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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[16] *Id.*

[17] 42 U.S.C. § 2458c (2000).

[18] *Id.*

[19] *Id.*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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[29] *Id.*

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

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

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

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

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

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

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

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

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[32] *Id.* at 2.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[64] 49 U.S.C. app. § 2603(2) (1984).

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

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

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

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

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

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[66] *Id.*

[67] 49 U.S.C. app. § 2605(b) (1984).

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

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

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

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

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

The Science Committee also noted:

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

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

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

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

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

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

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

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

[74] *See* 14 C.F.R. § 401.5 (2000).

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

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

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

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

[77] 14 C.F.R. § 431.35(c) (2000).

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

[79] 14 C.F.R. § 431.43 (2000).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

i. Congressional Designation of Flight Authority

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

ii. Definition of "Suborbital Rocket"

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

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[100] *Id.* at 2.

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

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

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

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

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

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

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

[106] *Id.*

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

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

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

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

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

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

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

### iii. Experimental Permits

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

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

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

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

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

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

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

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

iv. Treatment of Passengers and Crew

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

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

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

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

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[117] *Id.* at 12.

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

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

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

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

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

### C. *FAA Licenses* SpaceShipOne

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[133] *Id.*

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

[135] *Id.* at H10050.

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

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

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

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

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

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

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

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

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

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

[139] *Id.*

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

[141] *Id.*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[156] *Id.*

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

[158] *Id.*

[159] *Id.* at H10051.

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

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

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

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

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

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

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

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

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

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

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[164] *Id.* § 70101(a)(13).

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

[166] *Id.*

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

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

iii. Suborbital Rockets: A Broader Definition

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

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

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

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

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

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

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

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

iv. Informed Consent: Risky Business Knowingly Allowed

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

v. Liability Risk-Sharing and Indemnification

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

vi. Space flight participants are Not Indemnified

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

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

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

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

vii. No Indemnification for Permitted Flights

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

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

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

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

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

### viii. Reciprocal Waivers of Claims

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### ix. Experimental Permits

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

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

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

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

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

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

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

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[203] *Id.* § 70105a(d).

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

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

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

a. Environmental Streamlining

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

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

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

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

b. Protection of Public Health and Safety

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

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

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

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

[212] 14 C.F.R. § 91.305 (2000).

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

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

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

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

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

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[214] *Id.*

[215] *See supra* note 76.

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

[217] 14 C.F.R. § 431.43(d) (2000).

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

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

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

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

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

### c. Liability and Operating Risk

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

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

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

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

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

## V. REGULATORY AND LEGAL CHALLENGES GOING FORWARD

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## VI. FUTURE CHALLENGES

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

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[230] 5 U.S.C. §§ 601-12 (2000).

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

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

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

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

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

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

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

## VII. CONCLUSION

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

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

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

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

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

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

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

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

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

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