

Perspectives on Commercial Spaceport Insurance for a Catastrophic Launch Failure

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Abstract

The catastrophic detonation of a SpaceX rocket during pre-launch tests at Cape Canaveral, Florida in 2016 and the explosion of an Antares rocket operated by Orbital ATK three seconds into launch at Virginia's Mid-Atlantic Regional Spaceport (MARS) in 2014 brought to light the importance of launch insurance and the disastrous consequences resulting from the failure of ensuring sufficient coverage. A report by the NASA inspector general in the aftermath of damage to the MARS facility indicated that the policy actually in effect covered only damage from aviation operations and explicitly excluded spacecraft and launch vehicles. Thus, it should not have been surprising that the U.S. Government Accountability Office, under a provision of the 2015 Commercial Space Launch Competitiveness Act, reported that operators of launch sites licensed by the FAA are often puzzled about whether and how their facilities are covered by insurance in the event of an accident. The investigators interviewed nine of the ten FAA-licensed spaceports and found that a majority either encountered difficulties in obtaining insurance for commercial launches or expressed concerns about their affordability and, in any event, were uncertain about whether they even needed coverage due to an interpretation of whether they were or were not "involved parties" (requiring insurance) or "third parties" (covered by the launch provider's policy). This paper will evaluate and analyze the lack of consensus among launch site providers and insurers as to whether there is a need to change the current insurance approach, in which insurance for spaceports is not required but can be negotiated between launch companies, who operate launch vehicles, and spaceport operators, who run spaceports.

Spaceports Are Space Players

On August 3, 2017, The Space Foundation released the findings of its publication *The Space Report 2017: The Authoritative Guide to Global*

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Space Activity,¹ reporting that the global space economy totaled \$ 329 billion worldwide. The increase from \$ 323 billion in 2015 was due to growth in commercial space sectors, with negligible declines (0.3 percent) in United States government spending of \$ 44 billion on defense and civil space efforts in 2016. Commercial space products and services – including telecommunications, broadcasting, and Earth observation – as well as government and private investment in spaceport infrastructure, totaled \$ 253 billion and made up 76 percent of the global space economy last year.

The rise of spaceport participation in the new space economy has not been often heralded amidst the splashy and audacious feats of Virgin Galactic, SpaceX and Blue Origin, which for good reason grab the headlines. But NASA has recognized the phenomenon and pointed out that individual states invest in spaceport infrastructure because they recognize the economic benefit of space activities, including high-paying jobs, high-tech activities that generate secondary benefits, and the prestige associated with space.² “The recent increase in State-level legislative and gubernatorial action is a strong signal of the perceived economic importance of emerging space activities nationwide.”³

Historically, commercial rockets lifted off from coastal federal ranges – NASA launch pads or U.S. Air Force bases.⁴ But within the past twenty years, commercial spaceports have emerged in the wake of legislation⁵ permitting

1 *The Space Report* is published annually by the Space Foundation, using in-house industry analysts working with a European aerospace consulting firm to research and analyze government and industry trends in space activity. The report is available for purchase online at www.TheSpaceReport.org.

2 NASA, *New Landscape of Space Exploration: Emerging States in Emerging Space: The Evolving Landscape of 21st Century American Spaceflight*, available at https://www.nasa.gov/sites/default/files/files/Emerging_Space_Report.pdf. All electronic links herein were last accessed on September 7, 2017.

3 *Id.*

4 *See*, Robert, A., *States Bet On Spaceports, Future Economic Benefits*, *Forbes*, Legal Newsline, (June 13, 2017) available at <https://www.forbes.com/sites/legalnewsline/2017/06/13/states-bet-on-spaceports-future-economic-benefits/#5c09d7621639>, quoting Stuart Witt, the former CEO and general manager of the Mojave Air and Space Port. Although the primary purpose of federal ranges is to serve the needs of the U.S. government, federal spaceports can serve commercial customers as well and, when they do, they are subject to licensing and regulation by the FAA AST as commercial spaceports, even though they are not commercial spaceports.

5 The Commercial Space Launch Act (Space Launch Act), Pub. L. 98-575 (October 30, 1984) as amended by the Commercial Space Launch Act Amendments of 1988, Pub. L. No. 100-657, § 5, 102 Stat. 3900, 3901-3905 (November 15, 1988), the Commercial Space Launch Act Amendments of 2004, Public Law 108-492 (December 23, 2004) and the Commercial Space Launch Competitiveness Act of 2015, Public Law 114-90 (November 26, 2015).

the operation of commercial launch sites meeting strict license requirements.⁶ There are now ten commercial spaceport operators, three of which are co-located on federal facilities,⁷ while the rest are located on state, municipal, or private property. Only three of these spaceports have hosted commercial launches in the past five years: the Mid-Atlantic Regional Spaceport in Virginia, Mojave Air and Space Port in California and Spaceport America in New Mexico.

It is not necessarily as palpable but every bit as true that, just like their fellow rocket launch operators, spaceports need insurance, too. But unlike launch providers, FAA regulations inexplicably do not require spaceport operators to obtain insurance.⁸ As a result, confusion exists about who is financially responsible for property damage should a launch mishap occur, as dramatically illustrated in the wake of a recent launch site explosion in Virginia.

Launch Pad Explosions

On October 28, 2014, an Antares rocket made by Orbital ATK⁹ exploded only seconds after liftoff from MARS Pad 0A at NASA's Wallops Flight Facility in Virginia, destroying Orbital's unmanned Cygnus spacecraft on a resupply mission for the International Space Station.¹⁰ This was to be the

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- 6 The Space Launch Act granted the Secretary of Transportation authority to promulgate rules to regulate this industry, which were then delegated to the Federal Aviation Administration (FAA) Office of Commercial Space Transportation (hereinafter, "FAA-AST"). Commercial Space Launch Act, 51 U.S.C. § 50903 (a). *See*, Ryabinkin, C.T., Note, Let There Be Flight: It's Time to Reform the Regulation of Commercial Space Travel, 69 J. Air L. & Com. 101 at 121 (2004).
 - 7 The California Spaceport at Vandenberg Air Force Base, Cape Canaveral Spaceport at Cape Canaveral Air Force Station in Florida and the Mid-Atlantic Regional Spaceport (MARS), on NASA's Wallops Flight Facility in Virginia.
 - 8 Among the commercial space transportation regulations encapsulated in Title 14 of the Code of Federal Regulations (hereinafter, "C.F.R."), Part 440 of regulates the provision of financial responsibility for commercial space activities. 14 C.F.R. § 440.3 defines a "license" as an authorization the FAA issues "to launch or reenter a launch or reentry vehicle." By omission, it does not pertain to a license to operate a launch site under Part 420.
 - 9 Orbital ATK was formed in 2015 from the merger of Orbital Sciences Corporation and Alliant Techsystems. It builds and launches its own rockets and designs and constructs its own commercial communications and imaging satellites. *See*, Orbital ATK, Inc. 2015 Calendar Year Annual Report, available at www.orbitalatk.com/newsroom/feature-stories/15_AnnualReport/OA%20Annual%20Report%20CY2015.pdf.
 - 10 Calla Cofield, A Year After Private Rocket Explosion, Orbital ATK Aims to Soar Again, *Space.com* (October 28, 2015), available at <https://www.space.com/30955-orbital-atk-rocket-explosion-year-later.html>.

third of ten planned cargo missions for NASA under a \$ 1.9 billion contract.¹¹

Orbital later determined that a defect in a component that pumps fuel into the engine caused the failure and ultimately made the decision to replace the engines.¹² The combined value of the Antares and Cygnus lost was about \$ 200 million.¹³ The blast also damaged a transporter erector launcher adjacent to the pad (used to haul Antares to the pad and raise it vertical), lightning suppression rods and the concrete launch pad and the pad's cryogenic plumbing.¹⁴ Unfortunately, the spaceport was not insured. A report by the NASA inspector general explained: "We reviewed the policy in effect at the time of the Orbital mishap and found that, while it covers damage from aircraft and aviation operations, it explicitly excludes spacecraft and launch vehicles."¹⁵

The Virginia Commercial Spaceflight Authority desperately needed cash to repair the launch pad, so four Virginia Congressional representatives submitted language through an appropriations committee that directed NASA to fund repairs. Under political pressure, NASA relented and issued a notice of intent to non-competitively increase the value of its existing contract with the spaceport owner by \$ 5 million.¹⁶ NASA took funding from programs within its Space Operations budget and used it to help Wallops rebuild.¹⁷ This event highlighted a concern about the adequacy of insurance coverage obtained by spaceport operators, an increasingly key part of the commercial space industry.¹⁸

11 *Id.* In 2008, Orbital Sciences Corporation and SpaceX were awarded a Space Station Commercial Resupply Services (CRS) contract with NASA. Orbital ATK agreed to fly 10 cargo payloads to the International Space Station.

12 Loren Grush , Orbital ATK to launch Antares rocket this weekend – two years after 2014 explosion – The vehicle is back with new engines, *The Verge* (October 14, 2016), available at <https://www.theverge.com/2016/10/14/13225592/orbital-atk-antares-rocket-launch-2014-explosion>.

13 Mike Wall, **Private Orbital Sciences Rocket Explodes During Launch, NASA Cargo Lost, Space.com (October 28, 2014)** available at <https://www.space.com/27576-private-orbital-sciences-rocket-explosion.html>.

14 *See*, NASA Release 14-303, NASA's Wallops Flight Facility Completes Initial Assessment after Orbital Launch Mishap (Oct. 29, 2014), available at <https://www.nasa.gov/press/2014/october/nasa-s-wallops-flight-facility-completes-initial-assessment-after-orbital-launch>.

15 *See*, NASA Office of Inspector General, Office of Audits Report No. IG-15-023, NASA's Response to Orbital's October 2014 Launch Failure: Impacts on Commercial Resupply of the International Space Station (September 17, 2015).

16 *Id.*

17 Pappalardo, J., How NASA Got Bullied Into Rebuilding a Spaceport, *Popular Mechanics* (October 6, 2015), available at www.popularmechanics.com/space/rockets/a17619/nasa-wallops-island-spaceport-repairs/.

18 *See*, Government Accountability Office (GAO) Report, GAO-17-88, Commercial Space Launch Insurance at 2 (November 2016) (hereinafter, GAO Spaceport Report).

Soon after the tragedy, lawmakers passed the U.S. Commercial Space Launch Competitiveness Act, which included a provision requiring a report on the potential inclusion of all government property, including state and municipal property, in the existing indemnification regime that covers liability insurance and financial responsibility requirements.¹⁹ The GAO was asked to review the current state of insurance coverage for spaceports²⁰ and to determine whether stakeholders consider the existing approach adequate.²¹ Those findings, in order to be understood, must first be contextualized in the overall schema of space liability that includes spaceports.

Are the Space Treaties Relevant?

Yes, in a basic sense. Among the five international space treaties, the 1967 Outer Space Treaty (OST),²² addresses state liability in two provisions. OST Article VI of the treaty provides

“States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The 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. ...”²³

19 Commercial Space Launch Competitiveness Act, *supra* note 5, § 115.

20 A non-FAA launch site explosion occurred two years later, on September 1, 2016 when, during a standard pre-launch static test firing of a Falcon 9 rocket, an explosion at SpaceX Launch Complex 40 at Cape Canaveral Air Force Station resulted in loss of the rocket and its payload, a \$ 200 million communications satellite. See, SpaceX Anomaly Updates, September 1, 2016, available at www.spacex.com/news/2016/09/01/anomaly-updates. The launch pad, SLC-40, is one of three operated by SpaceX, including Launch Complex 39A at Kennedy Space Center and Launch Complex 4E at Vandenberg Air Force Base in California, all located on federal ranges.

21 See, NASA, Government Brief: Clarity Required for Commercial Space Launches, NASA Academy of Program/Project & Engineering Leadership (January 23, 2017), available at <https://appel.nasa.gov/2017/01/23/government-brief-clarity-required-for-commercial-space-launches/>.

22 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, 610 U.N.T.S. 205 (hereinafter Outer Space Treaty, or OST).

23 The principles in OST Article VI may already have attained the status of customary law, binding all states whether or not they are signatories to the treaty itself. See, Freeland, S., “Fly me to the moon: How will international law cope with commercial space tourism?” 2010 Melb J Int'l 1, at 17 (2010).

Thus, even if a non-state actor performs the space activity, the launching state is responsible for it through “authorization and continuing supervision.” There are some uncertainties concerning these due-diligence obligations, particularly with regard to how states implement their obligations.²⁴ As discussed below, most states carry out this obligation (and protect themselves) by enacting licensing statutes that include provisions for financial responsibility in the event of an accident.

Liability (as opposed to international responsibility) is provided in another OST provision, Article VII:

“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 space or in outer space, including the Moon and other celestial bodies.”

Thus, if damage is caused by an object launched by a commercial company at the behest of a government, that state is internationally liable for the consequences under Article VII.

The 1972 Liability Convention (LC),²⁵ the treaty that arose from the aforementioned provisions of OST Article VII, contains much more detail and specifically governs liability of a launching state. It defines a launching state as one “which launches or procures the launching of a space object” or “from whose territory or facility a space object is launched.”²⁶ Accordingly, for example, the United States government is internationally liable for launches and activities conducted by commercial space companies such as, for example, SpaceX, which launches from a site in Florida, and Virgin Galactic, which operates out of Spaceport America, in New Mexico. These facilities are within U.S. territory and any catastrophic launch accident originating from them will make the United States liable for any extraterritorial damages under international law.²⁷

24 See, Masson-Zwaan, T., Article VI of the Outer Space Treaty and Private Human Access to Space, *Proceedings of the International Institute of Space Law: 51st Colloquium on the Law of Outer Space* 536 at 543 (2008).

25 Convention on International Liability for Damage Caused by Space Objects, Mar. 29 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762, 961 U.N.T.S.187 (hereinafter Liability Convention, or LC).

26 LC Article I.

27 LC Article II provides: “A launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight.” Thus, the state incurs absolute liability, whether or not the spacecraft operator did anything wrong. See, Albert, C., *Liability in International Law and the on Commercial Space Launches and Space Tourism*, 36 L.A. Int'l &

The Outer Space Treaty and Liability Convention are widely accepted and all the space-faring states have ratified them.²⁸ The imposition of joint and several liability under these treaties is among the reasons many States have enacted national space laws to allow them to shift their exposure to liability by imposing financial responsibility on private launch companies.²⁹ In order to promote commercial development of space, some states cap liability and permit the financial resources of the national treasury to act as a surety for any catastrophic losses.³⁰

National Law: The United States

The United States satisfies its Article VI obligation to authorize and supervise launch activities by requiring any US private company (or a foreign company launching from a US territory) to obtain a launch license from the FAA AST.³¹ The same obligation exists for operation of a launch site (i.e., a spaceport) on its territory.³² The Commercial Space Launch Act³³ contains numerous conditions concerning general public interests as national security and abidance by international obligations³⁴ and details are provided in implementing regulations.

Comp. L. Rev. 233, 235 (2014). *But see*, LC Article VII. The convention does not apply to damage caused by the space object of the launching state to its own nationals or to foreign nationals involved in the launch.

28 The Outer Space Treaty has 105 ratifications and 25 signatures; the Liability Convention has been ratified by 94 states and signed by an additional 20 states. UNCOUOS, Status of International Agreements relating to activities in outer space as at 1 January 2017, UN Document No. A/AC.105/C.2/2017/CRP.7 (A/AC.105/C.2/2017/CRP.7 (March 23, 2017), available at www.unoosa.org/documents/pdf/spacelaw/treatystatus/AC105_C2_2017_CRP07E.pdf. A ratification is binding, while a signature is not. However, a signature expresses the state's official intention to comply with the treaty and creates an obligation to refrain from acts that would defeat its object and purpose. *See*, United Nations Glossary of terms relating to Treaty actions, available at https://treaties.un.org/pages/Overview.aspx?path=overview/glossary/page1_en.xml.

29 *See*, Freeland, S., Up, Up and... Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space, 6 *CI. J. INT'L L.* 1, 16 (2005); *see also*, Lyall, F., and Larsen, P., *Space law: A Treatise* at 470 (2009).

30 *See*, Dempsey, P.D., National Laws Governing Commercial Space Activities: Legislation, Regulation, & Enforcement, 36 *Nw. J. Int'l L. & Bus.* 1, 33 (2016).

31 Commercial Space Launch Act, 51 U.S.C. § 50904(a). *Cf.*, Australia Space Activities Act 1998 (CTH) and Regulations thereunder; *see de Zwart, M. and Stephens, D., Non-Military Space in the Woomera Prohibited Area: Opportunities for the Space Industry*, 45 *Fed. L. Rev.* 39, 57-58 (2017).

32 *Id.*

33 Commercial Space Launch Act, 51 U.S.C. § 50901.

34 Commercial Space Launch Act, 51 U.S.C. § 50905(a), (b).

The FAA regulations that implement the Space Launch Act establish a two-part licensing system: one license for launch vehicles and another license for launch sites. As of today, the FAA has issued 18 active launch licenses and 10 Launch site operator licenses since 1989.³⁵ The first license is for an operator to launch a specific vehicle.³⁶ Within that license there is a launch-specific license (allowing the operator to launch one vehicle from a specific site³⁷) and launch operator license, which allows the operator to launch from one launch site launch vehicles “from the same family of vehicles transporting specified classes of payloads.”³⁸ The second type of license, a launch site license³⁹ permits a spaceport operator to offer its launch site facilities to a licensed launch vehicle operator.

Not all launch sites are created equal and some have attributes that are more supportive for a particular mission than for others. Attributes such as cloudless days, high altitude, low population density or restricted airspace may make one site attractive for a given mission, while another type of mission may favor a site with a legacy infrastructure, ocean proximity or the availability of on-site contractors and partners. Regardless, all launch sites must go through an extensive site location review to make sure the facility is safe and capable of supporting multiple launch vehicle types.⁴⁰ The license lasts for five years from the day of issuance and is renewable for an additional five years.⁴¹

One of the strengths of the United States regime is the insurance and financial responsibility in the Space Launch Act, which are mirrored in the regulations.⁴² Addressing its Article VII obligations, the United States has established three tiers of liability.⁴³ In the first tier, launch operator liability

35 FAA Commercial Space Data, FAA Website available https://www.faa.gov/data_research/commercial_space_data/ (listing nine Active Launch Site Operator Licenses for sites in Texas, Florida, California, New Mexico, Alaska, Virginia, and Oklahoma). Not all spaceports are merely airports converted for space launch uses. Spaceport America, located in New Mexico, is the first purpose-built spaceport. *See*, FAQ, Spaceport America, <http://spaceportamerica.com/about-us/faq>; Mike Wall, SpaceX Breaks Ground on Private Spaceport in Texas, SPACE.COM (Sept. 23, 2014), www.space.com/27234-spacex-texas-spaceportgroundbreaking.html (“SpaceX has begun construction on a new launch site in Texas, a seaside spaceport that will be used to blast commercial satellites into orbit a few years from now.”)

36 14 C.F.R. § 415.3.

37 14 C.F.R. § 415.3(a).

38 14 C.F.R. § 415.3(b).

39 14 C.F.R. § 420.41.

40 14 C.F.R. §§ 420.19, .21, .23, .25, .27, .29, 31.

41 14 C.F.R. § 420.43.

42 Compare, 51 U.S.C. § 50914 with 14 C.F.R. § 440.

43 *See*, U.S. Government Accountability Office, GAO-17-366, Commercial Space Launch Insurance: Weakness in FAA’s Insurance Calculation May Expose the Federal

(and the requirement to obtain insurance) is capped at the “maximum probable loss” (MPL) as determined by FAA AST. For third party liability (i.e., where claimants are the uninvolved public), the operator is required to obtain insurance⁴⁴ up to the MPL for the lesser of \$ 500 million or the “maximum liability insurance available on the world market at a reasonable cost.”⁴⁵ For Government property, the operator must insure for the lesser of \$ 100 million or the maximum insurance available at reasonable cost.⁴⁶

If the amount of liability exceeds the amount available in the first tier, the second tier is triggered – governmental indemnification. The U.S. Congress may appropriate up to \$ 1.5 billion (in 1989 dollars) to indemnify catastrophic losses that exceed the first tier insurance limits.⁴⁷ If both the first and second tiers are inadequate to compensate for a catastrophic loss to third parties (or Congress does not, for any reason, act to appropriate funds for compensation), liability reverts to the legally liable licensee.⁴⁸

As for first and second parties to the launch, those engaged in the launch enterprise must enter into reciprocal cross-waivers of claims with each other and their contractors, subcontractors, and customers (and their customers’ contractors and subcontractors), including space flight participants, under which each party agrees to be responsible for property damage or loss it sustains, or for personal injury to, death of, or property damage or loss sustained by its own employees resulting from the launch activity.⁴⁹

Government to Excess Risk at 4-5 (March 2017), available at www.gao.gov/assets/690/683671.pdf.

44 The insurance policy protects the Government and its agencies, personnel, contractors, and subcontractors; contractors, subcontractors, and customers of the licensee; contractors and subcontractors of the customer; and space flight participants. Commercial Space Launch Act, 51 U.S.C. § 50914(a)(4).

45 Commercial Space Launch Act, 51 U.S.C. § 50914(a)(3)(B). This is in recognition that there may be a limit to the willingness of the insurance industry to accept risk. *See*, Lyall and Larsen, *supra* note 29, at 114-115.

46 *See*, von der Dunk, F.G., *Mixing US and Dutch Approaches: Curacao’s Legislation on Private Commercial* 62 ZLW 740, 745-47 (2013), *citing* P. Vorwig, *Regulation of Private Launch Services in the United States*, in *National Regulation of Space Activities* at 405 (Ed. R.S. Jakhu) (2010).

47 Commercial Space Launch Act, 51 U.S.C. § 50915. Adjusted for inflation, it amounts to approx. \$ 3.1 billion. *See*, GAO Report, March 2017, *supra* note 43, at 5.

48 Commercial Space Launch Act, 51 U.S.C. § 50915. There is an argument that the indemnity limit (what is, in current dollars, \$ 3.1 billion) is not favorable to U.S. space companies and could make it difficult for them to compete with foreign space companies as foreign governments may provide more protection. *See*, Ryabinkin, *supra* note 6, at 120 (noting the French government has no cap on the government’s indemnification of third party claims).

49 Commercial Space Launch Act, 51 U.S.C. § 50914(b)(1).

The FAA AST can also issue permits⁵⁰ – rather than licenses – for the launch or reentry of a reusable suborbital rocket.⁵¹ This is supposed to be an expedited process and intended to further the FAA’s duty to incentivize the industry and enable it to innovate without excessive regulation. Launch companies operating under an FAA-issued permit, like licensees, must purchase insurance under the first tier and sign cross waivers but, unlike licensees, they do not gain coverage under the second tier of the federal indemnification regime, neither are they required to obtain insurance for the third tier of liability.

At least twenty-six States have promulgated national space legislation and imposed regulatory requirements upon commercial space activities and while most national space laws require insurance and indemnification and provide that launch activity should not jeopardize public health, safety or property or adversely affect national security, there are vast differences in the approach states have taken to satisfy their treaty obligations.⁵² The absence of consistent standards may presage the establishment of forum shopping favoring flags-of-convenience⁵³ who attract launch operators by offering the least onerous regulatory structure and insurance requirements, at the expense of safety and financial responsibility to those injured in the event of a catastrophic accident.⁵⁴

50 If there is one advantage to the glacial progress of regulation reform to keep pace with technology, it is that some of the PowerPoints used by the FAA to explain its processes are still quite accurate. A helpful resource on experimental permits is the Office of Commercial Space Transportation slideshow on its Experimental Permit Program, prepared by Sherman Council (August 15, 2011), available at www.coe-cst.org/core/scripts/wysiwyg/kcfinder/upload/files/Council.ppt.

51 See generally, Title 14 C.F.R., Part 437. The FAA will issue an experimental permit to a person to launch or reenter a reusable suborbital rocket only for research and development, to show compliance with requirements for obtaining a license or for crew training before obtaining a license. 14 C.F.R. § 437.5.

52 See, generally, Dempsey, P.D., National Laws Governing Commercial Space Activities: Legislation, Regulation, & Enforcement, 36 *Nw. J. Int’l L. & Bus.* 1 (2016). See also, Hobe, H., Legal Aspects of Space Tourism, 86 *NEB. L. REV.* 439, 445 (2007). “By virtue of Article VI of the Outer Space Treaty, states are obligated to authorize and to continuously supervise their national space activities. This obligation can best be complied with by enacting national space legislation, preferably with a licensing regime for private activities in outer space, including certification of space vehicles.”

53 *Id.* at 43, citing Fitzgerald, P., Inner Space: ICAO’S New Frontier, 79 *J. AIR L. & COM.* 3, 23 (2014).

54 *Id.*, citing Taghdiri, A., Flags of Convenience and the Commercial Space Flight Industry: The Inadequacy of Current International Law to Address the Opportune Registration of Space Vehicles in Flag States, 19 *B.U. J. SCI. & TECH. L.* 405, 407 (2014).

Third Party Insurance

When a spaceport hosts a launch, the spaceport operator is considered a contractor of the launch company for purposes of the federal space insurance statute⁵⁵ and therefore is eligible for indemnification from third party claims. (Conversely, that means the spaceport is not ordinarily a “third party” who can make a claim against insurance that is backed up by government indemnity.) The spaceports and launch operators (and their contractors, etc.) must also sign cross waivers – so that none may make liability or property claims against the other. This is where the distinction between private property insurance and third party insurance is important: aside from being protected from third party claims (that is, the uninvolved public suing the spaceport and launch operator for damages when a launch goes awry), the spaceport has to privately negotiate its own insurance to get reimbursement for damage to its own infrastructure in the event of a launch mishap. That kind of insurance, discussed in the next section, is not within the scope of the federal space insurance statute. Spaceport’s property has to be separately insured.

A fine distinction exists as to third party insurance, which is required for both launches, under C.F.R. Part 440, and for reentries, under Title 14 C.F.R. Part 450.⁵⁶ For both launches and reentries, the licensee must procure *liability insurance* (i.e., not to exceed \$ 500 million, etc.) that protects the licensee, the federal government and its personnel. This includes claims for damage to property not located at a Federal range facility.⁵⁷ In addition, the licensee must obtain *property insurance* (i.e., not to exceed \$ 100 million) that covers claims of all property at a Federal range facility.⁵⁸ To distinguish the two, a licensed reentry to the designated reentry site of Vandenberg Air Force Base requires insurance covering loss or damage to government property located on that base under the property insurance required by 14 C.F.R. § 450.9(d). However, if the reentry vehicle misses the targeted landing point and impacts the U.S. Post Office in nearby Lompoc, California, the liability policy (not the property insurance policy, a smaller claim pool) would be required to respond to the claim.⁵⁹

55 Space Launch Act, Section 50914.

56 References to “C.F.R.” refer to title 14 of the Code of Federal Regulations, Chapter III, pertaining to commercial space transportation.

57 For reentries, this is covered under 14 C.F.R. § 450.9 (b); for launches the provision is 14 C.F.R. § 440.9 (b).

58 For reentries, this is covered under 14 C.F.R. § 450.9 (d), for launches the provision is 14 C.F.R. § 440.9 (d). Government property at a Federal range facility includes property located at an adjacent range. Cape Canaveral Air Station and Kennedy Space Center are an example of adjacent Federal range facilities. 64 Federal Register, No. 193, 54448 at 54460 (Notice of proposed rulemaking for 14 C.F.R., Part 450, Financial Responsibility Requirements for Licensed Reentry Activities) (October 6, 1999), available at <https://www.gpo.gov/fdsys/pkg/FR-1999-10-06/pdf/FR-1999-10-06.pdf>.

59 See, 64 Federal Register, *supra* note 58, at 54460.

First Party Insurance

This type of insurance must be distinguished from the third party insurance discussed above. Third party insurance offers protection from claims of outsiders in the event of an accident; first party insurance, on the other hand, is additional protection that a launch operator (or satellite owner) may want to purchase to reimburse the value of the vehicle or payload in the event of an accident. This type of insurance is extra-legislative and negotiated privately, usually as all-risks coverage, including accidents and malfunctions, whether from premature wear and tear or faulty design.⁶⁰

Pre-launch insurance remains in effect until “intentional ignition” and provides coverage against physical loss or damage of the satellite or launch vehicle whilst it is in its manufacturing and ground testing phase, including transportation to the launch site, assembly, integration and the various processing phases involved prior to launch.⁶¹

Satellite Launch insurance provides coverage for loss of, damage to or failure of the satellite occurring at any time between the beginning of the launch phase and typically one year thereafter,⁶² and is usually purchased by the satellite operator. The launch and early orbit phases constitute the most critical phases of a satellite’s life. If the launch is successful, the satellite will then be thoroughly tested to ascertain whether the satellite is free of design errors and manufacturing faults and will fulfill its operating requirements. This is the point at which most malfunctions (e.g., deployment of solar arrays) will be discovered; if no faults are detected during positioning and in-orbit testing, then the probability of losses occurring during the operations phase depreciates appreciably.⁶³

Satellite in-orbit insurance offers protection against the risk of a satellite’s complete or partial failure during its operational lifetime, commencing upon expiration of the Launch insurance policy, and is renewable on a yearly basis, subject to a review of the health status of the satellite. If anomalies have occurred during the expiring policy period, exclusions or deductibles may be introduced to maintain coverage at a reasonable cost.⁶⁴ As its operational

60 See, Lyall and Larsen, *supra* note 29, at 116.

61 See, Aon Risk Solutions, *Insuring Space Activities* at 6 (October 2016), available at www.aon.com/russia/files/Insuring_Space_Activities_whitepaper.pdf.

62 The standard is for coverage to terminate twelve months after launch for satellites that use chemical propellant or sixteen months for electric orbit-raising satellites.

63 See, Aon, *supra* note 61, at 7, *citing* XL Insurance, ‘Space Insurance Market Update’, (XL Insurance, May 2014) available at https://www.worldspaceriskforum.com/2014/wp-content/uploads/2014/05/1_MARKET-UPDATE_KUNSTADTER.pdf.

64 External influences may also affect the functioning of a satellite. Intense cosmic radiation resulting from solar flares can induce electronic discharges, causing satellites to malfunction, and collisions with orbital debris, especially in low earth orbit, where there is greater spatial density, may create additional risk in certain polar and sun-synchronous orbits.

lifetime declines, the value of the satellite will amortize correspondingly and the sum insured will decrease, linearly. The main risk during the in-orbit phase is of partial loss, statistically most likely to occur as a result of a malfunction in the electrical power systems.⁶⁵

Finally, in addition to these standard first party policies, an operator may also purchase a *Launch Risk Guarantee*, which reimburses for the full (or partial) cost of another launch if the satellite fails to reach its intended orbit or is destroyed, or if its functions are impaired as a result of a launch vehicle malfunction. Also, a *Loss of Revenue* policy may insure against financial loss caused by a partial or total failure during the launching or operation of a satellite (reimbursing, for example, the loss of contractually fixed revenue as a result of damage of a satellite transponder.)⁶⁶

Underwriting Space Risks

Enabling the great economic success of space systems operators, launch vehicle providers, governments and national space agencies is an industry that has played an important supporting role in facilitating technological advances to become reality: insurance. When one considers the extreme physical risks involved – subjecting a bespoke, fragile, expensive piece of electronic equipment to a high-pressure voyage to the harsh environment of outer space – it is no surprise that insurance is considered essential, especially for private entities. Insurance companies have been key enablers in the development of the space industry.⁶⁷

Insurance is a contractual relationship that exists when one party (the insurer), for a consideration (the premium), undertakes to reimburse another party (the insured) for loss to a specified subject (the risk) on the happening of a specific event (hazards or perils).⁶⁸ It is a form of risk management in which one party transfers the cost of a potential loss to another entity in exchange for a fee. By purchasing an insurance policy for a smaller (known) premium, the space actor removes the possibility of a potentially catastrophic loss (amounts unknown) by transferring risk to a more risk-neutral party.⁶⁹

With protection against associated business risks, a space entity can obtain credit in order to expand into new, unfamiliar territory, or continue to engage in the chosen activity and develop reliability, which in turn, will drive down the cost of the premium. Insurance is critical for encouraging

65 See, Aon, *supra* note 61 at 7.

66 *Id.* at 12.

67 *Id.* at 3.

68 International Risk Management Institute (IRMI) <https://www.irmi.com/online/insurance-glossary/terms/i/insurance.aspx>.

69 See, Aon, *supra* note 61, at 4.

risk-taking and creating and ensuring economic growth. As of 2016, of the 430 commercial satellites operating in-orbit, over 250 were insured.⁷⁰

The aim of underwriting is to define whether the risk is insurable and if so, what terms and rate of premium should be applied.⁷¹ Where insurance is concerned, space is special. Space activities are inherently risky. Rockets that launch satellites and spacecraft are filled with many times more propellant than the weight of the rocket itself and must travel twenty-five times faster than aircraft to reach earth orbit and, although no FAA-licensed commercial space launch has ever yet resulted in casualties or substantial property damage, the danger to the uninvolved public on the ground is always present.⁷²

There are some big differences between assessing risk for conventional market segments versus the risk inherent in space activities, including, *inter alia*, a special need to understand the sophisticated technology of launching and operating satellites, the low number of launches and satellites which limits the usual ability to rely on the rules of statistical probability and the unrelenting technological development that constantly increases uncertainty of the risk in space activities.⁷³

For example, as to the second point, insurers often rely on large data sets and statistics to measure risk, but the differences in launch sites, the wide variety of launchers, payloads and the particularized integration between the two requires an idiosyncratic evaluation of the risk involved in a given launch.⁷⁴ As a result, while the statistical analysis of an historical database is sufficient for most standard risks, space insurers must work on the basis of a technology-based engineering analysis⁷⁵ and require special information: the probabilities of meeting the launch deadline; technical details and heritage of the launch vehicle; time required by the satellite to travel into orbit; the number of comparable satellites currently in use; whether there are any new technologies introduced; the number of the transponders, their life expectancy, reliability and annual demand to assure uninterrupted

70 *Id.*

71 *See*, Williams, C.A., *et al.*, Risk Management and Insurance 386 (2002).

72 *See*, Schaefer, M., The Need for Federal Preemption and Negotiations regarding Liability Caps and Waivers of Liability in the U.S. Commercial Space Industry, 33 Berkeley J. L. 223, 225 (2015), *citing* See How Things Fly, Smithsonian Nat'l Air & Space Museum, <https://howthingsfly.si.edu/propulsion/rocket-propulsion>.

73 Malinowska, K., Risk Assessment in Insuring Space Endeavours: A Legal Approach, Air & Space Law 42, 329, 330 (2017).

74 *See, e.g.*, Blassel, P., Space Projects and the Coverage of Associated Risks, 10(35) Geneva Papers Risk & Ins. 64 (1985); Meredith, P. & Robinson, G., Space Law: A Case Study for the Practitioner: Implementing a Telecommunications Satellite Business Concept at 337 (Martinus Nijhoff Publishers 1992).

75 *See*, Kuskavelis, I., The Space Risk and Commercial Space Insurance, 111 Space Pol'y 119 (May 1993).

replacement; costs of the launch in relation to the costs of the satellite; and, sometimes, information about the future policyholder (i.e. historical data, experience and the reliability of the operator who, if a “newcomer”, may face higher premiums.)⁷⁶

Thus, risk assessment of space activities is a particularized endeavor. Slightly different criteria must also be taken into account when underwriting third party liability insurance, where exposure is more closely correlated to the launch site details, the launch trajectory and the impact zone. These criteria are weighed with respect to their remoteness to human locations, the intensity of population in neighboring areas, etc.⁷⁷

Unlike most insurance, the nature of space risks requires an underwriter to have extensive knowledge and expertise concerning space technology. But notwithstanding the specialized expertise of space insurers, the particularity of the evaluation requires that the information comes from the operator – not a data set – who is exquisitely familiar with the purpose and criteria of the space project. The insurer relies on the operator’s duty of “utmost good faith” to disclose to the insurer material facts that are relevant for the risk assessment and the way of deciding what information is material and who makes that decision may vary from country to country.⁷⁸

The Calculation of MPL

National space laws that address the financial responsibility for space activities generally define the space risk for the purposes of compulsory insurance, as well as the factors that are fundamental for the risk assessment. For example, United States regulations define risk in terms that account for both the probability of an anomaly and the consequences to persons or property⁷⁹ and, like most other national space laws that address insurance directly, employs the notion of “maximum probable loss” (MPL), which is widely used in insurance law to the evaluation of risk.⁸⁰ The MPL is the

76 See, Malinowska, *supra* note 73, at 331-332, *citing* Montpert, P., Space Insurance, in Contracting for Space 285 (L. J. Smith & I. Baumann eds, 2011); Schöffski, O. & Wegener, A.G., Risk Management and Insurance Solutions for Space and Satellites Projects, 24 Geneva Papers Risk & Ins. 209, 212 (1999).

77 See, Malinowska, *supra* note 73, at 333, *citing*, C. Gaubert, Insurance in the Context of National Authorisation, in National Space Legislation in Europe 169 (Martinus Nijhoff Publishers 2011).

78 *Id.* at 341-42.

79 Code of Federal Regulations (CFR), Chapter 14, part 440, available at www.ecfr.gov/cgi-bin/text-idx?SID=e97013510f2b651f21674b89e7dbde65&mc=true&tpl=/ecfrbrowse/Title14/14cfr433_main_02.tpl.

80 The Australian Space Activities Act of 1998 includes similar requirements. Division 7, section 48(3) requires operators to obtain third-party liability insurance for the lesser of AUS \$ 750 million and the MPL “as determined using the method set out in the

maximum value of loss that may happen due to one occurrence (to be distinguished from the “maximum possible loss,” or worst case scenario that is not probable, but merely possible.)

An MPL calculation helps to establish the risk of liability of engaging in space activities and is much better than establishing a flat rate of liability since it takes into account various risk factors,⁸¹ as well as other factors like the emerging industrial use of small satellites and large constellations of satellites.⁸² The MPL is related to the liability risk allocation regime between the launching state and the operator pursuing the space activity in that it is covered by the operator in the form of its mandatory liability insurance limit, while the risk of an extremely unlikely “maximum possible loss” is usually assumed by the launching state.⁸³

In the United States, FAA AST has historically used a statistical approach to calculate MPL values that considers three primary elements: a number of estimated casualties, an estimate of the average loss per casualty, and the estimated amount of losses from property damage.⁸⁴ The calculations are based on lists of potential debris for each launch vehicle generated by the launch company, the population densities of areas nearby, launch trajectory and fuel type of the vehicle, as well as failure rates for different phases of flight and types of failures. The data is fed into software to create physics-based simulations of possible accidents and the resulting model assigns each simulated accident a probability of occurrence based on the failure rates of the different elements of the launch vehicle. Based on the types of debris that are simulated, where the debris are predicted to fall and population data, numbers for direct and secondary casualties for each simulated accident are generated. Millions of these simulations are carried out with different probabilities of occurrence and the agglomerated estimates create a “risk profile” of the launch, representing the estimated number of casualties for

regulations” (or whatever method is otherwise set forth in the regulations.) Such calculations are made pursuant to the “Maximum Probable Loss Methodology”, (2d ed., Department of Industry, Tourism and Resources 2002). *See*, de Zwart and Stephens, *supra* note 31, at 58-59. The MPL concept has been adopted in the national laws of most other space-faring states, including Japan, Russia, South Africa, the Netherlands, Belgium, the United Kingdom, Ukraine and South Korea. *See*, Malinowska, *supra* note 73, at 338.

81 Risk factors include the launch vehicle or geographic location of the launch site and its proximity to the populated areas. *See*, Schaefer, *The Need for Federal Preemption*, *supra* note 72, at 239.

82 *See*, Malinowska, *supra* note 73, at 336, *citing* M. Schaefer, *The Intersection of Insurance Market and Liability Regimes Regarding Third Parties and Space Flight Participants in Commercial Space Activities*, *Proc. Int’l Inst. Space L.* 413 (2014).

83 Some jurisdictions, including the United States and the Russian Federation, make the operator ultimately liable for the worst-case scenario. *See*, Malinowska, *supra* note 73, at 337.

84 *See*, GAO Report, March 2017, *supra* note 43, at 6.

accidents with a range of probabilities of occurrence. The number of casualties estimated to have a 1-in-10 million chance of occurring are used in the MPL calculation.⁸⁵

Though there is some disagreement about the method for estimating losses from property damage as simply 50 percent (or 25 percent) of losses from casualties,⁸⁶ the more controversial element of the MPL calculation is the FAA's estimated dollar value loss for each casualty (the "cost-of-casualty amount".) To determine the cost of judgments and settlements that would result from the estimated casualties, FAA has used \$ 3 million as an estimate of the average loss per casualty since 1988, when it was first selected to be a conservative estimate of jury awards for transportation casualties.⁸⁷ This estimate has not been updated. Though jury verdicts may arguably have risen in recent years, industry experts have argued any impact of that estimate is far offset by the ultra-conservative choice to base the calculation on a one-in-ten million probability of loss exceeding that figure.⁸⁸

While the methodology for each of these components is the subject of ongoing debate,⁸⁹ the resulting MPL is usually set well below the \$ 500 million level. The GAO reported⁹⁰ in 2012 that the average third-party MPL value for active launch licenses – the average amount of insurance coverage required for commercial launches – was about \$ 99 million (ranging from \$ 23 million to \$ 267 million.) In 2016, the FAA issued five active licenses with an average third-party MPL of about \$ 51 million (ranging from \$ 10 million to \$ 99 million.)⁹¹ Thus, space risk assessment (at least in terms of third party liability) is conducted primarily not by the insurers, but by the licensing authorities. The role of the insurer is limited to applying a specific insurance premium and setting other terms of insurance coverage, although the insurer does perform the risk assessment space property insurance, which is voluntary, using information similar to that used by the licensing authorities.⁹²

85 *Id.* at 10-11.

86 *Id.* at 12-13.

87 *Id.* at 6.

88 *See*, Schaefer, *supra* note 72, at 241-42.

89 *See*, GAO Report, March 2017, *supra* note 43, at 2-3. As part of the Commercial Space Launch Competitiveness Act enacted in 2015, the FAA was obligated to evaluate the methodology used to calculate the amount of insurance launch companies must obtain. The study, due in May 2016, was never delivered and GAO's evaluation is necessarily incomplete.

90 *See*, GAO Report, 2012, *supra* note 72.

91 *Id.* at 7.

92 *See*, Malinowska, *supra* note 73, at 339.

The GAO Report on Spaceport Insurance

The U.S. Government Accountability Office (GAO) was mandated by Section 115 of the U.S. Commercial Space Launch Competitiveness Act to report on the potential inclusion of all government property, including state and municipal property, in the existing indemnification regime established under section 50914 of Title 51. As part of that process, GAO interviewed FAA-licensed spaceports, launch operators, insurers and brokers to determine whether the current insurance regulations should be improved. Of the ten FAA-licensed commercial spaceports, only three are commercially active as of 2016 – MARS, Mojave and Spaceport America – and all three had obtained both property and liability insurance coverage⁹³ to protect spaceport infrastructure against any damage resulting from launch activities,⁹⁴ either by negotiating with their launch companies to be covered as an additional insured or obtaining it through their state government. A third alternative (purchasing property insurance) was made difficult when insurers either declined to provide quotations, provided quotations exceeding launch fees, or included substantial deductibles and in comparison, it was less expensive to negotiate with their launch companies.⁹⁵

When the GAO conducted its survey, it found uncertainty among the stakeholders about whether spaceports actually needed third party coverage.⁹⁶ For example, among the spaceport operators, launch companies and insurance companies, six said they believe spaceports are involved parties; one said they are third parties; six said they may be involved parties, third parties, or both, depending on the circumstances, while one spaceport operator argued that its property should be covered under the liability insurance policy purchased by the launch company because it is a third party.⁹⁷

There are some reasonable bases for the confusion. First, it is unclear whether the required launch insurance is for federal government property only, or if it includes state and municipal government property as well. Second, the FAA

93 Property insurance indemnifies an insured party whose property is stolen, damaged, or destroyed by a covered peril, in this case a space launch or reentry mishap. Liability insurance covers all sums that the insured becomes legally obligated to pay because of bodily injury or property damage, and sometimes other wrongs to which an insurance policy applies.

94 The remaining seven spaceports not yet commercially active have not had to obtain insurance to protect their property from damage resulting from launch mishaps, although several purchase property and liability insurance for day-to-day operations.

95 See, GAO Spaceport Report, *supra* note 18, at 18.

96 See, GAO Spaceport Report, *supra* note 18, at 19. See also, Foust, J., Report finds commercial spaceports confused about insurance requirements, SpaceNews (Nov 23, 2016), available at <http://spacenews.com/report-finds-commercial-spaceports-confused-about-insurance-requirements/>.

97 *Id.* at 19-20.

says the insurance must protect federal government property only, but 14 CFR § 440 does not explicitly define “government” as the federal government. Third, there is additional uncertainty for spaceport operators when ownership of the assets involved in commercial space launches may be split among several different parties (federal government, a state or municipal government, a launch company, and its customer.) FAA officials acknowledged that a spaceport operator could, in theory, be both a third party and an involved party for a given launch but did not provide any examples.

Views among the stakeholders – spaceport operators, launch companies, and insurance industry stakeholders – were very inconsistent. Generally, three problems with the current approach were identified: Lack of certainty because contracts between launch companies and spaceport operators to determine insurance coverage can be open to interpretation and unclear; an uneven playing field because federal ranges enjoy a competitive advantage because launch companies are already required to purchase insurance to cover damage to federal property (nonfederal spaceports are not similarly protected); and inefficiency because coverage has to be negotiated for every launch or set of launches, whereas if insurance were required by law, that would be unnecessary.⁹⁸

On the other hand, stakeholders identified several reasons why the current insurance approach should be continued, including greater flexibility provided by allowing the spaceport to individually assess its assets and risks and to make decisions on how best to protect them given the varying characteristics of the launch vehicles and sites; enhanced competition because flexibility to make their own business decisions regarding what type and how much coverage allows competitive pricing to attract businesses; and assured consistency, since commercial space launch activities require significant advanced planning and changing regulatory conditions after such activities have begun can create an additional expense that they did not consider in their initial plans.⁹⁹

The GAO found that this uncertainty presented a risk that spaceports may not obtain adequate insurance against losses, which could have downstream consequences for the domestic commercial launch industry. Accordingly, they presented two options to increase certainty by specifying which party was required to insure spaceport property: (1) requiring launch companies to purchase insurance to cover spaceport property, versus (2) requiring spaceport operators to purchase insurance to cover their own property.

Organizing the stakeholders’ views on these options is a bit like herding cats. They are all over the place. Many stakeholders felt that requiring launch

98 *Id.* at 25-27.

99 *Id.* at 27-29.

companies to purchase insurance to cover spaceport property would help promote a *level playing field* with federal ranges because commercial spaceports would then receive the same level of insurance protection as federal spaceports.¹⁰⁰ Both options would provide *increased certainty* on what would be covered should a mishap occur¹⁰¹ and make contract negotiations more *efficient*, as the insurance protections would be clearly stipulated in law.¹⁰² On the other hand, the requirement to purchase insurance could remove some flexibility spaceports currently enjoy in making decisions on a case-by-case basis as to how best to protect and manage their risk and property assets. Compulsory insurance could increase costs for some participants who might ordinarily choose another risk management strategy¹⁰³ and in some instances would become part of the launch company's business decision regarding which spaceport to partner with, which could affect competition between spaceports (some spaceports may require less insurance depending on their property holdings.)¹⁰⁴

Conclusions

The GAO ultimately blamed the FAA for not clearly communicating its interpretation of the financial responsibility regulations to spaceports, criticism which was further inflamed when FAA officials brushed them off with a response that such guidance “has not been a high priority” for them.¹⁰⁵ The spaceport stakeholders' reactions to the dual-alternate proposals for compulsory insurance were apparently inconclusive; the GAO merely recommended that the FAA Administrator issue additional guidance and use other forums to clarify when a spaceport operator is a third party to a launch and when it is not.

There are some good reasons for the incongruous response to the GAO's hypothetical fixes of the current system. One is a fundamental misunderstanding of the nature of insurance as it relates to spaceport operations. Insurance is not necessary or appropriate in all instances. Some spaceports can rely on statutory protections that mitigate the exposure to liability.¹⁰⁶ There may be other risk-shifting mechanisms, such as indemnity

100 *Id.* at 30.

101 *Id.*

102 *Id.* at 31.

103 *Id.*

104 *Id.* at 32.

105 *Id.* at 23.

106 *See, e.g.,* New Mexico Space Flight Informed Consent Act, N.M.S.A. § 4-14-1, *et seq.* Specifically, NM Stat § 41-14-3 (1996 through 1st Sess 50th Legis) provides that a space flight entity is not liable for injury to or death of a participant resulting from the inherent risks of space flight activities if it has obtained informed consent prescribed in the statute.

agreements, that are more appropriate in attenuating risk under the circumstances. The property's purpose or value might make its insurance pointless. For example, some customers intentionally sacrifice developmental vehicles to ascertain the limits of the vehicle's performance envelope. Similarly, some spaceport property assets can be damaged or destroyed on the road to improved safety while other infrastructure, if lost, jeopardizes critical national security if it compromises an essential supply chain to a space transportation system.

A critical element in the competition among spaceports is the marketplace created by the ability of each spaceport to showcase its attributes on a competitive basis. The benefits of each spaceport due to its location may be fixed but the availability of equipment, facilities, runways, launch pads, power, services, infrastructure, tools, expertise and access – and the relative quality and expense of each – is part of the bargaining power that spaceports have with their launch customers to offer economic options that make sense in the context of each mission. In this connection, it is important to remember that the protection offered by third party insurance mandated by 14 C.F.R. Part 400, which covers spaceports as “involved parties”, does not cover spaceport property.¹⁰⁷ If a spaceport wants assets and facilities protected during a launch, it must purchase first party insurance. The absence of an insurance burden is a potential asset.

Spaceports with diverse property assets and customer base will naturally rebel against any proposition that seeks to impose on them a one-size-fits-all model where the highest value property becomes a burden on all their users. Spaceports are on a level playing field where commercial competition determines the best means of operating its assets and managing their risks. They can tailor their approach to each customer, evaluate the facilities at risk – there may be a range of launch pad architectures to choose from, at various levels of development and value – and then negotiate property and/or liability insurance only when it makes sense in the context of the mission. There is no one-size-fits all approach to spaceport risk management because spaceports vary widely in architecture, function and customer base. And in the end, legislation cannot cure the poor judgment of a spaceport.

107 The third party insurance provisions (14 C.F.R. § 450.9 (d) for reentries and 14 C.F.R. § 440.9 (d) for launches) pertain only to “a Federal range facility.”

