy, which regulates earth observation, including requiring sensitive areas of India to be "blotted out" before being sold and distributed within India. Finally, the chapter dis-

cusses export rules, as governed by the Exim Policy and the 1962 Central Customs Act (as amended).

THE UNITED STATES

The final seven chapters of the book concern the myriad space regulations and policies of the United States. The topics are divided into general policy, regulation of private launch services, satellite communications, Earth observation, GNSS and GPS, and state and municipal regulation of space activities. That concluding chapter, penned with aplomb by Patricia Sterns and Leslie Tennen, unveils the principles and intricacies of a complex, timely, and rapidly evolving field of localized regulation. While this review will not specifically analyze the individual laws of the U.S. states, the Sterns chapter is highly recommended for those curious about the development of sub-State space regulation.

In chapter sixteen, Professor Stephen Dempsey begins the ambitious task of covering an overview of regulation of space activities in the United States. Perhaps the most prolific State promulgator of space regulation, law, and policy, the U.S. government is keenly aware of the benefits of exploring and exploiting space. Dempsey notes that multiple U.S. agencies are involved in space regulation, including NASA, the Department of State (covering U.S. export control law), the Department of Transportation (licensing of space launches), the Department of Commerce, via its sub-department NOAA (covering remote sensing, weather prediction and analysis, et al.), and the Department of Defence. The President of the United States, who sets the space policy of the nation, is, ultimately, the chief executive over all of these agencies. While policies are not as forceful as law, they do set the tone for space utilization. From the Moon Landing to *Landsat*, to current efforts at Mars exploration, the role of policy cannot be underestimated. Remote sensing, commercialization of space activities, and export control law all receive treatment, as do the perennial concerns of peace and defence activities.

Petra Vorwig's chapter seventeen analyzes commercial launch regulation, handled under the purview of the Depart-

ment of Transportation. Central to this task is the Commercial Space Launch Act of 1984 (as amended; 49 USC §§ 70101 et seq.). The CLSA was enacted by Congress to encourage entrepreneurial space activity and to expand U.S. space exploration infrastructure. Under the Federal Aviation Administration, the Office of Space Transportation handles licensure of private space endeavors. The reach of U.S. law extends beyond its borders for the purposes of launching, so private entities must comply with regulation even when their launch site is outside of the U.S. (14 C.F.R. § 413.3(b)). Vorwig goes on to describe general licensing procedures, post-licensing monitoring and enforcement, license transference, safety approvals, and re-entry licensing. She also takes note of the ever present International Traffic in Arms Regulations rules (ITAR), the U.S. Munitions List (USML), and their effect on licensing.

In chapter twenty, Prof. Paul B. Larsen describes the origins and operations of the U.S. GPS, including its utilization as the current world-wide radio navigation system, its increasing usage in aviation navigation, and its use for timing and location in natural disasters and emergencies. Larsen rightly points out that GPS is not immune to the Janus-like dual use potentiality inherent in many space technologies, and is indeed used both for civilian and military purposes. The management of GPS dredges up challenges between the U.S. and the various States and people who have become dependent on the system. The U.S. military and her allies are provided access to the Precise Positioning System (per 10 USC 2281—mistakenly cited as 19 USC 2281 in the text), whereas U.S. and international civil uses depend on the Standard Positioning Service. While in the past the United States exercised the right to degrade signals used in the civilian service, the White House released a GPS Policy Statement in 2004 that signalled the end of this intentional degradation, known as Selective Availability, and attempted to allay the trepidation other States felt regarding this potentially heavy hand.

With the elimination of selective availability, the primary concern surrounding GPS is that of liability. As more and more airlines and ships equip GPS as their primary, and perhaps sole source of navigation, the question arises as to what happens if

accidents occur as a result of using the technology. Larsen notes that the U.S. is, like all States, immune from suits brought by individuals under the international legal principle of sovereign immunity. However, the U.S. does provide some mechanisms to allow suits against itself under the Federal Tort Claims Act (28 USC 1326), but only in the cases where the action was negligent and not discretionary. While the latter term remains undefined in the code, in the *United States v. Union Trust* (350 US 907 1955), the court held that negligent air traffic control management is not a discretionary act. Even if the FTCA did apply to GPS related accidents, the statute does not apply to accidents that take place in a foreign country. Thus, any accidents that occur in, e.g., Spain from faulty GPS service would not find remedy in the FTCA, but rather wash up against the wall of sovereign immunity—no picayune matter, to be sure.

CONCLUSION

Prof. Jakhu's book goes a long way in addressing a need for students of law and policy in the arena of space. Generally well written, there are few modifications he might make in future editions. One such suggestion would be to include a stand-alone chapter to discuss the role of NGO's, Inter-Governmental Organizations, and private industry in general in crafting national regulations. The relationship these entities have with the space faring States is of paramount importance, and while these topics get some coverage in the myriad chapters, they are deserving of greater attention. Additionally, the role of export control affecting global and national aerospace exploration and exploitation is often given cursory consideration in the text, but their impact on State policies and regulations could be fleshed out more fully in a generalized chapter. As with most texts, typos can be distracting, and should be more carefully assessed. Otherwise, this text is a fine addition to anyone's space law library.

BOOK REVIEW

SPACE LAW: A TREATISE

By Francis F. Lyall and Paul B. Larsen

(Ashgate Publishing, Farnham, UK;
Burlington, VT, 2009) 596 pages

*Review by Stephen E. Doyle**

Professors Lyall and Larsen have completed the second part of a monumental work which will be a great and lasting value to rising students of the law, particularly those concerned with the law related to activities conducted in outer space. This treatise on space law is a classic example of a systematic exposition in writing, presenting a methodical discussion of facts and principles involved in an area of human activity. In 2007 Lyall and Larsen began their joint enterprise when they produced a carefully selected compilation of papers and articles from various sources comprising a reader, or an anthology of space law.¹

In the current book, all the writings of others, going back to works a century old, are carefully and thoughtfully assessed for their relative contributions to the development of space law. Both men have spent hundreds of hours in classrooms with inquiring students and have employed all their experience and skills to provide an excellent, comprehensive, in-depth presentation of the history, the currency, and the future of space law development. This book fills a gaping need in American and foreign law libraries for a well researched, broad scope, and critically elaborated discourse on space law. It is likely to become a very popular major text for the teaching of space law in the

* Honorary Director, International Institute of Space Law. Dr. Doyle served 15 years in the federal civil service, including 4 years as Deputy Director of International Affairs at NASA, and he served 15 years with the Aerojet-General Corporation propulsion Division in program management and strategic planning.

¹ LYALL & LARSEN, SPACE LAW (Ashgate, 2007).

United States and abroad. There are no current comparable texts on space law with the fullness, extensive citations, and evaluative assessments of contributions found in this treatise.

Francis Lyall, a law professor of the University of Aberdeen, Scotland, and Paul B. Larsen, a law professor of the Georgetown Law Center in Washington, DC., bring together an understanding of the historical evolution of the common law and the Americanization of that legal system in its own legislative/judicial practices. The commentary throughout the treatise is always balanced, authoritative and constructive toward enhancing the understanding of the problems of space law.

The numerous United Nations treaties and declarations of principles related to activities in outer space are fully presented and evaluated. The many new and changing structures of national and international ventures in outer space are presented and discussed. It is noted that principles are established, and that they are generally agreed and complied with. Many early issues have been decided or eliminated, and a newly emerging body of relevant domestic laws is in the making throughout the world. A brief survey of the national laws collected and recited on the website of the UN Office of Outer space affairs give ample evidence of the expanding development of national laws relating to activities in outer space. As the commercialization of space activities and expanded private enterprise activities in space occur, the world will face new and important legal issues in order to maintain a form of order under law.

The task ahead will be no easier than the challenges passed. The reader is admonished that in dealing with the future the tendency to look back and seek analogies from the past must be avoided. The future of humanity in space will be a manifestation completely different in kind from all the experiences we have had here on the Earth. "In the remoter future the modalities of government of space bases and space stations will have to be determined" and this will be based on the prevailing circumstances, not regulated by an irrelevant past model.

There are few if any works in recent years which have taken on the full scope of space law, in its historical, national, and international dimensions, dealing with the implications and

ramifications of the developing law with the authority and experience of Lyall and Larsen. These two men were classmates at McGill University's Institute of Air and Space Law (1963-64) and have maintained close ties throughout the years, particularly through their participation in the programs and activities of the International Institute of Space Law. To produce this treatise, they combined their decades of teaching experience, writing experience, and work in institutions and governmental agencies instrumental in developing space law. The result of their combined effort is an educational and information tool that will have relevance and utility for nascent and practicing space lawyers for many years to come.

BOOK REVIEW

WHO OWNS THE MOON? EXTRATERRESTRIAL ASPECTS OF LAND AND MINERAL RESOURCES OWNERSHIP

by Virgiliu Pop

(Berlin: Springer, 2009) 175 pages

*Review by Chris Kalantzis**

With recent talks of space exploration privatization come the important question of whether western conceptions of ownership on which capitalism is based apply to outer space. Virgiliu Pop, in his contribution to Volume 4 of the Space Regulations Library brings to bear centuries old real property legal theories with the modern day space race.¹ Although it clocks in at a scant one hundred and seventy pages, Pop delves into concepts of public and personal ownership of outer space. He reviews pop culture, judicial decisions, and international treaties to explore the history of space ownership. He concludes that *res communis* (communal lands) is appropriate to define space ownership. Ownership may be possible when human kind turns to homesteading in outer space, as Pop suggests is very likely, and spreads its seeds among the stars. The short answer to the question of who owns the Moon that Pop posits in his title is: no one does, yet.

Pop combines the well-developed area of real property law with the comparatively unexplored region of space law. At the

* Chris Kalantzis studies law at Osgoode Hall Law School in Toronto, Canada. He has previously studied history and global affairs in Alberta, Scotland and New York. In his spare time he enjoys fencing and playing harpsichord.

¹ VIRGILIU POP, WHO OWNS THE MOON? EXTRATERRESTRIAL ASPECTS OF LAND AND MINERAL RESOURCES OWNERSHIP (Springer, 2009).

time of writing one other title on space property law comes to mind, Thomas Gangale, *The Development of Outer Space: Sovereignty and Property Rights in International Space Law* (New York: Praeger, 2009); see also Francis Lyall and Paul B. Larsen, *Space Law: A Treatise* (Burlington: Ashgate, 2009). No stranger to space policy, Pop is a researcher at the Romanian Space Agency and also maintains a blog.

Pop relies extensively on newspaper and hearsay evidence to prove that numerous private groups and individuals have claimed ownership of the Moon and other space objects for over a hundred years. For example, Dennis M. Hope sold properties on the Moon through the "Lunar Embassy" to over 3.6 million people in 181 countries.² This example is particularly relevant because it not only represents an individual who claimed vast amounts of lunar territory; it also represents the purported deeding and sale of lunar real property.

While sufficient intent to own (*animus possidendi*) may well be present in the claims of people like Mr. Hope, claims cannot proceed because they do not contain the necessary physical occupation (*corpus possidendi*) of the land in question.³ However, governments have generally ignored claims of celestial ownership. Pop's conclusion for how to deal with these false deeds and wills? They don't need to be dealt with – they were never valid, and they have no support in law. They are curiosities, nothing more. Nevertheless, their presence is telling of the need for a definitive space context for property law as such claims have only been able to be advanced due to the lack thereof.

Technological progress; natural law; and human, corporate, or government actors may prove to be material sources of space laws. Formal sources may include international conventions, treaties, custom, and judicial decisions. Scholars and practitioners agree that current international laws are ambiguous with regard to space property law. The primary example that Pop uses is whether asteroids and comets are included in the definition of "celestial bodies" as per Article II of the Outer Space Treaty, which outlaws national appropriation by any means of

² *Id.* at 2.

³ *Id.* at 12.

outer space and celestial bodies.⁴ This indistinctness must be resolved in order to minimize future conflict.

Territorial sovereignty may be defined as the ability of one State to exercise State functions to the exclusion of others.⁵ One primary State function is regulation of property rights. Since Article II of the Outer Space Treaty clearly prevents the lawful obtaining of State sovereignty over the Moon, a principle of non-appropriation applies. Pop admits that there are numerous viewpoints on whether this actually prevents private appropriation of property in space. He argues that it can only occur with endorsement by a sovereign entity. Since States cannot endorse this, and nor can the United Nations, it seems that private appropriation cannot occur within the current legal framework of the Outer Space Treaty. It is therefore necessary to explore alternate conceptions of property in space.

Article I of the Outer Space Treaty states that outer space is free for the exploration and use by all. Pop states that this in effect establishes an “open access and free use regime on the Moon, making it a public good whose owner is everybody and nobody.”⁶ Many space actors regard space as a sort of *res communis*. Pop also argues that outer space falls under the public trust doctrine. Legal title would rest with the sovereign while the equitable title would rest with everyone. Secretary General Kofi Annan in essence advanced this argument when he advocated for the reconstitution of the UN Trusteeship Council.⁷

Exploring the ideas of Providence, Manifest Destiny, and the High Frontier Thesis, Pop suggests that the same homesteading sentiment that populated the American West will do the same for the Moon. One of the central arguments in favor of the frontier mentality is the awe-inspiring vastness of resources in space that may be tapped. However, the disparity between developed and developing countries may lead to the countries with the best technology reaping the most lucrative rewards. Nevertheless, homesteading of outer space is likely to occur, and

⁴ *Id.* at 47.

⁵ *Id.* at 60.

⁶ *Id.* at 73.

⁷ *Id.* at 91.

in order for it to occur peacefully, a legal regime for property rights in space must be developed accordingly.

Pop also refers to the legal status of mineral resources as property. This is critical for future commercial uses of outer space, and directly relates to the collection of mineral samples from the Moon and near earth asteroids in missions including NASA's *Apollo* and Soviet *Luna*. Pop compares arguments in favor and against supporting the legal extension of property status to appropriated material. He concludes that extracted material, although from land lacking fee simple according to the non-appropriation principle of the Outer Space Treaty, is capable of ownership through enterprise rights, i.e. those who effect their removal may claim ownership. Private appropriation of material from commons land is allowed in law, and if outer space is common land, then commercial enterprise can still occur.

Quite fittingly, Virgiliu Pop casts his book as a series of ancient Greek plays. He sees the exploration and settlement of outer space not as a comedy of Aristophanes, nor a tragedy of Sophocles or Aristotle, but as a Homeric odyssey: a journey of humankind into the final frontier. Both the commons regime and private appropriation of land have attractive qualities. However, in a glamorizing of the Wild West, Pop submits to his readers that Providence is likely to lead humankind once again into the unknown, and that the frontier mentality will prevail. Pop's work delves deep into the chasm of one of the most underdeveloped areas of property law, one which must be developed soon if the rule of law is to exist in space. Ultimately, *Who Owns the Moon?* deserves a close inspection by anyone interested in the fascinating interplay between the law and what was once science fiction but may soon be reality.

BIBLIOGRAPHY

AVIATION AND SPACE LAW: RELEVANT PUBLICATIONS

*By P.J. Blount**

AVIATION LAW

Laws and Regulations

United States

Airport and Airway Extension act of 2011, Pub. L. No. 112-7 (2011).

Airport and Airway Extension Act of 2011, Part II, Pub. L. No. 112-16 (2011).

Airport and Airway Extension Act of 2011, Part III, Pub. L. No. 112-21 (2011).

Airport and Airway Extension Act of 2011, Part IV, Pub. L. No. 112-27 (2011).

Surface and Air Transportation Programs Extension Act of 2011, Pub. L. No. 112-30 (2011).

Cases

European Court of Justice

Case C-366/10, The Air Transport Association of America and Others, Opinion of Advocate General Kokott (Oct. 6, 2011).

* P.J. Blount is Research Counsel and Instructor of Law at the National Center for Remote Sensing, Air, and Space Law, University of Mississippi School of Law.

United States Administrative Decisions

Birdstrike Control Program, B-404986 (Gov't Accountability Office, July 15, 2011).

USA Jet Airlines, Inc.; Active Aero Group, Inc., B-404666 (Gov't Accountability Office, Apr. 1, 2011).

United States Judicial Cases

Field v. Napolitano, No. 11-1339, 2011 U.S. App. LEXIS 22655 (1st Cir. 2011).

Safeguarding the Historic Hanscom Area's Irreplaceable Res., Inc. v. FAA, 651 F.3d 202 (1st Cir. 2011).

Goodspeed Airport LLC v. E. Haddam Inland Wetlands & Watercourses Comm'n, 634 F.3d 206 (2d Cir. 2011).

Barnes v. United States DOT, 655 F.3d 1124 (9th Cir. 2011).

Ginsberg v. Northwest, Inc., 653 F.3d 1033 (9th Cir. 2011).

Trishan Air, Inc. v. Fed. Ins. Co., 635 F.3d 422 (9th Cir. 2011).

Avia Dynamics, Inc. v. FAA, 641 F.3d 515 (D.C. Cir. 2011).

CSI Aviation Servs. v. United States, 637 F.3d 408 (D.C. Cir. 2011).

Southwest Airlines Co. v. Transp. Sec. Admin., 650 F.3d 752 (D.C. Cir. 2011).

Town of Barnstable v. FAA, No. 10-1276, 2011 U.S. App. LEXIS 22025 (D.C. Cir. 2011).

Ballenger v. Sikorsky Aircraft Corp., CIVIL ACTION NO. 2:09cv72-MHT (WO), 2011 U.S. Dist. LEXIS 127699 M.D. Ala. 2011).

Lloyd's Aviation, Inc. v. Ctr. for Env'tl. Health, No. 1:11-CV-01078 AWI DLB, 2011 U.S. Dist. LEXIS 121134 (E.D. Cal. 2011).

Nat'l Fed'n of the Blind v. United Airlines, Inc., No. C 10-04816 WHA, 2011 U.S. Dist. LEXIS 44366 (N.D. Cal. 2011).

Summers v. Delta Airlines, Inc., Case No.: 10-CV-05730-LHK, 2011 U.S. Dist. LEXIS 36657 (N.D. Cal. 2011).

Certain Underwriters at Lloyd's London v. Great Socialist People's Libyan Arab Jamahiriya, Civil Action No. 06-cv-731

(JMF), Civil Action No. 08-cv-504 (JMF), 2011 U.S. Dist. LEXIS (D.D.C. 2011).

Competitor Liaison Bureau, Inc. v. Cessna Aircraft Co., Case No. 6:08-cv-2165-Orl-28GJK, 2011 U.S. Dist. LEXIS 33065 (M.D. Fla. 2011).

Dorsch v. Pilatus Aircraft, Ltd., CASE NO. 8:11-CV-441-T-17MAP, 2011 U.S. Dist. LEXIS 130381 (M.D. Fla. 2011).

Scott v. MD Helicopters, Inc., Case No.: 8:09-cv-986-T-33TBM, 2011 U.S. Dist. LEXIS 74778 (M.D. Fla. 2011).

CSDS Aircraft Sales & Leasing, Inc. v. Lloyd Aereo Boliviano Airlines, CASE NO. 09-CIV-22274-HOEVELER, 2011 U.S. Dist. LEXIS 43811 (S.D. Fla. 2011).

Garcia v. Wells Fargo Bank Northwest NA Tr., CASE No. 1:10-cv-20383-JLK, 2011 U.S. Dist. LEXIS 86523 (S.D. Fla. 2011).

Ventress v. Japan Airlines, CIVIL No. 07-00581 LEK, 2011 U.S. Dist. LEXIS 125975 (D. Haw. 2011).

Oxford Aviation, Inc. v. Global Aero., Inc., No. 2:10-cv-444-DBH, 2011 U.S. Dist. LEXIS 103781 (D. Me. 2011).

Fuondjing v. Am. Airlines, Inc., Civil Action No. DKC 10-1169, 2011 U.S. Dist. LEXIS 40078 (D. Md. 2011).

Redfern v. Napolitano, Civil Action No. 10-12048-DJC, 2011 U.S. Dist. LEXIS 49321 (D. Mass. 2011).

Edick v. Allegiant Air, LLC, No. 2:11-CV-259 JCM (GWF), 2011 U.S. Dist. LEXIS 41890 (D. Nev. 2011).

Bakeer v. Nippon Cargo Airlines, Co., Nos. 09 CV 3374 (RRM), 09 CV 3375 (RRM), 09 CV 3377 (RRM), 09 CV 3378 (RRM), 2011 U.S. Dist. LEXIS 90102 (E.D.N.Y. 2011).

Bavis v. UAL Corp. (In re September 11 Litig.), No. 21 MC 101 (AKH), 02 Civ. 7154, 2011 U.S. Dist. LEXIS 107232 (S.D. N.Y. 2011).

In re Air Crash near Clarence Ctr., No. 09-md-2085, 2011 U.S. Dist. LEXIS 78464 (W.D.N.Y. 2011).

Agape Flights, Inc. v. Covington Aircraft Engines, Inc., No. CIV-09-492-FHS, 2011 U.S. Dist. LEXIS 69521 (E.D. Okla. 2011).

CB Aviation, LLC v. Hawker Beechcraft Corp., CIVIL ACTION NO. 2:10-cv-1411-JD, 2011 U.S. Dist. LEXIS 128918 (E.D. Pa. 2011).

Thompson v. US Airways, Inc., CIVIL ACTION NO. 09-cv-870, 2011 U.S. Dist. LEXIS 78868 (E.D. Pa. 2011).

Pease v. Lycoming Engines, CIVIL ACTION NO. 4:10-CV-00843, 2011 U.S. Dist. LEXIS 93428 (M.D. Pa. 2011).

Pease v. Main Turbo Sys., 768 F. Supp. 2d 775 (M.D. Pa. 2011).

Sikkelee v. Precision Airmotive Corp., No. 07-cv-886, 2011 U.S. Dist. LEXIS 38382 (M.D. Pa. 2011).

Diaz Aviation Corp. v. Airport Aviation Servs., CIVIL NO. 09-1583 (CVR), 2011 U.S. Dist. LEXIS 128983 (D.P.R. 2011).

Lavergne v. ATIS Corp., 767 F. Supp. 2d 301 (D.P.R. 2011).

Brown v. Alaska Air Group, Inc., No. CV-11-0091-WFN, 2011 U.S. Dist. LEXIS 76261 (E.D. Wash. 2011).

United States Aviation Underwriters, Inc. v. Nabtesco Corp., No. C10-821Z, 2011 U.S. Dist. LEXIS 46889 (W.D. Wash. 2011).

Vreeland v. Ferrer, No. SC10-694, 2011 Fla. LEXIS 1583 (Fla. 2011).

Nowicki v. Cessna Aircraft Co., 69 So. 3d 406 (Fla. Ct. App. 2011).

Johnson v. Jacobs, No. 47A01-1102-CT-35, 2011 Ind. App. LEXIS 1827 (Ind. Ct. App. 2011).

Jet Acceptance Corp. v. Quest Mexicana S.A. de C.V., 929 N.Y.S.2d 206 (N.Y. App. Div. 2011).

Sky's the Limit, Inc. v. Zoning Hearing Bd., 18 A.3d 409 (Pa. Commw. Ct. 2011).

Burton v. Twin Commander Aircraft, LLC, 254 P.3d 778 (Wash. 2011).

Articles

Md. Tanveer Ahmad, *One passenger, one fare: A policy which neither benefits the air carriers nor the disabled population*, 36 ANNALS AIR & SPACE L. __ (2011).

Matt Andersson, commentary, *The Impact of Policy on Global Aircraft Manufacturing and Development*, 10 ISSUES IN AVIATION L. & POL'Y (2011).

Christopher Andrews & Vernon Nase, *Psychiatric Injury in Aviation Accidents Under the Warsaw and Montreal Conven-*

tions: *The Interface Between Medicine and Law*, 76 J. AIR L. & COM. 3 (2011).

A. Armstrong, *Call for a Congressional Inquiry into the Arbitrary and Capricious Decisions of the National Transportation Safety Board*, 75 J. AIR L. & COM. 3 (2010).

Gerald L. Baliles, commentary, *Time Flies: Observations about the Decade Past, and a Look Toward the Future*, 10 ISSUES IN AVIATION L. & POL'Y (2011).

Joachim Bentzien, *Die gerichtlichen Entscheidungen über die Beschränkungen des Anund Abflugs zum und vom Flughafen Zürich im süddeutschen Luftraum/ Court Decisions on the Limitation of Flights to and from Zurich Airport over the South of Germany/ Décisions judiciaires sur la limitation des vols pour et de l'aéroport de Zurich sur l'Allemagne du Sud*, 2011 ZLW 68 (2011).

Duncan P. Blake & Ian S. Henderson, *Military use of civil-registered aircraft*, 36 ANNALS AIR & SPACE L. __ (2011).

Harold Caplan, *Fulfilling the contract of carriage: How a new European regulation could help airlines and their passengers*, 36 ANNALS AIR & SPACE L. __ (2011).

Elena Carpanelli, *The "Siberian Overflights" Issue*, 11 ISSUES IN AVIATION L. & POL'Y __ (2011).

S. Chakraborty, et. al., *2010 Meltdown – Airport Closure Risk Communications in London and NYC*, 1 EUR. J. RISK REG. 108 (2011).

R.W. Clark, et. al., *Is Lessor More?*, 75 J. AIR L. & COM. 69 (2010).

Paul S. Dempsey, *All along the watchtower: forum non conveniens in international aviation*, 36 ANNALS AIR & SPACE L. __ (2011).

James L. Devall, *The U.S. and EU Approaches to Global Airline Alliances: Cooperation or Conflict*, 10 ISSUES IN AVIATION L. & POL'Y (2011).

Natalie N. DuBose, *Flightcrew Member Duty and Rest Requirements: Does the Proposed Legislation Put to Rest the Concern Over Pilot Fatigue?*, 76 J. AIR L. & COM. 253 (2011).

Natalie N. DuBose, *Twombly and Parallel Conduct—How the Sixth Circuit Grounded In Re Travel Agent commission Anti-trust Litigation*, 76 J. AIR L. & COM. 111 (2011).

David Timothy Duval & Niven Winchester, *Cost Sharing in Air-Service Provision*, 76 J. AIR L. & COM. 77 (2011).

Francesco Fiorilli, *Ensuring Global Competitiveness in the Airline Industry*, 11 ISSUES IN AVIATION L. & POL'Y __ (2011).

Francesco Fiorilli, *Report on the 22nd Annual Conference of the EALA*, 36 AIR & SPACE L. 173 (2011).

P. Paul Fitzgerald, *Europe's Emissions Trading System: Questioning its Raison d'Etre*, 10 ISSUES IN AVIATION L. & POL'Y __ (2011).

P. Paul Fitzgerald, *In defense of the nationality of aircraft*, 36 ANNALS AIR & SPACE L. __ (2011).

Mark Franklin, *Sovereignty and the Chicago Convention: English Court of Appeal Rules on the Northern Cyprus Question*, 36 AIR & SPACE L. 109 (2011).

J.R. Friedman, et. al., *Aviation Law: A Survey of Recent Trends and Developments*, 61 MERCER L. REV. 585 (2010).

Francesco Gaspari, *Slot mobility in the European Community*, 36 ANNALS AIR & SPACE L. __ (2011).

Sean Gates & Maud Marian, *The Concorde Accident Criminal Trial in France*, 36 AIR & SPACE L. 131 (2011).

J. David Grizzle, et al., *Navigating the turbulence of competing interests: principles and practice of the Federal Aviation Administration*, 75 J. AIR L. & COM. 777 (2010).

I. Gruber, *Safety and/or Sovereignty? European Skies After the Icelandic Volcano Crisis*, 12 CHI. J. INT'L L. 229 (2011).

W.R. Hand, *Continental Joins the (All)Star Alliance: Anti-trust Concerns with Airline Alliances and Open-Skies Treaties*, 33 HOUS. J. INT'L L. 641 (2011).

Francis Hane, *Aeronautics and Interjurisdictional Immunity in Canada*, 36 ANNALS AIR & SPACE L. __ (2011).

Andreas Hardeman, *Reframing the aviation climate change politics and policies*, 36 ANNALS AIR & SPACE L. __ (2011).

B.F. Havel, et. al., *The emerging Lex Aviatica*, 42 GEO. J. INT'L L. 639 (2011).

Brian F. Havel & Gabriel S. Sanchez, *Do We Need a New Chicago Convention?*, 11 ISSUES IN AVIATION L. & POL'Y __ (2011).

Stuart A. Hindman, *Full-Body Scanners: TSA's New "Optional" System for Airport Searches*, 10 ISSUES IN AVIATION L. & POL'Y (2011).

Auguste J. Hocking, *Ownership and control in Australia's air services agreements: further reform needed for genuine commercial freedom?*, 36 ANNALS AIR & SPACE L. __ (2011).

Michael J. Holland, *Antitrust and the Airlines: The Pursuit of Market Intelligence Meets The Sherman Act*, 77 J. TRANSP. L., LOGISTICS, & POL'Y 307 (2010).

Michael J. Holland, *Federalism in the Twenty-First Century: Preemption in the Field of Air*, 78 DEF. COUNS. J. 11 (2011).

Patrick Honnebier, *The 'Blue Sky' Case about the Enforcement of Aircraft Mortgages and its Impact on the Global Financial Market/ Der "Blue Sky" Fall über die Vollstreckung von Flugzeughypotheken und seine Auswirkung auf den globalen Versicherungsmarkt/ Le cas "Blue Sky" concernant l'enforcement des hypothèques sur aéronefs et les conséquences sur le marché global financier*, 2011 ZLW 47 (2011).

Joachim Janezic, *Die Behandlung von Flugschreibernaufzeichnungen nach der VO (EU) Nr. 996/2010/ The Use of Flight Recorders According to Regulation No. 996/2010 (EU)/ L'utilisation des enregistreurs de vol selon règlement no. 996/2010 (UE)*, 2011 ZLW 15 (2011).

Anna Konert, *Air Carrier Liability under Polish Air Law*, 50 INDIAN J. INT'L L. __ (2011).

Stefan A. Kaiser, *UAV's: Their Integration into Non-segregated Airspace*, 36 AIR & SPACE L. 161 (2011).

Jon Kettles and Ashley Sissell, *The causal connection question in aviation insurance coverage*, 75 J. AIR L. & COM. 829 (2010).

Kuwait Airways Corp. v. Republic of Iraq (Can.), with introductory note by Chimène I. Keitner, 50 I.L.M. 160 (2011).

I. Laborde, *EU Regulation of Aviation CO₂ Emissions*. 24 NAT. RESOURCES & ENV'T 54 (2010).

Robert Lawson & Tim Marland, *The Montreal Convention 1999 and the Decisions of the ECJ in the Cases of IATA and Sturgeon – in Harmony or Discord?*, 36 AIR & SPACE L. 99 (2011).

Simon Lester, *The WTO EC – Aircraft Panel and Appellate Body Reports on Subsidies to Airbus*, ASIL INSIGHTS, July 14, 2011, <http://www.asil.org/pdfs/insights/insight110714.pdf>.

S. Lopano, *Will the Ban on In-Flight Cell Phone Use Be “Up In The Air” Much Longer?* 76 J. AIR L. & COM. 289 (2011).

Douglas M. Marshall, *Civil, Public, or State Aircraft? The FAA’s Regulatory Authority Over Government Operations of Remotely Piloted Aircraft in U.S. National Airspace*, 10 ISSUES IN AVIATION L. & POL’Y (2011).

René Maysokolua & Ulrich Steppler, *Das Verfahren der ATA et al. gegen die Einbeziehung des Luftverkehrs in den EU-Emissionshandel/ The ATA et al. Procedure Challenging the Inclusion of Aviation into the EU Emissions Trading Scheme/ La procédure de l’ATA et al. contre l’intégration du trafic aérien dans le système européen d’échange de droits d’émission*, 2011 ZLW 28 (2011).

Laura McKenery, *Terminals Raises a Genuine Issue of Material Fact Concerning Its Constitutionality*, 76 J. AIR L. & COM. 119 (2011).

Allan I. Mendelsohn, *Foreign Plaintiffs, Forum Non Conveniens, and the 1999 Montreal Convention*, 10 ISSUES IN AVIATION L. & POL’Y (2011).

Allan I. Mendelsohn, *Why Civil-Military Integration of Yokota Air Force Base Makes Sense for Purposes of Promoting Mutual Cooperation Between the United States and Japan*, 76 J. AIR L. & COM. 99 (2011).

Paul V. Mifsud, *Metal Neutrality and the Nation-Bound Airline Industry*, 36 AIR & SPACE L. 117 (2011).

Michael Milde, *The Beijing Convention and Beijing Protocol Adopted at the International Conference on Air Law Held under the Auspices of the International Civil Aviation Organization at Beijing, 30 August to 10 September 2010/ Die Verabschiedung der Peking Konvention und des Peking Protokolls durch die ICAO Konferenz zur Luftverkehrssicherheit (30. August – 10. September 2010)/ L’adoption de la Convention de Beijing et du Protocole de Beijing par la Conférence de l’OACI sur la sécurité aérienne (30 août – 10 septembre 2010)*, 2011 ZLW 9 (2011).

O. Mironenko, *Body scanners versus privacy and data protection*, 27 COMPUTER L. & SECURITY REV. 232 (2011).

R.J. Pathroff, *Ripe, Riper, Ripest? The Ninth Circuit's Decision in Addington v. U.S. Airline Pilots Association Sets a Misguided Ripeness Standard for Duty of Fair Representation Claims*, 76 J. AIR L. & COM. 127 (2011).

Malgorzata Polkowska, *State sovereignty in the airspace: An old notion in a new reality*, 36 ANNALS AIR & SPACE L. __ (2011).

David E. Rapoport & Michael L. Teich, *The Erosion of Secrecy in Air Disaster Litigation*, 10 ISSUES IN AVIATION L. & POL'Y (2011).

Steven H. Resnicoff, *Shooting Down Suicide Airplanes—What's Law Got to Do With It?*, 10 ISSUES IN AVIATION L. & POL'Y (2011).

Scott Lars Rogers, *Pilots Denied Relief—By Narrowly Construing "Prevailing Parties" Under the EAJA, the D.C. Circuit Allows the FAA to Run Amok*, 76 J. AIR L. & COM. 135 (2011).

Carlos Ruiz, *Pulling Back the Throttle in the Exercise of Personal Jurisdiction over Air Carriers*, 11 ISSUES IN AVIATION L. & POL'Y __ (2011).

Vanja-Ivan Savić, *Responsibility in the Cockpit or Downtown? How Legal Theory Determines if an Airline Is to Be Treated as a Criminal*, 11 ISSUES IN AVIATION L. & POL'Y __ (2011).

Charles E. Schlumberger & Sebastian Stolorz, *A presidential crash: operational and regulatory aspects of an accident involving a high level delegation on a state aircraft*, 36 ANNALS AIR & SPACE L. __ (2011).

Michael N. Schmitt, *Wings over Libya: The No-Fly Zone in Legal Perspective*, 36 YALE J. OF INT'L L. ONLINE 45 (2011).

Francis P. Schubert, *Air navigation and volcanic ash contamination: A legal analysis*, 36 ANNALS AIR & SPACE L. __ (2011).

Isaku Shibata, *Airfield Management of High-Density Airports in Metropolitan Areas—A Study of Narita International Airport*, 10 ISSUES IN AVIATION L. & POL'Y (2011).

Charles E. Smith, *Air transportation taxation: the case for reform* 75 J. AIR L. & COM. 915 (2010).

Paul E. Stinson, *Implied Field Preemption of Aviation Claims Under the Federal Aviation Act: How the Landscape is Changing*, 11 ISSUES IN AVIATION L. & POL'Y __ (2011).

Kevin A. Teters, *Successor Employers' Obligations Under a Preexisting Collective Bargaining Agreement: The Second Circuit Misinterprets Supreme Court Decisions and Sets a Harmful Precedent*, 76 J. AIR L. & COM. 143 (2011).

J. van Asten, *Air Traffic Controller Liability—First Circuit Undermines FAA's Efforts to Incorporate Redundancy into Aviation Safety Procedures: Wojciechowicz v. United States*, 75 J. AIR L. & COM. 213 (2010).

Isavella Maria Vasilogeorgi, *Delimitation of ICAO-IMO search and rescue regions: A case of jurisdictional compilation and complication*, 36 ANNALS AIR & SPACE L. __ (2011).

Mathieu Vaugeois, *Les accords «ciel-ouvert» et l'union européenne: de la compétence étatique à la compétence communautaire*, 36 ANNALS AIR & SPACE L. __ (2011).

Joseph C. Wheeler, *ICAO guidance on volcanic ash: from risk aversion to risk management*, 36 ANNALS AIR & SPACE L. __ (2011).

Books and Reports

DANIEL CALLEJA CRESPO & PABLO MENDES DE LEON, *ACHIEVING THE SINGLE EUROPEAN SKY: GOALS AND CHALLENGES* (Wolters Kluwer Law & Business 2011).

ALAN P. DOBSON, *FDR AND CIVIL AVIATION: FLYING STRONG, FLYING FREE* (Palgrave MacMillan 2011).

JERRY EICHENBERGER, *GENERAL AVIATION LAW* (McGraw-Hill 2011).

LAURENCE E. GESELL & PAUL STEPHEN DEMPSEY, *AVIATION AND THE LAW* (Coast Aire Publications 2011).

GOV'T ACCOUNTABILITY OFFICE, *AVIATION SAFETY: STATUS OF FAA'S ACTIONS TO OVERSEE THE SAFETY OF COMPOSITE AIRPLANES*, GAO-11-849 (Sept. 21, 2011).

GOV'T ACCOUNTABILITY OFFICE, *AVIATION SECURITY: TSA HAS TAKEN STEPS TO ENHANCE ITS FOREIGN AIRPORT ASSESSMENTS, BUT OPPORTUNITIES EXIST TO STRENGTHEN THE PROGRAM*, GAO-12-163 (Oct. 21, 2011).

GOV'T ACCOUNTABILITY OFFICE, *COMMERCIAL AVIATION: PROGRAM AIMED AT HIGH-RISK PARENT ABDUCTORS COULD AID IN PREVENTING ABDUCTIONS*, GAO-11-602 (June 23, 2011).

J. SCOTT HAMILTON, *PRACTICAL AVIATION LAW* (2011).

ROBERT W. KAPS, J SCOTT HAMILTON, & TIMM J BLISS, *LABOR RELATIONS IN THE AVIATION AND AEROSPACE INDUSTRIES* (Southern Illinois University Press 2011).

ROD D. MARGO, *AVIATION INSURANCE*, (Butterworths Law 2011).

BARNES WARNOCK MCCORMICK, M. P. PAPADAKIS, ET AL, *AIRCRAFT ACCIDENT RECONSTRUCTION AND LITIGATION* (Lawyers & Judges Pub. Co., 2011).

KENT VANDEN OEVER, *GUIDEBOOK FOR DEVELOPING AND MANAGING AIRPORT CONTRACTS* (Transportation Research Board 2011).

SPACE LAW

Laws, Regulations, and Policies

India

India Space Research Organization, *Remote Sensing Data Policy (RSDP – 2011)* (2011).

International Agreements

Agreement between the United States of America and Romania on the Deployment of the United States Ballistic Missile Defense System in Romania, Sept. 13, 2011, *available at* <http://www.state.gov/documents/organization/173130.pdf>.

United States

Establishment of Rules and Policies for the Satellite Digital Audio Radio Service in the 2310-2360 MHz Frequency Band, 76 Fed. Reg. 57923-57924 (Sept. 19, 2011).

Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200, 76 Fed. Reg. 31252-31260 (May 31, 2011).

Department of Defense, Directive No. 5105.23: National Reconnaissance Office (June 28, 2011).

Florida

S.B. 652, Liability of Spaceflight Entities, 2011 Leg. (Fla. 2011).

Texas

S.B. 115, Relating to limiting the liability of space flight entities, 82d Leg. (Tex. 2011).

Cases

United States Administrative Decisions

Office of Science and Technology Policy: Violation of the Antideficiency Act, GAO-12-200T (Gov't Accountability Office, Nov. 2, 2011).

Takes of Marine Mammals Incidental to Specified Activities; Harbor Activities Related to the Delta IV/Evolved Expendable Launch Vehicle at Vandenberg Air Force Base, CA, 76 Fed. Reg. 33721-33726 (June 9, 2011).

Taking Marine Mammals Incidental to Space Vehicle and Missile Launch Operations at Kodiak Launch Complex, Alaska, 76 Fed. Reg. 27308-27309 (May 11, 2011).

United States Judicial Decisions

Dish Network Corp. v. FCC, No. 10-16666, 2011 U.S. App. LEXIS 16550 (9th Cir. 2011).

Aldrin v. Topps Co., Case No. CV 10-09939 DDP (FMOx), 2011 U.S. Dist. LEXIS 110800 (C.D. Cal. 2011). NML Capital, Ltd. v. Spaceport Sys. Int'l, L.P., NO. CV 11-03507 SJO (RZx), 2011 U.S. Dist. LEXIS 126621 (C.D. Cal. 2011).

Caguas Satellite Corp. v. Echostar Satellite LLC, CIVIL NO. 11-1071 (FAB), 2011 U.S. Dist. LEXIS 130989 (D.P.R. 2011).

Faith Satellite Radio, LLC v. Lutheran Church Mo. Synod, Case No. 4:11CV00073 AGF, 2011 U.S. Dist. LEXIS 115878 (E.D. Mo. 2011).

Blessing v. Sirius XM Radio, Inc., 775 F. Supp. 2d 650 (S.D.N.Y. 2011).

EchoStar Satellite Servs., L.L.C. v. XstreamHD, LLC, No. 11 Civ. 2790 (TPG), 2011 U.S. Dist. LEXIS 130648 (S.D.N.Y. 2011).

NML Capital v. Republic of Arg., 03 Civ. 8845 (TPG), 05 Civ. 2434 (TPG), 06 Civ. 6466 (TPG), 07 Civ. 1910 (TPG), 07 Civ. 2690 (TPG), 07 Civ. 6563 (TPG), 08 Civ. 2541 (TPG), 08 Civ. 3302 (TPG), 08 Civ. 6978 (TPG), 09 Civ. 1707 (TPG), 09 Civ. 1708 (TPG), 2011 U.S. Dist. LEXIS 43753 (S.D.N.Y. 2011).
Dish Network L.L.C. v. Delvecchio, No. 11-CV-06297-CJS, 2011 U.S. Dist. LEXIS 116019 (W.D.N.Y. 2011).

Northpoint Tech., Ltd. v. DIRECTV, Inc., No. 09-CV-506-JRN, 2011 U.S. Dist. LEXIS 90298 (W.D. Tex. 2011).

State v. Pedro Jose Santos, 708 S.E.2d 208 (Cal. Ct. App. 2011).

Articles

R.C. Berring, *Title 51 of the U.S. Code and why it matters*, 14 GREEN BAG 251 (2011).

Meredith Blasingame, *Nurturing the United States Commercial Space Industry in an International World: Conflicting State, Federal, and International Law*, 80 MISS. L.J. 741 (2010).

P.J. Blount, *Developments in Space Security and Their Legal Implications*, 44/2 LAW/TECHNOLOGY 18 (2011).

Jason R. Bonin & Fabio Tronchetti, *Constructing a Regulatory Regime for the Exploitation of Resources on the Moon and Other Celestial Bodies: A Balancing Act*, 3 INDIAN J. INT'L ECON. L. __ (2011).

Maria Buzdugan, *Satellite Financing through Hosted Payloads: Benefits and Challenges*, 36 AIR & SPACE L. 139 (2011).

B.L. Dickman, *Untying Knots: The application of mosaic theory to GPS surveillance in United States v. Maynard*, 60 AM. U.L. REV. 731 (2011).

Steven Freeland, *For better or for worse? The use of 'soft law' within the international legal regulation of outer space*, 36 ANNALS OF AIR & SPACE L. __ (2011).

Surya G. Gunasekara, *"Other Transaction" Authority: NASA's Dynamic Acquisition Instrument for the Commercialization of Manned Spaceflight or Cold War Relic?*, 40 PUB. CONT. L.J. 893 (2011).

Christopher M. Hearsey, *The Nexus between Law and Astrosociology*, 9 ASTROPOLITICS 28 (2011).

Joseph S. Imburgia, *Space Debris and Its Threat to National Security: A Proposal for a Binding International Agreement to Clean Up the Junk*, 44 VAND. J. TRANSNAT'L L. 589 (2011).

D. Irimes, *Promoting Space Ventures by Creating an International Space IPR Framework*, 33 EUR. INTELL. PROP. REV. 35 (2011).

Watcharachai Jirajindakul & Lalin Kovudhikulrungsri, *The Legal Loopholes in Space Law: The Case of Shin Corporation of Thailand – Temasek Holdings of Singapore Business Deal*, 3 INDIAN J. INT'L ECON. L. __ (2011).

K.A. Kerrane, *Keeping up with Officer Jones: a comprehensive look at the Fourth Amendment and GPS surveillance*, 79 FORDHAM L. REV. 1695 (2011).

Matthew J. Kleiman, *Patent rights and flags of convenience in outer space*, THE SPACE REVIEW, Feb. 7, 2011, <http://www.thespacereview.com/article/1772/1>.

P. Knippa, et. al., *Recent developments in aviation and space law*, 45 TORT TRIAL & INS. PRAC. L.J. 209 (2010).

Valnora Leister, *Economic Governance and Space Law*, 3 INDIAN J. INT'L ECON. L. __ (2011).

Bin Li & Haifeng Zhao, *Governmental Regulations on Commercial Aspects of China's Space Activities*, 3 INDIAN J. INT'L ECON. L. __ (2011).

Michael J. Listner, *International Space Law: An Overview of Law and Issues*, 52 N.H. BAR J. 62 (2011).

Michael Listner, *The Moon Treaty: failed international law or waiting in the shadows?*, THE SPACE REVIEW, Oct. 24, 2011, <http://www.thespacereview.com/article/1954/1>

Michael Listner, *Phobos-Grunt: a legal analysis of potential liability and options for mitigation*, THE SPACE REVIEW, Nov. 14, 2011, <http://www.thespacereview.com/article/1968/1>.

Michael Listner, *Revisiting the Liability Convention: reflections on ROSAT, orbital space debris, and the future of space law*, THE SPACE REVIEW, Oct. 17, 2011, <http://www.thespacereview.com/article/1948/1>.

Michael Listner, *UARS: A potential opportunity to bolster international space law*, THE SPACE REVIEW, Sept. 19, 2011, <http://www.thespacereview.com/article/1930/1>.

Michael Listner, *An update on the proposed European Code of Conduct*, THE SPACE REVIEW, Aug. 8, 2011, <http://www.thespacereview.com/article/1900/1>.

Christopher J. Newman & Ben Middleton, *Space law and the new era of commercial spaceflight*, THE SPACE REVIEW, Apr. 4, 2011, <http://www.thespacereview.com/article/1812/1>.

George S. Robinson, *Space law: Addressing the legal status of evolving "envoys of mankind"*, 36 ANNALS OF AIR & SPACE L. — (2011).

Kendra Rosenberg, *Location Surveillance by GPS: Balancing an Employer's Business Interest with Employee Privacy*, 6 WASH. J. L., TECH. & ARTS 143 (2010).

G. S. Sachdeva, *Commercial Order of Outer Space: Quest for Ethical Values*, 51 INDIAN J. INT'L L. — (2011).

Kai Uwe Schrogl, *Is UNCOPUOS Fit for the Future? Reflections at the Occasion of the 50th Session of its Legal Subcommittee 2011/ Ist UNCOPUOS bereit für die Zukunft? Betrachtungen anlässlich der 50. Sitzung seines Rechtsunterausschusses/ UNCOPUOS est-il prêt pour le futur? Délibérations à l'occasion de la 50ème session du sous-comité juridique*, 2011 ZLW 93 (2011).

S. Shekhter, *Every Step You Take, They'll Be Watching You: The Legal and Practical Implications of Lifetime GPS Monitoring of Sex Offenders*, 38 HASTINGS CONST. L.Q. 1085 (2011).

K.C. Smith, *Hiding in Plain Sight: Protection from GPS Technology Requires Congressional Action, Not a Stretch of the Fourth Amendment*, 62 MERCER L. REV. 1243 (2011).

Priscilla J. Smith, Nabiha Syed, David Thaw & Albert Wong, *When Machines Are Watching: How Warrantless Use of GPS Surveillance Technology Violates the Fourth Amendment Right Against Unreasonable Searches*, 121 YALE L.J. Online 177 (2011).

Lotta Viikari, *A New Liability Regime for the Space Sector – An Economic Imperative*, 3 INDIAN J. INT'L ECON. L. — (2011).

M. Walsh, *Sky-High Spy: With GPS Probing, the Zone of Privacy Is Getting Even Smaller*, 97/11 A.B.A.J. 23 (2011).

B. Worden, *Is Your Furniture Spying on You?: Covert Use of GPS in Advertising*, 33 HASTINGS COMM. & ENT. L.J. 461 (2011).

Books and Reports

R. I. R. ABEYRATNE, *SPACE SECURITY LAW* (Springer 2011).

M. ANSDELL, L. DELGADO LÓPEZ & D. HENDRICKSON, *ANALYZING THE DEVELOPMENT PATHS OF EMERGING SPACE NATIONS: OPPORTUNITIES OR CHALLENGE FOR SPACE SUSTAINABILITY?* (2011).

MATXALEN SÁNCHEZ ARANZAMENDI, "ECONOMIC AND POLICY ASPECTS OF SPACE REGULATIONS IN EUROPE. PART 2: SPACE RELATED REGULATIONS – ON TRACK FOR SPACE TECHNOLOGIES AND SPACE BASED SERVICES", ESPI Report 36 (2011).

MATXALEN SÁNCHEZ ARANZAMENDI, "EUROPEAN COMMISSION COMMUNICATION "TOWARDS A SPACE STRATEGY FOR THE EUROPEAN UNION THAT BENEFITS ITS CITIZENS" – TOWARDS A LISBON GENERATION COMPETENCE?", ESPI Perspective 46 (2011).

ESPI, *Yearbook on Space Policy 2009/2010: Space for Society* (Springer 2011).

MARTIN FAIX, STEPHAN HOBE, MAHULENA HOFMANNOVÁ, JAN WOUTERS; ET AL, *A COHERENT EUROPEAN PROCUREMENT LAW AND POLICY FOR THE SPACE SECTOR: TOWARDS A THIRD WAY* (LIT, 2011).

DAVID FINKLEMAN, *SPACE AND VERIFICATION: PART 2 – TECHNICAL ASSESSMENT* (Eisenhower Center 2011).

PETER FOLGER, *GEOSPATIAL INFORMATION AND GEOGRAPHIC INFORMATION SYSTEMS (GIS): AN OVERVIEW FOR CONGRESS* (Congressional Research Service 2011).

PETER FOLGER, *ISSUES AND CHALLENGES FOR FEDERAL GEOSPATIAL INFORMATION* (Congressional Research Service 2011).

GOV'T ACCOUNTABILITY OFFICE, *COMMERCIAL SPACE TRANSPORTATION: INDUSTRY TRENDS AND KEY ISSUES AFFECTING FEDERAL OVERSIGHT AND INTERNATIONAL COMPETITIVENESS*, GAO-11-629T (May 5, 2011).

GOV'T ACCOUNTABILITY OFFICE, *EVOLVED EXPENDABLE LAUNCH VEHICLE: DOD NEEDS TO ENSURE NEW ACQUISITION*

STRATEGY IS BASED ON SUFFICIENT INFORMATION, GAO-11-641 (Sept. 15, 2011).

GOV'T ACCOUNTABILITY OFFICE, INTERNATIONAL SPACE STATION (ISS)—ONGOING ASSESSMENTS FOR LIFE EXTENSION APPEAR TO BE SUPPORTED, GAO-11-519R (Apr. 11, 2011).

GOV'T ACCOUNTABILITY OFFICE, POLAR SATELLITES: AGENCIES NEED TO ADDRESS POTENTIAL GAPS IN WEATHER AND CLIMATE DATA COVERAGE, GAO-11-945T (Sept. 23, 2011).

GOV'T ACCOUNTABILITY OFFICE, SPACE ACQUISITIONS: DOD DELIVERING NEW GENERATIONS OF SATELLITES, BUT SPACE SYSTEM ACQUISITION CHALLENGES REMAIN, GAO-11-590T (May 11, 2011).

GOV'T ACCOUNTABILITY OFFICE, SPACE AND MISSILE DEFENSE ACQUISITIONS: PERIODIC ASSESSMENT NEEDED TO CORRECT PARTS QUALITY PROBLEMS IN MAJOR PROGRAMS, GAO-11-404 (June 24, 2011).

BENJAMIN GUYOT, DROIT SPATIAL EUROPÉEN (Bruylant 2011).

ROGER G. HARRISON, SPACE AND VERIFICATION: PART 1 – POLICY CONSIDERATIONS (Eisenhower Center 2011).

ATSUYO ITO, LEGAL ASPECTS OF SATELLITE REMOTE SENSING (M. Nijhoff Pub. 2011).

RAM S. JAKHU, INTERNATIONAL SPACE LAW (Springer 2011).

RAM JAKHU, TOMMASO SGOBBA, & PAUL STEPHEN DEMPSEY, THE NEED FOR AN INTEGRATED REGULATORY REGIME FOR AVIATION AND SPACE: ICAO FOR SPACE? (Springer Verlag 2011).

GABRIEL LAFFERRANDERIE & SERGIO MARCHISIO, THE ASTRONAUTS AND RESCUE AGREEMENT: LESSONS LEARNED (ECSL 2011).

CHARLES D. LUTES, PETER L. HAYS, VINCENT A. MANZO, LISA M. YAMBRICK & M. ELAINE BUNN, TOWARD A THEORY OF SPACEPOWER: SELECTED ESSAYS (National Defense University Press 2011).

AUSTIN A. MARDON, LAWRENCE DOMMER, ET AL., SPACE RESCUE SYSTEMS IN THE CONTEXT OF INTERNATIONAL LAWS (Golden Meteorite Press 2011).

NASA, COMMERCIAL MARKET ASSESSMENT FOR CREW AND CARGO SYSTEMS PURSUANT TO SECTION 403 OF THE NASA AUTHORIZATION ACT OF 2010 (P.L. 111-267) (Apr. 27, 2011).

PROCEEDINGS OF THE INTERNATIONAL INSTITUTE OF SPACE LAW 2010 (ed. Corinne M. Jorgenson, AIAA 2011).

VERONICA LA REGINA, SATCOM POLICY IN EUROPE, ESPI Report 32 (2011).

Report of the Legal Subcommittee on its fiftieth session, held in Vienna from 28 March to 8 April 2011, U.N. Doc. A/AC.105/990 (Apr. 20, 2011).

Report on the United Nations/Thailand Workshop on Space Law on the theme "Activities of States in outer space in the light of new developments: meeting international responsibilities and establishing national legal and policy frameworks" (Bangkok, 16-19 November 2010), U.N. Doc. No. A/AC.105/989 (Jan. 31, 2011).

GABRIELLA CATALANO SGROSSO, INTERNATIONAL SPACE LAW (LoGisma 2011).

ALLISON M. SMITH, LAW ENFORCEMENT USE OF GLOBAL POSITIONING (GPS) DEVICES TO MONITOR MOTOR VEHICLES: FOURTH AMENDMENT CONSIDERATIONS (Congressional Research Service 2011).

LESLEY JANE SMITH & INGO BAUMANN, CONTRACTING FOR SPACE: CONTRACT PRACTICE IN THE EUROPEAN SPACE SECTOR (Ashgate 2011).

SPACE SECURITY 2011 (ed. Cesar Jaramillo, 2011).

U.K. SPACE AGENCY, UK SPACE AGENCY STRATEGY 2011 – 2015 (2011).

CHRISTOPHE VENET & LAURENCE NARDON, THE USE OF SPACE FOR MARITIME SECURITY IN Europe (IFRI 2011).

FRANS G VON DER DUNK, NATIONAL SPACE LEGISLATION IN EUROPE: ISSUES OF AUTHORISATION OF PRIVATE SPACE ACTIVITIES IN THE LIGHT OF DEVELOPMENTS IN EUROPEAN SPACE COOPERATION (Martinus Nijhoff Publishers 2011).

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 "University of Mississippi, 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
University of Mississippi School of Law
481 Coliseum Drive
University, MS 38677-1858 USA

Fax Order 1.662.915.6921
Email: jsl@olemiss.edu
Tel: 1.662.915.6857

The 2012 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;	air mail.....\$140.00

Single issues price for vols. 14-37: \$70.00

Single 2007 Special Publication Bibliography price: \$70.00

Order for 2011 Volume 37 (Nos. 1 & 2)	\$ _____.
Order for 2012 Volume 38 (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: _____



