A Space Ly Primer for Colorado Lavyers Part 2: U.S. Space Law

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The United States has a robust regulatory scheme addressing activities in space. This article reviews selected aspects of national space law applicable to commercial space activities.

s discussed in Part 1, space activities occur within a framework of international law including, most importantly, the Outer Space Treaty.¹ Pursuant to Article 6 of the Outer Space Treaty, nations bear "international responsibility for national activities in space" whether such activities are carried on by governmental or non-governmental entities.² Moreover, the activities of non-governmental entities in outer space require "authorization and continuing supervision."³ To fulfill these obligations, the United States and many other nations have established detailed statutory and regulatory

regimes addressing safety, financial responsibility, licensing, and other matters. The United States has the most robust national space law regime, which is addressed below. Many other nations have also established space laws. A 2010 book details the space laws of 15 countries.⁴ Since then, seven additional countries have adopted space laws,⁵ and other countries, such as the United Arab Emirates, are in the process of developing their own space laws. Many nations have modeled their laws after those of the United States.

This article provides a high-level review of selected aspects of the U.S. legal regime

applicable to commercial space activities⁶ with a focus on (1) commercial space launch, (2) satellite remote sensing of the Earth, (3) satellite communications, (4) National Aeronautics and Space Administration (NASA) activities, and (5) space mining. Most of these areas involve U.S. space policy, statutory provisions, and extensive administrative regulations. The regulatory regimes have generally worked well and fostered the development of commercial space activities in the United States. Given the tremendous growth in commercial space activities, however, there are initiatives to streamline some of the extensive regulations and expedite the processing of license applications by agencies. U.S. space law is likely to mature as the commercialization of space activities progresses.

One recent significant development in space law was the re-codification of U.S. space laws in 2010. Public Law 111-314 enacted a restatement of existing law relating to national and commercial space programs as a new title of the United States Code. The enactment of Title 51 transferred statutes dealing with space programs from various United States Code titles and put them in one place,⁷ so most of the laws relevant to commercial use of space are located there.

Commercial Space Launch Activities

Commercial space launch capabilities are important to the United States for many reasons. The 2010 National Space Policy reflects this importance; one of its six goals is to "[e]nergize competitive domestic industries to participate in global markets and advance the development of: ... space launch[.]"⁸ The 2013 National Space Transportation Policy established five goals, including to "[p]romote and maintain a dynamic, healthy, and efficient domestic space transportation industrial base; [and] [e]ncourage and facilitate the U.S. commercial space transportation industry to increase industry robustness and cost effectiveness[.]"9 The 2013 Policy also directs agencies to "[p]urchase and use U.S. commercial space transportation capabilities and services and facilitate multiple U.S. commercial providers of space transportation services across a range of launch vehicle classes, to the maximum extent practicable."10 The United States has done so in many ways, including NASA's use of Space Act Agreements, discussed below. Because commercial space launch capabilities are so important, there is a very detailed statutory and regulatory regime applicable to such activities.

The Commercial Space Launch Act¹¹ (CSLA) was enacted in 1984 to incentivize the commercial space launch industry. The CSLA and its implementing regulations govern commercial space launch activity. The CSLA empowers the Secretary of Transportation, delegated to the Federal Aviation Administration (FAA) Office of Commercial Space Transportation, to (1) authorize and regulate launch and reentry activities of licensees consistent with public health and safety, the environment, national security, and U.S. foreign policy; (2) impose and enforce insurance and financial responsibility requirements on licensees; (3) encourage, facilitate, and promote commercial space launches and reentries by the private sector; and (4) investigate and penalize violations of the CSLA.¹²

The CSLA requires a license for:

- a person to launch a launch vehicle, operate a launch or reentry site, or reenter a reentry vehicle (launch-reentry activities) inside the United States;
- a U.S. citizen to conduct launch-reentry activities outside the United States; and
- a U.S. citizen to conduct launch-reentry activities outside the United States in certain situations involving a foreign government.¹³

The CSLA implementing regulations in Title 14 of the Code of Federal Regulations¹⁴ (CFR) establish procedures to obtain a

- launch license (Part 415);
- license to operate a launch site (Part 420);
- license for launch and reentry of a reusable launch vehicle (Part 431);
- license to operate a reentry site (Part 433); and
- license for reentry of a vehicle other than a reusable launch vehicle (Part 435).

Part 413 of the regulations establishes license application procedures.¹⁵ These procedures include guidance on who must obtain a license or permit, pre-application consultation with the FAA, confidentiality, and license or permit renewal.

Part 440 of the CSLA regulations addresses financial responsibility.¹⁶ The FAA determines "the maximum probable loss (MPL) from covered claims by a third party for bodily injury or property damage, and the United States, its agencies, and its contractors and subcontractors for covered property damage or loss, resulting from a permitted or licensed activity."¹⁷ The MPL is an important concept because the MPL determination "forms the basis for financial responsibility requirements issued in a license or permit order."¹⁸ The licensee or permittee must obtain third party liability insurance or demonstrate financial responsibility in amounts sufficient to compensate for the MPL.¹⁹ The third party MPL amounts are established for each license by the FAA up to a maximum of \$500 million or "[t]he maximum liability insurance available on the world market at a reasonable cost."²⁰ Similar provisions apply to claims by the United States, its agencies, and its contractors and subcontractors, with their MPL capped at \$100 million or "[t]he maximum liability insurance available on the world market at a reasonable cost."²¹

Each licensee must also comply with detailed and complex reciprocal waiver of claims requirements.²² This includes signing a cross-waiver of liability with their customer(s) and the U.S. government.23 Through these reciprocal waivers each party (1) agrees to be responsible for property damage or loss it sustains, and for personal injury to, death of, or property damage or loss sustained by its own employees, resulting from an activity carried out under the license; and (2) waives claims it may have against the other parties to the agreement.24 Furthermore, the licensee and its contractors, subcontractors, and customers, as well as the contractors and subcontractors of the customers, are also to extend the requirements of the waiver and release of claims, and the assumption of responsibility, to their contractors and subcontractors.²⁵ Proper implementation and flow-down of these waivers is critical. Failure to do so can lead to indemnity obligations²⁶ and other significant consequences, such as exposing parties to potential liability.

With limited exceptions, the government is authorized, subject to congressional appropriations, to pay successful third party claims against the licensee, a contractor, subcontractor, or customer of the licensee, or a contractor or subcontractor of the licensee's customer, in excess of the amount of the licensee's third party liability insurance up to \$1.5 billion.²⁷ In such an event, the President, on the recommendation of the Secretary of Transportation, must submit a compensation plan to Congress recommending the amount of claims to be paid.²⁸

In addition to determinations of financial responsibility, the FAA, with assistance from

other government agencies, will conduct policy, safety, payload, and environmental "reviews" for a proposed activity.²⁹

In a policy review, the FAA "reviews a license application to determine whether it presents any issues affecting U.S. national security or foreign policy interests, or international obligations of the United States."³⁰ This may involve interagency coordination with the Department of Defense, the Department of State, and other federal agencies. The processing of these reviews at FAA, and at the National Oceanic and Atmospheric Administration (NOAA), have come under attack from industry due to long delays, sometimes exceeding one year.³¹

Safety reviews vary depending on the specific type of activity. The FAA conducts them to determine whether an applicant is capable of launching a launch vehicle and its payload without endangering public health and safety and the safety of property.³² These reviews generally include analysis of compliance with acceptable flight risk criteria, flight readiness and communication plans, and accident investigation plans and procedures.³³

The FAA reviews a proposed payload "to determine whether a license applicant or payload owner or operator has obtained all required licenses, authorization, and permits . . . to determine whether its launch would jeopardize public health and safety, safety of property, U.S. national security or foreign policy interests, or international obligations of the United States."³⁴ The FAA does not review payloads regulated by the Federal Communications Commission (FCC) or the NOAA, or those owned or operated by the U.S. government.³⁵

The FAA's environmental review evaluates the environmental impacts associated with a proposed launch or reentry.³⁶ The applicant must provide sufficient information for the FAA to evaluate compliance with the National Environmental Policy Act³⁷ and other statutes.

The FAA regulations require a launch license applicant to describe how it will satisfy the FAA's requirements for avoiding the creation of space debris.³⁸ Among other things, the application must demonstrate efforts to prevent collisions between components of the launch vehicle and the satellite being launched. As will be seen below, other government agencies including the FCC and NOAA also require debris mitigation plans.

Part 460 of the FAA regulations details requirements for approval of human space flights. These requirements include require-

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ments for the crew, government astronauts, and "space flight participants," defined as "an individual, who is not crew, carried aboard a launch vehicle or reentry vehicle."³⁹ The CSLA and FAA regulations require crew members and space flight participants to be advised of the risks associated with space travel and to sign waivers releasing the U.S. government and the licensee from any claims arising from injury or property damage associated with their participation in space activities.⁴⁰ The CSLA protects private spaceflights from additional regulatory oversight by allowing the industry until October 1, 2023 to develop before government regulators will have a substantial role absent a death, serious injury, or an event that could have led to a death or serious injury.⁴¹

It is important to note that while the CSLA and FAA regulations apply to the launch and reentry of space objects, there is no regulation of on-orbit operations by the FAA or any agency. Although there have been proposals to assign responsibility for on-orbit transportation to the FAA or another agency, this regulatory gap remains.

Remote Sensing of the Earth from Space

Remote sensing of the Earth from space⁴² presents significant national security issues. The United States has developed a legal regime based on policies, laws, and regulations to accommodate national security concerns and allow the promotion of commercial remote sensing activities. Since 2003, U.S. remote sensing policy has favored commercialization.⁴³ Pursuant to the 2003 U.S. Commercial Remote Sensing Policy, the U.S. government will:

- rely to the maximum practical extent on U.S. commercial remote sensing space capabilities for filling imagery and geospatial needs for military, intelligence, foreign policy, homeland security, and civil users;
- focus government remote sensing space systems on meeting needs that cannot be effectively, affordably, and reliably satisfied by commercial providers because of economic factors, civil mission needs, national security concerns, or foreign policy concerns;
- develop a long-term, sustainable relationship between the government and the commercial remote sensing space industry;
- provide a timely and responsive regulatory environment for licensing the operations

and exports of commercial remote sensing space systems; and

 enable U.S. industry to compete successfully as a provider of remote sensing space capabilities for foreign governments and foreign commercial users, while ensuring appropriate measures are implemented to protect national security and foreign policy.⁴⁴

Remote sensing in the United States (other than national security operations) started with the government built and operated Landsat series of satellites. Although the government still operates Landsat satellites and provides its images for free, remote sensing has developed into a strong commercial industry.

The Land Remote Sensing Policy Act⁴⁵ (LRSPA) and its implementing regulations⁴⁶ govern commercial remote sensing operations. The LRSPA's purposes include stimulating the development of the commercial market for unenhanced data; furthering the long-term goal of commercialization of land remote sensing, which will enhance international trade; and promoting widespread access to unenhanced data on a non-discriminatory basis. The LRSPA therefore encourages accessibility to remote sensing data and encourages commercial and scientific cooperation between nations.⁴⁷

The LRSPA authorizes the Secretary of Commerce to license private commercial remote sensing satellite systems and provide unenhanced data produced by private remote sensing systems and government systems to foreign governments and other users pursuant to commercial terms and conditions.48 Operations under such licenses must be carried out in a manner to preserve U.S. national security and to observe international obligations of the United States.⁴⁹ The Secretary of Commerce has delegated his authority to NOAA. Operating requirements of licensees include (1) furnishing complete orbit and data collection characteristics of the remote sensing system, and immediately providing notification of any deviation; and (2) upon termination of operations under the license, making disposition of any satellites in space in a manner satisfactory to the U.S. President.⁵⁰

The NOAA regulations governing licensing of private remote sensing satellite systems are

in 15 CFR Part 960. These detailed regulations set forth licensing requirements, prohibitions, and enforcement procedures.

The NOAA regulations apply broadly to any "person," including individuals regardless of citizenship, business entities, and private remote sensing systems having substantial connections with the United States.⁵¹ Appendix 1 to Part 960⁵² provides filing instructions and information to be included in the license application, which includes information on the company; launch segment information, such as the launch vehicle, site, and schedule; the space segment, including sensor type, spatial and spectral resolution, fields of view for each sensor, and anticipated system lifetime; ground segment, including data collection and processing capabilities, command and mission data frequencies, and methods to be used to ensure integrity of operations; and other information, including plans for providing access to or distributing unenhanced data, information regarding commercial data distribution and pricing, and a plan for post-mission disposition of the satellite. Such end-of-life plans are now standard within the industry.

In addition, the licensee must notify and seek approval from the Secretary of Commerce regarding any significant or substantial agreement the licensee intends to enter into with a foreign nation, entity, or consortium involving foreign nations or entities, not later than 60 days prior to concluding the agreement.⁵³ The term "significant or substantial foreign agreement" is defined as an agreement providing for one or more of the following:

- administrative control, which may include distributorship arrangements involving the routine receipt of high volumes of unenhanced data from a licensee's system;
- participation in operations of the system, including direct access to the system's unenhanced data; or
- an equity interest in the licensee held by a foreign nation and/or person if such interest equals or exceeds or will equal or exceed 20% of total outstanding shares or entitles the foreign person to a position on the licensee's board of directors.⁵⁴

In conjunction with the Department of Defense, the Department of State, and other

relevant agencies, the Department of Commerce reviews the proposed agreement in light of national security interests, foreign policy, and the government's international obligations. As noted previously, private industry has been critical of the time required to complete these reviews. The LRSPA regulations outline certain requirements such an agreement must meet for approval.⁵⁵

Consistent with the United Nations' Principles Relating to Remote Sensing of the Earth from Outer Space,⁵⁶ the LRSPA requires a licensee to make available to the government of any country (including the United States) "unenhanced data" regarding the territory under the jurisdiction of such government as soon as such data are available and on reasonable cost terms and conditions.57 Unenhanced data, however, will not be provided if the release is contrary to national security concerns, foreign policy, or international obligations, or is otherwise prohibited by law.58 "Unenhanced data" is defined, in part, as "remote sensing signals or imagery products that are unprocessed or subject only to data preprocessing."59 In addition to the provision of such data to foreign governments, a licensee (and the U.S. government) must provide unenhanced data designated by the Secretary of Commerce to all users without preference or special arrangement regarding delivery, pricing, or technical considerations. Unenhanced data, however, may be provided on condition that such data are used solely for noncommercial purposes.⁶⁰

A licensee must also maintain operational control of the remote sensing space system from a location within the United States at all times and allow U.S. government representatives to access its facilities for license monitoring and compliance inspections.⁶¹

Satellite Communications

Communication satellites are used in every country and are the most pervasive commercial use of outer space. Satellite communication systems have extensive international regulation through the International Telecommunication Union (ITU)⁶² as well as national regulations that are consistent with the ITU regulations. In the United States, the Communications Act of 1934, as amended⁶³ (Communications Act), combined and organized federal regulation of telephone, telegraph, and radio communications. The Communications Act has been amended by many acts of Congress since 1934, most extensively by the Telecommunications Act of 1996.⁶⁴

The Communications Act created the FCC to oversee and regulate radio communication activities by non-federal government entities, and the FCC applies this authority to space activities.65 The FCC's primary function concerning radio communication is to issue licenses and develop rules to further the use of radio in the public interest.66 The FCC issues licenses based on a demonstration that the proposed operations will serve the public interest, convenience, and necessity. The FCC may also adopt rules to carry out the Communications Act, or the provisions of "any international radio or wire communications treaty or convention, or regulations annexed thereto, including any treaty or convention insofar as it relates to the use of radio, to which the United States is . . . a party."67

Part 25 of the FCC's rules provides procedures, technical standards, and other requirements for the licensing and operation of facilities used for satellite communications, including ground stations and satellites.⁶⁸ These rules provide technical requirements and enable coordination of satellite systems in the United States and internationally to avoid harmful radio-frequency interference. The FCC regulations also address reporting requirements for satellite operators.⁶⁹ The FCC participates in the processes directed by the ITU as the U.S. administration.

FCC regulations address communication satellites operating in the Geostationary Satellite Orbit, where the majority of communication satellites are located, as well as non-geostationary satellites. Geostationary satellites stay in a fixed location relative to the Earth's orbit and can be serviced by stationary antennas. Most geostationary satellites are regulated through a "first-come, first-served" regulatory regime by the ITU and the FCC, which processes licensing applications in the order they are filed.⁷⁰ If an application is acceptable for filing, the FCC, on behalf of the applicant, will make a filing for rights with the ITU, enter into the ITU frequency coordination process, and ultimately seek to have the satellite system entered into the ITU's Master International Frequency Register (MIFR). Entry in the MIFR as a conforming assignment provides international recognition and protection against harmful interference from subsequent applicants.⁷¹

The FCC also regulates non-geostationary satellite (NGSO) systems.⁷² These satellites do not stay in a fixed location relative to their Earth stations. Thus, the Earth stations must track the satellites across the horizon. The FCC first determines whether the NGSO application is a "lead application" or a "competing application." Public notice is provided, and the FCC ultimately grants applications that meet the standards.⁷³ The FCC has procedures for situations where there is insufficient spectrum available for all qualified applicants.⁷⁴

The FCC has adopted rules concerning orbital debris mitigation by satellite systems.⁷⁵ In adopting these rules, the FCC stated it would help preserve continued affordable access to space, continued provision of reliable space-based services, and continued safety of persons and property in space and on the Earth's surface.⁷⁶

The FCC's rules require a satellite operator to submit an orbital debris mitigation plan to the FCC addressing:

- the amount of debris released in a planned manner during normal operations, and the probability of the space station becoming a source of debris by collisions with small debris or meteoroids that could cause loss of control and prevent post-mission disposal;
- accidental explosions during and after completion of mission operations;
- the probability of the space station becoming a source of debris by collisions with large debris or other operational space stations; and

4. the quantity of fuel that will be reserved for post-mission disposal maneuvers.⁷⁷

Submission of orbital debris plans is becoming standard practice for launch operations and satellite operators.

Over many decades the ITU and FCC regulations have enabled thousands of communication satellites to effectively provide service for direct television broadcasts, mobile satellite services, telephone communications, and other uses without harmful radio frequency interference.

NASA Space Activities

One year after the Soviet Union launched Sputnik, the National Aeronautics and Space Act of 1958 (Space Act)⁷⁸ authorized creation of NASA. Congress declared "it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all humankind."⁷⁹ Congress also declared "the general welfare of the United States requires that the Administration seek and encourage, to the maximum extent possible, the fullest commercial use of space."⁸⁰

The Space Act identifies numerous objectives for NASA, including:

- expansion of human knowledge of the Earth and the phenomena in the atmosphere and space;
- improvement of the usefulness, performance, speed, safety, and efficiency of aeronautical and space vehicles;
- establishment of studies of the benefits from and problems involved in the use of space for peaceful and scientific purposes;

- preservation of U.S. leadership in space science and technology; and
- cooperation with other nations.⁸¹

International cooperation is exemplified by the International Space Station (ISS).⁸² The ISS has a complex legal structure based on an Intergovernmental Agreement signed by the government partners, four Memoranda of Understanding between NASA and other cooperating space agencies, and numerous bilateral implementing arrangements between space agencies that allow them to get things done. The ISS has been a tremendous success and is now facing issues of what to do next. Privatization is one option.

The Space Act enables NASA to acquire, construct, improve, operate, and maintain laboratories, research facilities, aeronautical and space vehicles, and other real and personal property, or any interest therein.83 Additionally, NASA has authority to enter into "other transactions,"84 commonly referred to as "Space Act Agreements." These Space Act Agreements may be Reimbursable, Non-reimbursable, or Funded Agreements.⁸⁵ NASA used funded Space Act Agreements for the Commercial Orbital Transportation System and the Commercial Crew Program. These agreements facilitated the combination of public and private financing, escaped the burdens of the Federal Acquisition Regulations, and promoted speed and innovation to secure new capabilities. These Space Act Agreements helped SpaceX and Orbital ATK develop commercial space launch vehicles and helped Colorado's Sierra Nevada Corporation Space Systems company develop the Dream Chaser spacecraft, which has now received a NASA contract to provide cargo delivery, return, and disposal service for the ISS.

The Space Act also contains provisions to meet U.S. responsibilities under Article VII of the Outer Space Treaty⁸⁶ and the Convention on International Liability for Damage Caused by Space Objects⁸⁷ regarding the absolute liability to pay compensation for damage on the Earth's surface caused by a U.S. space object. The Space Act authorizes NASA to provide liability insurance for any "user"⁸⁸ of a "space vehicle"⁸⁹ to compensate all or a portion of claims by third parties for death, bodily injury, or loss of or

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damage to property resulting from activities conducted in connection with the launch, operation, or recovery of the space vehicle.⁹⁰ Additionally, NASA may indemnify a space vehicle user against claims by third parties for death, bodily injury, or loss of or damage to property resulting from activities carried on in connection with the launch, operations, or recovery of the space vehicle to the extent that such claims are not compensated by the user's liability insurance. Indemnification may not extend to the user's actual negligence or willful misconduct.⁹¹

Space Mining

In 2015, the United States adopted the Commercial Space Launch Competitiveness Act.92 This Act, among other things, adopts provisions relating to mining operations on celestial bodies including the moon and asteroids.93 Pursuant to this Act, the President, through federal agencies, shall "facilitate commercial exploration for and commercial recovery of space resources by United States citizens."94 Furthermore, "[a] United States citizen engaged in commercial recovery of an asteroid or space resource . . . shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell . . . , in accordance with applicable law, including the international obligations of the United States."95 The Act unequivocally allows U.S. citizens to "engage in commercial exploration for and commercial recovery of space resources ... in accordance with the international obligations of the United States and subject to authorization and continuing supervision by the Federal Government."96

The Act further asserts the "sense of Congress that by the enactment of this Act, the United States does not thereby assert sovereignty or sovereign or exclusive rights or jurisdiction over, or the ownership of, any celestial body."97 Notwithstanding this "sense of Congress," some scholars contend that recognizing the ownership of space resources is itself an act of sovereignty and the Act violates the non-appropriation clause of the Outer Space Treaty.98 But that provision must be read in conjunction with the Freedom of Use Principle of the Outer Space Treaty.⁹⁹ While this scholarly debate may continue, there has been very little official objection to the legislation from countries within the United Nations or otherwise. In fact, in 2017 Luxembourg enacted legislation very similar to the Commercial Space Launch Competitiveness Act.¹⁰⁰

Space mining is expected to become viable in the near future. How near is debatable. But it is telling that the Colorado School of Mines recently established the world's first graduate program in Space Resources, which offers Masters and Ph.D. degrees in this emerging field.¹⁰¹ Given the differing opinions on the legality of space mining, perhaps engineers will need to be accompanied by lawyers when they go into space to mine resources. Any volunteers?

Conclusion

This very brief summary of some of the most significant U.S. space laws and regulations offers a glimpse into the complex legal regime governing the use and exploration of outer space. There are many other U.S. laws that relate to governmental and commercial space activities.

Although international space law flourished in the 1960s and 1970s and has changed relatively little since then, U.S. space law is an evolving and exciting field that is attracting many young lawyers. To those who chose this course, "may the force be with you." 🔍



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NOTES

1. Outer Space Treaty, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205, www.state.gov/t/ isn/5181.htm.

2. Id. at Article 6.

3. Id

4. Jakhu, ed., National Regulation of Space Activities (Space Regulations Library) (Springer 2010)

5. See United Nations, Office For Outer Space Affairs, National Space Law Collection, www. unoosa.org/oosa/en/ourwork/spacelaw/ nationalspacelaw/index.html.

6. This article does not address national security space issues.

7. Detailed information about Pub. L. No. 111-314 is available in the accompanying House Report 111-325.

8. Office of Space Commerce, National Space Policy at 4 (2010), https://obamawhitehouse. archives.gov/sites/default/files/national_space_ policy_6-28-10.pdf.

9. Office of Space Commerce, National Space Policy at 2 (2013), https://obamawhitehouse. archives.gov/sites/default/files/microsites/ostp/ national_space_transportation_policy_11212013. pdf.

10. *Id.* at 4.

11. Commercial Space Launch Act of 1984, as amended (CSLA) and re-codified in 51 USC Ch. 509 §§ 50901 to 50923.

12. See generally Commercial Space Transportation, www.faa.gov/regulations policies/faa_regulations/commercial_space. 13. 51 USC § 50904(a).

14. 14 CFR Chapter III, Parts 400 to 460.

15. 14 CFR §§ 413.1 to 413.23.

16. 14 CFR §§ 440.1 to 440.19.

17.14 CFR § 440.7(a).

18. Id

19. 14 CFR § 440.9(a) and (b).

20. 14 CFR § 440.9(c)(1) and (2).

21. 14 CFR § 440.9(d) and (e).

22.14 CFR § 440.17.

23. Forms for such cross-waivers are found in the FAA regulations. See 14 CFR § 440 Appendices B through E.

24. 14 CFR § 440.17. See also 51 USC § 50914(b) (1).

25. 51 USC § 50914(b)(2); 14 CFR § 440.17.

26.14 CFR § 440.17(c)(2)(i).

27. 51 USC § 50915(a); 14 CFR § 440.19(d). The CSLA requires that the \$15 billion maximum amount that the United States will pay in excess of the licensee's third party liability insurance be adjusted to reflect inflation. 14 CFR § 440.19(a)(1)(B). The Commercial Space Launch Competitiveness Act of 2015 extended this indemnification of launch providers for extraordinary catastrophic third party losses through 2025. 51 USC § 50915(f).

28. 51 USC § 50915(d).

29.14 CFR Part 415.

30. 14 CFR § 415.23(a). See also § 431.23(a).

31. See, e.g., http://spacenews.com/housepanel-criticizes-commercial-remote-sensinglicensing

32. 14 CFR Part 415, Subpart C (Safety Review and Approval for Launch From a Federal Launch Range) and Subpart F (Safety Review and Approval for Launch of an Expendable Launch Vehicle From a Non-Federal Launch Site).

33. Id.

34. 14 CFR § 415.51.

35.14 CFR § 415.53.

36. 14 CFR §§ 415.201 to 415.203, 431.91 to 431.93.

37. National Environmental Policy Act, 42 USC § 4321.

38. 14 CFR § 417.129.

39.14 CFR § 401.5.

40. 14 CFR §§ 460.9, 460.19, and 460.49. 41. 51 USC § 50905(c)(9).

42. Regulations define "remote sensing space system" as "any device, instrument, or combination thereof, the space-borne platform upon which it is carried, and any related facilities capable of actively or passively sensing the Earth's surface, including bodies of water, from space by making use of the electromagnetic waves emitted, reflected, or diffracted by the sensed objects." See 15 CFR § 960.3 (2017).

43. Office of Space Commerce, Commercial Remote Sensing Policy at 4 (2003), www. nesdis.noaa.gov/CRSRA/files/Commercial%20 Remote%20Sensing%20Policy%202003.pdf.

44. Id. at 2. The 2010 National Space Policy also has provisions related to remote sensing.

45. Land Remote Sensing Policy Act, as amended, 15 USC §§ 5601 to 5672 (Pub. L. No. 102-55 (1992)), as amended in 1998 (Pub. L. No. 105-303); now 51 USC §§ 60101 et seq.

46.15 CFR Part 960.

47. Id.

48. 51 USC § 60121(a) and (e). The LRSPA makes it unlawful for any person who is subject to the jurisdiction or control of the United States to operate a private remote sensing space system without a license issued by the Secretary. 51 USC § 60122(a).

49. 51 USC § 60122(b)(1).

50. 51 USC § 60122(b)(4) and (5). In the final rule implementing the LRSPA regulations, NOAA stated it will review post-mission plans on a case-by-case basis. See Licensing of Private Land Remote-Sensing Space Systems, Final Rule, 71 Fed. Reg. 24474, 24479 (Apr. 25, 2006)

51. 15 CFR § 960.3.

52. 15 CFR § 960 at Appendix 1.

53. 15 CFR § 960.8. See also 51 USC § 60122(b) (6).

54.15 CFR § 960.3.

55.15 CFR § 960.8(b).

56. The Principles Relating to Remote Sensing of the Earth from Space, G.A. Res. 41/65 (Dec. 3, 1986), www.unoosa.org/pdf/gares/ ARES_41_65E.pdf.