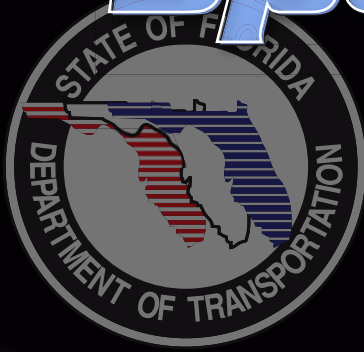


Florida Spaceports



An Analysis of the Regulatory Framework



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The Florida Department of
Transportation

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DISCLAIMER

The opinions, findings, and conclusions expressed in this publication are those of the author and not necessarily those of the State of Florida Department of Transportation.

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16. Abstract The purpose of this project is to look at international, federal, and state law related to commercial space travel in relation to rights and responsibilities the Florida Department of Transportation may have for implementing new regulations or revising current state statutes. The focus is on safety as it relates to licensing, liability, and security for airmen, airports, and commercial space operators. The report will raise issues pertinent to establishing regulatory and practical guidelines for the development of commercial space tourism and delivery and recovery of cargo related to space travel.			
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EXECUTIVE SUMMARY

In 2011 the United States Space Transportation System (the Space Shuttle Program) will end, but the need to transport crew and cargo to the International Space Station will continue. The National Aeronautics and Space Administration (NASA), Space Florida, Florida Department of Transportation (FDOT) and commercial operators are working to continue providing this transportation service at the Cape Canaveral Spaceport after the shuttle's retirement. They are also working to diversify the Spaceport by operating as a transportation hub specializing in access to space and the International Space Station.

There is also space related activity occurring in other parts of Florida in addition to the Cape Canaveral Spaceport. In January 2010, the Federal Aviation Administration issued a spaceport operators license to Cecil Field, an airport just to the west of Jacksonville, Florida. Further, preliminary evaluations are being done for a joint use facility (airport/spaceport) in Miami-Dade County.

As the commercial space sector develops in Florida, the state will face new challenges to provide a safe aviation/aerospace environment while promoting economic development. FDOT through its Aviation Program is responsible for promoting the development of a safe and secure air transportation system in the state of Florida. The challenge for the FDOT is identifying, balancing, and incorporating the various regulatory and economic aspects of these evolving commercial space activities with its mission to provide a safe and secure air transportation system.

This analysis identifies international, federal, and state laws and associated regulations for safety in the following areas:

- Licensing of airmen, aircraft, airports, and operators
- Liability related to commercial space transportation
- Security related to people and property

This analysis reports how the FDOT can examine the current statutes and regulations, explore a means to address areas it deems are presently insufficient to deal with commercial

space flight, and expound on its current regulatory and practical responsibilities. The purpose of this analysis is to look specifically at the regulatory environment and raise questions the FDOT needs to consider as an entity of the state and to have a representative voice in formulating future state and federal regulations. This report is a first step in what needs to be a continuing and fluid look at this rapidly developing industry.

The following conclusions pertaining to commercial space travel are identified in this analysis as jointly and severally related to the FDOT and Space Florida:

- ➔ Discuss federal licensing safety criteria with the Federal Aviation Administration (FAA) for:
 - Piloting remote or reusable launch vehicles (RLVs)
 - Certifying space aircraft
 - Repairing and maintaining space vehicles
 - Operating joint use facilities

- ➔ Determine if state licensure of spaceports is authorized in Florida Statutes. If clear and sufficient authority exists, FDOT would need to decide whether to use FAA standards or develop Florida specific state licensure standards. FDOT should:
 - Decide if the physical aspects related to spaceports will be incorporated into current administrative rules
 - Address dual use facilities and the ramifications, if any, on Florida's intermodal transportation obligations
 - Consider identifying spaceports on the Florida Aeronautical Chart and in the Airport Facilities Directory (AFD)

- ➔ Evaluate and, if necessary, discuss the crew training and medical requirements with the FAA to determine if the current requirements are adequate to protect Florida's citizens. In addition, determine if establishing medical criteria for space flight participants is warranted

- ➔ In cooperation with Space Florida, FDOT should encourage the Florida Congressional delegation to pass appropriate legislation related to 49 U.S.C. 700 regulatory statutes as deemed appropriate

- Where appropriate, request Florida Statutes be amended to include additional space related definitions; most notably the definition of “aircraft” should be addressed for its applicability to space capable vehicles
- Discuss federal regulations as they pertain to airspace classification and its restructuring as related to commercial space activities with the FAA and impacts on Florida’s airspace
- Consider the level of responsibility the state of Florida should accept or establish regarding compliance monitoring of a licensee’s launch site and air operations
- Address adding Operator Waivers of Liability in order to clarify operator responsibilities and protect the state of Florida from liability
- Be prepared to discuss and advise Florida’s issues related to operator, crew, passenger, and visitor security with the Transportation Security Administration

The FDOT is in a unique position at an unprecedented point in time. There are obvious regulatory challenges that ultimately have economic consequences. On one hand, FDOT is subject to and preempted by federal laws and regulations; however, it has the responsibility to be aware of and bring concerns to the FAA as they relate to commercial space travel in all its diverse aspects. As such, the FDOT should begin evaluating and prioritizing those issues it can influence as a change agent on a state and federal level. The result of the FDOT’s efforts has the potential to lay the groundwork for a thriving commercial space industry in Florida.

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LIST OF ABBREVIATIONS - ACRONYMS

ADIZ	Air Defense Identification Zone
AGL	Above Ground Level
AIM	Airmen Information Manual
A & P	Airframe and Powerplant
AFD	Airport Facilities Directory
ATF	Alcohol, Tobacco Firearms and Explosives
ATP	Airline Transport Pilot
C.F.R.	Code of Federal Regulations
DOHSA	Death on the High Seas Act
Department	Florida Department of Transportation
ERAU	Embry-Riddle Aeronautical University
FAA	Federal Aviation Administration
F.A.C.	Florida Administrative Code
FAR	Federal Aviation Regulation
FDOT	Florida Department of Transportation
F.S.	Florida Statutes
HR	House Rule
IA	Inspection Authorization
JAA	Jacksonville Aviation Authority
KVQQ	Cecil Field Airport/Spaceport
MSL	Mean Sea Level
NASA	National Aeronautics and Space Administration

NAS	National Airspace System
NOTAM	Notice to Airmen
NACO	National Aeronautical Charting Office
RLV	Reusable Launch Vehicle
SLC	Space Launch Complex
TSA	Transportation Security Administration
U.S.C.	United States Code
§	Section
42J	Keystone Heights Airport

INTRODUCTION

Space travel and the state of Florida have been integrally linked since the early 1950s when Explorer I, America's first satellite, was launched on top of a version of the Redstone rocket known as the Jupiter C.¹ In its infancy, expendable rockets were used to take satellites, men and cargo into earth orbit, which ultimately lead to lunar landings and deep space exploration. With the progress of technologies, as evidenced by the inception of the Space Shuttle Program, came the reality of combining expendable rocket technology with reusing a space vehicle for transportation to and from space. Although the Space Shuttle Program got a reprieve from its 2010 retirement² the future of space travel has refocused its attention on the concept of reusable launch vehicles, far beyond those of the past.

On May 6, 2001 when Dennis Tito returned to earth and set foot on the rolling steppes of Kazakhstan after emerging from a Russian Soyuz space capsule, space tourism had its first paying customer.³ Touted as the first space tourist, Tito reportedly paid \$20 million for a ride to and from the International Space Station, sandwiched between 7 days, 22 hours, and four minutes in space.⁴ His experience ultimately led to Mark Shuttleworth and Gregory Olsen being the next to pay for travel into space.⁵



Figure 1: Gregory Olsen was the third private citizen to visit the space station, after Dennis Tito and Mark Shuttleworth.

Photo: Courtesy airspacemag.com, October 22, 2010 "Floating off to sleep, Earthgazing, making sure the capsule doesn't depressurize: all standard on a space vacation.
By Gregory Olsen

¹ *The History of Aviation and Modern Rocketry*, <http://www.thespaceplace.com/history/rocket2.htm>. Accessed August 4, 2010.

² *Senate Plan Puts off Space Shuttle Retirement*, Thu Jul 15, 3:43 pm ET, http://news.yahoo.com/s/nm20100715/pl_nm/us_space_nasa. Accessed August 4, 2010.

³ Tyler, Patrick E. *Space Tourist, Back From 'Paradise,' Lands on Steppes*, Published: May 7, 2001

⁴ Daily TWiP – Dennis Tito becomes the first space tourist today in 2001. The Nashua Telegraph <http://www.nashuatelegraph.com/news/720120-196/daily-twip--dennis-tito-becomes-the.html>

⁵ \$20 million buys a sightseeing trip in orbit...Tourists Visit the International Space Station <http://www.spacetoday.org/Astronauts/SpaceTourists.html>

In 2004, when SpaceShipOne won the Ansari X Prize, it changed, or arguably created, the commercial space travel environment and a new challenge for the Federal Aviation Administration (FAA).⁶ The incentive for the \$10 million prize was to encourage civilian contractors to make reusable launch vehicles a viable means of transportation not only for cargo and personnel for NASA based missions to the International Space Station, but also for those wishing to experience space travel as tourists, thus creating a commercial space tourism market. Since SpaceShipOne's success, other companies, such as XCOR Aerospace, Armadillo Aerospace and Blue Origins have announced plans to develop vehicles to serve the personal spaceflight market.⁷



Figure 2: SpaceShipOne
Source: www.richard-seaman.com

To foster the potential for space tourism industry, the FAA licenses space flight operators and spaceports. As related to the latter, as of November 2009, there were six U.S federal spaceports, eight non-federal spaceports and one sole operator (federally licensed or by permit).⁸ As a result, the spaceport infrastructure is being put into place to facilitate future orbital and sub-orbital flight. Whether the emphasis of the missions will be to support or replace

NASA, as it sees its role evolve due to the decommissioning of the Space Shuttle Program, or space tourism missions are phased in, the FAA has recognized the importance of preparing our spaceport infrastructure for future space flight.

With this new market and those wishing to take advantage of its potential, the FAA is currently tasked with reviewing the applicable regulations now in place. Additionally, the

⁶ *SpaceShipOne wins \$10 million X Prize, Flight Also Bests X-15 Record*, <http://www.msnbc.msn.com/id/6167761/>. Accessed August 4, 2010.

⁷ United States Government Accountability Office, "Commercial Space Transportation-Development of the Commercial Space Launch Industry Presents Safety Oversight Challenges for FAA and Raises Issues Affecting Federal Roles." *Statement of Gerald L. Dillingham, Ph.D., Director Physical Infrastructure Issues*.

⁸ *Id.* Supra see note 17 for various federal licenses. Also for a pictorial depiction of existing spaceports as of July 2010, see Figure 6, page 17.

United States has international treaty responsibilities associated with putting, or allowing those interested in putting, vehicles and people into space. As such, Florida, Space Florida and the FDOT should have a fundamental understanding of the existing regulations and responsibilities they may have associated with complying with or holding others to international or federal regulations.

As more scrutiny is placed on the various aspects of space travel and the regulatory environment, the FDOT in cooperation with Space Florida, through the Florida Legislature, may find it necessary to develop and promulgate standards to regulate space travel. Since the inception of space flight, the state of Florida has experienced significant milestones associate with space travel. Understanding the existing regulatory environment and playing a role in its continued development will link Florida to space travel well into the future.

LICENSING

CREW AND PASSENGER LICENSING

The Commercial Space Launch Amendments Act of 2004 gave the FAA specific responsibilities related to commercial human space flight but prohibits it from regulating crew and passenger safety before 2012 except in response to high-risk incidents, serious injuries or fatalities or an event that poses a high risk of causing a serious or fatal injury.⁹ The practical results of the 2004 Act are the federal statutes address licensing of crewmembers and requisite experience only in the most basic forms. This leads to placing the majority of the responsibility on the commercial operators to insure those flying the vehicles, specifically the Concept X and Concept Z Reusable Launch Vehicles (RLV),¹⁰ are competent to safely operate the aircraft.

The format for comparing the applicable statutes in this licensing section will be to look first at *Title 14 C.F.R. §§ 400-460* then *49 U.S.C. 701* followed by the Florida Statutes (F.S.) and then any FDOT administrative rules. There will be suggestions and recommendations for the FDOT to consider after each individual section if applicable; however, the bulk of the commentary will be reserved after all the statutes have been introduced.

Review of Title 14 C.F.R. §§ 400-460

Title 14 C.F.R. § 460.5 Crew qualifications and training.

- (a) Each crewmember must—
 - (1) Complete training on how to carry out his or her role on board or on the ground so that the vehicle will not harm the public; and
 - (2) Train for his or her role in nominal and non-nominal conditions. The conditions must include
 - (i) Abort scenarios; and
 - (ii) Emergency operations.
- (b) Each member of a flight crew must demonstrate an ability to withstand the stresses of space flight, which may include high acceleration or deceleration, microgravity, and vibration, in sufficient condition to safely carry out his or her duties so that the vehicle will not harm the public.
- (c) A pilot and a remote operator must—
 - (1) Possess and carry an FAA pilot certificate with an instrument rating.

⁹ Pub. La. No. 108-492, 118 Stat. 3974 (2004).

¹⁰ Concept X launch vehicles are those all-in-one RLVs similar to an airplane that takes off from a runway using jet power and flies to a safe location before igniting its rocket engines to complete its launch profile. Concept Z launch vehicles are a two-part launch vehicle consisting of a reusable carrier aircraft and an RLV.

- (2) Possess aeronautical knowledge, experience, and skills necessary to pilot and control the launch or reentry vehicle that will operate in the National Airspace System (NAS). Aeronautical experience may include hours in flight, ratings, and training.
- (3) Receive vehicle and mission-specific training for each phase of flight by using one or more of the following—
 - (i) A method or device that simulates the flight;
 - (ii) An aircraft whose characteristics are similar to the vehicle or that has similar phases of flight to the vehicle;
 - (iii) Flight testing; or
 - (iv) An equivalent method of training approved by the FAA through the license or permit process.
- (4) Train in procedures that direct the vehicle away from the public in the event the flight crew abandons the vehicle during flight; and
- (5) Train for each mode of control or propulsion, including any transition between modes, such that the pilot or remote operator is able to control the vehicle.
- (d) A remote operator may demonstrate an equivalent level of safety to paragraph (c)(1) of this section through the license or permit process.
- (e) Each crew member with a safety-critical role must possess and carry an FAA second class airman medical certificate issued in accordance with *14 C.F.R. Part 67*, no more than 12 months prior to the month of launch and reentry.

Comments and Recommendations

As a point of reference, as to the above requirements of having an FAA pilot certificate, this could include having only a private pilot's certificate, a second class medical and an instrument rating to pilot a commercial tourism spacecraft. With the passing of federal law HR 5900: Airline Safety and Federal Aviation Administration Extension Act of 2010, the requirements to pilot or copilot an aircraft in an airport operating in accordance with *14 C.F.R. Part 121* will require an Airline Transport Pilot (ATP) Certificate (Figure 3a) and a minimum of 1,500 flight or equivalent hours.¹¹ Someone flying for a commercial carrier is also required to have a first-class medical certificate (Figure 3b) when exercising the privileges of an ATP certificate.¹²

¹¹ Public Law No: 111-216, signed into law August 3, 2010 by President Barack Obama.

¹² 14 C.F.R. 61.23(a)(1); Medical certificates: Requirement and duration.

The qualifications listed for piloting an aircraft into space also disregard the FAA’s own requirements of having a Commercial Rating for carrying passengers for compensation or hire.¹³

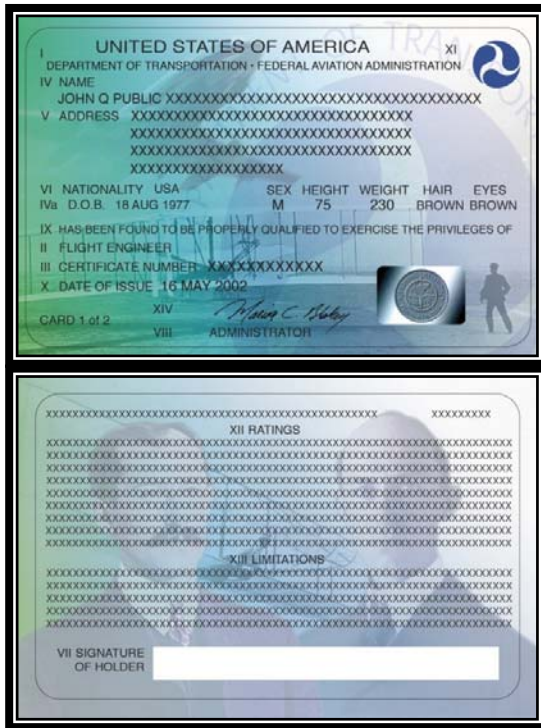


Figure 3a: Typical U.S. Pilot’s Certificate (front and back)

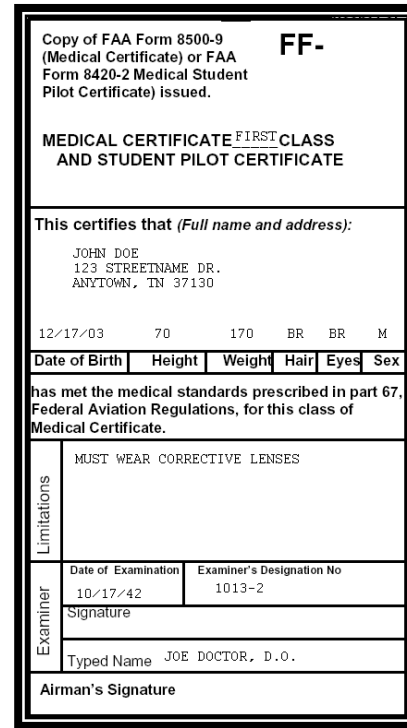


Figure 3b: Typical U.S. Medical Certificate

The issue with the above statute is not construction of the language, but what the FAA does not define and leaves to the interpretation of the operator and consideration for the FDOT regulatory oversight. For example, there are no specific provisions regarding what constitutes nominal or non-nominal conditions. There are no specific requirements, as the statute says, “complete training,” for the crewmembers to experience zero gravity conditions or receive hypo or hyperbolic training. Lastly, Section (4) addresses the crew’s responsibility regarding abandoning the spacecraft, however there is no crew training or responsibilities directly related to the egress of the space flight participants in the case of an in-flight emergency.¹⁴

¹³ 14 C.F.R. 61.133: Commercial pilot privileges and limitations.a) *Privileges* —(1) *General*. A person who holds a commercial pilot certificate may act as pilot in command of an aircraft—(i) Carrying persons or property for compensation or hire... Thus this FAR contradicts the general pilot certification required to fly a space vehicle.

¹⁴ AC 61.107A OPERATIONS OF AIRCRAFT AT ALTITUDES ABOVE 25,000 FEET MSL AND/OR MACH NUMBERS (MMO) GREATER THAN .75. This deals with a host of requirements associate with issues pilots of space vehicles will regularly face. Also discussed in this Advisory Circular is 14 C.F.R. section 61.31(g) which applies only to pilots who fly pressurized airplanes with a service ceiling or maximum operating altitude above

By comparison, commercial air carriers are required by Federal Aviation Regulations (FARs) to provide a safety and emergency briefing prior to takeoff dealing with operation of seatbelts, smoking, loss of cabin pressure, use of oxygen, exiting the aircraft including location of doors, use of floor track lighting, having a passenger sitting near a door to verbally confirm he or she is able to operate the emergency door and the location and use of personal flotation devices.¹⁵ So, the statute is written broadly and vaguely enough to either protect the space flight operators as it leaves training up to them and their interpretation or specific enough to allow for a violation should something happen. Thus, FDOT should be mindful of the lack of specificity related to the different aspects of the statute.

In view of its direct safety implications, the above examples represent some of the regulatory ambiguities and lack of specificity left undetermined by the FAA. To address the safety ramifications, the FDOT and Space Florida should exercise its authority and willingness to make the FAA aware of these issues when the regulatory blackout is lifted in 2012.¹⁶

Sections (d) and (e) of 14 CFR § 460.5 should not be overlooked as they define licensing requirements for remote operators, normally associated with vertical takeoff vehicles, and crew members with safety critical roles in horizontal takeoff capable vehicles.

Review of 49 U.S.C. 701

49 U.S.C. 701 License¹⁷ applications and requirements

49 U.S.C. § 70102 Definitions

(2) ‘crew’ means any employee of a licensee or transferee, or of a contractor or subcontractor of a licensee or transferee, who performs activities in the course of that employment directly relating to the launch, reentry, or other operation of or in a launch vehicle or reentry vehicle that carries human beings.

25,000 feet MSL, which directly applies to flight into space.

¹⁵ 14 C.F.R. Part 135.117 - Briefing of passengers before flight.

¹⁶ Supra see note 7. In view of these requirements for common carriage (air carrier operations) the FDOT may wish to raise with the FAA the issue of creating a separate license for those conducting space tourism flights. Or at a minimum, different licenses for those onboard crew members as opposed to remote operators. The concept of creating a new category is not a novel ideal. As there are Recreational Pilot License and Light Sport Aircraft licenses for specific aircraft operations/limitations, creating a specific license for piloting space vehicles should not be looked at as overreaching.

¹⁷ There are four licenses the FAA currently issues related to commercial space activities-Operator’s license, Launch Site Operator’s License, Reentry Site Operator’s License, and a Reenter a Reentry Vehicle License. The FAA also issues Experimental Permits. See § 70104. Restrictions on launches, operations, and reentries, page 14 of this report.

§ 70105 (b)(4)(A) & (C)

(4) The holder of a license or a permit under this chapter may launch or reenter crew only if—

(A) the crew has received training and has satisfied medical or other standards specified in the license or permit in accordance with regulations promulgated by the Secretary [of Transportation];

(C) the holder of the license or permit and crew have complied with all requirements of the laws of the United States that apply to crew.¹⁸

§ 70105a Experimental permits (as related to flight crews)

§ 70105a (d)(3)

(d) The Secretary [of Transportation] may issue a permit only for reusable suborbital rockets that will be launched or reentered solely for—

(3) crew training prior to obtaining a license for a launch or reentry using the design of the rocket for which the permit would be issued.

As this is the first time §700 has been mentioned, its importance should be noted. Should the state of Florida believe it to be in the best interest of the State or its citizens by addressing licensing or permitting regulations of 49 U.S.C. § 700, the following regulatory language gives them the right to pass appropriate legislation to address their concerns. This would apply to this and all the subsections §700 regulates.¹⁹

§ Sec. 70117 (a) & (c): Relationship to other executive agencies, laws, and international obligations.

(a) Executive Agencies - Except as provided in this chapter, a person is not required to obtain from an executive agency a license, approval, waiver, or exemption to launch a launch vehicle or operate a launch site or reentry site, or to reenter a reentry vehicle.

(c) States and Political Subdivisions - A State or political subdivision of a State - (1) may not adopt or have in effect a law, regulation, standard, or order inconsistent with this chapter; but

(2) may adopt or have in effect a law, regulation, standard, or order consistent with this chapter that is in addition to or more stringent than a requirement of, or regulation prescribed under, this chapter.

Review of Florida Statutes related to pilot licenses

Ch. 330.04, F.S. Possession of pilot's license; inspection on demand

The pilot's license required shall be kept in the personal possession of the licensee when he or she is operating aircraft within this state, and must be presented for

¹⁸ The specific pilot certificates, ratings and medical requirements of Title 14 C.F.R. 460.5 (c) & (e) would satisfy this.

¹⁹ This applies to the totality of 49 U.S.C. 700 and the FDOT should look closely at the liberty this affords the State related to commercial space regulations. § Sec. 70117 (a) & (c) will remain relevant throughout this report.

inspection upon the demand of any passenger, any peace officer of this state, or any official, manager, or person in charge of any airport or landing field in this state upon which the licensee shall land.

Comments and Recommendations

Looking at the Florida Statute, there are potential issues. Besides the obvious, there are the subtleties, ambiguities, and semantics the FDOT needs to be aware of and possibly address. When considering vehicles, does the FDOT consider a vehicle capable of space travel an aircraft? Is a rocket an aircraft? If not, or if so, is this statute to be strictly construed? If rockets are aircraft, then the statute is applicable. If not, the statute does not apply to crews of spacecraft and they are not required to comply. If a vehicle is a Concept X²⁰ type vehicle, is it applicable all the time? If a Concept Z,²¹ does it apply to the carrier ship only and not applicable to the vehicle that goes into space, but would ultimately do so when the vehicle returns from space? Or is *Ch. 330.27, F.S.* defining aircraft all encompassing and this is a moot point?²² Adding to the debate are those statutes applicable to Space Florida as they specifically mention space vehicles.²³

As exemplified by the above, commercial space travel is going to challenge current statutory language. The State will be faced with new demands, statutorily and practically, as they are associated with safe operations related to commercial space flight.

Certificating pilots is the responsibility of the FAA; however, other than the above there is no language in the Florida Statutes associated with identifying or qualifying those certificates necessary to pilot a space vehicle, either aboard the aircraft or by remote operators as would be the case for vertical takeoff capable vehicles. Before commercial space tourism moves from being a mere proposal to becoming a reality, the FDOT should, at a minimum, consider discussing pilot qualifications/certifications with the FAA to ascertain if the current requirements provide the appropriate safety standard for those responsible for flying vehicles capable of space travel.

²⁰ Supra see note 10.

²¹ Id.

²² § 330.27 F.S. Definitions, when used in ss. 330.29-330.36, 330.38, 330.39.-- (1) "Aircraft" means a powered or unpowered machine or device capable of atmospheric flight, except a parachute or other such device used primarily as safety equipment.

²³ § 331.303 F.S. Definitions.-- (1) "Aerospace" means the industry that designs and manufactures aircraft, rockets, missiles, spacecraft, satellites, space vehicles...(edited for brevity).

Lastly, and this has yet to be addressed by the FAA, is the certification of those who will be required to maintain or repair RLVs. The FAA has specific licenses for Airframe and Powerplant (A&P) mechanics and Inspection Authorization (IA) related to general and air carrier aircraft maintenance.²⁴ The FDOT needs to be aware of the potential inconsistency and should familiarize itself with how to address standards that operators should require of their maintenance personnel. The FDOT should consider if FAA licensing is a satisfactory standard or if a broader approach may be applicable, as for example a “Space Vehicle Technician Certificate.”²⁵ As maintenance equates directly to safe operations, licensing or certification of those maintaining space vehicles should be addressed.

The Transportation Security Administration (TSA) also has regulatory authority related to pilot certificates.

Review of 49 U.S.C. 1540

49 U.S.C. §1540.113 Inspection of airman certificate -

Each individual who holds an airman certificate, medical certificate, authorization, or license issued by the FAA must present it for inspection upon a request from TSA.

Comments and Recommendations

The TSA and their association with commercial space operators, launch and reentry sites and general responsibilities are discussed later in this report. However, it is apparent by this statute, notwithstanding any additional statutory language; the TSA has a direct link to commercial space travel.

²⁴ 14 C.F.R. Part 65.71-65.89 are the FARs related to eligibility for an Airframe and Powerplant license. 14 C.F.R. Part 65.91-65.95 addresses the general and specific requirement related to Inspection Authorization privileges.

²⁵ This term has no legal or regulatory significance or authority as it is originated from the author’s imagination. There have been discussions related to this, but there are no regulatory guidelines at this time.

LICENSING AIRCRAFT

The FAA does not have a formal process for licensing reusable launch vehicles. However, two FAA offices have signed a formal agreement for the licensing of SpaceShipTwo and delineate the responsibilities for each office.²⁶ Agency officials expect a similar licensing process will be used as future applications are received.²⁷ Without the benefit of reviewing specific contents of the existing SpaceShipTwo agreement, the only documented FAA safety approval regulations associated with space vehicles are outlined below. Figure 4 and 5 show Virgin Galactic and Blue Origin's respective RLVs.



Figure 4: Virgin Galactic's SpaceShipTwo (VSS Enterprise) makes first solo flight, October 11, 2010.

Source:
www.digitaljournal.com/article/298792

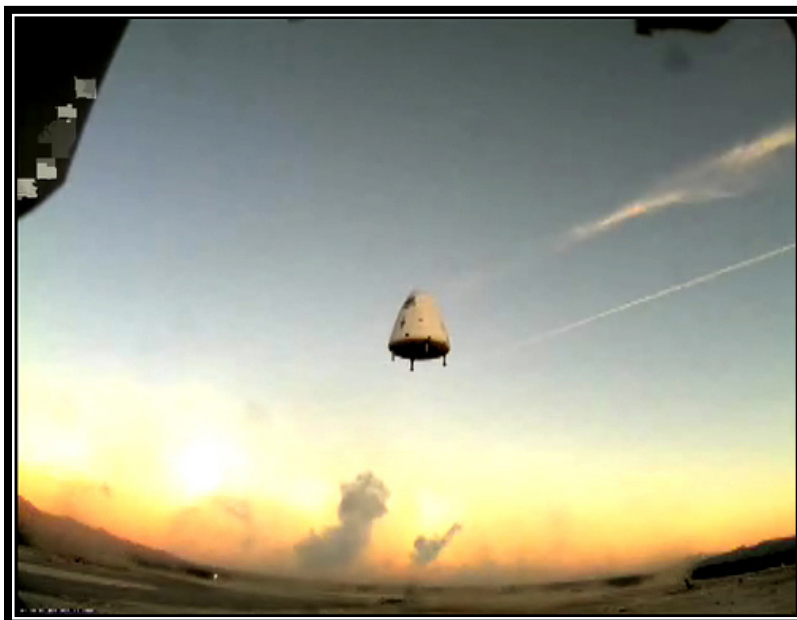


Figure 5: Blue Origin's Goddard demonstration vehicle in mid-flight above its West Texas launch pad during a test launch on Nov. 13, 2006

Source: www.space.com/7974-veil-lifts-slightly-secretive-blue-origin-rocket-project.html

²⁶ Supra see note 7, page 2.

²⁷ Id.

Title 14 C.F.R. § 414.3 Definitions.

Safety approval. For purposes of this part, a safety approval is an FAA document containing the FAA determination that one or more of the safety elements listed in paragraphs (1) and (2) of this definition, when used or employed within a defined envelope, parameter, or situation, will not jeopardize public health and safety or safety of property. A safety approval may be issued independent of a license, and it does not confer any authority to conduct activities for which a license is required under 14 C.F.R. chapters III. A safety approval does not relieve its holder of the duty to comply with all applicable requirements of law or regulation that may apply to the holder's activities.

(and applies to the following (added for clarity))

(1) Launch vehicle, reentry vehicle, safety system, process, service, or any identified component thereof; or

(2) Qualified and trained personnel, performing a process or function related to licensed launch activities or vehicles.

Safety element. For purposes of this part, a safety element is any one of the items or persons (personnel) listed in paragraphs (1) and (2) of the definition of "safety approval" in this section.

§§ 414.7 and 414.11 the Eligibility and Applications, describes what must be identified.

§ 414.5 Applicability.

This part applies to an applicant that wants to obtain a safety approval for any of the safety elements defined under this part and to persons granted a safety approval under this part. Any person eligible under this part may apply to become the holder of a safety approval.

§ 414.7(b) Eligibility.

(b) You may be eligible for a safety approval if you are—

(1) A manufacturer or designer of a launch or reentry vehicle or component thereof;

(2) The designer or developer of a safety system or process; or

(3) Personnel who perform safety critical functions in conducting a licensed launch or reentry.

(c) A safety approval applicant must have sufficient knowledge and expertise to show that the design and operation of the safety element for which safety approval is sought qualify for a safety approval.

§ 414.11(b) Application.

(b) The application must identify the following basic information

(3) Safety element (i.e., launch vehicle, reentry vehicle, safety system, process, service, or any identified component thereof; or personnel) for which the applicant seeks a safety approval.

- (c) The application must contain the following technical information:
 - (1) A Statement of Conformance letter, describing the specific criteria the applicant used to show the adequacy of the safety element for which a safety approval is sought, and showing how the safety element complies with the specific criteria.
 - (2) The specific operating limits for which the safety approval is sought.
 - (3) The following as applicable:
 - (i) Information and analyses required under this chapter that may be applicable to demonstrating safe performance of the safety element for which the safety approval is sought.
 - (ii) Engineering design and analyses that show the adequacy of the proposed safety element for its intended use, such that the use in a licensed launch or reentry will not jeopardize public health or safety or the safety of property.
 - (iii) Relevant manufacturing processes.
 - (iv) Test and evaluation procedures.
 - (v) Test results.
 - (vi) Maintenance procedures.
 - (vii) Personnel qualifications and training procedures.

Issuance of a safety approval is addressed in Subpart C –Safety Approval Review and Issuance and enumerates the performance based criteria for determination against which the FAA assesses the effect on public health and safety and on safety of property using the following hierarchy:

§ 414.19 Technical criteria for reviewing a safety approval application

- (1) FAA or other appropriate federal regulations.
- (2) Government-developed or adopted standards.
- (3) Industry consensus performance-based criteria or standard.
- (4) Applicant-developed criteria. Applicant-developed criteria are performance standards customized by the manufacturer that intends to produce the system, system component, or part. The applicant-developed criteria must define—
 - (i) Design and minimum performance;
 - (ii) Quality assurance system requirements;
 - (iii) Production acceptance test specifications; and
 - (iv) Continued operational safety monitoring system characteristics.

Comments and Recommendations

It should be noted, the FAA’s priority and regulatory authority is based on public safety. Although there are no licensing procedures associated with the RLVs, the FAA places safety responsibilities on those operators applying for safety approval. Determining if this will be the

appropriate standard for the future is an area the FDOT and Space Florida should scrutinize and ask for interagency cooperation to monitor the activities of those associated with the manufacture and flight of orbital and suborbital space vehicles. As this directly impacts safety, the FDOT and Space Florida should also consider developing regulatory standards and language to address licensing issues they deem appropriate for presentation to the FAA to assist them in their future regulatory development efforts.

Review of 49 U.S.C. Chapter 701

49 U.S.C. § 70102 Definitions

(8) “launch vehicle” means -

- (A) a vehicle built to operate in, or place a payload or human beings in, outer space; and
- (B) a suborbital rocket.

49 U.S.C. § 70103(c) General Authority

(c) Safety — In carrying out the responsibilities under subsection (b), the Secretary [of Transportation] shall encourage, facilitate, and promote the continuous improvement of the safety of launch vehicles designed to carry humans, and the Secretary may, consistent with this chapter, promulgate regulations to carry out this subsection.

§ 70104. Restrictions on launches, operations, and reentries

(a) Requirement – A license issued or transferred under this chapter, or a permit, is required for the following:

- (1) for a person to launch a launch vehicle or to operate a launch site or reentry site, or to reenter a reentry vehicle, in the United States.
- (2) for a citizen of the United States (as defined in section 70102(1)(A) or (B) of this title) to launch a launch vehicle or to operate a launch site or reentry site, or to reenter a reentry vehicle, outside the United States.²⁸

(b) Compliance With Payload Requirements. - The holder of a license or permit under this chapter may launch or reenter a payload only if the payload complies reentering a payload.

§ 70105. License applications and requirements

§ 70105 (a)(2) & (b)(2)(D)

(2) In carrying out paragraph(1), the Secretary [of Transportation] may establish procedures for safety approvals of launch vehicles, reentry vehicles, safety systems, processes, services, or personnel (including approval procedures for the

²⁸ Sections (3) and (4) reiterate parts of section (1) and (2) adding the international implications for sites outside the United States and the requisite bilateral agreements or lack thereof pertaining to a foreign country’s jurisdiction over the launch or operations of reentry.

purpose of protecting the health and safety of crews and space flight participants, to the extent permitted by subsections (b) and (c)) that may be used in conducting licensed commercial space launch or reentry activities.

(b) Requirements. - (1) Except as provided in this subsection, all requirements of the laws of the United States applicable to the launch of a launch vehicle or the operation of a launch site or a reentry site, or the reentry of a reentry vehicle, are requirements for a license or permit under this chapter.

(2) The Secretary [of Transportation] may prescribe

(D) additional license requirements, for a launch vehicle carrying a human being for compensation or hire, necessary to protect the health and safety of crew or space flight participants,

Comments and Recommendations

There are no Florida Statutes that are applicable to safety standards or licensing of launch or reentry vehicles. As previously stated, § 70117 (a) & (c) afford the State of Florida, Space Florida and the FDOT the statutory authority to promulgate rules addressing safety licensing standards they deem necessary to promote safety and protection from possible liability associated with vehicles used in commercial space travel.

LICENSING AND REGULATION OF AIRPORTS AND SPACEPORTS

14 C.F.R. § 420-420.71 and Appendices A-D are the launch site²⁹ regulatory sections of the FARs and deals specifically with the requirements to obtain a launch license and thus be classified as a spaceport. Primarily, this section deals with two distinct issues. First, the regulations address public safety and, as such, operators must identify the type of launch vehicle³⁰ that shall operate from the site. Second, the regulations address the environmental standards³¹ a launch site operator must meet in order to obtain a license. The ensuing discussions below are examples of the licensing requirements presently in place. Figure 6 depicts various commercial and government U.S. spaceports.

²⁹ The FAA not only requires a license to operate a launch site but in 14 C.F.R. § 433 an operator must be licensed to operate a Reentry Site as discussed later in this report.

³⁰ § 420.19 Launch site location review-general subsection (a) ...to gain approval...an applicant shall demonstrate that each launch point proposed for the launch site at least one type of expendable or reusable launch vehicle can be flown from the launch point safely. Subsection (a)(2) Types of launch vehicles include orbital expendable launch vehicles, guided sub-orbital expendable launch vehicles, unguided sub-orbital expendable launch vehicles and reusable launch vehicles...

³¹ Florida addresses environmental concerns in Ch. 331.325 F.S. Environmental permits.--Space Florida shall obtain required environmental permits in accordance with federal and state law and shall comply with the provisions of chapter 380 of the Florida Statutes.

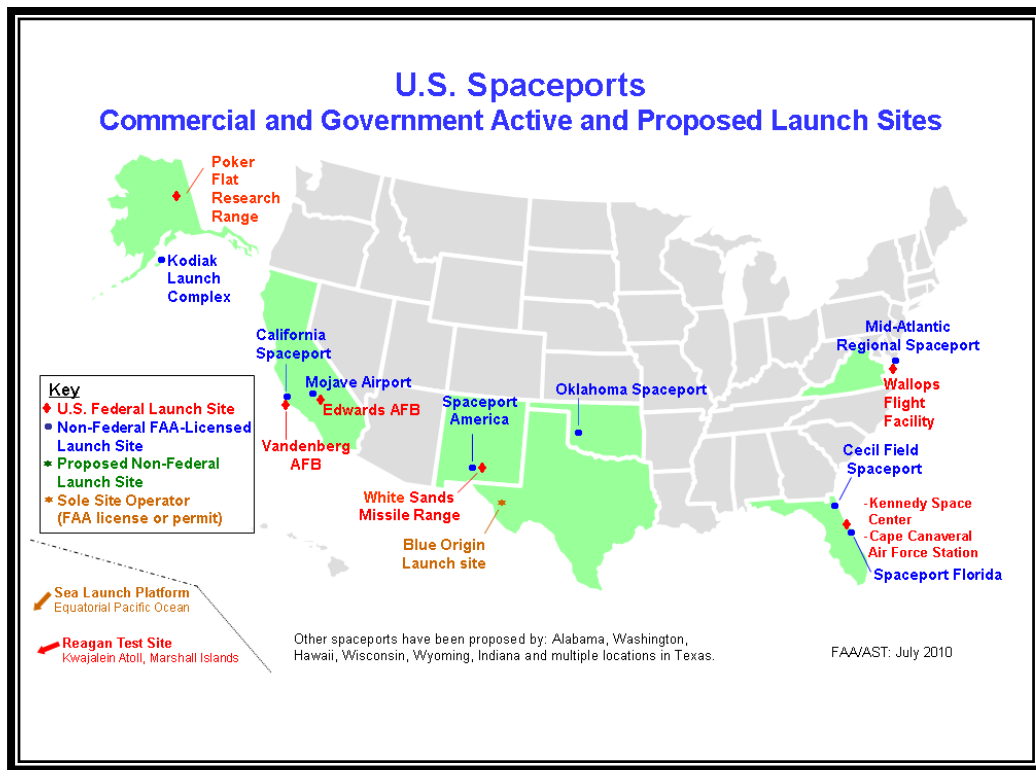


Figure 6: U.S. Spaceports

Source: www.faa.gov/about/office_org/headquarters_offices/ast/industry/media/spaceports.gif

Review of 14 C.F.R. PART 420—License To Operate A Launch Site

§ 420.21 Launch site location review—launch site boundary.

(c) For a launch site supporting any reusable launch vehicle, an applicant shall determine the debris dispersion radius that represents the maximum distance from a launch point that debris travels given a worst-case launch vehicle failure in the launch area. An applicant must clearly and convincingly demonstrate the validity of its proposed debris dispersion radius.

(4)(c) *Unguided sub-orbital expendable launch vehicle.* (1) For an unguided sub-orbital expendable launch vehicle, an applicant shall define the following...

(i) Impact dispersion areas that the applicant estimates, in accordance with the requirements of this part, to contain the impact of launch vehicle stages from nominal flight of an unguided sub-orbital expendable launch vehicle from the launch point to impact with the earth's surface; and

(ii) An overflight exclusion zone where the public risk criteria of 30×10^{-6} would be exceeded if one person were present in the open.³²

§ 420.27 Launch site location review—information requirements.

An applicant shall provide the following launch site location review information in its application:

- (a) A map or maps showing the location of each launch point proposed, and the flight azimuth, IIP, flight corridor, and each impact range and impact dispersion area for each launch point;
- (b) Each launch vehicle type and any launch vehicle class proposed for each launch point;
- (c) Trajectory data;
- (d) Wind data, including each month and any percent wind data used in the analysis;
- (e) Any launch vehicle apogee used in the analysis;
- (f) Each populated area located within a flight corridor or impact dispersion area;
- (g) The estimated casualty expectancy calculated for each populated area within a flight corridor or impact dispersion area;
- (h) The effective casualty areas used in the analysis;
- (i) The estimated casualty expectancy for each flight corridor or set of impact dispersion areas; and
- (j) If populated areas are located within an overflight exclusion zone, a demonstration that there are times when the public is not present or that the applicant has an agreement in place to evacuate the public from the overflight exclusion zone during a launch.

³² This is explained in detail in § 420.5 Definitions, defining the *Effective Casualty area* (A_c) and in § 420.19 (a)(1) A safe launch must possess a risk level estimated, in accordance with the requirements of this part, not to exceed an expected average number of 0.00003 casualties (E_c) to the collective member of the public exposed to hazards from the flight ($E_c \leq 30 \times 10^{-6}$). It is included to emphasize the safety standard responsibilities associated with acquiring a launch operator license.

§ 420.29 Launch site location review for unproven launch vehicles.

An applicant for a license to operate a launch site for an unproven launch vehicle shall provide a clear and convincing demonstration that its proposed launch site location provides an equivalent level of safety to that required by this part.

Review of Florida Statutes Related to Airports/Spaceports

Presently, the Florida Statutes do not have a specific definition for either a space flight vehicle or a spaceport as illustrated below.

Ch. 330.27, F.S. Definitions, when used in ss. 330.29-330.36, 330.38, 330.39.--

(1) "Aircraft" means a powered or unpowered machine or device capable of atmospheric flight, except a parachute or other such device used primarily as safety equipment.

Strictly construing the language a vehicle capable of flight into space would qualify as an aircraft as it is capable of atmospheric flight; however, space vehicles are capable of, and fly where there is no atmosphere, thus the FDOT should possibly suggest a clarification of the above statute. As mentioned previously,³³ the ultimate question to be resolved remains, is a rocket an aircraft per the *Ch. 330.27, F.S.* definition?

Ch. 330.27, F.S. Definitions, when used in ss. 330.29-330.36, 330.38, 330.39.--

(2) "Airport" means an area of land or water used for, or intended to be used for, landing and takeoff of aircraft, including appurtenant areas, buildings, facilities, or rights-of-way necessary to facilitate such use or intended use.

By definition an airport is one that is intended for use by "aircraft" as defined by § (1) this part may need revision, or in the alternative specifying a new category for spaceport and defining it accordingly.

Ch. 330.30, F.S. Approval of airport sites; registration and licensure of airports.

(2) LICENSES AND REGISTRATIONS; REQUIREMENTS, RENEWAL, REVOCATION.--

(a) 1. and (b) ...

1. For a public airport, the department [of Transportation] shall issue a license after a final airport inspection finds the facility to be in compliance with all requirements for the license. The license may be subject to any reasonable conditions that the department may deem necessary to protect the public health, safety, or welfare.

³³ See page 9 and 24 of this report for questions related to defining various terms related to space flight.

(b) The department [of Transportation] may license a public airport that does not meet standards only if it determines that such exception is justified by unusual circumstances or is in the interest of public convenience and does not endanger the public health, safety, or welfare. Such a license shall bear the designation “special” and shall state the conditions subject to which the license is granted.

(d)1. Each public airport license shall expire no later than 1 year after the effective date of the license, except that the expiration date of a license may be adjusted to provide a maximum license period of 18 months to facilitate airport inspections, recognize seasonal airport operations, or improve administrative efficiency.

3. The effective date and expiration date shall be shown on public airport licenses. Upon receiving an application for renewal of an airport license in a form and manner prescribed by the department and receiving a favorable inspection report indicating compliance with all applicable requirements and conditions, the department shall renew the license, subject to any conditions deemed necessary to protect the public health, safety, or welfare.

Comments and Recommendations

The language in the above statutes raises questions of interpretation pertaining to the regulatory authority of the FDOT and the FAA. One side of the argument is the FDOT can only stay within its regulatory authority and license airports, as it has no statutory authority related to spaceports, as they are not defined. Thus, the FAA has preempted the field as it licenses spaceports. However, the other side of the argument is there is no federal statutory language specifically preempting the State of Florida from licensing a spaceport and as a result it could do so if it had legislative authority. This is an important issue as it directly relates to the safety and economic aspects related to commercial space travel.

Another issue, affecting commercial space flight and airport licensing is the FDOT’s authority to license airports used by aircraft, which a space vehicle is, by the current definition under *Ch. 330.27(1), F.S.*, for at least part of its flight path into and back from space, especially in light of horizontal takeoff and landing reusable launch vehicles. The State of Florida has a unique set of challenges associated with the direction they wish to pursue as related to dealing with spaceport licensing.

Review of Florida Statutes Space Florida Part II

Ch. 331.303, F.S. Definitions.

- (1) "Aerospace" means the industry that designs and manufactures aircraft, rockets, missiles, spacecraft, satellites, space vehicles, space stations, space facilities or components thereof, and equipment, systems, facilities, simulators, programs, and related activities, including, but not limited to, the application of aerospace technologies in air-based, land-based, and sea-based platforms for commercial, civil, and defense purposes.
- (9) "Landing area" means the geographical area designated by Space Florida within the spaceport territory for or intended for the landing and surface maneuvering of any launch or other space vehicle.
- (10) "Launch pad" means any launch pad, runway, airstrip, or similar facility used for launching space vehicles.
- (15) "Recovery" means the recovery of space vehicles and payloads, which have been launched, from or by a spaceport.
- (16) "Spaceport" means any area of land or water, or any manmade object or facility located therein, developed by Space Florida under this act, which area is intended for public use or for the launching, takeoff, and landing of spacecraft and aircraft, and includes any appurtenant areas which are used or intended for public use, for spaceport buildings, or for other spaceport facilities, spaceport projects, or rights-of-way.³⁴
- (17) "Spaceport launch facilities" means industrial facilities as described in s. 380.0651(3)(c)³⁵ and include any launch pad, launch control center, and fixed launch-support equipment.

³⁴ On its face this section does not appear to apply to the Cecil Field Spaceport, as it was not developed by Space Florida. However, it infers the possible dual use nature of a spaceport for use as an airport for public use and spaceport when used by spacecraft. As written, there could possibly be varied interpretations.

³⁵ Ch. 380.0651(3)(c) F.S. is an expansive view of industrial facilities and includes...Industrial plants, industrial parks, and distribution, warehousing or wholesaling facilities —any proposed industrial, manufacturing, or processing plant, or distribution, warehousing, or wholesaling facility. It then excludes certain properties. For details refer to the statute.

Comments and Recommendations

This statute presents the need to either license a spaceport by incorporating by reference the existing FAA requirements,³⁶ or establish new State of Florida licensing criteria. The latter leads to questioning whether the FDOT will require physical attributes related to the airport facilities as expounded upon in its administrative rules³⁷ and apply them, in addition to the FAA safety and environmental licensing standards. To date, the FAA has not addressed the physical requirements associated with spaceports. In this respect, should the FDOT choose, they could incorporate their own physical airport attributes and standards into its spaceport-licensing model. The dilemma continues when looking at the FAA’s licensing of reentry sites associated with space travel activities and will the FDOT license reentry sites as well. As the FDOT’s administrative rules are based on safety, this is a major consideration.

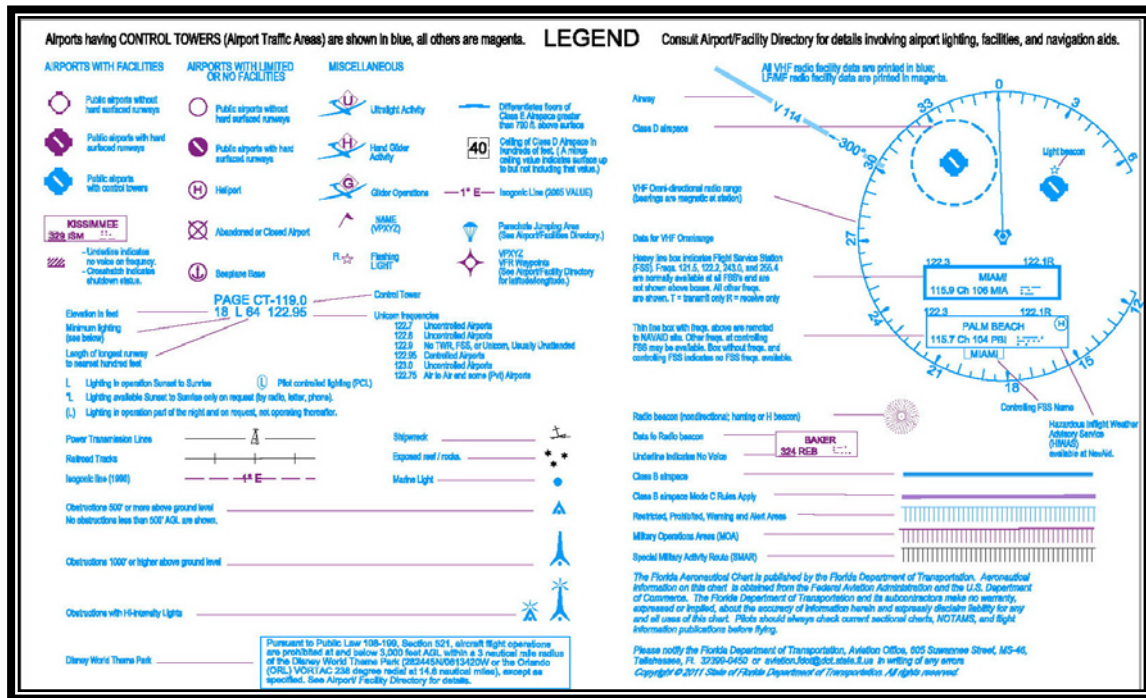


Figure 7: 2011 Florida Aeronautical Chart Legend

³⁶ The FDOT has done this in Rule 14-60.007, F.A.C., Airfield Standards for Licensed Airport. “Airports fulfilling the requirements of Title 14, C.F.R., Aeronautics and Space, Chapter 1, Federal Aviation Regulations, Federal Aviation Administration, Department of Transportation, Part 139, Certification and Operations: Land Airports Serving Certain Air Carriers, dated January 1, 2004, incorporated herein by reference, airport certification program shall be considered to meet the minimum standards for licensed airports shown below. All airports licensed by the State of Florida, whether public or private, shall comply with the following minimum airfield standards.”

³⁷ These include Rules 14-60.003, F.A.C., Purpose, Definitions, and Designation of Signature Authority; 14-60.005 F.A.C., Airport Site Approval, 14-60.006, F.A.C., Airport Licenses and Registration; 14.60.07, F.A.C., Airfield Standards for Licensed Airports; 14.60.009, F.A.C., Airspace Protection; and 14-60.011, F.A.C., Forms.

Not yet addressed by the FAA or FDOT, is identifying spaceports on published sectional charts, as well as in AFDs. Sectional charts identify various types of airports using a variety of symbols to help pilots identify the size, type, and uses of the available airport facilities. Public, private, military, seaplane, and heliports are depicted on sectional charts as well as airports that are special use facilities for glider, ultralight or parachute activities. As pilots routinely use charts, being able to identify airports and their use is vital to pilot and public safety.

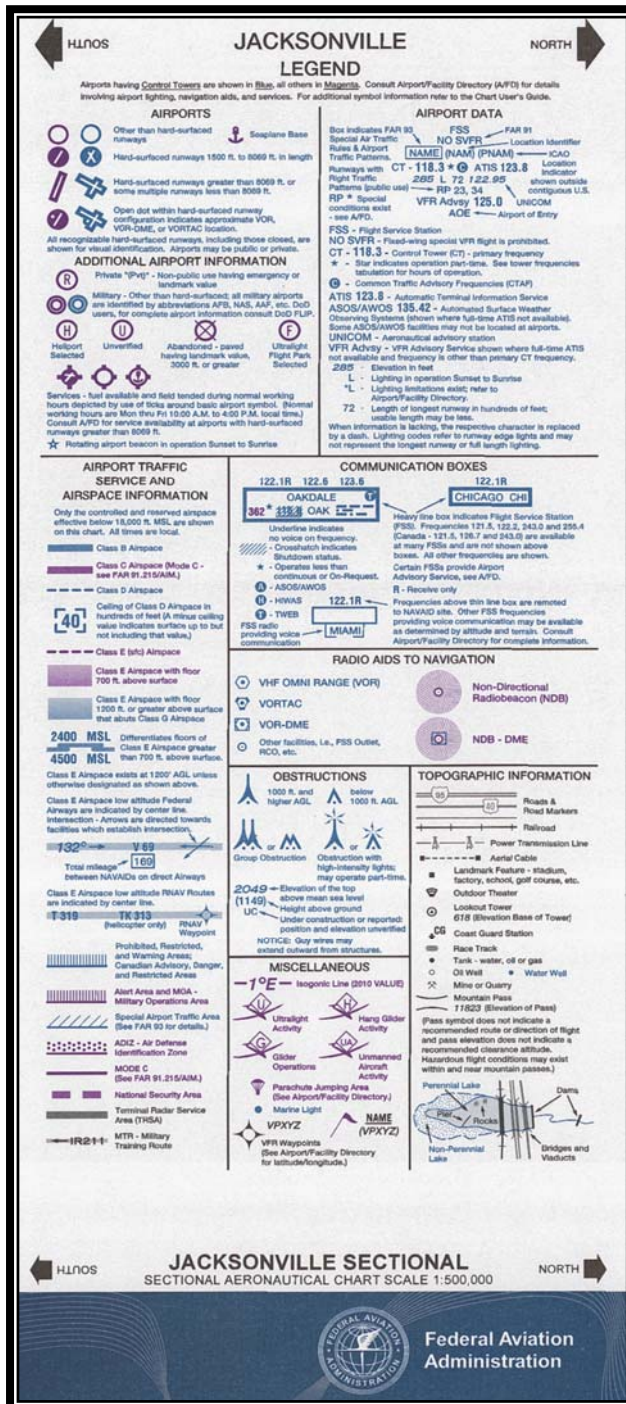


Figure 8: NACO Chart

Spaceports, whether vertical or horizontal takeoff or recovery capable, need to be identified for pilots to make them aware of their rights and responsibilities in using such facilities, whether they are flying with either Federal or State of Florida published charts and directories such as the chart shown in Figure 8 above.

Using Cecil Field (KVQQ) as an example of a licensed spaceport,³⁸ the current National Aeronautical Charting Office (NACO) or 2011 Florida Aeronautical Chart does not depict the airport as a spaceport nor is it listed as such in the FAA AFD or the 2010 Florida Airport Directory.³⁹ It is depicted on both charts and listed as a public airport in both directories, highlighting the possible dual use nature of airports/spaceports and the quandary that could create for aviators. The two depictions of Cecil Field are shown below in Figures 9 and 10.

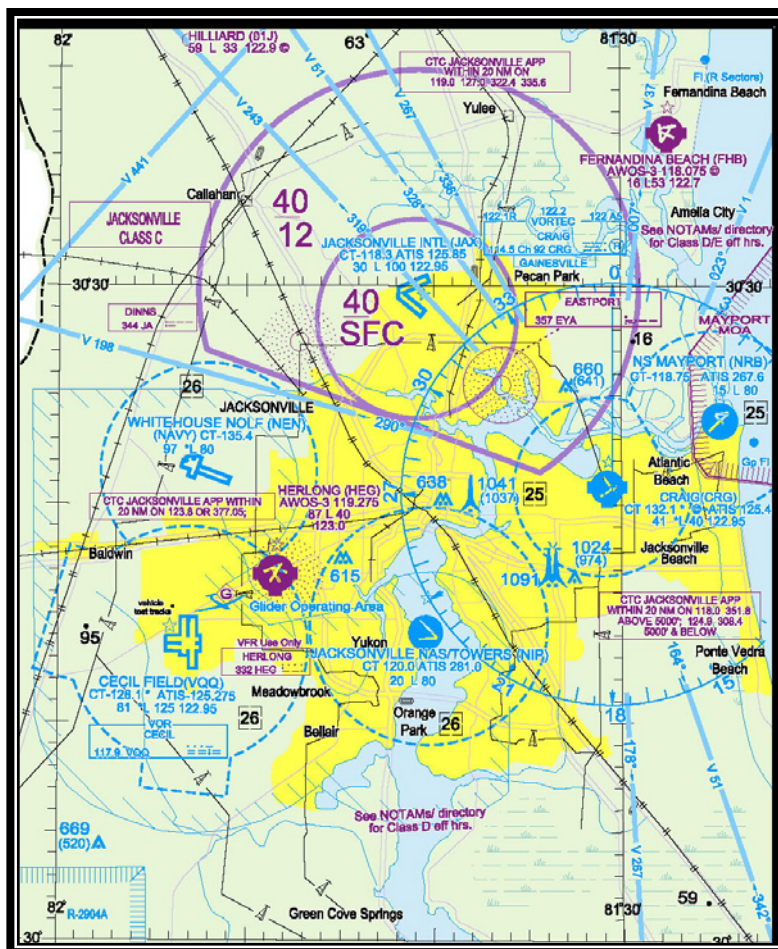


Figure 9: Depiction of Cecil Field from the 2011 Florida Aeronautical Chart

³⁸ Klotz, Irene. *North Florida Airport Becomes Licensed Spaceport*. Cecil Field was the eighth facility to receive a Spaceport license by the FAA on January 11, 2010. Accessed on August 17, 2010 at <http://news.discovery.com/space/north-florida-airport-becomes-licensed-spaceport.html>

³⁹ This is not limited to the FDOT; the FAA is dealing with and commissioning studies of the same issues.

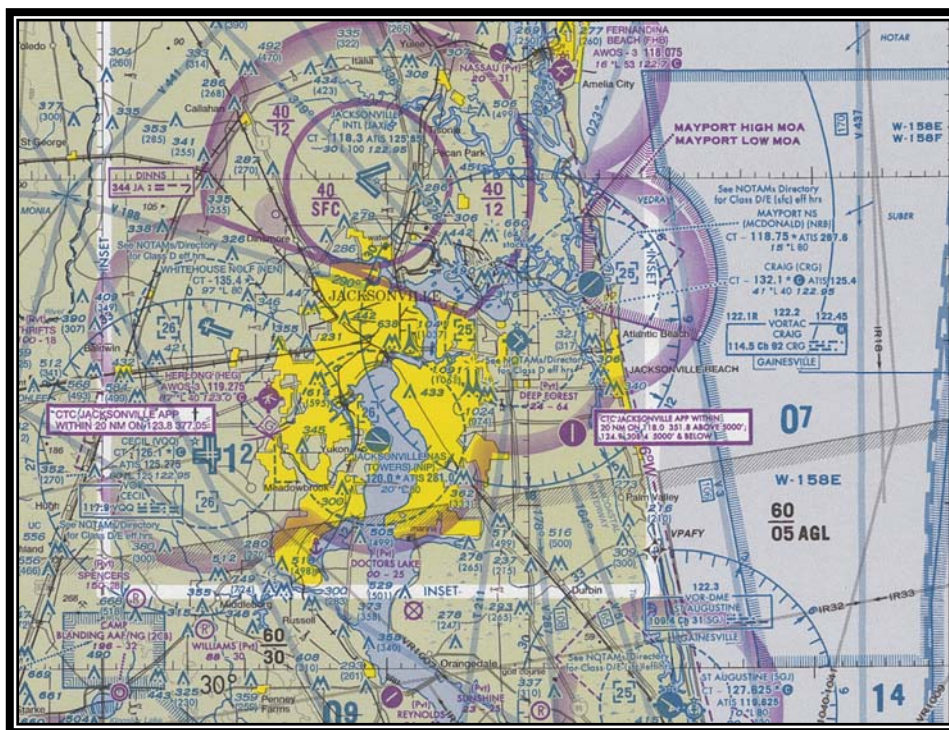


Figure 10: Depiction of Cecil Field from NACO

The point is that the FDOT needs to be a part of the discussions on the practical implications surrounding spaceports as related to their functional use and depiction for not only space related activities, but to aviation in general.⁴⁰

It is recommended the FDOT and Space Florida take a very close and comprehensive look at the language of the State of Florida enabling statutes related to airport licensing. The focus should not only be on the safety and environmental emphasis of the federal licensing requirements but also the physical, technological, and practical aspects associated with licensing a spaceport and should be done in conjunction with current and future FAA initiatives.⁴¹

Review of FDOT Administrative Rules in the Florida Administrative Code

As previously mentioned there are six administrative rules applicable to possible spaceport licensing. Below are examples.

⁴⁰ The issues are not limited to what symbol to use on a chart or to identify a spaceport in a directory. Runways, taxiways, lighting, communications, arrivals, departures, NOTAMS, weather gathering and dissemination, instrument approach procedures are but a few of the concerns in attempting to define a functioning spaceport.

⁴¹ Ch. 330.31 F.S. says in part, The department is authorized to confer with or to hold joint hearing with any agency of the United States in connection with any matter arising under ss. 330.27-330.36, 330.38 and 330.39 or relating to safe developments of airports. (In this case, confer as relating to spaceports (-added by author)).

14-60.003, F.A.C. Purpose, Definitions, and Designation of Signature Authority.

(2) 1. “Aeronautics” means transportation by aircraft; the operation, construction, repair, or maintenance of aircraft, aircraft power plants and accessories, including the repair, packing, and maintenance of parachutes; the design, establishment, construction, extension, operation, improvement, repair, or maintenance of airports, restricted landing areas, or other air navigation facilities, and air instruction.

The specifics associated with the definition of terms has been addressed previously as to “aircraft” and if it applies to a vehicle capable of travel to and from space. As related to commercial space activities the FDOT may wish to consider adding such terms as aerospace, commercial space activity/tourism, flight crew member, orbital/suborbital flight, space, spaceport, space flight participant/passenger, horizontal/vertical launch, space launch/recovery/activities, and space vehicle/craft to its administrative rules. The Florida Statutes in *Ch. 331.303, F.S.* use these or related terms in conjunction with the rights and responsibilities associated with Space Florida, but the FDOT should evaluate the need to expand the applicable terminology related to commercial space activity.

14-60.003, F.A.C. Purpose, Definitions, and Designation of Signature Authority.

(3) The State Aviation Manager is authorized to issue site approval orders and licenses, and to accept registrations for those airports subject to the licensing and registration requirements of Section 330.30, Florida Statutes, and to enforce the provisions of Chapter 330, Florida Statutes. Additionally, the State Aviation Manager is authorized to issue airspace obstruction permits subject to the requirements of Section 333.025, Florida Statutes, and to enforce the provisions of Chapter 333, Florida Statutes.

14-60.005, F.A.C. Airport Site Approval.

(1) Any proposed new airport requires an airport site approval order issued by the Florida Department of Transportation (Department). Site approval by the Department is required prior to the establishment of an operational airport.

Without reading too much into the current language, or the specific *Ch. 330.27, F.S.* definitions of aircraft and airports, the FDOT should consider adding a rule specific to Spaceport Site Approval or amend this rule to read Airport/Spaceport Site Approval. Although there are



Figure 11: Kennedy Space Center Landing Strip and Canaveral Skid Strip
Source: Google Maps

existing vertical launch facilities at Cape Canaveral⁴² and a horizontal facility at Cecil Field the possibility exists that new spaceports may be in Florida's future and the FDOT should position itself to deal with those possibilities. This could also be a factor should the Shuttle Landing Facility at the Kennedy Space Center's 15,000 foot runway and the Cape

Canaveral Air Force Station's 10,000 foot runway need to be licensed as "new" airports depending on future decisions by NASA or the Air Force regarding their future involvement.⁴³

14-60.006, F.A.C. Airport Licenses and Registrations.

(1)(a) Public Airport. Public airports shall be licensed after the site approval is granted by the Department [of Transportation], including completion of the public announcement and physical airport inspection process, if the Department [of Transportation] finds the facility to be in compliance with all requirements for the license. The license shall be subject to any conditions that are necessary to protect the public health, safety, or welfare. Such conditions shall include the requirement to remove natural growth obstructions, relocate aircraft parking sites beyond runway protective boundaries, or provide aircraft warning lights on structures in close proximity to the runway or potential ground hazards.

⁴² These include SLC-36, SLC-46 and SLC-47 at the Cape Canaveral Air Force Station. SLC-40 supports SpaceX activities.

⁴³ Space Florida Spaceport Master Plan 2010. The Kennedy Space Center and Cape Canaveral Air Force Station are considered federal spaceports and approved by the FAA.

With all of the *14-60, F.A.C.* Rules dealing with “airports,” the FDOT should consider either adding the term spaceport to the Administrative Rules as written or promulgate rules specific to spaceports.

14-60.006, F.A.C. Airport Licenses and Registrations.

- (2) Airport Licensing. The following provisions apply to airport licensing:
- (g) The Department shall only license an airport that meets established standards unless the Department determines that an airport’s exception to established standards is justified by unusual circumstances or is in the interest of public convenience and does not endanger the public health, safety, or welfare. Such a license shall bear the designation “Special” and shall state the conditions to which the license is granted.

Should the FDOT prefer to license an airport for spaceport operations and not create a spaceport license per se, use of Rule *14-60.006, F.A.C. § (2)(g)* would be a possible mechanism to do so. In this case, the “Special” designation could be applied to an existing airport noting the airport has the capability for facilitating suborbital and orbital space flight vehicles and operations.

14-60.007, F.A.C. Airfield Standards for Licensed Airports.

Airports fulfilling the requirements of Title 14, C.F.R., Aeronautics and Space, Chapter 1, Federal Aviation Regulations, Federal Aviation Administration, Department of Transportation, Part 139, Certification and Operations: Land Airports Serving Certain Air Carriers, dated January 1, 2004, incorporated herein by reference, airport certification program shall be considered to meet the minimum standards for licensed airports shown below. All airports licensed by the state of Florida, whether public or private, shall comply with the following minimum airfield standards.

This section of the Administrative Rules deals with the following:

- § (1) Minimum Landing Area Dimensions for Licensed Airports
- § (2) Landing and Surface Areas for Licensed Airports
 - (b) Primary Surface
 - (c) Approach Surface
 - (d) Transition Surface
- § (3) Thresholds and Displaced Thresholds for Licensed Airports
- § (4) Vertical Approach Clearance for Licensed Airports
- § (5) Runway Safety Areas for Licensed Airports
- § (6) Runway Pavement Standards for Licensed Airports
- § (7) Airfield Improvements for Licensed Airports
- § (8) Additional Responsibilities
- § (9) Airport Markings
- § (10) Airport Lighting

Comments and Recommendations

The above are the practical criteria associated with ultimately defining a spaceport. There are some primary areas upon which to focus in order to properly adapt these standards to those necessary for spaceport operations and space vehicles. These would include:

1. Redefining Approach, Transition Surfaces, and Thresholds, Vertical Approach Clearance, and Runway Safety Areas for vertical takeoff and landing reusable launch vehicles, as the aspect ratios may not be applicable.⁴⁴
2. Runway Pavement Standards would need to be addressed for horizontal Category X RLVs as the fuel for the rocket engines could possibly compromise, or worse, ignite or severely compromise a petroleum based surface, in the case of spillage or a ruptured fuel tank.
3. Adding requirements for an Explosive Site Plan⁴⁵ using, for example, the one in place for Cecil Field.⁴⁶ Figure 12 depicts potential proposed fuel and payload processing areas.

It is evident the above are issues directly related to the FDOT's safety responsibilities for those associated with spaceport operations inside the confines of the property and for those outside those boundaries as well.

By looking at these issues now, the FDOT would be in a preemptive position as opposed to a reactive position at such time the FAA looks beyond the environmental and safety criteria for licensing spaceports. It does not appear it is a question of if the FAA will expand its licensing criteria, it is a matter of when and the FDOT should be prepared to lead these discussions with the FAA regarding these areas.

⁴⁴ Leonard, David. *Veil Lifts Slightly on Secretive Blue Origin Rocket Project*, posted: 26 February 2010. The New Shepard will consist of a pressurized crew capsule mounted atop a propulsion module to hurl experiments and astronauts upward of 400,000 feet (120 kilometers). New Shepard would depart from Blue Origin's already operational private spaceport in west Texas. The trajectory is nearly vertical . . . straight up, straight down, and will reenter vertically and restart the engines and do a powered landing on the propulsion module. Accessed on 08/18/10 at <http://www.space.com/business/technology/blue-origin-rocket-secrets-100226.html>.

⁴⁵ 14 C.F.R. §§ 420.63-420.69 details the requirement to have an explosive site plan and standards for handling and storage of liquid and solid propellants on launch areas other than those associated with a federal launch range. This could be incorporated by reference as can all the federal regulations associated with space law. Additionally, the Department of Alcohol, Tobacco, Firearms and Explosives (ATF) may exercise regulatory or oversight control as related to State of Florida spaceports storing and handling potentially explosive fuels used by commercial space vendors.

⁴⁶ Space Florida Spaceport Master Plan 2010 page 76-77.



Figure 12: Jacksonville Aviation Authority depiction of potential RLV fuel, payload, housing and Spaceport use facilities at Cecil Field;
Source: Jacksonville Aviation Authority

LICENSING AND REGULATION OF OPERATORS

14 C.F.R. Part 433—License To Operate A Reentry Site Part 401—Organization And Definitions

§ 401.5 Definitions.

Reentry operator means a person responsible for conducting the reentry of a reentry vehicle as specified in a license issued by the FAA.

Reentry site means the location on Earth where a reentry vehicle is intended to return. It includes the area within three standard deviations of the intended landing point (the predicted three-sigma footprint).

§ 433.1 General.

The FAA evaluates on an individual basis an applicant's proposal to operate a reentry site.

§ 433.3 Issuance of a license to operate a reentry site.

(a) The FAA issues a license to operate a reentry site when it determines that an applicant's operation of the reentry site does not jeopardize public health and safety, the safety of property, U.S. national security or foreign policy interests, or international obligations of the United States.

(b) A license to operate a reentry site authorizes a licensee to operate a reentry site in accordance with the representations contained in the licensee's application, subject to the licensee's compliance with terms and conditions contained in any license order accompanying the license.

§ 433.5 Operational restrictions on a reentry site.

A license to operate a reentry site authorizes the licensee to offer use of the site to support reentry of a reentry vehicle for which the three-sigma footprint⁴⁷ of the vehicle upon reentry is wholly contained within the site.

Comments and Recommendations

§§ 433.7 and 433.9 deal with environmental compliance with existing federal environmental acts. This is consistent with the two major areas the FAA looks at when licensing a spaceport, those being environmental and safety.

§ 433.5 has been highlighted, as it could potentially be problematic. For a horizontal takeoff and landing RLV, it is reasonably safe to assume the reentry vehicle would come back to a specific reentry site and thus meet the three-sigma footprint statistical requirements and thus

⁴⁷ Generally speaking, the three-sigma footprint is a statistical and probability formula for determining how far a spacecraft would land from a designated area.

prove its statistical compliance. As an example, WhiteKnightOne and Two and SpaceShipOne have made it back to the airport from which they were launched and thus that airport would be classified as its reentry airport and meet the three-sigma footprint criteria. Of course, this depends on whether the statute applies to horizontal landing aircraft, which there is no reason to believe it does not.

However, for those using vertical takeoff and recovery vehicles, those statistics have yet to be proven, i.e. Blue Origin has yet to launch and recover.⁴⁸ Thus, licensing a vertical spaceport as a reentry site, by the FAA, using its own standards, on the one hand could raise concerns as there are no statistics; however, if any vendor ultimately takes off from a licensed spaceport and comes back to that site one time they could say, and be statistically correct regarding the three-sigma footprint, that they should get a license to operate as a reentry site.

Admittedly, the above may be extreme but there are foreseeable examples of why the FDOT should look closely at the regulatory framework and ask for clarification before incorporating by reference existing FAA standards, or how they should address these questions should they wish to draft their own regulations in this area.

The decision the FDOT has to make, as an agency, is if it is going to seek a determination that it has legislative authority to license a spaceport facility. If not, does it want to seek such authority and then ultimately license spaceports within the state of Florida. Depending on its decision, this will lead to either establishing licensing criteria of its own design or licensing them by reference or default to the *Title 14 C.F.R. §§ 420 and 433* standards established by the FAA. The FDOT, like the FAA, should, as previously discussed, also look beyond the safety and environmental concerns and address the physical, technological and support characteristics a facility should have to be designated as a spaceport.

The issue goes beyond establishing licensing criteria but anticipating any unintended consequences including, does licensing a spaceport establish revenue responsibilities for the State to the newly licensed facility? If the FDOT has these responsibilities related to airport and their licensing, the argument could be made it would have those responsibilities as related to licensed spaceports. Designating them dual use or special airports could raise the same concerns.

⁴⁸ Supra, see note 44.

This would be of major interest to those cities or municipalities who have or are considering spaceport facilities as to maintaining or planning future facility improvements and their ability to fund specific projects, either in part with help from the FDOT or in full.

Another consideration is the impact on redefining what constitutes and defines the State of Florida's intermodal system as it relates to space flight activities. The broadest and most often conceptualized aspects of intermodal systems are related to road, rail, automobile, marine, and aviation transportation. These aspects are defined by their specific infrastructures and their affect on each other, commercial activity and the general public. Space flight adds another intermodal dimension if in fact it is seen as such, as it combines two intermodal systems, aviation and space travel, and confines them to a vertical or horizontal launch facility. The ramifications for the FDOT is the fiscal accountability or new found fiscal responsibility associated with allocating funds for airport infrastructure improvements under the State's intermodal system plan.

Review of federal regulations related to operational responsibilities associated with spaceport licenses

Title 14 C.F.R. §§417.121(c)

(c) *Collision avoidance.* A launch operator must coordinate with United States Strategic Command to obtain a collision avoidance analysis, also referred to as a conjunction on launch assessment, as required by *Title 14 C.F.R. 417.231*. A launch operator must implement flight commit criteria as required by *Ch. 417.113(b)* to ensure that each launch meets all the criteria of *Title 14 C.F.R. 417.107(e)*.⁴⁹

Title 14 C.F.R. 420.31 Agreements.

- (a) Except as provided by paragraph (c) of this section, an applicant shall complete an agreement with the local U.S. Coast Guard district to establish procedures for the issuance of a Notice to Mariners prior to a launch and other such measures as the Coast Guard deems necessary to protect public health and safety.
- (b) Except as provided by paragraph (c) of this section, an applicant shall complete an agreement with the FAA Air Traffic Control (ATC) office having jurisdiction over the airspace through which launches will take place, to establish procedures for the issuance of a Notice to Airmen prior to a launch and foreclosing of air routes during the launch window and other such measures as the

⁴⁹ The additional sections referred to by this part refer to ensuring a payload or jettisoned material for orbital or suborbital pass no closer than 200 kilometers to a manned or man able orbital object throughout the flight.

FAA ATC office deems necessary to protect public health and safety.

(c) An applicant that plans to operate a launch site located on a federal launch range does not have to comply with section 420.31 if the applicant is using existing federal launch range agreements with the U.S. Coast Guard and the FAA ATC office having jurisdiction over the airspace through which launches will take place.

Review of Florida Statutes related to notification responsibilities.

Ch. 331.306, F.S. Federal airspace notification.

In accordance with Federal Aviation Administration procedures, Space Florida shall file the appropriate federal notification to activate special use airspace in support of its⁵⁰ launch operations.

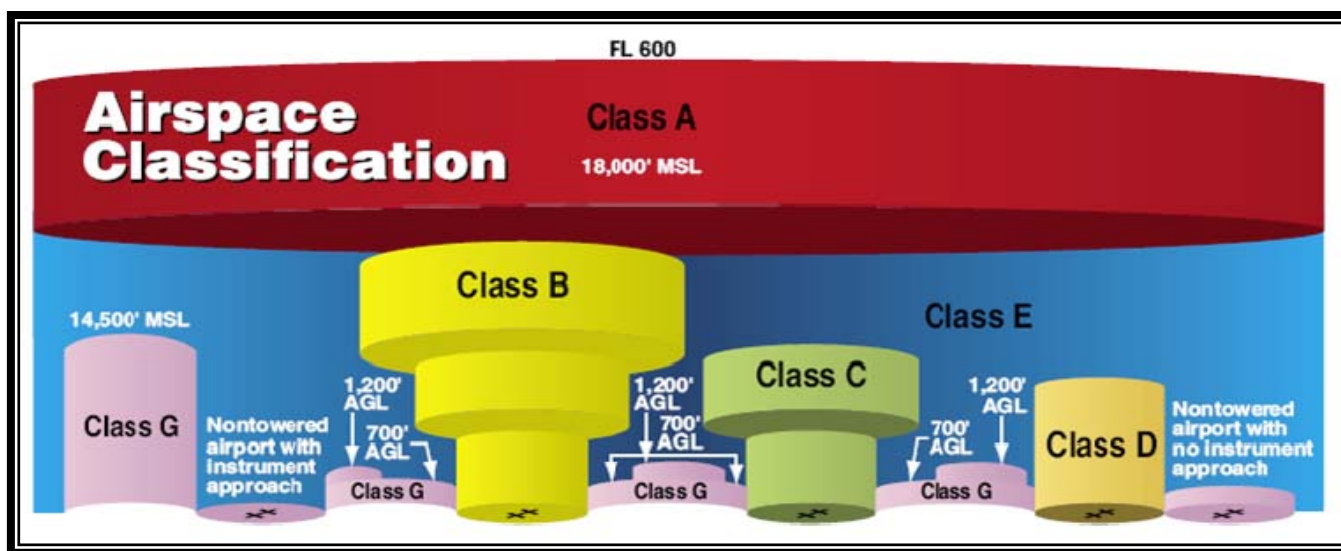


Figure 13: U.S. Airspace Classifications

As a licensed spaceport, Cecil Field has four types of airspace impacted by the notification issue and two of which are over water geographic impact areas. The airspace involved includes Class D, Class E, and Class A⁵¹ airspace as shown in Figure 13. Also impacted are the airspace associated with the Air Defense Identification Zone (ADIZ) and Warning Area

⁵⁰ Speaking with a Space Florida official, as an entity Space Florida’s predecessor, Florida Space Authority conducted launch operations. However, if Space Florida sponsors a launch or contract one to an outside source the FAA would consider it a launch operation and they would be subject to § 331.306 F.S.

⁵¹ Class D as defined in the *Aeronautical Information Manual (AIM)* is generally that airspace from the surface to 2,500 above the airport elevation (charted in mean sea level (MSL) surrounding those airport that have an operational control tower (Cecil Field is 2600 msl). Class E begins at 700 or 1200 feet above the ground extending up to but not including 18,000 msl. Class A airspace begins at flight level 18,000 feet MSL) up to and including flight level 600, including the airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States and Alaska...and beyond 12 nautical miles of the coast...within areas of domestic radio navigational signal or ATC radar coverage...

W-158 A and Warning Area W-158 E.⁵² As these specific types of airspace would be implicated in a flight from Cecil Field it would require communication and coordination with the appropriate approach, departure and Air Traffic Control Centers. It would more likely than not also require communication with those military air traffic control facilities whose airspace includes the ADIZ or the on/off shore Warning Areas.

Figure 14 depicts the flight corridor currently designed for use by those commercial space flight vendors for use in conjunction with the Cecil Field Spaceport and corresponding altitudes for arrivals and departures. The pictorial view includes various altitudes for each section and the overland and overwater airspace that would be impacted by potential RLVs.

The over water geographical impact area includes the ADIZ and Warning Area as they are over the Atlantic Ocean and as such would require an operator to communicate with the Coast Guard regarding launch and recovery operations. Warning Area W-158 E is an area south of Cecil Field and extends over land from an altitude of 500 feet above ground level (agl) to an altitude of 6000 feet agl (see Figure 14).

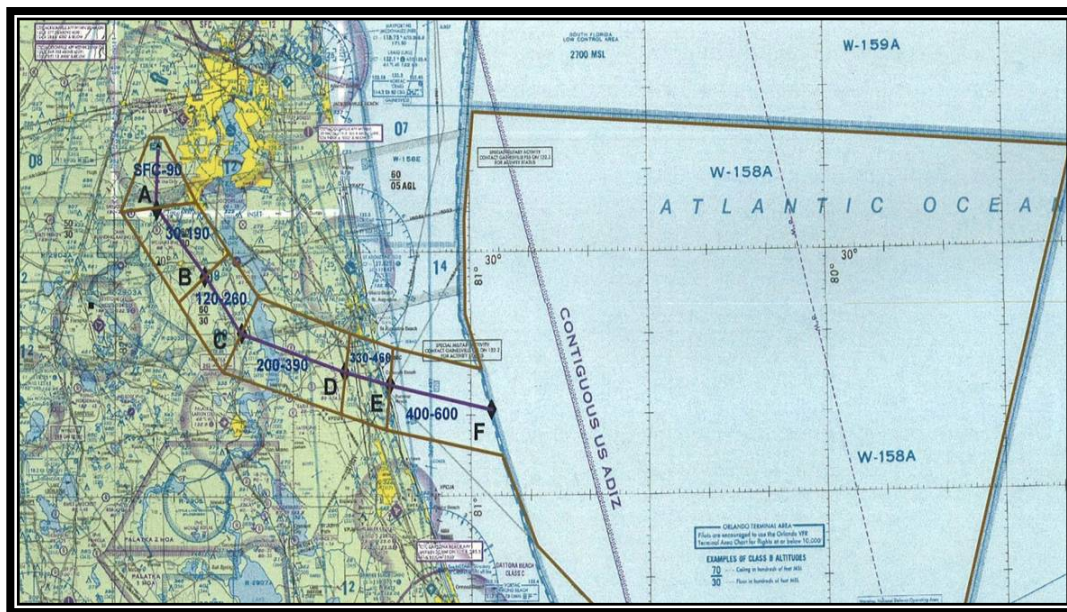


Figure 14: Proposed RLV launch/recovery corridors to and from Cecil Field
Source: Jacksonville Aviation Authority

⁵² Per FAR § 99.3 Definitions-Air defense identification zone (ADIZ) means an area of airspace over land or water in which the ready identification, location, and control of all aircraft (except for Department of Defense and law enforcement aircraft) is required in the interest of national security. The AIM in Chapter 3 §3-4-4 defines a warning area as airspace of defined dimensions, extending from three nautical miles outward from the coast of the U.S., which contains activity that may be hazardous to nonparticipating aircraft. The purpose of such warning areas is to warn nonparticipating pilots of the potential danger. A warning area may be located over domestic or international waters or both.

Discussion between the FDOT and the FAA should include the possibility of adding a classification of airspace above FL 600. If the commercial space industry’s estimation of up to four (4) suborbital flights per day⁵³ and up to two hundred flights per year for vertical launch vendors,⁵⁴ new airspace, now undefined will be in common use and should be appropriately identified. This should also be discussed in light of possible point-to-point suborbital space travel, either domestically or internationally and its feasibility in the future that may not be as distant as one may imagine.

Figure 15 is a Reynolds, Smith and Hills rendition of a Nominal Mission Profile for a RLV leaving and returning to Cecil Field.⁵⁵ Table 1 is a representation of the Nominal Launch Phases. These renditions, combined with the depictions from the NACA chart portray the futuristic vision of what flight commercial space travel will entail as related to commercial RLV activity over and near north Florida.

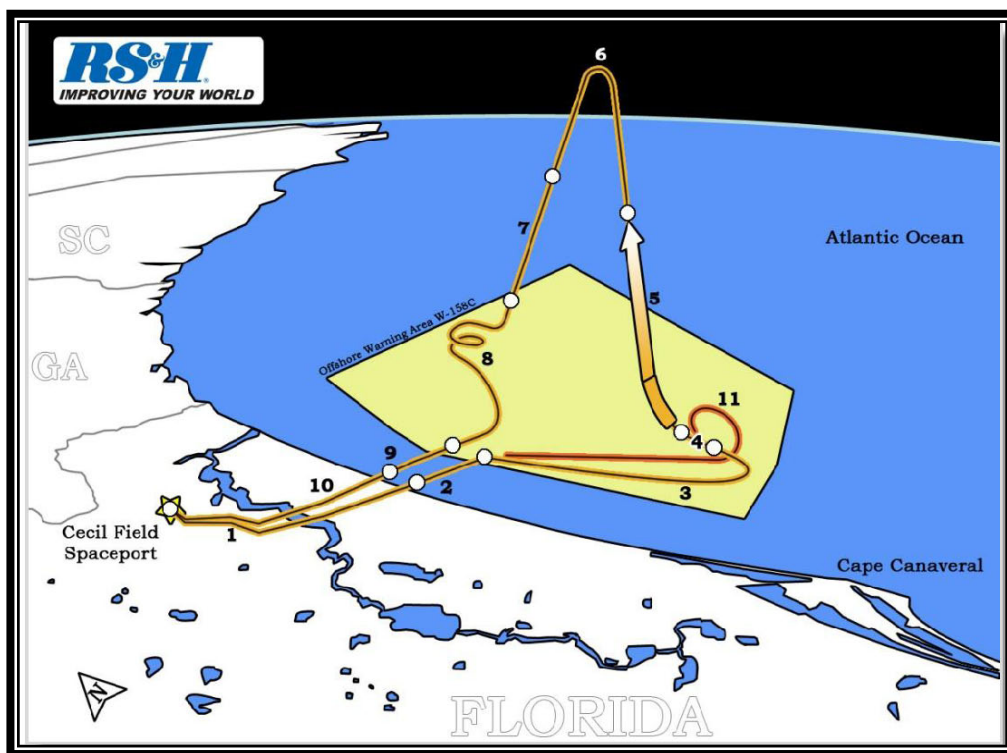


Figure 15: Nominal Mission Profile
Source: Space Florida Spaceport Master Plan 2010 as prepared by Reynolds, Smith and Hills, Inc. pg. 74

⁵³ VIRGIN GALACTIC A NEW PLATFORM FOR RESEARCH: A Summary Brief for Investigators

⁵⁴ Dr. Alan Stern, at the Next-Gen Suborbital Space Grant Workshop, July 27, 2010.

⁵⁵ Note: The Warning Area in this figure is depicted as W-158 C not W-158 A.

Nominal Launch Phases	Flight Configuration
(1) Takeoff from Cecil Field and Flight to Coast	Launch Vehicle & Carrier Aircraft (if applicable)
(2) Flight from Coast to Offshore Warning Area (W-158C)	
(3) Flight to Launch Point	
(4) Separation and Glide to Launch	Launch Vehicle
(5) Launch and Boost Phase	
(6) Suborbital Trajectory	
(7) Ballistic Reentry	
(8) Return to Aerodynamic Flight & Glide	
(9) Glide from Offshore Warning Area to Coast	
(10) Glide to Cecil Field and Landing	
(11) Carrier Aircraft Returns to Cecil Field	Carrier Aircraft Only

Table 1: Nominal Launch Phases

Source: Space Florida Spaceport Master Plan 2010 as prepared by Reynolds, Smith and Hills, Inc, pg. 75

In addition to the above launch operator notification requirements, the FDOT and Space Florida should consider a means to be informed of and be made aware of launch and recovery notification and coordination responsibilities associated with flying into and out of the Warning Area airspace over the Atlantic Ocean, as the projected flying profile for a RLV flying from Cecil Field will spend a considerable portion of the flight in this area. Another consideration would be asking the FAA to designate the airspace as Prohibited or Restricted⁵⁶ when in use by RLV operators.

Title 14 C.F.R. §420.49 Compliance monitoring.

A licensee shall allow access by and cooperate with federal officers or employees or other individuals authorized by the FAA to observe any activities of the licensee, its customers, its contractors, or subcontractors, associated with licensed operation of the licensee’s launch site.

There are no State of Florida compliance monitoring statutes directly applicable to this section.

Ch. 331.305, F.S. Powers of Space Florida

(18) Hire, through its president, a safety officer with substantial experience in public safety procedures and programs for space vehicle launching and related hazardous operations. The safety officer shall monitor and report on the safety and hazards of ground-based space operations to the president.

⁵⁶ An argument against any restrictions would be typical commercial, general and military aviation aircraft are not capable of flight above Flight Level 600, thus these operations could continue during RLV activities and airspace of this nature does not generally change designation once established.

Comments and Recommendations

Ch. 331.305, F.S. appears to be ambiguous, as it does not specify if it relates to only those activities associated with Space Florida and its contractors or to those private entities as it relates to FAA licensed spaceport operators. No matter the interpretation, the FDOT should consider requesting of the Florida Legislature statutory language granting it compliance monitoring of spaceports licensed by the FAA whether the FDOT chooses to become a licensing body by incorporation or otherwise.

LIABILITY FOR REGULATORS

With the development of new technology expanding the width and breath of space travel to space tourism, thus increasing the likelihood of space flight, the international community currently has in place treaty law directly related to the legal responsibilities of States⁵⁷ pursuing space activities associated with its use and exploration. Several provisions in the treaties deal specifically with liability, which indirectly corresponds to protection of those affected by participants in commercial space flight activities.

The United Nations, in an effort to establish uniform guidelines, has formulated international rules to both foster and facilitate travel into and exploration of space and the responsibility States have in such pursuits. Section 1 of the United Nations Treaty reviews those sections specific to a State's responsibilities.⁵⁸

This part is organized to first introduce the United Nations Treaty, then applicable United States and Florida law. The sections below first establish the applicable international law pertaining to the specific Articles. Immediately following are any federal or state statutes pertaining to, or articulating, what entity will be responsible for compliance.

⁵⁷ In treaty law, a State is a country who is signatory to the applicable international agreement, not to be confused with individual states as normally associated with countries who include individual sovereign states as does the United States.

⁵⁸ Note: Only those sections the author deemed pertinent to the focus of this report are discussed, not the Treaty in its entirety.

NATIONAL OUTER SPACE RESPONSIBILITIES

TREATY ON PRINCIPLES GOVERNING THE ACTIVITIES OF STATES IN THE EXPLORATION AND USE OF OUTER SPACE, INCLUDING THE MOON AND OTHER CELESTIAL BODIES.

This treaty addresses and encompasses commercial space travel and future space flight participants.⁵⁹ *Article I* of this section in part says...[T]he exploration and use of outer space. By reference, those commercial vendors associated with carrying cargo, being part of a crew, and those who have paid to experience space flight activities are, or will be, involved in the use of outer space. The term also appears in *Articles III, IX, X, XI and XIII*. Use of outer space is a term that appears to address, by its breathe, an expanse of space activities. *Article VI* addresses liability of State Parties to the Treaty and says in part:

States Parties to the Treaty shall bear international responsibility for national activities⁶⁰ in outer space,...whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental...shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space,...by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization.

Federal Law:

Title 14 C.F.R. §§400-1199 through the authority of *Title 49 U.S.C. § 70101-70121* establish FAA statutory requirements related to Procedural and Licensing requirements for commercial space transportation operators in the United States.

State Law:

There are no State laws related to this section.

⁵⁹ Space Flight Participant is a term specific to United States federal regulations 49 U.S.C. 70102 (17) “an individual, who is not crew, carried within a launch vehicle or reentry vehicle” and used in § 331.501(1)(a) F.S. The United Nations has not dealt specifically with those who may travel into space, except to identify them as “astronauts” as referenced in, for example, in Article V of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, referring to them as envoys of mankind, affording them all possible assistance in the event of an accident, distress or emergency landing on the territory of another State Party or on the high seas.

⁶⁰ An argument could be made that commercial space tourism is not a “national activity” even if done by “non-governmental entities,” but that would be a matter for the court and outside the speculation of this research. Thus, for purposes herein, the United States will presumed to be held responsible.

Key points

Related to commercial space travel involving flying persons into space for hire, it would more likely than not, be associated with “non-governmental entities” and the United States would be responsible for authorization and supervision of such activities. Having said that, specific to Florida, Space Florida and its sponsorship or contract potential related to space flight vendors and activities may be considered a governmental activity as an entity of the State of Florida.⁶¹

International Liability

Article VII directly deals with international liability.

Each State Party to the Treaty that launches or procures the launching of an object into outer space, ...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...

Strictly construing and using the plain meaning of its words would imply the United States is liable for those launches it procures, i.e. in the absence of the Shuttle Program for the activities of commercial contractors to carry material to the International Space Station, from its territory-Florida to the persons of another territory. It is not intended to imply Florida, Space Florida or commercial space flight operators would be free from liability. This issue is addressed in another section of the treaty and will be revisited.

Applicable Federal And State Statues:

For third party claims governing launch operator:

49 U.S.C. §70112(a)(3)

For the total claims related to one launch or reentry, a licensee or transferee is not required to obtain insurance or demonstrate financial responsibility of more than - (A)(i) \$500,000,000 and the U.S. will indemnify a launch operator for any claim if the amount is not more than \$1,500,000,000 (*49 U.S.C. §70113(1)(B)*)

⁶¹ Supra, see note 50.

However, the above only applies pursuant to 49 U.S.C. §70113(f) [t]o a license issued or transferred under this chapter for which the Secretary [of Transportation] receives a complete and valid application not later than December 31, 2009. This section does not apply to permits. The result is, the U.S. may no longer indemnify those who apply for licenses after this date.⁶²

For liability associated with Space Florida under Florida Statutes

Ch. 331.305, F.S. Powers of Space Florida.--Space Florida may: (1) Sue and be sued by its name in any court of law or in equity.

Ch. 331.328, F.S. Sovereign immunity.--As an independent special district, Space Florida has sovereign immunity in the same manner as the state under the laws and Constitution of the State of Florida. The state, by this section, hereby waives the sovereign immunity granted to the same extent as waived by the state under state law.

Sovereign Immunity as applicable to the FDOT and Space Florida

Ch. 768.28, F.S. Waiver of sovereign immunity in tort actions; recovery limits; limitation on attorney fees; statute of limitations; exclusions; indemnification; risk management programs.--

(1) In accordance with s. 13, Art. X of the State Constitution, the state, for itself and for its agencies or subdivisions, hereby waives sovereign immunity for liability for torts, but only to the extent specified in this act. Actions at law against the state or any of its agencies or subdivisions to recover damages in tort for money damages against the state or its agencies or subdivisions for injury or loss of property, personal injury, or death caused by the negligent or wrongful act or omission of any employee of the agency or subdivision while acting within the scope of the employee's office or employment under circumstances in which the state or such agency or subdivision, if a private person, would be liable to the claimant, in accordance with the general laws of this state, may be prosecuted subject to the limitations specified in this act. . . [remaining portion edited]

(2) As used in this act, "state agencies or subdivisions" include the executive departments, the Legislature, the judicial branch (including public defenders), and the independent establishments of the state, including state university boards of trustees; counties and municipalities; and corporations primarily acting as instrumentalities or agencies of the state, counties, or municipalities, including the Florida Space Authority.

(3) Except for a municipality and the Florida Space Authority, the affected agency or subdivision may, at its discretion, request the assistance of the Department of Financial Services in the consideration, adjustment, and settlement of any claim under this act.

⁶² The FAA in an attempt to continue to promote the growth of the industry, with the support of the Department of Transportation has asked for the law's extension. *Testimony Before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives*, Statement of Gerald L. Dillingham, Ph.D., Director Physical Infrastructure Issues, *Supra*, see note 7.

FDOT and Florida Space Authority Statute of Limitations

(5) The state and its agencies and subdivisions shall be liable for tort claims in the same manner and to the same extent as a private individual under like circumstances, but liability shall not include punitive damages or interest for the period before judgment. Neither the state nor its agencies or subdivisions shall be liable to pay a claim or a judgment by any one person which exceeds the sum of \$100,000 or any claim or judgment, or portions thereof, which, when totaled with all other claims or judgments paid by the state or its agencies or subdivisions arising out of the same incident or occurrence, exceeds the sum of \$200,000. However, a judgment or judgments may be claimed and rendered in excess of these amounts and may be settled and paid pursuant to this act up to \$100,000 or \$200,000, as the case may be; and that portion of the judgment that exceeds these amounts may be reported to the Legislature, but may be paid in part or in whole only by further act of the Legislature. Notwithstanding the limited waiver of sovereign immunity provided herein, the state or an agency or subdivision thereof may agree, within the limits of insurance coverage provided, to settle a claim made or a judgment rendered against it without further action by the Legislature, but the state or agency or subdivision thereof shall not be deemed to have waived any defense of sovereign immunity or to have increased the limits of its liability as a result of its obtaining insurance coverage for tortuous acts in excess of the \$100,000 or \$200,000 waiver provided above. [remaining portion edited]

(6)(a) An action may not be instituted on a claim against the state or one of its agencies or subdivisions unless the claimant presents the claim in writing to the appropriate agency, and also, except as to any claim against a municipality or the Florida Space Authority, presents such claim in writing to the Department of Financial Services, within 3 years after such claim accrues and the Department of Financial Services or the appropriate agency denies the claim in writing;

Service of Process for claims against the FDOT or the Florida Space Authority

(7) In actions brought pursuant to this section, process shall be served upon the head of the agency concerned and also, except as to a defendant municipality or the Florida Space Authority, upon the Department of Financial Services; and the department or the agency concerned shall have 30 days within which to plead thereto.

Launch Observations/Monitoring:

Article X of Section 1 Part A:

in order to promote international cooperation asks States to...afford an opportunity to observe the flight of space objects launched by those States...the nature of such opportunity...shall be determined by agreement between the States concerned.

Applicable Federal and State Statutes:

Title 14 C.F.R. § 420.49 Compliance monitoring.

A licensee shall allow access by and cooperate with federal officers or employees or other individuals authorized by the FAA to observe any activities of the licensee, its customers, its contractors, or subcontractors, associated with licensed operation of the licensee's launch site.

49 U.S.C. § 70106 – (a) General Requirements.

A licensee under this chapter must allow the Secretary of Transportation to place an officer or employee of the United States Government or another individual as an observer at a launch site or reentry site the licensee uses, at a production facility or assembly site a contractor of the licensee uses to produce or assemble a launch vehicle or reentry vehicle at a site used for crew or space flight participant training, or at a site at which a payload is integrated with a launch vehicle or reentry vehicle. The observer will monitor the activity of the licensee or contractor at the time and to the extent the Secretary considers reasonable to ensure compliance with the license or to carry out the duties of the Secretary under section 70104(c), 70105, and 70105a of this title. A licensee must cooperate with an observer carrying out this subsection.

Article XI of Section 1 Part A

...requires States conducting activities in outer space agree to inform the Secretary-General of the United Nations, as well as the public...of the nature, conduct locations and results of such activities.

Applicable Federal and State Statutes:

Title 14 C.F.R. § 415.57 Payload review.

(b) *Interagency consultation.* The FAA consults with other agencies to determine whether launch of a proposed payload or payload class would present any issues affecting public health and safety, safety of property, U.S. national security or foreign policy interests, or international obligations of the United States.

SECTION 1: PART B. AGREEMENT ON THE RESCUE OF ASTRONAUTS, THE RETURN OF ASTRONAUTS AND THE RETURN OF OBJECTS LAUNCHED INTO OUTER SPACE

Article 3 and Article 5 mention the term “on the high seas.”

Applicable Federal and State Statutes:

46 U.S.C. app. §§ 761-767, The Death on the High Seas Act (DOHSA) is federal legislation that specifically deals with both maritime and aviation accidents. For DOSHA

to attach the maritime accident would have to be beyond a marine league⁶³ from the shore. To apply to aviation accidents the requirement must exceed twelve (12) miles. As the Eastern Range and proposed flight profiles project flights over the Atlantic, DOSHA could attach should a spacecraft or a part thereof hit someone, something or crash thereby creating an alternate jurisdictional venue for tort claims.

SECTION 1: PART C. CONVENTION ON INTERNATIONAL LIABILITY FOR DAMAGE CAUSED BY SPACE OBJECTS

Article I defines various terms related to liability:

For the purposes of this Convention:

- (a) The term “damage” means loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations;
- (b) The term “launching” includes attempted launching;
- (c) The term “launching State” means:
 - (i) A State, which launches or procures the launching of a space object;
 - (ii) A State from whose territory or facility a space object is launched;
- (d) The term “space object” includes component parts of a space object as well as its launch vehicle and parts thereof.

Article II defines a State’s liability:

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, this Article attaches strict liability⁶⁴ to those injured on the ground or in flight, which is all-inclusive whether it is atmospheric or space flight. *Article VI* removes the strict liability should the launching State establish a claimant State or natural person’s damages resulted either wholly or partially from *their* gross negligence or from an act or omission done with intent to cause damage. However, *Article VI* does not exonerate the launching State if they fail to conform to international law and thus would remain strictly liable.

Article III deals with damage to a space object:

In the event of damage being caused elsewhere than on the surface of the Earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be liable only if the damage is due to its fault or the fault of persons for whom it is responsible.

⁶³ A marine league is defined as three nautical miles.

⁶⁴ *Black’s Law Dictionary Abridged Sixth Edition* defines strict liability as liability without fault.

The liability for damage to a space object is based on a negligence standard⁶⁵ as opposed to the strict liability in *Article II*.

Article VII limits those who may make a claim against a launching State:

The provisions of this Convention shall not apply to damage caused by a space object of a launching State to:

- (a) Nationals of that launching State;
- (b) Foreign nationals during such time as they are participating in the operation of that space object from the time of its launching or at any stage thereafter until its descent, or during such time as they are in the immediate vicinity of a planned launching or recovery area as the result of an invitation by that launching state

Using an example, if a space vehicle is horizontally launched from the Cecil Field Spaceport and an engine falls off and hits a man from the United States and his Canadian born fiancé, under the rules of the Convention the United States citizen would be precluded from bringing a case against the United States, while the Canadian citizen would not face such preclusion.⁶⁶

Articles IX and *X*, respectively, deal with making claims against the launching State through the diplomatic channels or the Secretary-General of the United Nations and the one year statute of limitations period in which to make a claim following the occurrence of the damage or identification of the launching State.

Article XI clarifies a claimant's rights to pursue alternative venues related to damages.

1. Presentation of a claim to a launching State for compensation for damage under this Convention shall not require the prior exhaustion of any local remedies which may be available to a claimant State or to natural or juridical persons it represents.
2. Nothing in this Convention shall prevent a State, or natural or juridical persons it might represent, from pursuing a claim in the courts, administrative tribunals or agencies of a launching State. A State shall not, however, be entitled to present a claim under this Convention in respect of the same damage for which a claim is being pursued in the courts or administrative tribunals or agencies of a launching State or under another international agreement, which is binding on the States concerned.

⁶⁵ In a common law negligence cause of action there are four (4) components. There would be a *duty* of care the entity or individual would have been required to meet, second, they *breached* that duty and the result of that breach was the actual (but for) and proximate *causation* (legal cause) of the injury resulting in *damages* to the defendant.

⁶⁶ This hypothetical situation is based on the Canadian citizen not being restricted under section (b) of the Article.

Comments and Recommendations

This section should not go unnoticed. The ramifications of *Article XI* are a claimant could initiate a cause of action against the United States, NASA, the FAA, Space Florida, the FDOT, a designated spaceport under the regulatory authority of municipalities/airport authorities, or spacecraft manufactures/operators under a common law claim as long as they are not pursuing the same claim under the rules of the Convention. Examples of causes of actions available in the courts against those referred to above would include negligence⁶⁷ and design and/or manufacturing defects.

Article XII outlines international law and principals of justice and equity will be used to provide restoration of the claimant to the condition that would have existed if the damage had not occurred.

Article XIII says any compensation due the claimant shall be paid in the currency of the claimant State.

Applicable Federal and State Statutes:

The detailed federal and state statutes listed previously under *Section 1 Part A, Article VII* above are applicable to *Articles II-XIII* of this section.

SECTION 1: PART D. CONVENTION ON REGISTRATION OF OBJECTS LAUNCHED INTO OUTER SPACE

Article II establishes the requirements of a registry.

1. When a space object is launched into Earth orbit or beyond, the launching State shall register the space object by means of an entry in an appropriate registry, which it shall maintain. Each launching State shall inform the Secretary-General of the United Nations of the establishment of such a registry.

Article IV establishes the specificity of information required by the U N.

1. Each State of registry shall furnish to the Secretary-General of the United Nations, as soon as practicable, the following information concerning each space object carried on its registry:

- (a) Name of launching State or States;
- (b) An appropriate designator of the space object or its registration

⁶⁷ Supra see note 65.

- number;
- (c) Date and territory or location of launch;
- (d) Basic orbital parameters, including:
 - (i) Nodal period;
 - (ii) Inclination;
 - (iii) Apogee;
 - (iv) Perigee;
- (e) General function of the space object.

Although space tourism vendors are not presently planning to launch space vehicles into orbital flight, commercial space transportation contractors will have orbital capability and will be involved in orbital launch activities. Examples of these activities include the deployment of communication/navigation satellites, or replenishing the International Space Station, making orbital flight imminent.

Applicable Federal and State Statutes:

Title 14 C.F.R. § 417.19 Registration of space objects.

- (a) To assist the U.S. Government in implementing Article IV of the 1975 Convention on Registration of Objects Launched into Outer Space, each launch operator must provide to the FAA the information required by paragraph (b) of this section for all objects placed in space by a licensed launch, including a launch vehicle and any components, except:
 - (1) Any object owned and registered by the U.S. Government; and
 - (2) Any object owned by a foreign entity.
- (b) For each object that must be registered in accordance with this section, not later than 30 days following the conduct of a licensed launch, an operator must file the following information:
 - (1) The international designator of the space object(s);
 - (2) Date and location of launch;
 - (3) General function of the space object; and
 - (4) Final orbital parameters, including:
 - (i) Nodal period;
 - (ii) Inclination;
 - (iii) Apogee; and
 - (iv) Perigee.

International law pertaining to liability to crew or space flight participants:

Liability as to Crew

There is no United Nations Treaty law applicable to those who serve as crewmembers or space flight participants associated with flight into space by member States. However, the United States and the State of Florida do address liability.

Applicable Federal and State Statutes:

Title 14 C.F.R. § 460.9 Informing crew of risk.

An operator must inform in writing any individual serving as crew that the United States Government has not certified the launch vehicle and any reentry vehicle as safe for carrying flight crew or space flight participants.

Title 14 C.F.R. § 460.19 Crew waiver of claims against U.S. Government.

Each member of a flight crew and any remote operator must execute a reciprocal waiver of claims with the Federal Aviation Administration of the Department of Transportation in accordance with the requirements of Part 440.

The State of Florida does not have, nor do the Florida Statutes include any such language or waiver of claims protection.

TITLE 14 C.F.R. PART 440, APPENDIX D - AGREEMENT FOR WAIVER OF CLAIMS AND ASSUMPTION OF RESPONSIBILITY FOR A CREW MEMBER

2. Waiver and Release of Claims

(a) Crew Member hereby waives and releases claims it may have against the United States, and against its respective Contractors and Subcontractors, for Bodily Injury, including Death, or Property Damage sustained by Crew Member, resulting from Licensed/Permitted Activities, regardless of fault.

(b) The United States hereby waives and releases claims it may have against the Crew Member for Property Damage it sustains, and for Bodily Injury, including Death, or Property Damage sustained by its own employees, resulting from Licensed/Permitted Activities, regardless of fault.

3. Assumption of Responsibility

(a) The Crew Member shall be responsible for Bodily Injury, including Death, or Property Damage sustained by Crew Member, resulting from Licensed/Permitted Activities, regardless of fault. The Crew Member shall hold harmless the United States, and the Contractors and Subcontractors of each Party, for Bodily Injury, including Death, or Property Damage sustained by Crew Member, resulting from Licensed/Permitted Activities, regardless of fault.

(b) The United States shall be responsible for Property Damage it sustains, and for Bodily Injury, including Death, or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault, to the extent that claims it would otherwise have for such damage or injury exceed the amount of insurance or demonstration of financial responsibility required under sections 440.9(c) and (e), respectively, of the Regulations.

(c) The United States shall be responsible for Property Damage it sustains, resulting from Permitted Activities, regardless of fault, to the extent that claims it would otherwise have for such damage exceed the amount of insurance or demonstration of financial responsibility required under section 440.9(e) of the Regulations.

4. Extension of Assumption of Responsibility and Waiver and Release of Claims

(a) The United States shall extend the requirements of the waiver and release of

claims, and the assumption of responsibility as set forth in paragraphs 2(b) and 3(b), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims they may have against Crew Member and to agree to be responsible, for any Property Damage the Contractors and Subcontractors sustain and for any Bodily Injury, including Death, or Property Damage sustained by their own employees, resulting from Licensed Activities, regardless of fault.

(b) The United States shall extend the requirements of the waiver and release of claims, and the assumption of responsibility as set forth in paragraphs 2(b) and 3(c), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims the Contractors and Subcontractors may have against Crew Member and to agree to be responsible, for any Property Damage they sustain, resulting from Permitted Activities, regardless of fault.

5. Indemnification

Crew Member shall hold harmless and indemnify the United States and its agencies, servants, agents, subsidiaries, employees and assignees, or any of them, from and against liability, loss, or damage arising out of claims brought by anyone for Property Damage or Bodily Injury, including Death, sustained by Crew Member, resulting from Licensed/Permitted Activities.

6. Assurances Under 49 U.S.C. 70112(e)

Notwithstanding any provision of this Agreement to the contrary, Crew Member shall hold harmless the United States and its agencies, servants, agents, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims for Bodily Injury, including Death, or Property Damage, sustained by Crew Member, resulting from Licensed/Permitted Activities, regardless of fault, except to the extent that, as provided in section 6(b) of this Agreement, claims result from willful misconduct of the United States or its agents.

7. Miscellaneous

(a) Nothing contained herein shall be construed as a waiver or release by the United States of any claim by an employee of the United States, respectively, including a member of the Armed Forces of the United States, for Bodily Injury or Property Damage, resulting from Licensed/Permitted Activities.

(b) Notwithstanding any provision of this Agreement to the contrary, any waiver, release, assumption of responsibility or agreement to hold harmless herein shall not apply to claims for Bodily Injury, including Death, or Property Damage resulting from willful misconduct of any of the Parties, the Contractors and Subcontractors of any of the Parties, and in the case of the United States, its agents.

Florida Statute pertaining to Space Florida or FDOT liability:

The State of Florida, either through Space Florida or the FDOT, does not have a statute addressing Waiver of Claims and Assumption of Responsibility for a Crew Member, except to rely upon *Ch. 321.328, F.S.* pertaining to sovereign immunity addressed above.

Liability as to Space Flight Participants:

Title 14 C.F.R. 460.45 Operator informing space flight participant of risk.

- (a) Before receiving compensation or making an agreement to fly a space flight participant, an operator must satisfy the requirements of this section. An operator must inform each space flight participant in writing about the risks of the launch and reentry, including the safety record of the launch or reentry vehicle type. An operator must present this information in a manner that can be and must disclose in writing—
- (1) For each mission, each known hazard and risk that could result in a serious injury, death, disability, or total or partial loss of physical and mental function;
 - (2) That there are hazards that are not known; and
 - (3) That participation in space flight may result in death, serious injury, or total or partial loss of physical or mental function.
- (b) An operator must inform each space flight participant that the United States Government has not certified the launch vehicle and any reentry vehicle as safe for carrying crew or space flight participants.
- (c) An operator must inform each space flight participant of the safety record of all launch or reentry vehicles that have carried one or more persons on board, including both U.S. government and private sector vehicles. This information must include—
- (1) The total number of people who have been on a suborbital or orbital space flight and the total number of people who have died or been seriously injured on these flights; and
 - (2) The total number of launches and reentries conducted with people on board and the number of catastrophic failures of those launches and reentries.
- (d) An operator must describe the safety record of its vehicle to each space flight participant. The operator's safety record must cover launch and reentry accidents and human space flight incidents that occurred during and after vehicle verification performed in accordance with §460.17, and include—
- (1) The number of vehicle flights;
 - (2) The number of accidents and human space flight incidents as defined by § 401.5; and
 - (3) Whether any corrective actions were taken to resolve these accidents and human space flight incidents.
- (e) An operator must inform a space flight participant that he or she may request additional information regarding any accidents and human space flight incidents reported.
- (f) Before flight, an operator must provide each space flight participant an opportunity to ask questions orally to acquire a better understanding of the hazards and risks of the mission, and each space flight participant must then provide consent in writing to participate in a launch or reentry. The consent must—
- (1) Identify the specific launch vehicle the consent covers;
 - (2) State that the space flight participant understands the risk, and his or her presence onboard the launch vehicle is voluntary; and
 - (3) Be signed and dated by the space flight participant.

Title 14 C.F.R. § 460.49 Space flight participant waiver of claims against U.S. Government.

Each space flight participant must execute a reciprocal waiver of claims with the Federal Aviation Administration of the Department of Transportation in accordance with the requirements of Part 440 of this chapter.

TITLE 14 C.F.R. PART 440, APPENDIX E -AGREEMENT FOR WAIVER OF CLAIMS AND ASSUMPTION OF RESPONSIBILITY FOR A SPACE FLIGHT PARTICIPANT

Attached as Appendix D, is the above waiver which can be compared to the State of Florida's space participant waiver of liability as detailed below.

Florida Statute pertaining to Space Florida or FDOT Entity liability:

Ch. 331.501, F.S. Spaceflight; informed consent

(1) For purposes of this section, the term:

(a) "Participant" means any spaceflight participant as that term is defined in 49 U.S.C. s. 70102.⁶⁸

(b) "Spaceflight activities" means launch services or reentry services as those terms are defined in 49 U.S.C. s. 70102.

(c) "Spaceflight entity" means any public or private entity holding a United States Federal Aviation Administration launch, reentry, operator, or launch site license for spaceflight activities.

(2)(a) Except as provided in paragraph (b), a spaceflight entity is not liable for injury to or death of a participant resulting from the inherent risks of spaceflight activities so long as the warning contained in subsection (3) is distributed and signed as required. Except as provided in paragraph (b), a participant or participant's representative may not maintain an action against or recover from a spaceflight entity for the loss, damage, or death of the participant resulting exclusively from any of the inherent risks of spaceflight activities.⁶⁹

(3)(a) Every spaceflight entity providing spaceflight activities to a participant, whether such activities occur on or off the site of a facility capable of launching a suborbital flight, shall have each participant sign the warning statement specified in paragraph (b).

(b) The warning statement described in paragraph (a) shall contain, at a minimum, the following statement:

"WARNING: Under Florida law, there is no liability for an injury to or death of a participant in a spaceflight activity provided by a spaceflight entity if such injury

⁶⁸ 49 U.S.C. 70102 (17) 'space flight participant' means an individual, who is not crew, carried within a launch vehicle or reentry vehicle. (Emphasis Added)

⁶⁹ The statute continues-(b) Paragraph (a) does not prevent or limit the liability of a spaceflight entity if the spaceflight entity does any one or more of the following: 1. Commits an act or omission that constitutes gross negligence or willful or wanton disregard for the safety of the participant and that act or omission proximately causes injury, damage, or death to the participant; 2. Has actual knowledge or reasonably should have known of a dangerous condition on the land or in the facilities or equipment used in the spaceflight activities and the danger proximately causes injury, damage, or death to the participant; or 3. Intentionally injures the participant.

or death results from the inherent risks of the spaceflight activity. Injuries caused by the inherent risks of spaceflight activities may include, among others, injury to land, equipment, persons, and animals, as well as the potential for you to act in a negligent manner that may contribute to your injury or death. You are assuming the risk of participating in this spaceflight activity.”

Comments and Recommendations

This statute only applies to waiving liability as to a space flight entity and only applies to space flight participants and by definition does not include the space flight crew.⁷⁰ As such, neither the state of Florida, the FDOT, nor Space Florida has a Waiver of Claims and Assumption of Responsibility statement that applies directly to them as entities and relies on their sovereign immunity to shield them from liability in a strict or negligence liability claim under *Ch. 321.328, F.S.* addressed previously. Nor does it waive liability for those who may be injured on the ground as a result of an accident.

A possible exception to the above as related to a “space flight entity” would be if Space Florida sponsored or contracted for a space flight and as such would qualify as the space flight entity, premised on the fact they initiated and had the participant sign the appropriate waiver.

The federal waiver expounds on who may not bring a cause of action by stating neither (a) The above-named Space Flight Participant, (b) All the heirs, administrators, executors, assignees, next of kin, and estate of the above-named Space Flight Participant, and (c) Anyone who attempts to bring a claim on behalf of the Space Flight Participant or for damage or harm arising out of the Bodily Injury, including Death, of the Space Flight Participant.⁷¹

On a related, but different issue is that of a space flight participant’s physical condition. Except for requiring a waiver, the FDOT and Space Florida should discuss with the FAA setting physical standards for those flying into space. As addressed previously, a crew must have a FAA medical certificate, which provides for at least some minimum medical standards as opposed to flight participants who do not have standards. Asking a flight participant to pass at least some

⁷⁰ Supra see note 20 for the definition of space flight participant.

⁷¹ 14 C.F.R Appendix E to Part 440—Agreement for Waiver of Claims and Assumption of Responsibility for a Space Flight Participant. See Appendix Section of this report.

minimum standard level of fitness would not be excessive, particularly in light of the liability concerns and due diligence as related to safety.⁷²

LIABILITY AS TO OPERATORS

C.7.1: TITLE 14 C.F.R. PART 440, APPENDIX B AGREEMENT FOR WAIVER OF CLAIMS AND ASSUMPTION OF RESPONSIBILITY FOR LICENSED ACTIVITIES

Part 2—Waiver of Claims and Assumption of Responsibility for
Licensed Reentry

TITLE 14 C.F.R. PART 440, APPENDIX C AGREEMENT FOR WAIVER OF CLAIMS AND ASSUMPTION OF RESPONSIBILITY FOR PERMITTED ACTIVITIES

These are attached as Appendices A and B due to their lengths.

The State of Florida does not have any Waivers of Claims related to responsibilities for licensed activities or responsibility for permitted activity. As stated earlier, the state of Florida, the FDOT and Space Florida would have to rely upon *Ch. 321.328, F.S.* pertaining to sovereign immunity for protection for licensed and permitted activities.

⁷² Virgin Galactic advertises the following: Virgin Galactic's first priority is safety; of the vehicles, the crew and our passengers. Although we don't expect many medical restrictions to prevent people from flying, we will not jeopardize your safety if we believe you are at risk. This will involve some pre-flight medical checks. Early indicators show that the required medical assessment will be simple and unrestrictive and that the vast majority of people who want to fly will not be prevented from doing so by health or fitness considerations. Accessed at <http://www.virgingalactic.com/overview/training/>

SECURITY

SECURITY OF PROPERTY

There are two federal entities regulating the security of property associated with space flight activities. First are those specific to the Office of Commercial Space Transportation and second are the less specific regulations of the Transportation Security Administration (TSA) as presently related to commercial and general air carrier airports and operations. We will begin with those regulations specific to space travel as related to the security of property.

Title 14 C.F.R. § 417.111 Launch plans.

(j) *Hazard area surveillance and clearance plan.* A launch operator must implement a plan that defines the process for ensuring that any unauthorized persons, ships, trains, aircraft or other vehicles are not within any hazard areas⁷³ identified by the flight safety analysis or the ground safety analysis. In the plan, the launch operator must—

- (1) List each hazard area that requires surveillance under §§417.107 and 417.223;
- (2) (not applicable)
- (3) (not applicable)
- (4) Identify the number of security and surveillance personnel employed for each launch and the qualifications and training each must have;
- (5) Identify the location of roadblocks and other security checkpoints, the times that each station must be manned, and any surveillance equipment used; and
- (6) Contain, or incorporate by reference, all procedures for launch personnel control, handling of intruders, communications and coordination with launch personnel and other launch support entities, and implementation of any agreements with local authorities and any launch site operator.

§ 420.53 Control of public access.

- (a) A licensee shall prevent unauthorized access to the launch site, and unauthorized, unescorted access to explosive hazard facilities or other hazard areas not otherwise controlled by a launch operator, through the use of security personnel, surveillance systems, physical barriers, or other means approved as part of the licensing process.
- (b) A licensee shall notify anyone entering the launch site of safety rules and emergency and evacuation procedures prior to that person's entry unless that person has received a briefing on those rules and procedures within the previous year.

⁷³ Note: § 417.23-Flight hazard areas (b) Launch site flight hazard area. A flight hazard area analysis must establish a launch site flight hazard area that encompasses the launch point. For purposes of this section related to security of property, this does not include a discussion pertaining to protection of persons on the ground outside the airport area. There are numerous subsections in § 417 dealing with protection of those in the flight path, flight corridor (if applicable) and for operations over water as related to the term "flight hazard areas."

(c) A licensee shall employ warning signals or alarms to notify any persons at the launch site of any emergency.

Title 14 C.F.R. § 417.411 Safety clear zones for hazardous operations.

(d) A launch operator must control a safety clear zone to ensure no public access during the hazardous operation. Safety clear zone controls include:

- (1) Use of security guards and equipment;
- (2) Physical barriers; and
- (3) Warning signs, and other types of warning devices.

Comments and Recommendations

The Transportation Security Administration (TSA) is responsible for the safety at airports that serve commercial air carriers, public and private charters and general aviation.⁷⁴ Due to the newness of commercial space travel, the TSA does not have specific regulatory guidelines specific to airports that may be used by vendors who service commercial space flight activities.⁷⁵ The regulations listed below provide an overview of current regulations the TSA could require space flight operators and site operators to address and adhere to related to airport security and should be reviewed by the FDOT for familiarity and involvement in future regulatory development.

Title 49 C.F.R. §1540 CIVIL AVIATION SECURITY: GENERAL RULES

§ 1540.1 Applicability of this subchapter and this part.

This subchapter and this part apply to persons engaged in aviation-related activities.

Comments and Recommendations

This section defines terms dealing with areas associated with passenger and cargo traffic as they are used in the relevant sections as related to, for example, air operations areas, aircraft operator, airport operator, secured areas, security identification display areas, and sterile areas. It then defines those responsibilities of passenger and other individuals and persons, security threat assessment and finally responsibilities of holders of TSA approved security programs.

⁷⁴ General aviation involves all aviation activities other than those involving air carriers and military activity. Additionally, this is not an exhaustive list of air operations under the purview of the TSA's regulatory responsibilities.

⁷⁵ Speaking with an official of the Transportation Security Administration, they felt regulations directly related to commercial space flight will become a priority, whether dealt with by emergency enactment or otherwise and would possible be a hybrid of §§1540, 1542, or 1544.

Title 49 C.F.R. § 1542—AIRPORT SECURITY

§ 1542.113 Airport tenant security programs.

This part describes aviation security rules governing:

- (a) The operation of airports regularly serving aircraft operations required to be under a security program under part 1544 of this chapter, as described in this part.
- (b) The operation of airport regularly serving foreign air carrier operations required to be under a security program under part 1546 of this chapter, as described in this part.
- (c) Each airport operator that receives a Security Directive or Information Circular and each person who receives information from a Security Directive or Information Circular issued by the Designated official for Civil Aviation Security.
- (d) Each airport operator that does not have a security program under this part that serves an aircraft operator operating under a security program under part 1544 of this chapter, or a foreign air carrier operating under a security program under part 1546 of this chapter. Such airport operators must comply with §1542.5(e).

Comments and Recommendations

The Airport Security section could directly apply to commercial space travel as vendors are tenants of the airport. The level of detail to which they would be held accountable is the ultimate issue. Airport Security as it applies to tenants requires a security coordinator, an airport security program, inspection authority allowing TSA personnel access to Airport Operation Areas/Security Identification Display Areas and adequate security of these area including access and control, a personnel identification system and in some cases a criminal history records check of certain employees.

As an example of those who must comply as an airport tenant is Embry-Riddle Aeronautical University (ERAU) located at the Daytona Beach International Airport. As a tenant of the airport, ERAU has an Airport Tenant Security Program document outlining its safety responsibilities. It also requires the University to provide Security Awareness Training for all its employees who have flight line privileges.⁷⁶ Not only are there Stop, Challenge and Notify procedures, but the ramp can only be accessed through an identification security gate.

⁷⁶ In this instance ERAU has two areas of responsibility. One as an airport tenant, the other as a flight school under the regulations associated with Title 49 C.F.R. 1552 related to flight schools.



Figure 16: Ramp Security C.F.R. 49 Part 1542
Source: S.V. Dedmon

Another example would be the Keystone Heights airport, 42J, which has a coded gate entry system to prevent unauthorized ramp access. Based on either of these scenarios, it would not be unrealistic to believe § 1542 of the TSA regulations would be applicable to commercial space flight tenants as well.

PART 1544—AIRCRAFT OPERATOR SECURITY: AIR CARRIERS AND COMMERCIAL OPERATORS

§ 1544.1 Applicability of this part.

- (a) This part prescribes aviation security rules governing the following:
- (1) The operations of aircraft operators holding operating certificates under 14 C.F.R. part 119 for scheduled passenger operations, public charter passenger operations,⁷⁷ private charter passenger operations;⁷⁸ the operations of aircraft operators holding operating certificates under 14 C.F.R. part 119 operating aircraft with a maximum certificated takeoff weight of 12,500 pounds or more; and other aircraft operators adopting and obtaining approval of an aircraft operator security program.

⁷⁷ Title 49 §1540.5 *Public charter* means any charter flight that is not a private charter.

⁷⁸ Title 49 §1540.5 *Private charter* means any aircraft operator flight—(1) For which the charterer engages the total passenger capacity of the aircraft for the carriage of passengers; the passengers are invited by the charterer; the cost of the flight is borne entirely by the charterer and not directly or indirectly by any individual passenger; and the flight is not advertised to the public, in any way, to solicit passengers. (2) For which the total passenger capacity of the aircraft is used for the purpose of civilian or military air movement conducted under contract with the Government of the United States or the government of a foreign country.

- (2) Each law enforcement officer flying armed aboard an aircraft operated by an aircraft operator described in paragraph (a)(1) of this section.
- (3) Each aircraft operator that receives a Security Directive or Information Circular and each person who receives information from a Security Directive or Information Circular issued by TSA.
- (b) As used in this part, “aircraft operator” means an aircraft operator subject to this part as described in §1544.101.

Comments and Recommendations

Looking at the applicability section of Aircraft Operator Security does question if this directly affects commercial space flight. In its broadest interpretation, it could be applied to commercial space flight for carrying passengers under the definition of public charter.⁷⁹

The subsections of §1544 include TSA regulations as applicable to the TSA’s authority to inspect operator security program documents for compliance, screening of individuals and materials,⁸⁰ procedures for all-cargo aircraft, acceptance and screening of cargo, screening of individuals, use of metal detection devices and X-ray systems and threat and threat response requirements.

Title 14 C.F.R. § 1550—AIRCRAFT SECURITY UNDER GENERAL OPERATING AND FLIGHT RULES

§ 1550.1 Applicability of this part.

This part applies to the operation of aircraft for which there are no security requirements in other parts of this subchapter.

§ 1550.3 TSA inspection authority.

(a) Each aircraft operator subject to this part must allow TSA, at any time or place, to make any inspections or tests, including copying records, to determine compliance with—

(1) This subchapter and any security program or security procedures under this subchapter, and part 1520⁸¹ of this chapter; and

⁷⁹ Supra see note 53.

⁸⁰ § 1544.201 (a) *Preventing or deterring the carriage of any explosive, incendiary, or deadly or dangerous weapon.* Each aircraft operator must use the measures in its security program to prevent or deter the carriage of any weapon, explosive, or incendiary on or about each individual’s person or accessible property before boarding an aircraft or entering a sterile area. (d) *Prohibitions on carrying a weapon, explosive, or incendiary.* Except as provided in §§1544.219, 1544.221, and 1544.223, no aircraft operator may permit any individual to have a weapon, explosive, or incendiary, on or about the individual’s person or accessible property when onboard an aircraft. These specific issues are discussed later as the federal space statutes address this as well.

⁸¹ §1520—PROTECTION OF SENSITIVE SECURITY INFORMATION was not included herein. It governs the maintenance, safeguarding, and disclosure of records and information that TSA has determined to be Sensitive Security Information.

(2) 49 U.S.C. Subtitle VII, as amended.

(b) At the request of TSA, each aircraft operator must provide evidence of compliance with this part and its security program or security procedures, including copies of records.

§ 1550.5 *Operations using a sterile area.*

(a) *Applicability of this section.* This section applies to all aircraft operations in which passengers, crewmembers, or other individuals are enplaned from or deplaned into a sterile area, except for scheduled passenger operations, public charter passenger operations, and private charter passenger operations, that are in accordance with a security program issued under part 1544 or 1546 of this chapter.

(b) *Procedures.* Any person conducting an operation identified in paragraph (a) of this section must conduct a search of the aircraft before departure and must screen passengers, crewmembers, and other individuals and their accessible property (carry-on items) before boarding in accordance with security procedures approved by TSA.

(c) *Sensitive security information.* The security program procedures approved by TSA for operations specified in paragraph (a) of this section are sensitive security information. The operator must restrict the distribution, disclosure, and availability of information contained in the security procedures to persons with a need to know as described in part 1520 of this chapter.

(d) *Compliance date*(section not included)

(e) *Waivers.* TSA may permit a person conducting an operation under this section to deviate from the provisions of this section if TSA finds that the operation can be conducted safely under the terms of the waiver.

§ 1550.7 *Operations in aircraft of 12,500 pounds or more.*

(a) *Applicability of this section.* This section applies to each aircraft operation conducted in an aircraft with a maximum certificated takeoff weight of 12,500 pounds or more except for those operations specified in §1550.5 and those operations conducted under a security program under part 1544 or 1546 of this chapter.

(b) *Procedures.* Any person conducting an operation identified in paragraph (a) of this section must conduct a search of the aircraft before departure and screen passengers, crewmembers, and other persons and their accessible property (carry-on items) before boarding in accordance with security procedures approved by TSA.

(c) *Compliance date.* Persons identified in paragraph (a) of this section must implement security procedures when notified by TSA. TSA will notify operators by NOTAM [Notice to Airmen], letter, or other communication when they must implement security procedures.

(d) *Waivers.* TSA may permit a person conducting an operation identified in this section to deviate from the provisions of this section if TSA finds that the operation can be conducted safely under the terms of the waiver.

Comments and Recommendations

Without implementation of the specific regulations or using either of parts 1540, 1542, or 1544 this section could and may well be applicable to space travel activities and would give the TSA the regulatory authority to mandate compliance by commercial space travel vendors, if it is concluded they do not fall within the sections previously discussed.

Neither the Florida Statutes nor any FDOT documents address airport security and as a result defer to the TSA and FAA as to operations for commercial air operations under Parts 119, 121 and 135. The FDOT needs to be aware the TSA will be an active participant in regulating commercial space flight activities. Unless specifically precluded by statute, the FDOT should confer and coordinate with the TSA and those municipalities who will be responsible for security issues related to space flight.⁸²

⁸² § 332.005 F.S. Restrictions on authority of Department of Transportation.—This act specifically prohibits the Department of Transportation from regulating commercial air carriers operating within the state pursuant to federal authority and regulations; from participating in or exercising control in the management and operation of a sponsor's airport, except when officially requested by the sponsor; or from expanding the design or operational capability of the department in the area of airport and aviation consultants' contract work, other than to provide technical assistance as requested. Although it would not appear to preclude the FDOT from being actively involved one could possible infer it would preclude the FDOT's involvement in this and most of the areas reported herein.

SECURITY OF INDIVIDUALS

§ 460.53 Security.

An operator must implement security requirements to prevent any space flight participant from jeopardizing the safety of the flight crew or the public. A space flight participant may not carry on board any explosives, firearms, knives, or other weapons.

§ 1540.111 Carriage of weapons, explosives, and incendiaries by individuals.

(a) *On an individual's person or accessible property—prohibitions.* Except as provided in paragraph (b) of this section, an individual may not have a weapon, explosive, or incendiary, on or about the individual's person or accessible property—

- (1) When performance has begun of the inspection of the individual's person or accessible property before entering a sterile area, or before boarding an aircraft for which screening is conducted under this subchapter;
- (2) When the individual is entering or in a sterile area; or
- (3) When the individual is attempting to board or onboard an aircraft for which screening is conducted under §§1544.201, 1546.201, or 1562.23 of this chapter.

(b) *On an individual's person or accessible property—permitted carriage of a weapon.* Paragraph (a) of this section does not apply as to carriage of firearms and other weapons if the individual is one of the following:

- (1) Law enforcement personnel required to carry a firearm or other weapons while in the performance of law enforcement duty at the airport.
- (2) An individual authorized to carry a weapon in accordance with §§1544.219, 1544.221, 1544.223, 1546.211, or subpart B of part 1562 of this chapter.
- (3) An individual authorized to carry a weapon in a sterile area under a security program.

(c) *In checked baggage.* A passenger may not transport or offer for transport in checked baggage or in baggage carried in an inaccessible cargo hold under §1562.23 of this chapter:

- (1) Any loaded firearm(s).
- (2) Any unloaded firearm(s) unless—
 - (i) The passenger declares to the aircraft operator, either orally or in writing, before checking the baggage, that the passenger has a firearm in his or her bag and that it is unloaded;
 - (ii) The firearm is unloaded;
 - (iii) The firearm is carried in a hard-sided container; and
 - (iv) The container in which it is carried is locked, and only the passenger retains the key or combination.
- (3) Any unauthorized explosive or incendiary.

(d) *Ammunition.* This section does not prohibit the carriage of ammunition in checked baggage or in the same container as a firearm. Title 49 C.F.R. Part 175 provides additional requirements governing carriage of ammunition on aircraft.

Comments and Recommendations

The necessity of the above are obvious as related to those passengers aboard commercial space vehicles. What is not so obvious are issues such as photograph identification of space flight participants as well as the requirement, or not, of background checks and the possible establishment of a space flight participant “no fly list,” though seemingly extravagant, should be considered. The FDOT should be visionary and not reactionary regarding addressing those things that appear, at this stage, superfluous but are not outside the realm of possibility. The FDOT and Space Florida should monitor TSA regulations and be prepared to assist in the construction of new language related specifically to commercial space flight as it relates to security issues.

CONCLUSION

As NASA's space shuttle program begins its final chapter, a new class of commercial space entrepreneurs will fill the void created by its absence. These entrepreneurs will not only take NASA's traditional role as it once pertained to transporting people and cargo into and out of space, but will provide additional opportunities for commercial space travel. As with any fledgling industry, a regulatory environment needs to be in place to protect not only those directly involved from a commercial viability standpoint, but also those peoples of the state from where space travel will originate.

As the State of Florida continues to lead the effort in developing the commercial space industry, monitoring the international, federal and state laws related to crew members, airports, liability and security will be vital. Therefore, it is incumbent upon the FDOT to be aware of and address, either through the Florida congressional delegation or Space Florida, instituting regulatory change relating to commercial space activities. Although preempted in certain areas, such as licensing airmen, the FDOT should position itself to discuss with federal regulators those areas it believes essential to protect the safety of the citizens of the state. Additionally, the FDOT and Space Florida should consider looking specifically at the language of the Florida Statutes related to space travel and consider modifying them to address any inadequacies.

To ensure that the State of Florida is in a position to affect a positive regulatory environment to meet and exceed the economic benefit and safety requirements related to commercial space activities, issues of licensing, liability, national outer space responsibilities, and security will need to be addressed.

The State of Florida will need to address licensing with regards to pilots, technicians, aircraft, spaceports, and operators. For pilots, the FDOT should, at a minimum, consider discussing pilot qualifications/certifications with the FAA to ascertain if the current requirements provide the appropriate safety standard for those responsible for flying vehicles capable of space travel. As maintenance equates directly to safe operations, licensing or certification of those maintaining space vehicles should be addressed.

There are currently no Florida Statutes that are applicable to safety standards or licensing of launch or reentry vehicles. As previously stated, the state of Florida, Space Florida and the FDOT are afforded the statutory authority to promulgate rules addressing safety licensing

standards as they deem necessary to promote safety and protection from possible liability associated with vehicles used in commercial space travel.

For the licensing of spaceport facilities, the State of Florida has the option to either license a spaceport by incorporating by reference the existing FAA requirements, or by establishing new state of Florida licensing criteria. If the option of establishing new State of Florida criteria is selected, the option leads to questioning whether the FDOT will require physical attributes related to the airport facilities as expounded upon in its administrative rules and apply them, in addition to the FAA safety and environmental licensing standards.

In addition to licensing, the State of Florida will also need to address liability. Currently, neither the State of Florida, the FDOT, nor Space Florida has a Waiver of Claims and Assumption of Responsibility statement that applies directly to them as entities and relies on their sovereign immunity to shield them from liability in a strict or negligence liability claim. Nor does it waive liability for those who may be injured on the ground as a result of an accident. Additionally, asking a flight participant to pass at least some minimum standard level of fitness would not be excessive, particularly in light of the liability concerns and due diligence as related to safety.

Security should also be addressed by the State of Florida. Neither the Florida Statutes nor any FDOT documents address airport security and as a result defer to the TSA and FAA as to operations for commercial air operations. The FDOT needs to be aware the TSA will be an active participant in regulating commercial space flight activities. Unless specifically precluded by statute, the FDOT should confer and coordinate with the TSA and those municipalities who will be responsible for security issues related to space flight.

With the downturn of the space shuttle program, development of new commercial space travel technology, new entrants into the commercial space market and commercial space tourism the future of commercial space travel is poised to reach unprecedented heights. The State of Florida, through the FDOT and Space Florida is in a position to affect a positive regulatory environment to meet and exceed the economic benefit and safety requirements related to commercial space activities.

REFERENCES

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APPENDICES

APPENDIX A

Agreement for Waiver of Claims and Assumption of Responsibility for Licensed Activities (14 C.F.R. Part 440, Appendix B)

Part 1—Waiver of Claims and Assumption of Responsibility for Licensed Launch, including Suborbital Launch

THIS AGREEMENT is entered into this ____ day of _____, by and among [Licensee] (the “Licensee”), [Customer] (the “Customer”) and the Federal Aviation Administration of the Department of Transportation, on behalf of the United States Government (collectively, the “Parties”), to implement the provisions of section 440.17(c) of the Commercial Space Transportation Licensing Regulations, 14 C.F.R. Ch. III (the “Regulations”). This agreement applies to the launch of [Payload] payload on a [Launch Vehicle] vehicle at [Location of Launch Site]. In consideration of the mutual releases and promises contained herein, the Parties hereby agree as follows:

1. Definitions

Contractors and Subcontractors means entities described in §440.3 of the Regulations.

Customer means the above-named Customer on behalf of the Customer and any person described in §440.3 of the Regulations.

License means License No. ____ issued on _____, by the Associate Administrator for Commercial Space Transportation, Federal Aviation Administration, Department of Transportation, to the Licensee, including all license orders issued in connection with the License.

Licensee means the Licensee and any transferee of the Licensee under 49 U.S.C. Subtitle IX, ch. 701.

United States means the United States and its agencies involved in Licensed Activities. Except as otherwise defined herein, terms used in this Agreement and defined in 49 U.S.C. Subtitle IX, ch. 701—Commercial Space Launch Activities, or in the Regulations, shall have the same meaning as contained in 49 U.S.C. Subtitle IX, ch. 701, or the Regulations, respectively.

2. Waiver and Release of Claims

(a) Licensee hereby waives and releases claims it may have against Customer and the United States, and against their respective Contractors and Subcontractors, for Property Damage it sustains and for Bodily Injury or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault.

(b) Customer hereby waives and releases claims it may have against Licensee and the United States, and against their respective Contractors and Subcontractors, for Property Damage it sustains and for Bodily Injury or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault.

(c) The United States hereby waives and releases claims it may have against Licensee and Customer, and against their respective Contractors and Subcontractors, for Property Damage it sustains, and for Bodily Injury or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault, to the extent that claims it would otherwise have for such damage or injury exceed the amount of insurance or demonstration of financial responsibility required under sections 440.9(c) and (e), respectively, of the Regulations.

3. Assumption of Responsibility

(a) Licensee and Customer shall each be responsible for Property Damage it sustains and for Bodily Injury or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault. Licensee and Customer shall each hold harmless and indemnify each other, the United States, and the Contractors and Subcontractors of each Party, for Bodily Injury or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault.

(b) The United States shall be responsible for Property Damage it sustains, and for Bodily Injury or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault, to the extent that claims it would otherwise have for such damage or injury exceed the amount of insurance or demonstration of financial responsibility required under sections 440.9(c) and (e), respectively, of the Regulations.

4. Extension of Assumption of Responsibility and Waiver and Release of Claims

(a) Licensee shall extend the requirements of the waiver and release of claims, and the assumption of responsibility, hold harmless, and indemnification, as set forth in paragraphs 2(a) and 3(a), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims they may have against Customer and the United States, and against the respective Contractors and Subcontractors of each, and to agree to be responsible, for Property Damage they sustain and to be responsible, hold harmless and indemnify Customer and the United States, and the respective Contractors and Subcontractors of each, for Bodily Injury or Property Damage sustained by their own employees, resulting from Licensed Activities, regardless of fault.

(b) Customer shall extend the requirements of the waiver and release of claims, and the assumption of responsibility, hold harmless, and indemnification, as set forth in paragraphs 2(b) and 3(a), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims they may have against Licensee and the United States, and against the respective Contractors and Subcontractors of each, and to agree to be responsible, for Property Damage they sustain and to be responsible, hold harmless

and indemnify Licensee and the United States, and the respective Contractors and Subcontractors of each, for Bodily Injury or Property Damage sustained by their own employees, resulting from Licensed Activities, regardless of fault.

(c) The United States shall extend the requirements of the waiver and release of claims, and the assumption of responsibility as set forth in paragraphs 2(c) and 3(b), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims they may have against Licensee and Customer, and against the respective Contractors and Subcontractors of each, and to agree to be responsible, for any Property Damage they sustain and for any Bodily Injury or Property Damage sustained by their own employees, resulting from Licensed Activities, regardless of fault, to the extent that claims they would otherwise have for such damage or injury exceed the amount of insurance or demonstration of financial responsibility required under sections 440.9(c) and (e), respectively, of the Regulations.

5. Indemnification

(a) Licensee shall hold harmless and indemnify Customer and its directors, officers, servants, agents, subsidiaries, employees and assignees, or any of them, and the United States and its agencies, servants, agents, subsidiaries, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims that Licensee's Contractors and Subcontractors may have for Property Damage sustained by them and for Bodily Injury or Property Damage sustained by their employees, resulting from Licensed Activities.

(b) Customer shall hold harmless and indemnify Licensee and its directors, officers, servants, agents, subsidiaries, employees and assignees, or any of them, and the United States and its agencies, servants, agents, subsidiaries, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims that Customer's Contractors and Subcontractors, or any person on whose behalf Customer enters into this Agreement, may have for Property Damage sustained by them and for Bodily Injury or Property Damage sustained by their employees, resulting from Licensed Activities.

(c) To the extent provided in advance in an appropriations law or to the extent there is enacted additional legislative authority providing for the payment of claims, the United States shall hold harmless and indemnify Licensee and Customer and their respective directors, officers, servants, agents, subsidiaries, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims that Contractors and Subcontractors of the United States may have for Property Damage sustained by them, and for Bodily Injury or Property Damage sustained by their employees, resulting from Licensed Activities, to the extent that claims they would otherwise have for such damage or injury exceed the amount of insurance or demonstration of financial responsibility required under sections 440.9(c) and (e), respectively, of the Regulations.

6. Assurances Under 49 U.S.C. 70112(e)

Notwithstanding any provision of this Agreement to the contrary, Licensee shall hold harmless and indemnify the United States and its agencies, servants, agents, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims for Bodily Injury or Property Damage, resulting from Licensed Activities, regardless of fault, except to the extent that: (i) As provided in section 7(b) of this Agreement, claims result from willful misconduct of the United States or its agents; (ii) claims for Property Damage sustained by the United States or its Contractors and Subcontractors exceed the amount of insurance or demonstration of financial responsibility required under section 440.9(e) of the Regulations; (iii) claims by a Third Party for Bodily Injury or Property Damage exceed the amount of insurance or demonstration of financial responsibility required under section 440.9(c) of the Regulations, and do not exceed \$1,500,000,000 (as adjusted for inflation after January 1, 1989) above such amount, and are payable pursuant to the provisions of 49 U.S.C. 70113 and section 440.19 of the Regulations; or (iv) Licensee has no liability for claims exceeding \$1,500,000,000 (as adjusted for inflation after January 1, 1989) above the amount of insurance or demonstration of financial responsibility required under section 440.9(c) of the Regulations.

7. Miscellaneous

(a) Nothing contained herein shall be construed as a waiver or release by Licensee, Customer or the United States of any claim by an employee of the Licensee, Customer or the United States, respectively, including a member of the Armed Forces of the United States, for Bodily Injury or Property Damage, resulting from Licensed Activities.

(b) Notwithstanding any provision of this Agreement to the contrary, any waiver, release, assumption of responsibility or agreement to hold harmless and indemnify herein shall not apply to claims for Bodily Injury or Property Damage resulting from willful misconduct of any of the Parties, the Contractors and Subcontractors of any of the Parties, and in the case of Licensee and Customer and the Contractors and Subcontractors of each of them, the directors, officers, agents and employees of any of the foregoing, and in the case of the United States, its agents.

(c) In the event that more than one customer is involved in Licensed Activities, references herein to Customer shall apply to, and be deemed to include, each such customer severally and not jointly.

(d) This Agreement shall be governed by and construed in accordance with United States Federal law.

IN WITNESS WHEREOF, the Parties to this Agreement have caused the Agreement to be duly executed by their respective duly authorized representatives as of the date written above.

Licensee

By: _____
Its: _____

Customer

By: _____
Its: _____

Federal Aviation Administration of the Department of Transportation on Behalf of the
United States Government

By: _____
Its: _____

Associate Administrator for Commercial Space Transportation

Part 2—Waiver of Claims and Assumption of Responsibility for Licensed Reentry

This Agreement is entered into this ____ day of _____, by and among [Licensee] (the “Licensee”), [Customer] (the “Customer”), and the Federal Aviation Administration of the Department of Transportation, on behalf of the United States Government (collectively, the “Parties”), to implement the provisions of §440.17(c) of the Commercial Space Transportation Licensing Regulations, 14 C.F.R. Ch. III (the “Regulations”). This agreement applies to the reentry of the [Payload] payload on a [Reentry Vehicle] vehicle.

In consideration of the mutual releases and promises contained herein, the Parties hereby agree as follows:

1. Definitions

Contractors and Subcontractors means entities described in §440.3 of the Regulations.

Customer means the above-named Customer on behalf of the Customer and any person described in §440.3 of the Regulations.

License means License No. ____ issued on _____, by the Associate Administrator for Commercial Space Transportation, Federal Aviation Administration, Department of Transportation, to the Licensee, including all license orders issued in connection with the License.

Licensee means the Licensee and any transferee of the Licensee under 49 U.S.C. Subtitle IX, ch. 701.

United States means the United States and its agencies involved in Licensed Activities. Except as otherwise defined herein, terms used in this Agreement and defined in 49 U.S.C. Subtitle IX, ch. 701—Commercial Space Launch Activities, or in the Regulations, shall have the same meaning as contained in 49 U.S.C. Subtitle IX, ch. 701, or the Regulations, respectively.

2. Waiver and Release of Claims

(a) Licensee hereby waives and releases claims it may have against Customer and the United States, and against their respective Contractors and Subcontractors, for Property Damage it sustains and for Bodily Injury or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault.

(b) Customer hereby waives and releases claims it may have against Licensee and the United States, and against their respective Contractors and Subcontractors, for Property Damage it sustains and for Bodily Injury or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault.

(c) The United States hereby waives and releases claims it may have against Licensee and Customer, and against their respective Contractors and Subcontractors, for Property Damage it sustains, and for Bodily Injury or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault, to the extent that claims it would otherwise have for such damage or injury exceed the amount of insurance or demonstration of financial responsibility required under sections 440.9(c) and (e) of the Regulations.

3. Assumption of Responsibility

(a) Licensee and Customer shall each be responsible for Property Damage it sustains and for Bodily Injury or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault. Licensee and Customer shall each hold harmless and indemnify each other, the United States, and the Contractors and Subcontractors of each Party, for Bodily Injury or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault.

(b) The United States shall be responsible for Property Damage it sustains, and for Bodily Injury or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault, to the extent that claims it would otherwise have for such damage or injury exceed the amount of insurance or demonstration of financial responsibility required under §§440.9(c) and (e) of the Regulations.

4. Extension of Assumption of Responsibility and Waiver and Release of Claims

(a) Licensee shall extend the requirements of the waiver and release of claims, and the assumption of responsibility, hold harmless, and indemnification, as set forth in paragraphs 2(a) and 3(a), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims they may have against Customer and the United States, and against the respective Contractors and Subcontractors of each, and to agree to be responsible, for Property Damage they sustain and to be responsible, hold harmless and indemnify Customer and the United States, and the respective Contractors and Subcontractors of each, for Bodily Injury or Property Damage sustained by their own employees, resulting from Licensed Activities, regardless of fault.

(b) Customer shall extend the requirements of the waiver and release of claims, and the assumption of responsibility, hold harmless, and indemnification, as set forth in paragraphs 2(b) and 3(a), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims they may have against Licensee and the United States, and against the respective Contractors and Subcontractors of each, and to agree to be responsible, for Property Damage they sustain and to be responsible, hold harmless and indemnify Licensee and the United States, and the respective Contractors and Subcontractors of each, for Bodily Injury or Property Damage sustained by their own employees, resulting from Licensed Activities, regardless of fault.

(c) The United States shall extend the requirements of the waiver and release of claims, and the assumption of responsibility as set forth in paragraphs 2(c) and 3(b), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims they may have against Licensee and Customer, and against the respective Contractors and Subcontractors of each, and to agree to be responsible, for any Property Damage they sustain and for any Bodily Injury or Property Damage sustained by their own employees, resulting from Licensed Activities, regardless of fault, to the extent that claims they would otherwise have for such damage or injury exceed the amount of insurance or demonstration of financial responsibility required under §§440.9(c) and (e) of the Regulations.

5. Indemnification

(a) Licensee shall hold harmless and indemnify Customer and its directors, officers, servants, agents, subsidiaries, employees and assignees, or any of them, and the United States and its agencies, servants, agents, subsidiaries, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims that Licensee's Contractors and Subcontractors may have for Property Damage sustained by them and for Bodily Injury or Property Damage sustained by their employees, resulting from Licensed Activities.

(b) Customer shall hold harmless and indemnify Licensee and its directors, officers, servants, agents, subsidiaries, employees and assignees, or any of them, and the United States and its agencies, servants, agents, subsidiaries, employees, assignees, or any of them, from and against liability, loss or damage arising out of claims that Customer's Contractors and Subcontractors, or any person on whose behalf Customer enters into this Agreement, may have for Property Damage sustained by them and for Bodily Injury or Property Damage sustained by their employees, resulting from Licensed Activities.

(c) To the extent provided in advance in an appropriations law or to the extent there is enacted additional legislative authority providing for the payment of claims, the United States shall hold harmless and indemnify Licensee and Customer and their respective directors, officers, servants, agents, subsidiaries, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims that Contractors and Subcontractors of the United States may have for Property Damage sustained by them, and for Bodily Injury or Property Damage sustained by their employees, resulting from Licensed Activities, to the extent that claims they would otherwise have for such damage or injury exceed the amount of insurance or demonstration of financial responsibility required under §§440.9(c) and (e) of the Regulations.

6. Assurances Under 49 U.S.C. 70112(e)

Notwithstanding any provision of this Agreement to the contrary, Licensee shall hold harmless and indemnify the United States and its agencies, servants, agents, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims for Bodily Injury or Property Damage, resulting from Licensed Activities,

regardless of fault, except to the extent that: (i) As provided in section 7(b) of this Agreement, claims result from willful misconduct of the United States or its agents; (ii) claims for Property Damage sustained by the United States or its Contractors and Subcontractors exceed the amount of insurance or demonstration of financial responsibility required under §440.9(e) of the Regulations; (iii) claims by a Third Party for Bodily Injury or Property Damage exceed the amount of insurance or demonstration of financial responsibility required under §440.9(c) of the Regulations, and do not exceed \$1,500,000,000 (as adjusted for inflation after January 1, 1989) above such amount, and are payable pursuant to the provisions of 49 U.S.C. 70113 and §440.19 of the Regulations; or (iv) Licensee has no liability for claims exceeding \$1,500,000,000 (as adjusted for inflation after January 1, 1989) above the amount of insurance or demonstration of financial responsibility required under §440.9(c) of the Regulations.

7. Miscellaneous

(a) Nothing contained herein shall be construed as a waiver or release by Licensee, Customer or the United States of any claim by an employee of the Licensee, Customer or the United States, respectively, including a member of the Armed Forces of the United States, for Bodily Injury or Property Damage, resulting from Licensed Activities.

(b) Notwithstanding any provision of this Agreement to the contrary, any waiver, release, assumption of responsibility or agreement to hold harmless and indemnify herein shall not apply to claims for Bodily Injury or Property Damage resulting from willful misconduct of any of the Parties, the Contractors and Subcontractors of any of the Parties, and in the case of Licensee and Customer and the Contractors and Subcontractors of each of them, the directors, officers, agents and employees of any of the foregoing, and in the case of the United States, its agents.

(c) In the event that more than one customer is involved in Licensed Activities, references herein to Customer shall apply to, and be deemed to include, each such customer severally and not jointly.

(d) This Agreement shall be governed by and construed in accordance with United States Federal law.

IN WITNESS WHEREOF, the Parties to this Agreement have caused the Agreement to be duly executed by their respective duly authorized representatives as of the date written above.

Licensee

By: _____
Its: _____

Customer

By: _____
Its: _____

Federal Aviation Administration of the Department of Transportation on Behalf of the
United States Government

By: _____
Its: _____
Associate Administrator for Commercial Space Transportation

APPENDIX B

Agreement for Waiver of Claims and Assumption of Responsibility for Permitted Activities (14 C.F.R. Part 440, Appendix C)

THIS AGREEMENT is entered into this ___ day of ____, by and among [Permittee] (the “Permittee”), [Customer] (the “Customer”) and the Federal Aviation Administration of the Department of Transportation, on behalf of the United States Government (collectively, the “Parties”), to implement the provisions of section 440.17(c) of the Commercial Space Transportation Licensing Regulations, 14 C.F.R. Ch. III (the “Regulations”). This agreement applies to [describe permitted activity].

In consideration of the mutual releases and promises contained herein, the Parties hereby agree as follows:

1. Definitions

Customer means the above-named Customer on behalf of the Customer and any person described in §440.3 of the Regulations.

Permit means Permit No. __ issued on ____, by the Associate Administrator for Commercial Space Transportation, Federal Aviation Administration, Department of Transportation, to the Permittee, including all permit orders issued in connection with the Permit.

Permittee means the holder of the Permit issued under 49 U.S.C. Subtitle IX, ch. 701. *United States* means the United States and its agencies involved in Permitted Activities. Except as otherwise defined herein, terms used in this Agreement and defined in 49 U.S.C. Subtitle IX, ch. 701—Commercial Space Launch Activities, or in the Regulations, shall have the same meaning as contained in 49 U.S.C. Subtitle IX, ch. 701, or the Regulations, respectively.

2. Waiver and Release of Claims

(a) Permittee hereby waives and releases claims it may have against Customer and the United States, and against their respective Contractors and Subcontractors, for Property Damage it sustains and for Bodily Injury or Property Damage sustained by its own employees, resulting from Permitted Activities, regardless of fault.

(b) Customer hereby waives and releases claims it may have against Permittee and the United States, and against their respective Contractors and Subcontractors, for Property Damage it sustains and for Bodily Injury or Property Damage sustained by its own employees, resulting from Permitted Activities, regardless of fault.

(c) The United States hereby waives and releases claims it may have against Permittee and Customer, and against their respective Contractors and Subcontractors, for Property Damage it sustains resulting from Permitted Activities, regardless of fault, to the extent

that claims it would otherwise have for such damage exceed the amount of insurance or demonstration of financial responsibility required under section 440.9(e) of the Regulations.

3. Assumption of Responsibility

(a) Permittee and Customer shall each be responsible for Property Damage it sustains and for Bodily Injury or Property Damage sustained by its own employees, resulting from Permitted Activities, regardless of fault. Permittee and Customer shall each hold harmless and indemnify each other, the United States, and the Contractors and Subcontractors of each Party, for Bodily Injury or Property Damage sustained by its own employees, resulting from Permitted Activities, regardless of fault.

(b) The United States shall be responsible for Property Damage it sustains, resulting from Permitted Activities, regardless of fault, to the extent that claims it would otherwise have for such damage exceed the amount of insurance or demonstration of financial responsibility required under section 440.9(e) of the Regulations.

4. Extension of Assumption of Responsibility and Waiver and Release of Claims

(a) Permittee shall extend the requirements of the waiver and release of claims, and the assumption of responsibility, hold harmless, and indemnification, as set forth in paragraphs 2(a) and 3(a), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims they may have against Customer and the United States, and against the respective Contractors and Subcontractors of each, and to agree to be responsible, for Property Damage they sustain and to be responsible, hold harmless and indemnify Customer and the United States, and the respective Contractors and Subcontractors of each, for Bodily Injury or Property Damage sustained by their own employees, resulting from Permitted Activities, regardless of fault.

(b) Customer shall extend the requirements of the waiver and release of claims, and the assumption of responsibility, hold harmless, and indemnification, as set forth in paragraphs 2(b) and 3(a), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims they may have against Permittee and the United States, and against the respective Contractors and Subcontractors of each, and to agree to be responsible, for Property Damage they sustain and to be responsible, hold harmless and indemnify Permittee and the United States, and the respective Contractors and Subcontractors of each, for Bodily Injury or Property Damage sustained by their own employees, resulting from Permitted Activities, regardless of fault.

(c) The United States shall extend the requirements of the waiver and release of claims, and the assumption of responsibility as set forth in paragraphs 2(c) and 3(b), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims they may have against Permittee and Customer, and against the respective Contractors and Subcontractors of each, and to agree to be responsible, for any Property Damage they sustain, resulting from Permitted Activities, regardless of fault, to the extent that claims

they would otherwise have for such damage exceed the amount of insurance or demonstration of financial responsibility required under section 440.9(e) of the Regulations.

5. Indemnification

(a) Permittee shall hold harmless and indemnify Customer and its directors, officers, servants, agents, subsidiaries, employees and assignees, or any of them, and the United States and its agencies, servants, agents, subsidiaries, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims that Permittee's Contractors and Subcontractors may have for Property Damage sustained by them and for Bodily Injury or Property Damage sustained by their employees, resulting from Permitted Activities.

(b) Customer shall hold harmless and indemnify Permittee and its directors, officers, servants, agents, subsidiaries, employees and assignees, or any of them, and the United States and its agencies, servants, agents, subsidiaries, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims that Customer's Contractors and Subcontractors, or any person on whose behalf Customer enters into this Agreement, may have for Property Damage sustained by them and for Bodily Injury or Property Damage sustained by their employees, resulting from Permitted Activities.

6. Assurances Under 49 U.S.C. 70112(e)

Notwithstanding any provision of this Agreement to the contrary, Permittee shall hold harmless and indemnify the United States and its agencies, servants, agents, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims for Bodily Injury or Property Damage, resulting from Permitted Activities, regardless of fault, except to the extent that it is provided in section 7(b) of this Agreement, except to the extent that claims (i) result from willful misconduct of the United States or its agents and (ii) for Property Damage sustained by the United States or its Contractors and Subcontractors exceed the amount of insurance or demonstration of financial responsibility required under section 440.9(e) of the Regulations.

7. Miscellaneous

(a) Nothing contained herein shall be construed as a waiver or release by Permittee, Customer or the United States of any claim by an employee of the Permittee, Customer or the United States, respectively, including a member of the Armed Forces of the United States, for Bodily Injury or Property Damage, resulting from Permitted Activities.

(b) Notwithstanding any provision of this Agreement to the contrary, any waiver, release, assumption of responsibility or agreement to hold harmless and indemnify herein shall not apply to claims for Bodily Injury or Property Damage resulting from willful misconduct of any of the Parties, the Contractors and Subcontractors of any of the Parties, and in the case of Permittee and Customer and the Contractors and Subcontractors of each of them, the directors, officers, agents and employees of any of

the foregoing, and in the case of the United States, its agents.

(c) In the event that more than one customer is involved in Permitted Activities, references herein to Customer shall apply to, and be deemed to include, each such customer severally and not jointly.

(d) This Agreement shall be governed by and construed in accordance with United States Federal law.

IN WITNESS WHEREOF, the Parties to this Agreement have caused the Agreement to be duly executed by their respective duly authorized representatives as of the date written above.

Permittee

By: _____

Its: _____

Customer

By: _____

Its: _____

Federal Aviation Administration of the Department of Transportation on Behalf of the
United States Government

By: _____

Its: _____

Associate Administrator for Commercial Space Transportation

APPENDIX C

Agreement for Waiver of Claims and Assumption of Responsibility for a Crew Member (14 C.F.R. Part 440, Appendix D)

THIS AGREEMENT is entered into this ____ day of _____, by and among [name of Crew Member] (the “Crew Member”) and the Federal Aviation Administration of the Department of Transportation, on behalf of the United States Government (collectively, the “Parties”), to implement the provisions of section 440.17(f) of the Commercial Space Transportation Licensing Regulations, 14 C.F.R. Ch. III (the “Regulations”). This agreement applies to the Crew Member’s participation in activities that the FAA has authorized by license or permit during the Crew Member’s employment with [Name of licensee or permittee].

In consideration of the mutual releases and promises contained herein, the Parties hereby agree as follows:

1. Definitions

Crew Member means

- (a) The above-named Crew Member,
- (b) All the heirs, administrators, executors, assignees, next of kin, and estate of the above-named Crew Member, and
- (c) Anyone who attempts to bring a claim on behalf of the Crew Member or for damage or harm arising out of the Bodily Injury, including Death, of the Crew Member.

License/Permit means License/Permit No. _____ issued on _____, by the Associate Administrator for Commercial Space Transportation, Federal Aviation Administration, Department of Transportation, to the Licensee/Permittee, including all license/permit orders issued in connection with the License/Permit.

Licensee/Permittee means the Licensee/Permittee and any transferee of the Licensee under 49 U.S.C. Subtitle IX, ch. 701.

United States means the United States and its agencies involved in Licensed/Permitted Activities.

Except as otherwise defined herein, terms used in this Agreement and defined in 49 U.S.C. Subtitle IX, ch. 701—Commercial Space Launch Activities, or in the Regulations, shall have the same meaning as contained in 49 U.S.C. Subtitle IX, ch. 701, or the Regulations, respectively.

2. Waiver and Release of Claims

- (a) Crew Member hereby waives and releases claims it may have against the United States, and against its respective Contractors and Subcontractors, for Bodily Injury,

including Death, or Property Damage sustained by Crew Member, resulting from Licensed/Permitted Activities, regardless of fault.

(b) The United States hereby waives and releases claims it may have against the Crew Member for Property Damage it sustains, and for Bodily Injury, including Death, or Property Damage sustained by its own employees, resulting from Licensed/Permitted Activities, regardless of fault.

3. Assumption of Responsibility

(a) The Crew Member shall be responsible for Bodily Injury, including Death, or Property Damage sustained by Crew Member, resulting from Licensed/Permitted Activities, regardless of fault. The Crew Member shall hold harmless the United States, and the Contractors and Subcontractors of each Party, for Bodily Injury, including Death, or Property Damage sustained by Crew Member, resulting from Licensed/Permitted Activities, regardless of fault.

(b) The United States shall be responsible for Property Damage it sustains, and for Bodily Injury, including Death, or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault, to the extent that claims it would otherwise have for such damage or injury exceed the amount of insurance or demonstration of financial responsibility required under sections 440.9(c) and (e), respectively, of the Regulations.

(c) The United States shall be responsible for Property Damage it sustains, resulting from Permitted Activities, regardless of fault, to the extent that claims it would otherwise have for such damage exceed the amount of insurance or demonstration of financial responsibility required under section 440.9(e) of the Regulations.

4. Extension of Assumption of Responsibility and Waiver and Release of Claims

(a) The United States shall extend the requirements of the waiver and release of claims, and the assumption of responsibility as set forth in paragraphs 2(b) and 3(b), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims they may have against Crew Member and to agree to be responsible, for any Property Damage the Contractors and Subcontractors sustain and for any Bodily Injury, including Death, or Property Damage sustained by their own employees, resulting from Licensed Activities, regardless of fault.

(b) The United States shall extend the requirements of the waiver and release of claims, and the assumption of responsibility as set forth in paragraphs 2(b) and 3(c), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims the Contractors and Subcontractors may have against Crew Member and to agree to be responsible, for any Property Damage they sustain, resulting from Permitted Activities, regardless of fault.

5. Indemnification

Crew Member shall hold harmless and indemnify the United States and its agencies, servants, agents, subsidiaries, employees and assignees, or any of them, from and against liability, loss, or damage arising out of claims brought by anyone for Property Damage or Bodily Injury, including Death, sustained by Crew Member, resulting from Licensed/Permitted Activities.

6. Assurances Under 49 U.S.C. 70112(e)

Notwithstanding any provision of this Agreement to the contrary, Crew Member shall hold harmless the United States and its agencies, servants, agents, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims for Bodily Injury, including Death, or Property Damage, sustained by Crew Member, resulting from Licensed/Permitted Activities, regardless of fault, except to the extent that, as provided in section 6(b) of this Agreement, claims result from willful misconduct of the United States or its agents.

7. Miscellaneous

(a) Nothing contained herein shall be construed as a waiver or release by the United States of any claim by an employee of the United States, respectively, including a member of the Armed Forces of the United States, for Bodily Injury or Property Damage, resulting from Licensed/Permitted Activities.

(b) Notwithstanding any provision of this Agreement to the contrary, any waiver, release, assumption of responsibility or agreement to hold harmless herein shall not apply to claims for Bodily Injury, including Death, or Property Damage resulting from willful misconduct of any of the Parties, the Contractors and Subcontractors of any of the Parties, and in the case of the United States, its agents.

(c) This Agreement shall be governed by and construed in accordance with United States Federal law.

IN WITNESS WHEREOF, the Parties to this Agreement have caused the Agreement to be duly executed by their respective duly authorized representatives as of the date written above.

I [name of Crew Member] have read and understand this agreement and agree that I am bound by it.

Crew Member

Signature: _____

Printed Name: _____

Federal Aviation Administration of the Department of Transportation on Behalf of the
United States Government

By: _____

Its: _____

Associate Administrator for Commercial Space Transportation

APPENDIX D

Agreement for Waiver of Claims and Assumption of Responsibility for a Space Flight Participant (14 C.F.R. Part 440, Appendix E)

THIS AGREEMENT is entered into this ____ day of _____, by and among [name of Space Flight Participant] (the “Space Flight Participant”) and the Federal Aviation Administration of the Department of Transportation, on behalf of the United States Government (collectively, the “Parties”), to implement the provisions of section 440.17(e) of the Commercial Space Transportation Licensing Regulations, 14 C.F.R. Ch. III (the “Regulations”). This agreement applies to Space Flight Participant’s travel on [name of launch or reentry vehicle] of [name of Licensee or Permittee]. In consideration of the mutual releases and promises contained herein, the Parties hereby agree as follows:

1. Definitions

Space Flight Participant means

- (a) The above-named Space Flight Participant,
- (b) All the heirs, administrators, executors, assignees, next of kin, and estate of the above-named Space Flight Participant , and
- (c) Anyone who attempts to bring a claim on behalf of the Space Flight Participant or for damage or harm arising out of the Bodily Injury, including Death, of the Space Flight Participant.

License/Permit means License/Permit No. _____ issued on _____, by the Associate Administrator for Commercial Space Transportation, Federal Aviation Administration, Department of Transportation, to the Licensee/Permittee, including all license/permit orders issued in connection with the License/Permit.

Licensee/Permittee means the Licensee/Permittee and any transferee of the Licensee under 49 U.S.C. Subtitle IX, ch. 701.

United States means the United States and its agencies involved in Licensed/Permitted Activities.

Except as otherwise defined herein, terms used in this Agreement and defined in 49 U.S.C. Subtitle IX, ch. 701—Commercial Space Launch Activities, or in the Regulations, shall have the same meaning as contained in 49 U.S.C. Subtitle IX, ch. 701, or the Regulations, respectively.

2. Waiver and Release of Claims

- (a) Space Flight Participant hereby waives and releases claims it may have against the United States, and against its respective Contractors and Subcontractors, for Bodily

Injury, including Death, or Property Damage sustained by Space Flight Participant, resulting from Licensed/Permitted Activities, regardless of fault.

(b) The United States hereby waives and releases claims it may have against Space Flight Participant for Property Damage it sustains, and for Bodily Injury, including Death, or Property Damage sustained by its own employees, resulting from Licensed/Permitted Activities, regardless of fault.

3. Assumption of Responsibility

(a) Space Flight Participant shall be responsible for Bodily Injury, including Death, or Property Damage sustained by the Space Flight Participant resulting from Licensed/Permitted Activities, regardless of fault. Space Flight Participant shall hold harmless the United States, and its Contractors and Subcontractors, for Bodily Injury, including Death, or Property Damage sustained by Space Flight Participant from Licensed/Permitted Activities, regardless of fault.

(b) The United States shall be responsible for Property Damage it sustains, and for Bodily Injury, including Death, or Property Damage sustained by its own employees, resulting from Licensed Activities, regardless of fault, to the extent that claims it would otherwise have for such damage or injury exceed the amount of insurance or demonstration of financial responsibility required under sections 440.9(c) and (e), respectively, of the Regulations.

(c) The United States shall be responsible for Property Damage it sustains, resulting from Permitted Activities, regardless of fault, to the extent that claims it would otherwise have for such damage exceed the amount of insurance or demonstration of financial responsibility required under section 440.9(e) of the Regulations.

4. Extension of Assumption of Responsibility and Waiver and Release of Claims

(a) The United States shall extend the requirements of the waiver and release of claims, and the assumption of responsibility as set forth in paragraphs 2(b) and 3(b), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims they may have against Space Flight Participant, and to agree to be responsible, for any Property Damage they sustain and for any Bodily Injury, including Death, or Property Damage sustained by their own employees, resulting from Licensed Activities, regardless of fault.

(b) The United States shall extend the requirements of the waiver and release of claims, and the assumption of responsibility as set forth in paragraphs 2(b) and 3(c), respectively, to its Contractors and Subcontractors by requiring them to waive and release all claims they may have against Space Flight Participant, and to agree to be responsible, for any Property Damage the Contractors and Subcontractors sustain, resulting from Permitted Activities, regardless of fault.

5. Indemnification

Space Flight Participant shall hold harmless and indemnify the United States and its agencies, servants, agents, subsidiaries, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims brought by anyone for Property Damage or Bodily Injury, including Death, sustained by Space Flight Participant, resulting from Licensed/Permitted Activities.

6. Assurances Under 49 U.S.C. 70112(e)

Notwithstanding any provision of this Agreement to the contrary, Space Flight Participant shall hold harmless the United States and its agencies, servants, agents, employees and assignees, or any of them, from and against liability, loss or damage arising out of claims for Bodily Injury, including Death, or Property Damage, sustained by Space Flight Participant, resulting from Licensed/Permitted Activities, regardless of fault, except to the extent that, as provided in section 6(b) of this Agreement, claims result from willful misconduct of the United States or its agents.

7. Miscellaneous

(a) Nothing contained herein shall be construed as a waiver or release by the United States of any claim by an employee the United States, respectively, including a member of the Armed Forces of the United States, for Bodily Injury or Property Damage, resulting from Licensed/Permitted Activities.

(b) Notwithstanding any provision of this Agreement to the contrary, any waiver, release, assumption of responsibility or agreement to hold harmless herein shall not apply to claims for Bodily Injury, including Death, or Property Damage resulting from willful misconduct of any of the Parties, the Contractors, Subcontractors, and agents of the United States, and Space Flight Participant.

(c) This Agreement shall be governed by and construed in accordance with United States Federal law.

IN WITNESS WHEREOF, the Parties to this Agreement have caused the Agreement to be duly executed by their respective duly authorized representatives as of the date written above.

I [name of Space Flight Participant] have read and understand this agreement and agree that I am bound by it.

Space Flight Participant

Signature: _____

Printed Name: _____

Federal Aviation Administration of the Department of Transportation on Behalf of the United States Government

By: _____

Its: _____

Associate Administrator for Commercial Space Transportation