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ASSESSING THE RISKS: TORT LIABILITY AND RISK MANAGEMENT IN THE EVENT OF A COMMERCIAL HUMAN SPACE FLIGHT VEHICLE ACCIDENT

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I. INTRODUCTION

IN THE EARLY 21st century, the private commercial space transportation industry demonstrated that commercial human space transportation is both technologically and economically feasible. In 2004, the United States Congress responded and granted the Department of Transportation (DOT) the authority to implement regulatory standards to govern commercial human space flight.

Today, the U.S. commercial human space flight (CHSF) industry is developing launch vehicles that will carry paying participants on suborbital flights. The DOT has granted permits to test this experimental vehicle technology, and it is anticipated that CHSF vehicles carrying space flight participants will enter into operation in the near future. As CHSF vehicles begin operation, questions of tort liability and risk management will need to be addressed.

To that end, this article examines U.S. tort liability law within the paradigm of a potential CHSF vehicle accident. Given the extensive nature of tort law, this section focuses on negligence, strict liability for third party damage, and products liability as it relates to CHSF operators, pilots/crew, space flight participants

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(SFPs), and vehicle manufacturers. Analogies are drawn from aviation and adventure sports/tourism for assessment of potential causes of action, defendants, plaintiffs, and applicable standards of care. This article examines and assesses the role of U.S. state law and recent state legislative initiatives regarding tort liability. It also evaluates whether strict liability for third party damage should be imposed on CHSF operators. Further, it discusses reciprocal cross-waivers of liability and informed consent provisions established by federal law within the context of tort defense. This article advises CHSF operators, pilots/crew, SFPs, and vehicle manufacturers to protect themselves against economic loss attributable to likely tort liability resulting from a CHSF vehicle accident. Finally, it presents proposals for legal reform in the area of CHSF tort liability.

The potential CHSF vehicle accident discussed in this article is presumed to have occurred within the United States on a flight that departs and arrives from points within the United States. The reason for this presumption is to limit the scope of accident analysis to U.S. domestic tort law. The role of international law in the event of an international accident is given credence and addressed, although briefly.

II. DEFINING COMMERCIAL HUMAN SPACE FLIGHT

Commercial human space flight is the transport of persons to, from, or through outer space for compensation. The critical element that distinguishes CHSF from other forms of human space flight is the commercial nature of the transportation.

CHSF is not defined in either international law or United States law. The definition provided for "CHSF" is derived from an examination of the common usage of the terms "commercial," "human," "space," and "flight."

In common usage, the term "commercial" is related to, or pertains to, commerce and the engagement of commerce.¹ "Commerce," in this context, is the buying, selling, or exchange of merchandise or services.² "Transportation" is the action or process of moving, carrying, or conveying people or goods from one place to another.³ "Flight" is one mode of transportation

¹ THE NEW SHORTER OXFORD ENGLISH DICTIONARY 451 (Lesley Brown et al. eds., 1993).

² *Id.*

³ *Id.* at 3373-74.

related to flying or moving through air.⁴ In this sense, the use of the term “space flight” is misleading, as vehicle propulsion in outer space does not exhibit the same characteristics of traditional terrestrial air flight. Nonetheless, the term “human space flight” has been adopted in the language of U.S. federal law and regulatory documents relating to commercial human space transportation.⁵ For the purpose of consistency with U.S. law and regulatory documentation, this paper will adopt the phrase “human space flight.” CHSF should be viewed as a mode of transportation distinct from terrestrial air flight and be considered a unique class of commercial space transportation.

No rule of conventional international law has been established to define where airspace ends and outer space begins.⁶ Likewise, no U.S. law or regulation defines or demarcates air and outer space. This author accepts the proposition that at minimum a logically inferred legal definition of outer space “begins *at least* from the height above the earth of the lowest perigee of any existing or past artificial satellite that has orbited the earth without encountering any protest.”⁷ It is interesting to note that the U.S. DOT awards commercial astronaut wings to pilots and flight crew on board a licensed launch vehicle on a flight that exceeds 80.45 kilometers as recognition for having reached outer space.⁸ As suborbital transport systems and high-altitude platform vehicles enter into service, this legal ambiguity in delimitation of air and outer space will need to be addressed in order to resolve questions of concurrent conflicting air and outer space legal norms.

III. HISTORY OF CHSF

Until the early 1980s, space launch activities were in the exclusive domain of the States. While some private commercial space

⁴ *Id.* at 974.

⁵ See, e.g., Commercial Space Launch Activities, 49 U.S.C. § 70101(a)(3) (2000 & Supp. V 2006).

⁶ Michael C. Mineiro, *The United States and the Legality of Outer Space Weaponization: A Proposal for Greater Transparency and a Dispute Resolution Mechanism*, 33 *ANALS AIR & SPACE L.* 441, 444 (2008).

⁷ Christopher M. Petras, “*Space Force Alpha*”: *Military Use of the International Space Station and the Concept of “Peaceful Purposes”*, 53 *A.F. L. REV.* 135, 155 (2002).

⁸ Patricia Grace Smith, Assoc. Adm’r for Commercial Space Transp., Fed. Aviation Admin., Remarks at the Presentation of FAA Commercial Astronaut Wings to SpaceShipOne Pilot Mike Melvill (June 21, 2004), available at http://www.faa.gov/about/office_org/headquarters_offices/ast/media/PGS_Melvill_wings_2004-06-21.pdf, (transcript indicates the distance to be 50 miles).

activity had begun in the satellite telecommunication industry, launch vehicles and related services to launch commercial satellites were government operations. During the 1980s, Europe and the United States began offering private commercial launch services. While there are a variety of reasons why this change occurred, the end result is that today, commercial launch services are available on a worldwide basis.

In 1998, Eric Anderson founded Space Adventures, the first company in the world to offer space flights to private citizens.⁹ Space Adventures successfully marketed and booked private citizens to fly on Russian manned space vehicles.¹⁰ While the Russian government owned and operated the vehicles, the flights were for remuneration and could arguably be considered the first commercial human space flights.¹¹

On October 4, 2004, SpaceShipOne won the Ansari X-Prize by successfully launching a vehicle carrying human beings on sub-orbital trajectories to an altitude of 112 kilometers.¹² Subsequently, Richard Branson established Virgin Galactic, the world's first CHSF operator to offer suborbital flights to private passengers.¹³ Today, a number of U.S. CHSF operators are preparing to offer suborbital adventure flights, in some cases already training and medically screening passengers.¹⁴

IV. FEDERAL LAW GOVERNING LICENSING AND REGULATION OF CHSF

The Commercial Space Launch Act (CLSA), as amended by the Commercial Space Launch Amendments Act of 2004 (CSLAA-2004), grants the DOT the authority to implement regulatory standards to govern commercial human space flight. The CLSA and related provisions are codified in 49 U.S.C. §§ 70101–70121 et seq. (the Act).¹⁵ The Act is the codification

⁹ James M. Clash, *Space Cowboy*, FORBES.COM, May 5, 2005, <http://www.forbes.com/business/forbes/2005/0509/058.html>.

¹⁰ *Id.*

¹¹ *See id.*

¹² Alan Boyle, *SpaceShipOne Wins X Prize*, MSNBC.COM, Oct. 5, 2004, <http://www.msnbc.msn.com/id/6167761/>.

¹³ *See* Press Release, Scaled Composites, Virgin Group Sign Deal With Paul G. Allen's Mojave Aerospace (Sept. 27, 2004), *available at* http://www.scaled.com/projects/tierone/092704_scaled_paul_allen_virgin_galactic.htm.

¹⁴ Jeff Foust, *Screening and Training for Commercial Human Spaceflight*, SPACE REV., Feb. 18, 2008, *available at* <http://www.thespacereview.com/article/1062/1>.

¹⁵ Commercial Space Launch Activities, 49 U.S.C. §§ 70101–70121 (2000 & Supp. V 2006).

of the CLSA and all of its amendments, including the CSLAA-2004.

Pursuant to the Act, the Executive Branch has issued regulations and National Space Policy and Space Transportation Directives.¹⁶ Together the Act, Regulations, and Directives are the primary law and regulation governing U.S. CHSF.

It should be clarified at this point that the Act, Regulations, and Directives are not the sole federal laws governing CHSF operations. Like any business, CHSF will include an array of activities, from marketing to financing to actual flight operations. As a result, CHSF is subject to a range of federal laws and regulations (e.g., Federal Communications Commission (FCC) radio frequency licensing).

The Act is legislation designed fundamentally to license commercial space launch vehicles and launch sites, and serves as the regulatory regime for actual commercial human space flight (i.e., the transport of persons on a vehicle to outer space for remuneration). This regulatory authority has been implemented within a DOT vehicle licensing.

V. THE CHALLENGE OF CHSF LIABILITY ASSESSMENT

The major challenge when assessing potential liability for persons and entities involved in CHSF is the categorization of respective parties' legal duties. Commercial human space flight exhibits functional characteristics of commercial aviation, commercial space launches, adventure sports, and tourism. Legal precedent exists in respective fields that can assist in determining the appropriate legal duties, standards of care, immunities, and defenses for commercial human space flight. The difficulty is predicting how courts will interpret current federal and state statutory law and common law and how the law will be applied in litigation arising from a CHSF accident. The CHSF industry is still in a stage of embryonic development. CHSF vehicles have not yet carried paying passengers. Federal law provides minimum guidance on tort liability—only legislating in the areas of mandatory cross-waivers of liability, licensee insurance and financial responsibility requirements, and catastrophic indemnification. As a result, parties involved in CHSF must do their best to determine potential risk by drawing analogies to other activities.

¹⁶ See Commercial Space Transportation Regulations, 14 C.F.R. § 401 (2008).

VI. GENERAL OVERVIEW: TORTS

A tort is a “civil wrong, other than breach of contract, for which a remedy may be obtained, usu[ally] in the form of damages; a breach of a duty that the law imposes on persons who stand in a particular relation to one another.”¹⁷

Tort law has three primary functions or goals: (1) compensating persons sustaining a loss or harm as a result of another’s conduct; (2) placing the cost of that compensation on those who, in justice, ought to bear it, but only on such persons; and (3) preventing future losses and harms.¹⁸

Modern tort liability cases are classified into intentional torts, property torts, dignitary torts, economic torts, nuisance, negligence, and strict liability torts.

VII. CAUSES OF ACTION AND POTENTIAL DEFENDANTS

In the event of a CHSF vehicle accident, U.S. commercial aviation litigation provides a model upon which to assess potential tort liability risks.¹⁹ In general, litigation of commercial aviation accidents in the United States that result in injury to either passengers or third parties focuses on two causes of action: negligent acts and defective products. Typical aviation accident litigation includes claims of negligence against air carriers, pilots, and manufacturers.²⁰ In some cases, air traffic control (ATC) negligence is also alleged.²¹ Products liability claims are primarily filed against aircraft manufacturers and manufacturers or suppliers of component parts.²² Based on the U.S. aviation

¹⁷ BLACK’S LAW DICTIONARY 1526 (8th ed. 2004).

¹⁸ EDWARD J. KIONKA, TORTS IN A NUTSHELL 5 (3d ed. 1999).

¹⁹ See Doug Griffith, The Liability Atmosphere: Awaiting the Commercial Human Spaceflight Industry, Presentation at the Transforming Space 2007 Conference (Nov. 6, 2007) (PowerPoint presentation), available at <http://www.californiaspaceauthority.org/conference2007/images/presentations/071106-1530-Griffith.pdf>. In his presentation, Mr. Griffith comments that state tort law governing CHSF vehicle accidents may be “derived largely from aircraft accident cases,” focusing on negligence and product liability. *Id.*

²⁰ See WINDLE TURLEY, AVIATION LITIGATION 58–134 (1986) (providing an overview of liability for certain defendants).

²¹ E. Air Lines Inc. v. Union Trust Co., 221 F.2d 62, 73 (D.C. Cir. 1955); see also TURLEY, *supra* note 20, at 98.

²² TURLEY, *supra* note 20, at 60. Mr. Turley notes that [t]he majority of recently reported aviation accident cases involve strict liability claims against the aircraft manufacturer. To a lesser extent, strict liability actions are also maintained against the manufacturer or supplier of aircraft component parts, and in some in-

litigation model, one can predict that negligence lawsuits will arise against CHSF operators, pilots/crew, and ATC, and that product liability claims will arise against CHSF vehicle manufacturers and component parts manufacturers or suppliers.

In the common law courts of the United States, commercial air carriers, air taxi operators, and most charter services are categorized as common carriers.²³ “Common carrier” is defined as “one who engages in the transportation of persons or things from place to place for hire, and who holds himself out to the public as ready and willing to serve the public, indifferently, in the particular line in which he is engaged.”²⁴ U.S. courts have imposed on common carriers a higher degree of care with respect to their passengers.²⁵ Courts that hold common carriers subject to a higher degree of care impose upon a common carrier a duty of “the highest degree of care consistent with the mode of conveyance used and the practical operation of its business.”²⁶ Some courts “rather than (or in addition to) making common carriers liable for failure to exercise the ‘highest degree of care,’ hold them liable for slight negligence.”²⁷ “‘Slight’ negligence is the failure to exercise *great* care.”²⁸ Practically, these distinctions have little impact.²⁹

Whether or not CHSF vehicle operators are held to be common carriers is a question of fact. To impose common carrier status, courts will need to find that a CHSF operator “holds itself out to the public as offering to transport freight or passengers for a fee.”³⁰ While CHSF operators have offered their services to the general public,³¹ at this point in the development of CHSF, it is highly unlikely a court will find CHSF operators as offering

stances, against the manufacturer or supplier of accessory items not incorporated in the aircraft.

Id.

²³ See *id.* at 83. “Airlines, air taxi operators, and most charter services are considered common carriers. As such, they have a duty to exercise the highest degree of care for the safety of their passengers, although this duty falls short of making the common carrier an insurer of its passengers’ safety.” *Id.*

²⁴ PAUL STEPHEN DEMPSEY & MICHAEL MILDE, INTERNATIONAL AIR CARRIER LIABILITY: THE MONTREAL CONVENTION OF 1999 9 (2005) (quoting *Burnett v. Rivers*, 276 S.W. 347, 349 (Tex. 1925)).

²⁵ *Id.* at 10. See also KIONKA, *supra* note 18, at 98–101.

²⁶ KIONKA, *supra* note 18, at 98.

²⁷ *Id.* at 100.

²⁸ *Id.*

²⁹ *Id.*

³⁰ BLACK’S LAW DICTIONARY, *supra* note 17, at 226.

³¹ Virgin Galactic has advertised their CHSF services to the general public.

transportation to passengers. Instead, courts will most likely hold CHSF operators are offering a tourism or adventure experience. CHSF operators are not offering point-to-point transportation service. They advertise the experience of going into outer space and market CHSF as an adventure flight. Federal law, specifically, the Act³² and the Regulations,³³ categorizes persons who are not crew, but who are carried on a launch or reentry vehicle, as SFPs and not passengers, even if SFPs are paying participants.³⁴ This is indicative of the status of CHSF not as a mode of transportation but as an adventure experience.³⁵

As CHSF operations evolve, it is possible CHSF operators may be deemed common carriers. When CHSF operators begin offering point-to-point transportation services, either to terrestrial locations or orbiting spacecraft, a stronger argument will exist for imposing common carrier status on CHSF operators.

In commercial aviation accident litigation, passengers are generally not defendants to a lawsuit unless evidence exists that the passenger undertook reckless or intentional conduct that is casually related to the plaintiffs' alleged injury. While it is possible that aviation passengers could be sued on the basis of negligence, it is highly unlikely that a passenger could cause an aviation accident based solely on his or her negligence. Commercial aviation passengers are passive parties, excluded from participation in the operation of the aircraft, and absent intentional or reckless conduct, very unlikely able to cause serious injury to fellow passengers and crew or damage to the aircraft.

In contrast to commercial aviation passengers, SFPs may be able to undertake actions during the operation of the CHSF vehicle that will expose them to negligence tort liability. Potential SFP negligence liability can be compared to negligence liability imposed on participants in the adventure sports/tourism con-

³² Commercial Space Launch Activities, 49 U.S.C. §§ 70101–70121 (2000 & Supp. V 2006).

³³ See Commercial Space Transportation Regulations, 14 C.F.R. §§ 400–99 (2008).

³⁴ See *id.* § 401.5 (defining space flight participants as “an individual, who is not crew, carried aboard a launch vehicle”).

³⁵ Tracey Knutson, *What is “Informed Consent” for Space-Flight Participants in the Soon-To-Launch Space Tourism Industry?*, 33 J. SPACE L. 105, 109 & n.17 (2007) (quoting Commercial Space Transportation Regulations, 14 C.F.R. § 415 (2008)) (“wherein the FAA/AST expressly states that the CSLAA characterization of ‘Space Flight Participant’ ‘... signifies that someone on board a launch vehicle or re-entry vehicle is not a typical passenger with typical expectations of transport, but someone going on an adventure ride.’”).

text.³⁶ In adventure sports/tourism, participants are actively involved in the undertaking, and a person participating in adventure sports/tourism activities has a duty to “act like a reasonably prudent person in whatever circumstance[s] . . . presented.”³⁷ Failure of adventure sport/tourism participants to fulfill this duty may result in negligence liability for the participant.

Similarly, SFPs have a duty to exercise the standard of care as a reasonably prudent person would have exercised in a similar situation. Failure to exercise this duty is negligence and could result in SFP negligence liability to fellow participants, pilot/crew, operators, and third parties. Liability exposure will depend on the nature of the SFP’s participation. The standard of care for SFPs will depend on how the courts interpret the relationships and duties between the SFPs and the pilot, crew, and CHSF operators, the nature of the activity undertaken, relevant state and federal law, and public policy. A significant factor to consider is that the Act and the Regulations treat SFPs as participants and not passengers, affording them only the protection of informed consent and training sufficient to protect the innocent public.³⁸

It is also important to note that unlike most commercial aviation passengers, SFPs are paying relatively large sums of money for their flight and most likely are high net worth individuals with the capacity to pay a civil judgment rendered in a plaintiff’s favor.³⁹ This capacity to pay provides an incentive for plaintiffs to include SFPs as defendants and argue SFP liability.

VIII. POTENTIAL PLAINTIFFS

The universe of potential plaintiffs in CHSF vehicle accident cases is larger than in civil aviation. In addition to terrestrial third party plaintiffs (i.e., persons and property on the ground and aircraft in flight) and first party plaintiffs (i.e., SFPs, crew, pilots, their survivors and beneficiaries), CHSF operations pose

³⁶ See *id.* Ms. Knutson’s article provides an excellent examination of CLSAA informed consent provision and SFP liability, drawing parallels with the adventure travel industry. See *id.*

³⁷ *Id.* at 110.

³⁸ Commercial Space Launch Activities, 49 U.S.C. §§ 70102(17) (2000 & Supp. V 2006).

³⁹ Peter B. de Selding, *Swedish Authorities Look to Ease Way for Virgin Galactic*, SPACE NEWS, Apr. 7, 2008, at 16.

a risk of injury to outer space and high-altitude objects and personnel.⁴⁰

CHSF vehicle operations are scheduled to begin operation in high-altitude suborbital trajectories and have the potential to soon begin operations in LEO. These operations pose a risk to new technologies that are coming online such as high-altitude vehicle positioning (HAVP), high-altitude unmanned aerial vehicles (HAUAVs), and other high-altitude projects, as well as LEO operations. As high-altitude and LEO applications develop, the potential universe of plaintiffs will increase.

With regard to terrestrial third parties, the likelihood of third party injury in the event of a CHSF vehicle accident is related to the size of the vehicle, the vehicle materials/composites, flight paths, and the altitude at which the vehicle operates. Current CHSF vehicles are relatively small when compared to modern commercial jet aircraft. This smaller size should lower the risk factor of injury to terrestrial third parties; however, as CHSF vehicles become larger, the risk of third party injury will correspondingly increase. CHSF vehicles will operate at higher altitudes than commercial aircraft, potentially expanding the footprint of falling debris (but also potentially removing the footprint if the altitude and trajectory allows for atmospheric burnout). CHSF vehicles will be operating in an environment that requires different materials/composites than in civil aviation and the technologies employed may be a factor in assessing terrestrial third party risk from a material strength/survivability and environmental standpoint.

IX. THE ROLE OF STATE LAW: TORT LAW AND IMMUNITY LEGISLATION

In the event of an accident involving a CHSF vehicle, negligence and products liability will be the primary tortious legal basis on which causes of action are undertaken. These forms of tort liability are primarily governed by state law, and "[d]espite the traditionally federal character of spaceflight activity, liability for human spaceflight accidents will be determined by a given state's *tort law*."⁴¹

⁴⁰ In the immediate future, CHSF operations are only planned to be conducted as suborbital flights. As CHSF technology develops, CHSF will be conducted in orbit and in other locations that pose a risk to space objects and persons.

⁴¹ Griffith, *supra* note 19.

State law poses a unique challenge when assessing and managing liability risk. Depending on the jurisdiction in which the claim is litigated, different legal standards will apply to determine standards of care and enforceability of contracts.

Federal legislation has not been enacted to preempt state tort law in the field of CHSF. While states are prohibited from having laws inconsistent with federal law, the Act specifically grants states the authority to implement law in addition to or more stringent than a requirement of, or regulation prescribed under, the Act.⁴²

States have enacted or proposed legislation (sometimes called “commercial space initiatives”) designed to facilitate the development of commercial space activities in their respective jurisdictions. One aspect of commercial space initiatives are liability and immunity provisions that shield entities engaged in commercial space activities from certain types of tort liability.

In 2007, Virginia became the first state to enact legislation providing conditional immunity to CHSF operators. The Virginia Space Flight Liability and Immunity Act (Space Flight Act) shields Federal Aviation Administration Advanced Spaceport Technology (FAA-AST) licensed entities, including CHSF operators, from liability arising out of human space flight activities.⁴³ Specifically, the Space Flight Act prohibits human space flight participants (SFPs as defined in the Act, 49 U.S.C. § 70102), their representatives, heirs, administrators, executors, assignees, next of kin, estate, or any other person bringing a claim on behalf of the SFP from maintaining an action or recovery from a licensed entity for injury resulting from the risk of spaceflight activities.⁴⁴ Entities may not avail themselves of this immunity if they commit an act or omission that constitutes gross negligence evidencing willful or wanton disregard for the safety of the SFP, and that act or omission proximately caused an SFP injury; or the entity intentionally causes an SFP injury.⁴⁵

The Space Flight Act immunity is provisional on the SFP being informed of the risk of spaceflight activities as required under federal law, the Act, and the Regulations.⁴⁶ The requirement to inform SFPs of risk is a codification of the “common law

⁴² 49 U.S.C. § 70117(c).

⁴³ VA. CODE ANN. §§ 8.01-227.8–8.01-227.10 (2009).

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *Id.*

principles associated with the 'duty to warn' in adventure sports."⁴⁷ A challenge for spaceflight operators will be determining what should be explained to SFPs in order to fulfill their legal duties under statute and common law.⁴⁸ The Space Flight Act provides some guidance, giving an example "warning statement" that at a minimum (and in addition to any language required by federal law) would fulfill the Space Flight Act's requirement.⁴⁹

In 2008, Florida followed Virginia's lead and adopted the Spaceflight Informed Consent Act of 2008. It provides conditional liability immunity for CHSF operators for injury or death resulting from the inherent risks of spaceflight and is structured similar to Virginia's Spaceflight Act.⁵⁰ New Mexico also has a bill pending in its state legislature.⁵¹

Recent state legislative initiatives indicate that states are willing to take the lead in facilitating the development of commercial human space flight by providing some measure of liability protection for operators. While state initiatives do provide protection, they should be viewed as temporary measures that only partially remedy the issue of CHSF operator liability. If one takes the position that CHSF operators would benefit from harmonization and standardization of relevant law, and that said harmonization and standardization would facilitate the development of the industry, then state law initiatives are insufficient. State law initiatives apply only in the jurisdiction of the state where enacted. Depending on the jurisdiction where litigation is filed and choice of law provisions (contractual, statutory, or common law), state immunity legislation may or may not be applicable. As a result, CHSF operators still face a multiplicity of possible legal standards and liability exposure. For the time being, CHSF operators should be aware of state initiatives and conduct operations in jurisdictions with favorable state laws. At the same time, CHSF operators should contract with SFPs for preferred choice-of-law provisions.

⁴⁷ Knutson, *supra* note 35, at 113.

⁴⁸ *Id.*

⁴⁹ VA. CODE ANN. § 8.01-227.10 (2009).

⁵⁰ Fla. Stat. Ann. § 331.501 (2009).

⁵¹ S.B. 37, 49th Leg., 1st Sess. (N.M. 2009).

X. IMPOSING STRICT LIABILITY ON CHSF VEHICLE
OPERATOR(S) FOR DAMAGE CAUSED TO THIRD
PARTIES ON THE GROUND, IN THE AIR,
OR IN OUTER SPACE

A negligence tort is "a tort committed by failure to observe the standard of care required by law under the circumstances."⁵² Liability for negligent conduct is premised on the idea that "all persons are under a duty to conduct themselves in all of their diverse activities so as not to create unreasonable risks of physical harm to others."⁵³ The components of a cause of action for negligence are duty, breach of duty, causation, and damages.⁵⁴ Like all persons, CHSF vehicle operators are tasked with a general duty of care not to commit a negligent act (i.e., a duty to "exercise the standard of care that a reasonably prudent person would have exercised in a similar situation").⁵⁵

In addition to negligence, courts sometimes impose strict liability. Strict liability is "[l]iability that does not depend on actual negligence or intent to harm, but that is based on the breach of an absolute duty to make something safe."⁵⁶ Absent statutory rules, whether CHSF vehicle operators are subject to strict liability for damage caused by a CHSF vehicle to third parties on the ground, in the air, or in outer space will be a point of litigation decided by the courts.

To date, there are no court cases directly applicable to CHSF vehicle operations. Legal precedent in the fields of aviation and rocketry provide insight on likely judicial interpretations of law and policy because CHSF vehicles exhibit functional characteristics of both aviation and rocketry. In cases involving ground damage caused by aircraft and rockets, courts have ruled on the applicability of strict liability standards.⁵⁷ These cases, read in conjunction with the Second and Third (Final Draft) Restatement of Torts, provide a basis from which to infer whether courts should apply strict liability to CHSF operators for damage caused to third parties on the ground, in the air, or in outer space.

⁵² BLACK'S LAW DICTIONARY, *supra* note 17, at 1527.

⁵³ KIONKA, *supra* note 18, at 54.

⁵⁴ *Id.* at 55.

⁵⁵ BLACK'S LAW DICTIONARY, *supra* note 17, at 1061.

⁵⁶ *Id.* at 934.

⁵⁷ *See, e.g.,* Wood v. United Air Lines, Inc., 223 N.Y.S.2d 692, 697 (N.Y. App. Div. 1961); Smith v. Lockheed Propulsion Co., 56 Cal. Rpt. 128, 131 (Cal. Ct. App. 1967).

A. ON THE GROUND

Tort liability standards for ground damage from aircraft have evolved over time. Initially, operating an aircraft was deemed to be an abnormally dangerous activity and therefore strict liability was imposed.⁵⁸ During the 1950s and 1960s, courts began to hold that "in light of the technical progress achieved in the design, construction, operation and maintenance of aircraft generally, that flying should no longer be deemed to be an ultra-hazardous activity, requiring the imposition of absolute liability for any damage or injury caused in the course thereof."⁵⁹ These holdings represented a departure from the imposition of strict liability based on the theory that aviation was no longer an abnormally dangerous activity.

The Restatement (Second) of Torts imposes strict liability for operators of aircraft for physical harm to land, person, or chattels on the ground caused by the ascent, descent or flight of an aircraft, or by the dropping or falling of an object from the aircraft.⁶⁰ The Restatement (Second) of Torts takes the position that "while the safety record is greatly improved it still cannot be said that the danger of ground damage has been so eliminated or reduced that the ordinary rules of negligence law should be applied."⁶¹ Since the adoption of the Restatement (Second) of Torts, courts continued to move towards a negligence standard of liability for ground damage caused by aircraft.⁶² The Restatement (Third Final-Draft) of Torts recognizes that "aviation does not fit the formal Restatement criteria for abnormally dangerous activity" and leaves open the question whether or not strict or negligence liability should be imposed for ground damage.⁶³ The Restatement (Third Final-Draft) of Torts does present the defendant's control over the instrumentality of harm as an alternative rationale for the imposition of strict liability as "impressively applicable in aviation ground-damage cases."⁶⁴

⁵⁸ RESTATEMENT (SECOND) OF TORTS § 520A (1976).

⁵⁹ *Wood*, 223 N.Y.S.2d at 697; *see also* TURLEY, *supra* note 20, at 54. "Aviation in general, however, is no longer itself considered an ultrahazardous activity rendering carriers strictly liable for all accidents, although the Restatement indicates that pilots and owners are strictly liable under this theory for ground damage caused by aviation accidents." *Id.*

⁶⁰ RESTATEMENT (SECOND) OF TORTS, *supra* note 57.

⁶¹ *Id.*

⁶² *Crosby v. Cox Aircraft Co.*, 746 P.2d 1198, 1202 (Wash. 1987).

⁶³ RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL HARM § 20 cmt. k (Proposed Final Draft No. 1, 2005).

⁶⁴ *Id.*

Case law involving ground damage from rockets is limited. There are two cases, both from the 1960s, in which the plaintiffs brought tort actions for compensation due to the effect of rocket engine testing.⁶⁵ The damage caused by the rocket engine tests was analogized to damage resulting from blasting.⁶⁶ In both cases, the courts held the defendants strictly liable on a theory that the activity undertaken was ultra-hazardous (i.e., abnormally dangerous) and that public policy concerns required the imposition of strict liability for trespass.⁶⁷

Parties in favor of strict liability for ground damage caused by CHSF vehicle operations can draw several analogies in support of their position. First, the historical development of aviation demonstrates an evolution from strict liability to negligence as the industry matured, underlying technology developed, and the likelihood of airplane crashes occurring absent tortious conduct lessened.⁶⁸ Similarly, CHSF is a new industry without sufficient flight experience to establish a basis on which to estimate risk to the uninvolved public or determine the likelihood of a vehicle crash absent tortious conduct and whose technology is in the developmental stages. Second, CHSF vehicles are in the exclusive control of the operators, an argument presented in favor of strict liability for ground damage caused by airplanes that is equally valid when applied to CHSF vehicles.⁶⁹ Third, an argument exists that CHSF launch/reentry/and suborbital flight operations meet the criteria of an abnormally dangerous activity and, hence, should be subject to strict liability. Restate-

⁶⁵ See *Smith v. Lockheed Propulsion Co.*, 56 Cal. Rptr. 128, 131 (Cal. Ct. App. 1967); *Berg v. Reaction Motors Div., Thiokol Chem. Corp.*, 181 A.2d 487, 489 (N.J. Sup. Ct. 1962).

⁶⁶ See *Smith*, 56 Cal. Rptr. at 134; *Berg*, 181 A.2d at 410.

⁶⁷ See *Smith*, 56 Cal. Rptr. at 142; *Berg*, 181 A.2d at 410.

⁶⁸ See RESTATEMENT (THIRD) OF TORTS, *supra* note 62. The drafters note that almost all airplane crashes occur because of tortious conduct—the negligence of the airline, the negligence of federal air-traffic control, or a defective product supplied by the aircraft manufacturer. Indeed, in cases brought on behalf of airline passengers, liability is rarely contested. A quite small (yet ultimately unquantifiable) percentage of all airplane crashes happen utterly without negligence or tortious conduct.

Id.

⁶⁹ See *id.* (stating “[n]evertheless, as Comment f has emphasized, one rationale for strict liability relates to the defendant’s exclusive control over the instrumentality of harm, and this rationale is impressively applicable in aviation ground-damage cases.”).

ment (Second) Torts § 520 provides six criteria to determine whether an activity is abnormally dangerous:

(a) existence of high degree of risk of some harm to the person, land or chattels of others; (b) likelihood that the harm that results from it will be great; (c) inability to eliminate the risk by the exercise of reasonable care; (d) extent to which the activity is not a matter of common usage; (e) inappropriateness of the activity to the place where it is carried on; and (f) extent to which its value to the community is outweighed by its dangerous attributes.⁷⁰

CHSF does exhibit several of the characteristics listed in § 520. CHSF is not yet of common usage,⁷¹ poses a risk of some harm that cannot be eliminated by the exercise of reasonable care, and it is likely that the harm that results from a CHSF vehicle accident will be great.⁷² Points of contention are how "high" the degree of risk is, the appropriateness of the activity to the place where it is carried on, and the extent to which its value to the community is outweighed by its dangerous attributes.⁷³

Parties in favor of negligence for ground damage can present a doctrinal argument that strict liability for vehicle operators is no longer of significance.⁷⁴ This argument presumes that, similar to aviation accidents, most CHSF accidents will be caused by negligence or defective products.⁷⁵ The problem is that CHSF has not had time to establish a history of accidents that supports this presumption. Initially, the cause of CHSF accidents may re-

⁷⁰ Compare RESTATEMENT (SECOND) OF TORTS, *supra* note 57, with RESTATEMENT (THIRD) OF TORTS, *supra* note 62 (providing two criteria to determine whether an activity is abnormally dangerous: "(1) the activity creates a foreseeable and highly significant risk of physical harm even when reasonable care is exercised by all actors; and (2) the activity is not one of common usage.").

⁷¹ RESTATEMENT (SECOND) OF TORTS, *supra* note 57, at cmt. i (defining common usage as "[a]n activity is a matter of common usage if it is customarily carried on by the great mass of mankind or by many people in the community."); see also *Crosby v. Cox Aircraft Co.*, 746 P.2d 1198, 1207 (Wash. 1987) (Brachtenbach, J., dissenting) (arguing for the adoption of the definition of RESTATEMENT (SECOND) OF TORTS § 520 cmt. i).

⁷² If a CHSF vehicle or component part causes harm to a structure or person, it is likely to be significant given the altitude and velocities at which CHSF vehicles operate. Simple trespass on land without damaging persons, structures, or the economic value of the land is possible, but not likely. The best case scenario for a CHSF accident is for it to occur over an uninhabited location where there is no economic activity. The worst case scenario is for a CHSF accident to occur over a city or populated area.

⁷³ RESTATEMENT (SECOND) OF TORTS, *supra* note 57, at cmt. i.

⁷⁴ RESTATEMENT (THIRD) OF TORTS, *supra* note 62, at cmt. k.

⁷⁵ See *id.*

main unknown or may not be the result of negligence or defective products.

Courts should rule in favor of imposing strict liability against licensed vehicle operators for ground damage caused by CHSF vehicles. CHSF vehicle safety, reliability, technology, and regulation have not yet reached the level of development achieved in modern civil aviation; thereby negating an argument in favor of adopting modern aviation negligence standards while supporting the position that CHSF is abnormally dangerous. CHSF is a unique and rare undertaking and it may be several decades before CHSF has evolved to the point of common usage. The imposition of strict liability for abnormally dangerous activities is "designed largely to protect innocent third parties or innocent bystanders" and uninvolved parties on the ground that have no control over the CHSF vehicle and no means to prevent or mitigate the harm.⁷⁶ As Dean Prosser aptly stated: "The problem [of imposing strict liability] is dealt with as one of allocating a more or less inevitable loss to be charged against a complex and dangerous civilization, and liability is placed upon the party best able to shoulder it."⁷⁷ And in relation to innocent third parties on the ground, CHSF vehicle operators are in a better position to prevent and absorb loss.

B. IN THE AIR

Aircraft operators owe a duty of ordinary care to other aircraft operators that includes complying with FAA regulations, adhering to filed flight plans, operating at the proper altitude and speed, keeping proper lookout, and yielding the right of way.⁷⁸ Failure to observe this standard of care is negligence.⁷⁹ Similarly, CHSF vehicle operators, like all persons, are under a duty to exercise the standard of care a reasonably prudent person would have exercised in a similar situation.⁸⁰ One can analogize from aviation that CHSF vehicle operators owe a duty of care to all other vehicles in the air which includes compliance with FAA regulations, adherence to filed flight plans, etc., and that failure to observe this standard of care is negligence.

⁷⁶ *Id.* § 24 cmt. a.

⁷⁷ *Smith v. Lockheed Propulsion Co.*, 56 Cal. Rptr. 128, 137 (Cal. Ct. App. 1967) (quoting PROSSER, *LAW OF TORTS* 318 (2d ed. 1955)).

⁷⁸ TURLEY, *supra* note 20, at 85.

⁷⁹ BLACK'S LAW DICTIONARY, *supra* note 17, at 1572.

⁸⁰ *Id.*

In addition to negligence, courts could impose strict liability on CHSF vehicle operators for damage caused to other vehicles in the air. The most likely rationale for imposition of strict liability is that CHSF is an abnormally dangerous activity like rocket test firing. Just as damage caused on the ground is subject to strict liability, so should damage caused in the air.⁸¹ However, there is a distinction that can be drawn between the imposition of strict liability on CHSF and rocket activities for damage on the ground as opposed to damage in the air. Unlike injured parties on the ground, aircraft (and other vehicles in the air) and their passengers can be said to have assumed a degree of risk that accompanies all air travel.⁸² This assumption of risk includes risks inherent in operating an aircraft in airspace that is accessible to CHSF vehicles. Therefore, CHSF vehicle operators should not be held strictly liable, but instead should be subject to the duty of ordinary care owed to all other vehicles operating in the air.⁸³

There is also an inconsistency in applying strict liability to CHSF vehicles for damage caused to aircraft in flight but not to aircraft for damage caused to CHSF vehicles in flight. If courts impose strict liability on CHSF, they will be distinguishing aircraft from CHSF vehicles and imposing different standards of care within the same spatial region (i.e., airspace). Ruling as such, the courts will inadvertently make conclusions as to whether CHSF vehicles are aircraft or spacecraft and, as such, whether they should be subject to the same standards of tort liability. The precedent established by ruling in favor of strict liability for CHSF vehicles would have implications in other legal arenas grappling with the issue of whether CHSF vehicles should be categorized as aircraft or spacecraft and thereby subject to the legal norms respectively applicable. This is because underlying the question of strict liability is a question of whether

⁸¹ KIONKA, *supra* note 18, at 41.

⁸² RESTATEMENT (THIRD) OF TORTS, *supra* note 62, § 24 cmt. d.

⁸³ The duty owed to all other vehicles operating in the air should not be confused with the duty owed to passengers or participants. If CHSF operators are held to be common carriers either a higher degree of care or higher duty of care will be imposed on CHSF operators towards their passengers but not towards other vehicles operating in the same airspace. See DEMPSEY & MILDE, *supra* note 24, at 10-11. Regardless of whether CHSF operators are held to be common carriers, there is a general duty not to commit negligent acts that cause injury to other vehicles in the air. See *id.* The question is whether courts will impose an escalated duty of care on CHSF vehicles towards aircraft operating in the same air space.

CHSF should be subject to the legal norms of aviation or outer space. Courts should be reluctant to set a precedent at this time. Instead, courts should support a negligence standard on the basis of equity for all vehicles operating in airspace, regardless of whether they are air or spacecraft, thereby reserving the issue of strict liability for federal and state legislatures.

C. IN OUTER SPACE

CHSF vehicle operators, like all persons in space or all persons who place an object in space, are under a duty to exercise the standard of care a reasonably prudent person would have exercised in a similar situation.⁸⁴ Failure of CHSF vehicle operators to exercise reasonable care in activities in outer space will expose them to potential negligence liability.

This duty of reasonable care is not affected by the Convention on International Liability for Damage Caused by Space Objects (Liability Convention).⁸⁵ The Liability Convention provides an alternative method for resolution of liability for damage caused by space objects that allows States "which suffer damage[], or whose natural or juridical persons suffer damage, [to] present to a launching State a claim for compensation of such damage."⁸⁶ But the Liability Convention does not impose domestic tort liability standards and does not preclude individuals from pursuing remedies in domestic courts.⁸⁷ Individuals are allowed to file negligent tort claims in U.S. domestic courts for damage caused by CHSF vehicles to objects or persons in outer space, subject to the laws of the United States.⁸⁸

The doctrine of *res ipsa loquitur* provides that "in some circumstances, the mere fact of an accident's occurrence raises an inference of negligence so as to establish a *prima facie* case."⁸⁹ "The doctrine implies that the court does not know, and cannot

⁸⁴ BLACK'S LAW DICTIONARY, *supra* note 17, at 1572.

⁸⁵ See Convention on the International Liability for Damage Caused by Space Objects art. VII, Mar. 29, 1972, 961 U.N.T.S. 187 [hereinafter Liability Convention].

⁸⁶ *Id.* at art. VIII.

⁸⁷ The intent of the Liability Treaty is to provide a legal mechanism for States to claim damages. Nothing in the treaty prohibits individuals from pursuing a domestic remedy. This interpretation of the treaty is consistent with the text of the treaty, the *travaux préparatoires* of the treaty, historical context, and general rules of international law.

⁸⁸ Commercial Space Launch Activities, 49 U.S.C. § 70117(c) (2000 & Supp. V 2006).

⁸⁹ BLACK'S LAW DICTIONARY, *supra* note 17, at 1336.

find out, what actually happened in the individual case. Instead, the finding of likely negligence is derived from knowledge of the causes of the type or category of accidents involved.”⁹⁰ CHSF vehicle accidents in outer space are an appropriate type of accident for the doctrine of *res ipsa loquitur* to be invoked, which shifts the burden of proof of negligence to the defendants.⁹¹

The environment of outer space and our current ability to operate in outer space prevents accident “site” investigation and debris recovery. As a matter of fact, “site” investigation is impossible unless the accident occurred on a celestial body.⁹² To further complicate matters, only limited capabilities exist to track space objects. Most, if not all, evidence related to an outer space CHSF vehicle accident will be in terrestrial recordings and data. Given the limited capacity of plaintiffs to conduct an investigation of CHSF vehicle accidents in outer space, courts will most likely rely heavily on the doctrine of *res ipsa loquitur*.

Courts should not impose strict liability on CHSF vehicle operators for damage caused to objects in outer space. First, it is fundamentally inequitable for strict liability to apply only to CHSF vehicles and not to other objects/vehicles in outer space. While CHSF vehicles pose a threat to other objects in space, that threat is not significantly greater than any other object in space.⁹³ There is nothing abnormally dangerous about CHSF vehicle activities as compared to other space activities.⁹⁴ Simply imposing strict liability on CHSF vehicles for damage caused to space objects *cart blanche* is without equitable basis.

Second, space objects may be negligently piloted, derelict, or otherwise malfunction as to cause a collision with a CHSF vehi-

⁹⁰ *Id.* (quoting RESTATEMENT (THIRD) OF TORTS § 17 cmt. a (Tentative Draft No. 1, 2001)).

⁹¹ *Id.*

⁹² Under general rules of physics, in outer space the momentum of objects will carry them over a period of time in a particular direction to a different location relative to the point earlier in time. The result is that the ‘site’ of the accident is only a spatial reference point at a specific period of time.

⁹³ See, e.g., John – Derral Mulholland & Christian Veillet, *A Space Debris Primer for Astronomers*, 2 SPACE DEBRIS 295, 301–02 (2000) (stating that size of object in space does not matter in terms of interference and collisions); C. Pardini & L. Anselmo, *Assessing the Risk of Orbital Debris Impact*, 1 SPACE DEBRIS 59, 60 (1999) (“Objects larger than 10–20 cm may cause the fatal breakup of spacecraft in collision.”).

⁹⁴ See Mulholland & Veillet, *supra* note 92; Pardini & Anselmo, *supra* note 92.

cle.⁹⁵ In the absence of direct evidence, fault can be inferred from known orbital parameters, satellite registries, and other "knowledge of the causes of the type or category of accidents involved"⁹⁶

Third, the Liability Convention applies liability for damage to space objects or persons on board a space object only if the damage is due to fault.⁹⁷ Courts should consider that one of the Liability Convention's stated purposes is "full and equitable measure of compensation to victims."⁹⁸ Even though the Liability Convention does not apply to domestic tort claims, its refusal to impose strict liability is relevant legal precedent.

Imposition of strict liability for damage caused to persons not on board a space object can be distinguished from persons on board. Public policy arguments favoring imposing strict liability for damage caused to persons in outer space (i.e., on a space walk), but not while on board a space object, include the relative vulnerability of persons in outer space and the utmost importance of protecting human life and preventing future accidents. Of course, strict liability is not absolute. If a person intentionally collides with a CHSF vehicle or commits an act of gross negligence, courts may refuse to impose strict liability on vehicle operators.

The potential liability for damage caused to space objects is significant. As CHSF and other commercial space activities develop, CHSF vehicles will eventually begin conducting operations near or at space objects. Once CHSF vehicles are operated near or at space objects, there will be a corresponding increase in the probability of a collision occurring between CHSF vehicles and space objects. This higher probability will result in higher risks of loss, which is a serious concern for the insurance industry that may impact the cost of insurance policies. One can imagine that the damages for the destruction of an orbiting space hotel and death of all its inhabitants could be in the hundreds of millions, if not billions, of dollars. Law and policy makers should begin today to assess the issue of tort liability because once significant commercial space activities are undertaken; the issue of tort liability for damage caused on the ground, in the air, and in outer space will be of critical importance.

⁹⁵ See RESTATEMENT (THIRD) OF TORTS, *supra* note 62.

⁹⁶ BLACK'S LAW DICTIONARY, *supra* note 17, at 1336.

⁹⁷ Liability Convention, *supra* note 84, at art. III.

⁹⁸ *Id.* at pmbl.

XI. FEDERAL LAW: THE ACT'S RISK SHARING REGIME

The Act establishes a risk sharing regime. This regime is comprised of mandatory cross-waivers of liability, insurance and financial responsibility requirements, and conditional catastrophic indemnification. Critical to this regime is the exclusion of SFPs.⁹⁹ Within the federal regulations, SFPs are specifically excluded from the definition of "customer," and not listed in the definition of "contractor or subcontractor."¹⁰⁰ As a result, SFPs are not placed within the mandatory cross-waivers of liability (with the exception of those applicable to the federal government), insurance and financial responsibility, and indemnification provisions applicable to customers, contractors, or subcontractors of CHSF licensed operators.¹⁰¹

Under mandatory cross-waivers of liability, each party to the waiver 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.¹⁰² The government is in the envious position of receiving protection of mandatory cross-waivers from operators (their customers, contractors and subcontractors), crew, *and* SFPs.¹⁰³ Licensed operators also receive the benefit of mandatory cross-waivers, but those protections are not mandated as applicable to crew or SFPs.¹⁰⁴ The Act's silence on mandatory cross-waiver provisions between licensed operators and SFPs allows for contractual agreements that shift the risk of loss from SFPs to operators.¹⁰⁵

The Act has a three-tier financial responsibility risk sharing mechanism that provides financial protection for licensed operators. First, operators are required to carry liability insurance or demonstrate financial responsibility to compensate for maxi-

⁹⁹ See generally, Commercial Space Launch Activities, 49 U.S.C. §§ 70112-70113 (2000 & Supp. V 2006).

¹⁰⁰ Commercial Space Transportation Regulations, 14 C.F.R. § 430.3 (2008).

¹⁰¹ See, e.g., 14 C.F.R. § 440.9, 440.17.

¹⁰² 49 U.S.C. § 70112(b).

¹⁰³ *Id.*

¹⁰⁴ *Id.*

¹⁰⁵ Hughes & Rosenburg, *supra* note 102, at 59.

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.

mum probable loss (MPL)¹⁰⁶ from claims of third parties and claims from the U.S. government for damage or loss of property from an activity carried out under the license.¹⁰⁷ Second, conditioned on Congressional budget approval, the federal government accepts the risk of loss above mandatory insurance or demonstration of financial responsibility up to \$1.5 billion (adjusted for inflation (AFI) from January 1, 1989).¹⁰⁸ Third, above \$1.5 billion (AFI 1989) licensed operators are financially responsible.¹⁰⁹

While the Act provides a mechanism for Congressional approval and funding of a compensation plan, it does not require Congress to indemnify.¹¹⁰ This decision is ultimately left to the discretion of Congress as to whether it will exercise its spending power to that end.¹¹¹ While this indemnification provision is a strong public statement of support for the CHSF industry and

¹⁰⁶ 14 C.F.R. § 440.3. MPL is defined as:

the greatest dollar amount of loss for bodily injury or property damage that is reasonably expected to result from a licensed or permitted activity; (1) Losses to third parties, excluding Government personnel and other launch or reentry participants' employees involved in licensed or permitted activities, that are reasonably expected to result from a licensed or permitted activity are those that have a probability of occurrence of no less than one in ten million. (2) Losses to Government property and Government personnel involved in licensed or permitted activities that are reasonably expected to result from licensed or permitted activities are those that have a probability of occurrence of no less than one in one hundred thousand.

Id.

¹⁰⁷ 49 U.S.C. § 70112.

¹⁰⁸ *Id.* § 70113. The Act states that

[t]o the extent provided in advance in an appropriation law or to the extent additional legislative authority is enacted providing for paying claims in a compensation plan submitted under subsection (d) of this section, the Secretary of Transportation shall provide for the payment by the United States Government of a successful claim (including reasonable litigation or settlement expenses) of a third party against a licensee or transferee under this chapter, a contractor, subcontractor, or customer of the licensee or transferee, or a contractor or subcontractor of a customer, [but not against a space flight participant], resulting from an activity carried out under the license issued or transferred under this chapter for death, bodily injury, or property damage or loss resulting from an activity carried out under the license.

Id.

¹⁰⁹ *Id.*

¹¹⁰ *See id.*

¹¹¹ *Id.*

may be comforting, operators and insurers should beware that in the event of a catastrophic accident, their indemnification is not guaranteed by the Act, but instead will depend on the political will of Congress and the President.

The Act does not provide conditional indemnification of successful claims by third party litigants against SFPs and does not mandate licensed operators place SFPs under the protection of insurance policies.¹¹² As a result, if SFPs want protection against personal liability, they must secure their own insurance, either through operator policies or through an independent SFP insurance policy.¹¹³ Even if SFPs attempt to secure insurance, it is unclear whether the insurance industry will be willing to insure individual SFPs and, if so, to what amount and at what premium. Exclusion of SFPs from federal catastrophic indemnification exposes SFPs to unlimited liability and potentially raises insurance liability premiums. Operators can rely on provisional catastrophic indemnification provisions, receiving what is in essence a federal subsidy for catastrophic liability insurance, but SFPs are provided only the protection they can afford to purchase or negotiate.

XII. SFP INFORMED CONSENT: A NEED TO CLARIFY THE CONCEPT AND APPLICATION TO CHSF

Consent is legally effective assent and is "an affirmative defense to assault, battery, and related torts, as well as such torts as defamation, invasion of privacy, conversion, and trespass."¹¹⁴ Informed consent is a term traditionally applied within the context of professional negligence cases, in particular medical malpractice, and is "[a] person's agreement to allow something to happen, made with full knowledge of the risks involved and the alternatives."¹¹⁵ "What makes informed consent unique is that something is *done to* the participant by another party (usually the medical provider) with the participant's consent."¹¹⁶ Informed consent is sometimes used in an adventure sports/tourism context when assessing whether professional guides are

¹¹² *Id.*

¹¹³ Hughes & Rosenberg, *supra* note 102 (stating that "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.").

¹¹⁴ BLACK'S LAW DICTIONARY, *supra* note 17, at 323.

¹¹⁵ *Id.*

¹¹⁶ Knutson, *supra* note 35, at 110.

negligent for failing to disclose information to clients regarding risks associated with different choices available.¹¹⁷

The Act and Regulations (§ 460.45) mandate CHSF vehicle operators inform each SFP in writing about the risk of the launch and reentry, including the safety record of the vehicle type before receiving compensation from or agreeing to fly an SFP.¹¹⁸ For each mission, operators must inform SFPs, in writing, of the known hazards and risks that could result in serious injury, death, disability, or total or partial loss of physical and mental function, and disclose that participation may result in these hazards and risks.¹¹⁹ Operators must also disclose that there are unknown hazards, that the U.S. Government has not certified the CHSF vehicle as safe for carrying crew or SFPs, and provide a safety record of all launch and reentry vehicles that have carried one or more persons aboard.¹²⁰ These disclosure requirements are considered the “informed consent” provisions of the CLSAA-2004.¹²¹

The fulfillment of CLSAA-2004 informed consent requirements will not serve as enforceable release and waiver contracts or satisfy requirements for common law defenses associated with assumption of risk simply because the term “implied consent” has been adopted in parlance. The legal effect of CHSF operator compliance with CLSAA-2004 “implied consent” provisions, as either contractual or common law tort defenses, will be determined under applicable state law.

XIII. VICARIOUS LIABILITY

Vicarious liability is “[l]iability that a supervisory party (such as an employer) bears for the actionable conduct of a subordinate or associate (such as an employee) based on the relationship between the two parties.”¹²² “The vicarious liability of an employer for torts committed by employees should not be confused with the liability an employer has for his own torts. An employer whose employee commits a tort may be liable in his

¹¹⁷ ROSS CLOUTIER ET AL., *LEGAL LIABILITY AND RISK MANAGEMENT IN ADVENTURE TOURISM* 18 (2000).

¹¹⁸ Commercial Space Launch Activities, 49 U.S.C. § 70101–70121 (2000 & Supp. V 2006); Commercial Space Transportation Regulations, 14 C.F.R. § 460.45 (2008).

¹¹⁹ 14 C.F.R. § 460.45.

¹²⁰ *Id.*

¹²¹ Hughes & Rosenberg, *supra* note 102, at 51.

¹²² BLACK’S LAW DICTIONARY, *supra* note 17, at 934.

own right for negligence in hiring or supervising the employee."¹²³

When a CHSF vehicle pilot¹²⁴ or crew member is an agent of the CHSF operators and is acting within the scope of authority or employment at the time of an accident, the pilot and/or crew liability can be imputed to the CHSF operator through the doctrine of respondent superior.¹²⁵

XIV. PRODUCTS LIABILITY

The manufacturers of CHSF vehicle and component parts may be subject to products liability claims. "Products liability [claims] can be based on a theory of negligence, strict liability, or breach of warranty."¹²⁶

In the event of a CHSF vehicle accident, persons (i.e., SFPs and third parties) who suffer injury or death may sue vehicle manufacturers under a theory of negligence or strict liability.¹²⁷ To successfully litigate a strict products liability claim, plaintiffs must prove that:

the goods were unreasonably dangerous and that (1) the seller was in the business of selling goods, (2) the goods were defective when they were in the seller's hands, (3) the defect caused the plaintiff's injury, and (4) the product was expected to and did reach the consumer without substantial change in condition.¹²⁸

"A product is defective when, at the time of sale or distribution, it contains a manufacturing defect, is defective in design, or is defective because of inadequate instructions or warnings."¹²⁹

Claims of defective design will likely be difficult to maintain given the infantile state of CHSF vehicle manufacturing. Products are

¹²³ *Id.* (quoting KENNETH S. ABRAHAM, THE FORMS AND FUNCTIONS OF TORT LAW 166 (2002)).

¹²⁴ Commercial Space Launch Activities, 49 U.S.C. § 70102(2) (2000 & Supp. V 2006). Note that the CLSAA definition of CHSF "crew" includes pilots. *Id.*

¹²⁵ TURLEY, *supra* note 20, at 118 (explaining that in commercial aviation "[w]here a pilot is an agent or employee acting within the scope of authority or employment at the time of an accident, the pilot's liability can be imputed to the pilot's principal or employer, frequently an air carrier or the government, through the doctrine of respondent superior."). See also BLACK'S LAW DICTIONARY, *supra* note 17, at 1338.

¹²⁶ BLACK'S LAW DICTIONARY, *supra* note 17, at 1245.

¹²⁷ See *id.*

¹²⁸ *Id.* at 1245-46.

¹²⁹ RESTATEMENT (THIRD) OF TORTS: PRODUCTS LIABILITY § 2 (1998).

defective in design when the foreseeable risks of harm posed by the product[s] could have been reduced or avoided by the adoption of a reasonable alternative design by the seller or other distributor, or a predecessor in the commercial chain of distribution, and the omission of the alternative design renders the product[s] not reasonably safe.¹³⁰

The difficulty for plaintiffs is to propose reasonable alternative designs for an industry that has yet to establish design standards, in which vehicle manufacturers are developing a variety of vehicles with an array of functionalist characteristics, and for which no federal or state law provides vehicle design guidance beyond the limited regulations relating to vehicle design features for the purpose of protecting the crew as an integral part of the flight safety system.¹³¹

Breach of warranty and other actions initiated by CHSF vehicle operators against vehicle manufacturers are subject to the Act's mandatory reciprocal cross-waiver provisions.¹³² Under these provisions, the manufacturers and operators sign reciprocal cross-waivers under which each party agrees to be responsible for property damage or loss it sustains.¹³³ In addition, each party agrees to be responsible for personal injury to, death of, or property damage or loss sustained by its own employees resulting from an activity carried out under the applicable license.¹³⁴ SFPs are specifically excluded from the mandatory cross-waiver provisions.¹³⁵ This exclusion leaves open the possibility of CHSF operators suing manufacturers for indemnification of damages paid to injured SFPs. Manufacturers may also be sued for indemnification of damages paid to injured third parties. The Act does not prohibit manufacturers and operators from contracting for obligations associated with third party claims in the event of a CHSF vehicle accident.

¹³⁰ *Id.*

¹³¹ Final Rule on Human Space Flight Requirements for Crew and Space Flight Participants, 71 Fed. Reg. 75,618 n. 4 (Dec. 15, 2006) (to be codified at 14 C.F.R. pt. 460).

¹³² This is because CHSF vehicle and component parts manufacturers fall within the mandatory reciprocal cross-waiver definition of contractors and sub-contractors. *See* Commercial Space Transportation Regulations, 14 C.F.R. § 440.3 (2008).

¹³³ Commercial Space Launch Activities, 49 U.S.C. § 70112(b) (2000 & Supp. V 2006).

¹³⁴ *Id.*

¹³⁵ *Id.*

XV. PROTECTING AGAINST ECONOMIC LOSS ATTRIBUTED TO TORT LIABILITY RESULTING FROM A CHSF VEHICLE ACCIDENT

Limiting and mitigating risk of exposure to tort liability is critical for the success of the CHSF industry. Operators, employees, and manufacturers need a predictable liability regime that limits potential loss in order to facilitate the industrial, financial, and operational development of CHSF. Liability without mitigation, defense, or insurance could bankrupt the CHSF industry and expose industry participants to personal liability. SFPs, the customers of the CHSF industry, may also be subject to tort litigation and need protection against this exposure.

In order to protect against economic loss attributed to tort liability exposure, prior to the accident, operators, pilots/crew, SFPs, and manufacturers will want to implement risk mitigation measures designed to limit their respective tort liability exposures. Risk mitigation measures include liability insurance, waiver and releases, and other agreements that shift risk of loss. In some instances, the parties' respective interests will align and allow for collaborative risk mitigation measures. In other instances, their interests will conflict and they will attempt to shift risk liability to each other.

XVI. PROPOSALS FOR REFORM

A unified tort legal regime is needed to facilitate investment and growth. State law currently governs tort liability standards, enforceability of risk allocation agreements, releases and waivers, and various other elements of tort liability law. As a result, applicable laws will depend on a host of unknown variables including where an accident occurred, where the case is litigated, and choice of law provisions. Federal legislation is needed that supersedes state liability law and creates a predictable liability regime for the commercial space industry. This legislation should establish standards for assumption of risks and waivers of liability, exclude SFPs from joint and several liability for CHSF operator negligence, and resolve whether damage caused on the ground, in the air, and in outer space is subject to strict liability. As an alternative, a tort liability regime can be achieved by creating a uniform model code subject to state-by-state adoption. The disadvantage of this alternative option is that true uniformity will not be achieved because states will modify the model code to best serve state interests.

SFPs should be advised of the financial risks of CHSF and take steps to protect against potential tort liability. The current system grants SFPs a wide degree of freedom to mitigate potential liability by choosing whether they participate in CHSF, obtain liability insurance, and/or contract with CHSF operators to shift liability risks. While SFPs have the freedom to mitigate potential liability, they are also exposed to unlimited liability without provisional federal indemnification.

CHSF operators should take heed of potential SFP liability for their own business success and the success of this fledgling industry. Let us not forget that the SFPs are providing the demand for the industry. CHSF operators should consider voluntarily including SFPs on their insurance policies, contracting for risk shifting and assumptions of risk in an open and transparent manner, and minimizing the operational risk of SFP negligence causing injury to third parties. How the CHSF industry conducts itself at this point in development will set the stage for the next round of legislation and regulations. By taking proactive voluntary steps to protect the interests of SFPs, the industry will promote an image of self responsibility.

Liability insurance may be difficult to obtain at economically feasible rates for operators, crew/pilots, manufacturers, SFPs, and other members of the CHSF industry. If the liability insurance market is not able to provide insurance at economically feasible rates, then Congress or state legislatures should consider publicly subsidizing insurance rates. Publicly subsidized insurance can be instituted with tax-based policies in the form of tax credits or deductions to underwrite the purchase of insurance.¹³⁶

Congress and state legislatures should also postpone terminating indemnification and immunity legislation. The indemnification provisions under the Act only apply to complete and valid applications received no later than December 31, 2009.¹³⁷ The Space Flight Act expires on July 1, 2013.¹³⁸

¹³⁶ J.A. VEDDA, NAT'L SPACE SYS. ENG'G, STUDY OF THE LIABILITY RISK-SHARING REGIME IN THE UNITED STATES FOR COMMERCIAL SPACE TRANSPORTATION 32 (2006), *available at* [http://www2.faa.gov/about/office_org/headquarters_offices/ast/reports_studies/media/Risk_Study\(final\).pdf](http://www2.faa.gov/about/office_org/headquarters_offices/ast/reports_studies/media/Risk_Study(final).pdf).

¹³⁷ 49 U.S.C. § 70113(f).

¹³⁸ VA. CODE ANN. §§ 8.0-227.8–8.0-227.9 (2009).

XVII. ISSUE OF INTERNATIONAL ACCIDENTS AND RELATED QUESTIONS OF INTERNATIONAL LAW

The focus of this article is U.S. tort liability law in the event of a CHSF vehicle accident that occurs in the United States on a flight that departs and arrives from points within the United States. However, it is important to note that legal complexities and challenges will arise if a U.S. licensed CHSF vehicle has an accident outside the territory of the United States, involves non-U.S. nationals, or occurs while a CHSF vehicle is engaged in what is deemed international transport of passengers for the purpose of private international air law. Similar to the multiplicity of U.S. domestic tort jurisdictions resulting from the non-harmonized system of U.S. tort law, there is no harmonization of international law or the law between foreign sovereigns to govern CHSF tort liability, unless international air law agreements governing tort liability are deemed applicable to CHSF vehicles.¹³⁹

¹³⁹ The primary multilateral international air law agreements governing tort liability are the Montreal Convention of 1999 and the Warsaw Convention. Convention for the Unification of Certain Rules for International Carriage by Air, May 28, 1999, 2242 U.N.T.S. 309 [hereinafter Montreal Convention of 1999]; Convention for the Unification of Certain Rules Relating to International Carriage by Air, Oct. 29, 1929, 137 U.N.T.S. 11 [hereinafter Warsaw Convention]. These conventions apply to all "international carriage of persons, luggage or goods performed by aircraft for reward" and "gratuitous carriage by aircraft performed by an air transport undertaking." Warsaw Convention at art. I. Before a CHSF can be deemed subject to these Conventions, first the CHSF vehicle must be deemed an aircraft performing international carriage. International carriage for the purposes of these Conventions is defined as:

any carriage in which, according to the contract made by the parties, the place of departure and the place of destination, whether or not there be a break in the carriage or a transshipment, are situated either within the territories of two High Contracting Parties, or within the territory of a single High Contracting Party, if there is an agreed stopping place within a territory subject to the sovereignty, suzerainty, mandate or authority of another Power, even though that Power is not a party to this Convention. A carriage without such an agreed stopping place between territories subject to the sovereignty, suzerainty, mandate or authority of the same High Contracting Party is not deemed to be international for the purposes of this Convention.

Id. The term "aircraft" is not defined in the instruments of international public or private air law, but only defined in the annexes promulgated by ICAO in accordance with the Convention on International Civil Aviation. Ultimately, whether or not the Warsaw Convention, Montreal Convention of 1999, or the Convention on International Civil Aviation will be deemed applicable to CHSF is a political question. Legally, the term "aircraft" will need to be interpreted or

Until legal harmonization is achieved at both the domestic and international levels, the CHSF industry will be subject to a multiplicity of jurisdictions with varying legal standards, unable to predict and mitigate tort liability risks with a high degree of precision.

XVIII. SUMMARY AND CONCLUSIONS

Federal law provides minimum guidance on CHSF tort liability, only legislating in the areas of mandatory crow-waivers of liability, licensee insurance and financial responsibility requirements, and catastrophic indemnification. CHSF tort liability is therefore primarily governed by state law, with litigants subject to a multiplicity of jurisdictions without unified standards. As a result, parties involved in CHSF must do their best to formulate potential risks by drawing parallels to other established industries such as aviation and adventure sports/tourism. Interested parties should undertake legal risk mitigation measures that minimize exposure and protect against tort liability.

In the long term, the CHSF industry will require a unified tort liability regime, on both a national and international level, to facilitate investment and growth while promoting predictability and equitable compensation for accident victims. On the national level, this regime should be established through Congressional legislation premised on authority granted under the commerce clause of the U.S. Constitution. Internationally, States should adopt a multilateral CHSF tort liability regime that governs passengers, cargo, and third party ground, air, and space damage.

defined to include CHSF. This is an open question that has yet to be resolved. For a more detailed analysis of ICAO's jurisdiction over CHSF, as well as the impact of concurrent-conflicting international regimes applicable to CHSF, see PAUL S. DEMPSEY AND MICHAEL C. MINEIRO, *THE INTERSECTION OF AIR AND SPACE LAW: ICAO'S ROLE IN REGULATING SAFETY AND NAVIGATION IN SUBORBITAL AEROSPACE TRANSPORTATION* (unpublished manuscript but scheduled to be presented and published to the IAASS in Rome October 21–23, 2008).

