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The United States Commercial Space Launch Competitiveness Act: The Creation of Private Space Property Rights and the Omission of the Right to Freedom From Harmful Interference

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THE UNITED STATES COMMERCIAL SPACE LAUNCH COMPETITIVENESS ACT: THE CREATION OF PRIVATE SPACE PROPERTY RIGHTS AND THE OMISSION OF THE RIGHT TO FREEDOM FROM HARMFUL INTERFERENCE

INTRODUCTION

In March 2004, the European Space Agency successfully launched the Rosetta Spacecraft from Kourou, French Guiana.[1] Over $1.5 billion dollars, ten years, and four billion miles later, the Rosetta Spacecraft released a sophisticated 220-pound probe called the "Philae," which landed on Comet 67P/Churyumov-Gerasimenko on November 12, 2014.[2] The landing on Comet 67P, the first of its kind, is one of the most recent technological advancements in space travel and exploration.[3] During its year-long stay on Comet 67P, the Philae probe has drilled into the surface to collect samples, taken a series of photographs, and conducted a swath of experiments, all of which have provided never-before-seen data that has the potential to shed light on the origins of the universe.[4]

Perhaps more important than the information gleaned from the Philae landing is the symbolic impact of the mission. The Philae landing

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1. Warren E. Leary, *Intricate European Mission Goes Hunting for a Comet,* N.Y. TIMES (Feb. 24, 2004), http://www.nytimes.com/2004/02/24/science/intricate-european-mission-goes-hunting-for-a-comet.html; Kenneth Chang, *Rosetta Spacecraft Set for Unprecedented Close Study of a Comet*, N.Y. TIMES (Aug. 5, 2014), http://www.nytimes.com/2014/08/06/science/space/rosetta-spacecraft-set-for-unprecedented-close-study-of-a-comet.html.

2. Chang, *supra* note 1; Dave Gilbert, *We Landed Twice: Philae Comet Probe May Have Bounced after Harpoon Failure*, CNN (Nov. 12, 2014, 4:22 PM), http://www.cnn.com/2014/11/12/world/comet-landing-countdown/index.html.

3. *See* Leary, *supra* note 1.

4. Gilbert, *supra* note 2 ("No one has ever gotten data like Rosetta has gotten. No one has ever been able to land on a comet the way Philae just did."(quoting NASA chief scientist Ellen Stofan)); Matt Saccaro, *The Philae Lander May Have Found the Origins of Life on Earth*, NEWS MIC (Nov. 18, 2014), http://mic.com/articles/104490/the-philae-lander-may-have-found-the-origins-of-life-on-earth#.cAn2eKbFk ("The European Space Agency's Philae probe has discovered organic molecules on Comet 67P . . . [f]inding organic materials on a comet could help determine the origins of life on Earth . . . ."). While Philae was the first manmade object to land on a *comet*, NASA landed a probe, entitled Shoemaker, on an *asteroid* in 2001. The Near Earth Asteroid Rendezvous (NEAR) mission was designed to simply orbit and study the Near Earth Asteroid 433 Eros. However, toward the end of the mission NASA decided to attempt a last minute landing on the asteroid, despite the fact that the Shoemaker probe was never designed for a landing. The probe successfully landed on Eros 433, took the highest resolution images ever obtained of an asteroid, and provided information on the asteroid for two weeks after the landing. *NEAR-Shoemaker*, NASA, http://science.nasa.gov/missions/near/ (last visited Oct. 25, 2015).

establishes that humans possess—or will soon possess—the technology for extensive commercial enterprises in space. Specifically, proof of our ability to land on a comet makes the idea of landing on and potentially excavating an asteroid more realistic.[5] Asteroids, comets' similarly-situated cousins,[6] present potentially extraordinary incentives for mining and exploitation.[7] There are three types of asteroids: rare "M-class" asteroids, which contain ten times as much metal as other asteroids; "S-type" or stony asteroids; and "C-type" asteroids, which contain significant amounts of hydrated clay minerals.[8] According to some estimates, certain "platinum-rich asteroids just 500 meters across could contain more than the entire known reserves of platinum group metals."[9] Additionally, because asteroids have very low gravity, the fuel required for landing and exiting is greatly diminished, making the potential cost of asteroid mining more palatable.[10] Despite the tremendous amount of rare and precious minerals contained within asteroids, asteroid mining's most valuable purpose may be derived from something that is already abundant on earth:

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5. Kevin Hartnett, *The Comet Landing as a Prelude to Asteroid Mining*, BOSTON GLOBE (Nov. 14, 2014), https://www.bostonglobe.com/ideas/2014/11/14/the-comet-landing-prelude-asteroid-mining/WDUHGKNhsP3wLLPn6XT7qN/story.html (reporting that, according to David Gump, vice-chairman of Deep Space Industries, a trip to an asteroid would be "much easier" than the trip to 67P mostly because asteroids are usually much closer to earth and would not require the ten-year journey that was the Rosetta mission).

6. Asteroids are "relatively small, inactive, rocky bod[ies] orbiting the Sun." *Near Earth Object Program: Frequently Asked Questions,* NASA (Dec. 21, 2014), http://neo.jpl.nasa.gov/faq/. Comets are "relatively small, at times active, object[s] whose ices can vaporize in sunlight forming an atmosphere (coma) of dust and gas and, sometimes, a tail of dust and/or gas." *Id.*

7. Hartnett, *supra* note 5 ("An asteroid 30 or 40 meters wide has more platinum on it than five years of platinum trading on earth . . . ." (quoting Eric Anderson, CEO of Planetary Resources)); Susan Thomas, *Gold Rush in Space? Asteroid Miners Prepare, but Eye Water First*, REUTERS (Nov. 21, 2013) http://www.reuters.com/article/2013/11/21/us-space-mining-asteroids-idUSBRE9AK0JF20131121 (noting that asteroids can "yield significant amounts of precious metals like platinum, rhodium, iridium, rhenium, osmium, ruthenium, palladium, germanium and gold."). Asteroid mining has been described as being "the main resource opportunity of the 21st century." Marc Kaufman, *The Promise and Perils of Mining Asteroids*, NATIONAL GEOGRAPHIC (Jan. 23, 2013), http://news.nationalgeographic.com/news/2013/130122-asteroids-mining-space-science/ (quoting Mark Sonter of Deep Space Industries). "We sit in a sea of resources so infinite they're impossible to describe[.]" *Id.* (quoting Rick Tumlinson, Deep Space Industries company chairman).

8. William Steigerwald, *New NASA Mission to Help Us Learn How to Mine Asteroids*, NASA (Aug. 8, 2013), https://www.nasa.gov/content/goddard/new-nasa-mission-to-help-us-learn-how-to-mine-asteroids.

9. Thomas, *supra* note 7.

10. Hartnett, *supra* note 5 ("The attraction begins with the fact that it's extremely expensive to lift anything from earth into space because of the huge amounts of fuel needed to escape gravity. Asteroids, by contrast, have almost no gravity at all, which makes it easy, from a fuel perspective, to get on and off them."). But note, while an asteroid's relatively low gravity makes it easier to depart from it, it also makes it much more difficult to land on in the first place. Sarah Zhang, *Asteroid Miners Can Learn a lot from Philae's Bumpy Landing*, WIRED (July 30, 2015) http://www.wired.com/2015/07/asteroid-miners-can-learn-lot-philaes-bumpy-landing/ ("The extremely low gravity of near earth asteroids is, after all, both a challenge and their primary advantage in space travel.").

water.[11] Water, extracted from hydrated clay minerals present on asteroids, can be harvested and turned into hydrogen rocket fuel, giving asteroids the potential to be deep space gas stations.[12] Plans to mine asteroids are not entirely new, as evidenced by the formation of several companies looking to extract resources from space enterprises.[13]

Until recently, potential space investors in the United States and internationally had no legal assurances that they would be able to reap the financial benefits of their investments.[14] Specifically, no legal clarity existed as to whether commercial actors would be entitled to property rights in space resources.[15] Reacting to this glaring need for regulation in the industry, Congress passed the U.S. Commercial Space Launch Competitiveness Act of 2015 ("USCSLC")[16] with the stated purpose to "promote the right of United States citizens to engage in commercial exploration for and commercial recovery of space resources."[17] The USCSLC guarantees commercial actors the rights to "possess, own, transport, use, and sell the asteroid resource or space resource" that has been "obtained" by the commercial entity.[18] While the passage of the USCSLC goes a long way toward providing clarity for investors looking to begin asteroid mining enterprises,[19] this type of legislation also presents

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11. Steigerwald, *supra* note 8 ("Although these asteroids [C-type] currently have little economic value since water is so abundant on Earth, they will be extremely important if we decide we want to expand the human presence throughout the solar system.").

12. *Id.* ("The other thing you can do with water is break it apart into its constituent hydrogen and oxygen, and that becomes rocket fuel, so you could have fuel depots out there where you're mining these asteroids."). Of course, water is also "a critical life-support item for a spacefaring civilization, and it takes a lot of energy to launch it into space. . . . With launch costs currently thousands of dollars per pound, you want to use water already available in space to reduce mission costs." *Id.*

13. *See* Hartnett, *supra* note 5 (citing Deep Space Industries, Astrobotic, and Planetary Resources as companies that are currently engaged in the planning stages of asteroid exploitation missions). NASA also currently has plans to launch an "asteroid sample return mission, OSIRIS-REx (Origins, Spectral Interpretation, Resource Identification, Security and Regolith Explorer)." Steigerwald, *supra* note 8.

14. *Hearing Before the Subcomm. on Space of the H. Comm. on Sci., Space, and Tech.*, 113th Cong. 4 (2014) (written testimony of Joanne I. Gabrynowicz), http://joannegabrynowicz.com/wp-content/uploads/2013/11/Gabrynowicz-Final-Testimony-H.R.-5063.pdf ("Despite this relevant body of law there are 'gaps' in [U.S. space law] that will have to be raised by private sector asteroid resource exploration and utilization.") [hereinafter Gabrynowicz testimony].

15. *Id.*; Letter from Henry Hertzfield, et al., Co-Chair of the Am. Branch, Int'l Law Ass'n, to Maj. Leader McCarthy, et al. at 2 (May 15, 2015) [hereinafter Letter from Henry Hertzfield].

16. U.S. Commercial Space Launch Competitiveness Act Pub. L. No. 114-90, 129 Stat. 704 (2015) [hereinafter "USCSLC"]. The bill was previously known as the Spurring Private Aerospace Competitiveness and Entrepreneurship Act of 2015. H.R. 2262, 114th Cong. (2015) [hereinafter "SPACE Act."]

17. USCSLC § 51302(a)(3).

18. *Id.* at § 51303.

19. Letter from Henry Hertzfield, *supra* note 15, at 2. "The bill provides a critically important element of legal certainty regarding property rights in asteroid resources. This will help companies like ours continue to unlock private support for resource exploration in space." 161 Cong. Rec. H8185-01,

three main issues that will shape its practical impact. First, is giving commercial actors property rights to extracted resources consistent with international law? Second, how will the word "obtained" be defined and used in practice? Third, how will the right to "freedom from harmful interference"—as referenced in USCSLC[20]—be enforced and implemented in conjunction with the property rights outlined in the statutes?

This Note will address all three questions in the following parts. Part I will analyze the USCSLC in terms of its compliance with international law, specifically as it pertains to the Outer Space Treaty,[21] concluding that the USCSLC most likely complies with international law. Part II looks to other property law principles and analogous scenarios that seek to define the notion of "obtained" within the USCSLC. Part III examines how the right to "freedom from harmful interference" eroded in the legislative drafting process and how previous versions of the right may have functioned as a quasi-property right. The Note will also address the desirability and underlying fairness concerns of the proposed rights given to commercial actors extracting resources in space, finding that the bundle of rights given to commercial actors in space is a necessary first step in the development of the space industry as a whole.

H8192 (daily ed. Nov. 16, 2015) (letter from Chris Lewicki, CEO of Planetary Resources). The *Congressional Record* also lists "SpaceX; Virgin Galactic; Blue Origin; World View Enterprises; XCOR Aerospace: Mojave Air and Space Port; Planetary Resources; Moon Express; Spaceport America; Spaceport Camden, Georgia; Midland Development Corporation; Masten Space Systems; the Satellite Industry Association; and the Commercial Spaceflight Federation" as space companies who have expressed support for USCSLC. *Id.*

20. USCSLC § 51302(a)(3).

21. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Oct. 10, 1967, 18 U.S.T. 2410 [hereinafter the OST].

I. IS THE USCSLC CONSISTENT WITH THE UNITED STATES' INTERNATIONAL TREATY OBLIGATIONS?

Does the conferral of property rights over extracted resources as established by the USCSLC comport with international law?[22] The USCSLC guarantees that "[a] United States citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained."[23] Other than the ambiguity surrounding the word "obtained," which this Note will address in Part III, the proposed legislation straightforwardly approves commercial appropriation of asteroid resources. This Note will examine both the establishment of property rights in space resources and the right to freedom from harmful interference for the rights' compliance with international law.

To answer this question, one must first turn to the Outer Space Treaty ("OST"). Created in the midst of the space race, it is the most relevant treaty dealing with the appropriation of space resources.[24] The OST "is very often perceived as a 'Constitution' for outer space."[25] Concerns over space imperialism were the main impetus for the central provision of the OST: the principle of nonappropriation of space by Nation-States.[26] Article II of the OST states, "[o]uter space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."[27]

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22. Gabrynowicz testimony, *supra* note 14, at 8 (noting that, in regards to treaty obligations, "[i]n the absence of agreement legal opinion, *opinio juris,* is divided regarding the ownership status of extracted space resources.") (footnote omitted); USCSLC § 51303 (describing the allocation of property rights).

23. USCSLC § 51303.

24. *See* Timothy Nelson, *Mining Outer Space: Who owns the Asteroids?*, 254 N.Y. L.J. 19 (2015).

25. Virgiliu Pop, WHO OWNS THE MOON? EXTRATERRESTRIAL ASPECTS OF LAND AND MINERAL RESOURCES OWNERSHIP 36 (Prof. R. Jakhu et al. eds., 2009).

26. *Id.* at 60–61; Gabrynowicz testimony *supra* note 14, at 6; Brandon C. Gruner, *A New Hope For International Space Law: Incorporating Nineteenth Century First Possession Principles into the 1967 Space Treaty for the Colonization of Outer Space in the Twenty-First Century*, 35 SETON HALL L. REV. 299, 317 (2004) ("The 1967 Space Treaty prohibits any country from asserting sovereignty over any celestial body, thereby eradicating global international rivalry as a key ingredient in space exploration. The intent of the 1967 Space Treaty's authors was to eliminate outer space from the galvanized sphere of Cold War politics . . . .") (footnote omitted).

27. OST art. II. There is some debate over the definition of "celestial bodies" and whether asteroids can be considered a non-appropriable celestial body in the first place. There are several academic theories for defining celestial bodies. However, some asteroids and comets "with the appropriate technology . . . could be moved; and they can be destroyed, i.e. consumed in their totality. Thus, they may qualify as movables." Pop, *supra* note 25, at 51. Therefore, in many respects, asteroids themselves may be more akin to a resource than a body." In other words, whether a space object can be considered a celestial body may be dependent on its ability to be moved. *Id.* For a full discussion on

Additionally, Article I of the OST states, "[t]he exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind."[28] The United States and one hundred other states have ratified the treaty and an additional twenty-five have signed it.[29]

Taken together, it is clear that the OST precludes any claim over territorial rights in space of any kind.[30] What is less clear, however, is whether the appropriation of space *resources* is consistent with the OST,[31] as the OST does not explicitly mention the extraction or ownership of space resources.[32] Some scholars argue that the property rights guaranteed by the USCSLC might violate Article II of the OST because authorizing the private appropriation of space resources is tantamount to enabling national appropriation under the OST.[33]

However, the concern that the USCSLC will violate the OST does not hold under closer scrutiny for several reasons. First, if the OST was meant to preclude private property rights in space resources, then it would have contained an explicit section prohibiting individual actors from claiming resources. "[U]nder international law states may do whatever is not expressly forbidden. 'Restrictions upon the independence of States cannot…be presumed.'"[34] Furthermore, "[t]he long-accepted legal doctrine *expressio unius est exclusio alterius* says that, when interpreting statutes, we should presume things not mentioned were excluded by deliberate choice, not inadvertence."[35] Therefore, the very fact that the OST does not directly deal with the appropriation of space resources is

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the different attempts to define celestial body and whether asteroids fall within that definition, see *id* at 51–58. For the purposes of this Note, it is assumed that asteroids are non-appropriable celestial bodies.

28. OST art. I.

29. *See* Comm. on the Peaceful Uses of Outer Space, Legal Subcomm., Status of International Agreements Relating to Activities in Outer Space as of 1 January 2015, U.N. Doc. A/AC.105/C.2/2015/CRP.8 (Apr. 8, 2015).

30. Gabrynowicz testimony, *supra* note 14, at 7 ("The treaty regime is clear that appropriation of territory is prohibited."); Nelson, *supra* note 24 ("Together, these articles mean that space cannot be subdivided into national 'colonies,' in the manner of 19th century European powers.").

31. Gabrynowicz testimony, *supra* note 14, at 8 ("What remains unclear is the ownership status of the resources when they are collected.").

32. *Id.* at 7.

33. *See id.* at 8–9; Letter from Henry Hertzfield, *supra* note 15, at 2–4.

34. Wayne N. White Jr., Presentation at the 40th Colloquium on the Law of Space of the American Institute of Aeronautics and Astronautics: Real Property in Outer Space (Oct. 6–10, 1997), http://www.spacefuture.com/archive/real_property_rights_in_outer_space.shtml (quoting Case of the S.S. Lotus (Fr. v. Turk.), 1927 P.C.I.J. (ser. A) No. 10, at 18 (Sept. 7)).

35. Alan Wasser & Douglas Jobes, *Space Settlements, Property Rights, and International Law: Could a Lunar Settlement Claim the Lunar Real Estate it Needs to Survive?,* 73 J. AIR L. & COM. 37, 47 (2008).

strong evidence that it does not preclude it. Some also argue that when the OST says "the moon and other celestial bodies, shall be free for exploration and *use* by all states," the signatories were implicitly giving permission for States to extract resources from celestial bodies.[36]

The second reason that the OST does not prohibit private resource extraction derives from the distinction between authorizing individuals to reap the benefits of *obtained* resources and giving those same individuals rights to the land itself.[37] Guarantees of private ownership of extracted resources do not "in any manner, claim sovereignty over a celestial body or portions of outer space; it only provides for rights for private entities to use the resources on a celestial body (specifically asteroids)." [38] If the bills allowed for the claiming of *unextracted resources,* then there would be a strong argument that the bill was akin to giving land rights.[39] While the definition of "obtained" has the potential to be interpreted in a variety of ways, the words "obtained" and "unextracted" are almost certainly mutually exclusive.[40]

Third, the United States' refusal to sign the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies ("Moon Agreement") is demonstrative of the fact that U.S. officials interpreted the OST as permissive of private resource extraction enterprises.[41] The Moon Agreement was a treaty designed to fill in gaps in international space law and, in particular, address the ownership of space resources.[42] The agreement, however, was impeded by ideological differences, and the U.S., along with ultimately all other space-faring nations, withdrew from the agreement because it was too collectivist.[43] As a result, the treaty was

36. OST art. I (emphasis added); Letter from Henry Hertzfield, *supra* note 15, at 2–3.

37. Nelson, *supra* note 24 ("But there is a difference between appropriation of territory . . . and appropriation of mineral resources, as occurs in commercial mining-and OST says nothing in particular about the latter.").

38. Letter from Henry Hertzfield, *supra* note 15, at 2.

39. *Id.*

40. *Id.* at 2. ("The words of the bill are 'resources obtained,' leaving the unknown technical details to be specified in the future when they can be better defined and a process can be developed for regulatory actions as needed. In any event, 'obtained' is inconsistent with 'unextracted.'").

41. Nelson, *supra* note 24.

42. *Id.*

43. *Id.* ("Under this treaty, all lunar mining activities would have been carried out under the supervision of an international licensing body. In addition, the Moon Agreement stipulated that the moon (and all celestial bodies) were 'the common heritage of mankind'-an expression that, for some, reflected a socialized/collectivist mind-set.") (footnotes omitted); Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, G.A. Res. 34/68, U.N. Doc. A/RES/34/68 art. 11(5) (Dec. 5, 1979) (declaring that the international body shall also "govern the exploitation of the natural resources of the moon as such exploitation is about to become feasible"); *see also id.* art 11(7)(d) (stating that the body will mandate "[a]n equitable sharing by all States Parties in the benefits derived from those resources . . . ."); Richard B. Bilder, *A Legal Regime for the Mining of Helium-3 on the*

seen as having the potential to "doom any private investment directed at space resource exploration."[44] Since the United States actively avoided limitations on the potential for private space resource enterprises, it necessarily believed that pre-existing obligations allowed for the private extraction of resources in the first place. In other words, it has always been the unofficial U.S. position that the OST allows for private resource extraction; a myriad of statements by U.S. officials in discussions over whether to ratify the Moon Agreement corroborated this notion.[45] Additionally, the scholarship community is beginning to reach a consensus that property rights in extracted resources are permitted by the OST.[46]

A final, if not less significant, argument why the USCSLC is compliant with international law comes from a provision in the USCSLC itself that seeks to directly address potential concerns of a violation of the OST. Congress, clearly cognizant of the concerns that the USCSLC could be

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Moon: U.S. Policy Options, 33 FORDHAM INT'L L.J. 243, 269 (2010) ("[T]he Moon Agreement has, over a considerable period, gained few adherents, none of which are significant space powers.").

44. *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies: Hearings before the Subcomm. on Science, Technology, and Space of the Senate Comm. on Commerce, Science, and Transportation*, 96th Cong. 2d Sess. 12, 219–20 (1980) (statement of Alexander Haig, President, United Technologies Corp. Future Secretary of State); Alan Duane Webber, Note, *Extraterritorial Law on the Final Frontier: A Regime to Govern the Development of Celestial Body Resources*, 71 GEO. L.J. 1427, 1436–37 (1983) ("[t]he developing countries interpret[ed the concept] to embody the principle that celestial body resources are the common property of all the nations, and to require international control of celestial body resources for the purpose of redistributing wealth and technology among nations.") (footnote omitted).

45. U.S. Government officials have consistently interpreted the OST as not prohibiting rights to extracted space resources. *See* Letter from Secretary of State Vance to Sen. Church, Chairman of Senate Foreign Relations Committee, Nov. 28, 1979, *reprinted in* Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Senate Committee on Commerce, Science and Transportation, August 1980, at 313 (stating that the OST's ban on appropriation is only applicable to stagnant bodies and that the OST would allow for the ownership of extracted space resources); *Hearings Before the Subcommittee on Science, Technology and Space of the Senate Committee on Commerce, Science, and Transportation on Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, 96th Cong.) 2–19 (1980) (oral and written testimony of State Dep't Legal Advisor Owen) ("American companies will have a continuing legal right to exploit the Moon's resources. . ."; "once [resources] have been extracted from the Moon, ownership can be asserted at that point. . ."; "The United States took the position from the outset that such exploitation should be permitted, that such ownership after extraction should be permitted. And that. . .is an authoritative interpretation. . .").

46. Matthew Schaefer, *Property Rights in Space (Part II):Post-NewSpace Conference Thoughts-Posey ASTEROIDS Act, Bigelow Payload Safety Review, On-Orbit Jurisdiction, Etc.*, LAW OF SCHAEFER (July 26, 2014) http://lawofschaefer.com/ (summarizing the consensus of the academic conference that "[r]esources extracted from lunar bodies and asteroids can be brought back to Earth and utilized and sold and 'owned' in that sense. There should be no debate over this. . . . Indeed, the [ASTEROIDS] act should specifically state that the granting of a property interest in extracted resources is consistent with international law."); Letter from Henry Hertzfield, *supra* note 15, at 4 ("The Space Resource Exploration and Utilization Act is in complete compliance with all existing international obligations of the United States."); Pop, *supra* note 25, at 136 (noting that the view that the OST precludes appropriation of extraterrestrial resources is no longer current).

construed as being an assertion of sovereignty,[47] added an express disclaimer to the bill stating that the legislation is not intended to make any such assertion.[48] The disclaimer reads: "[i]t is 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."[49] While a congressional declaration that the USCSLC is not an assertion of extraterritorial sovereignty will likely not impact how other nations perceive the underlying reality of the new law, it does convey that the United States believes its interpretation of the statute comports with the OST.

II. USING ANALOGOUS PROPERTY LAW PRINCIPLES TO DEFINE "OBTAINED" IN THE USCSLC

The future of space travel and exploration will largely depend on the involvement of the private sector.[50] NASA consistently struggles with funding,[51] and since the space shuttle was retired in 2011, NASA has been solely reliant on Russian rockets to travel to the International Space Station.[52] NASA's solution to this problem is to more heavily rely on private companies for space travel by contracting with companies like Boeing and SpaceX.[53] Furthermore, private companies can often take more

47. Gabrynowicz testimony, *supra* note 14, at 10.

48. USCSLC § 403.

49. *Id.*

50. Joel Achenback, *Which Way to Space? Flights of Fancy may Launch the Industry's Future,* WASH. POST, Nov. 23, 2013, http://www.washingtonpost.com/sf/national/2013/11/23/which-way-to-space/ (referring to NASA as "Old Space" and private companies as "New Space": "If there's one thing that New Space has going for it, it's that Old Space is in trouble. Old Space and New Space turn out to be symbiotic. New Space companies need NASA contracts, and NASA needs New Space companies to pick companies to pick up the agency's slack.").

51. While NASA is "perennially underfunded," that distinction may start to change as:

> Congress wants to give the agency more money than it asked for . . . [t]he omnibus spending bill would give the US space agency close to $19.3 billion for next year. That exceeds the Obama administration's budget request of $18.5 billion for NASA and provides the agency with $1.27 billion more than it received for 2015.

Loren Grush, *Congress Wants to Give NASA $19.3 Billion Next Year, Even More than Obama Asked For,* THE VERGE (Dec. 16, 2015), http://www.theverge.com/2015/12/16/10289030/nasa-budget-increase-2016-congress-funding.

52. *NASA: Seats on Russian Rockets Will Cost U.S. $490 Million*, CBSNEWS (Aug. 6, 2015), http://www.cbsnews.com/news/nasa-seats-on-russian-rockets-will-cost-u-s-490-million/.

53. Ross Wilkers, *NASA Selects Orbital ATK, Sierra Nevada, SpaceX for Round 2 Space Station Resupply Contracts*, GOVCONWIRE (Jan. 14, 2016), http://www.govconwire.com/2016/01/nasa-selects-orbital-atk-sierra-nevada-spacex-for-round-2-space-station-resupply-contracts/ ("NASA has awarded Orbital ATK. . ., Sierra Nevada and SpaceX a second round of potential multi-billion dollar contracts to deliver cargo to and from the International Space Station through 2024 in support of efforts to end U.S. reliance on Russia for access to space by 2017.").

risks, be more ambitious, and innovate more than government agencies.[54] In order for investors and private citizens to be willing to make the enormous financial investment that space exploration and utilization requires,[55] it is absolutely imperative to create sufficient incentives for private companies to expand and embark upon space activities.[56] Attempting to define the term "obtained" within the meaning of the statute is tantamount to asking: At what point do property rights in space resources attach to the actor? As a result, defining "obtained" will establish a procedure for securing property rights, which in turn could shape whether and how private companies go about securing space resources.[57]

When attempting to interpret a statutory term, the best place to start is the legislative context. The full statutory text that guarantees property rights to asteroid resources reads:

> [a] United States Citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained,

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54. Cost reduction is one area that is especially ripe for innovation by private companies such as SpaceX. "SpaceX has learned. With industry veterans and outsiders, they benefit from past experiences but are unconstrained by forces and factors that pushed up NASA costs." Tom Agan, *What SpaceX Can Teach Us About Cost Innovation*, HARV. BUSINESS REV. (Apr. 25, 2013), https://hbr.org/2013/04/what-spacex-can-teach-us-about. SpaceX is on the verge of accomplishing in six years of existence what NASA has never been able to manage: the ability "to provide low-cost space flight—that was the failed promise of the Space Shuttle—a reusable spacecraft to avoid the expensive building of a new craft for each mission." *Id.* SpaceX has now successfully returned their Falcon 9 rocket to earth after launching a satellite into orbit. The Falcon 9 is intact and ready for future missions. Kenneth Chang, *SpaceX Successfully Lands Rocket After Launch of Satellite into Orbit*, N.Y. TIMES, Dec. 21, 2015, http://www.nytimes.com/2015/12/22/science/spacex-rocket-landing.html.

55. Steigerwald, *supra* note 8 ("However, it currently costs hundreds of millions to billions of dollars to build and launch a space mission, so innovations that would make these costs fall dramatically are needed before it is profitable to mine asteroids . . . .").

56. Incentivizing commercial activity in space is the clear objective of the USCSLC. In addition to being named the United States Commercial Space Launch Competitiveness Act, the preceding bill was similarly titled the Spurring Private Aerospace Competitiveness Act of 2015. *See* USCSLC, *supra* note 16; SPACE Act, *supra* note 16. Furthermore, proponents of the legislation have said that "space commercialization, this bill, is the future of space. This bill will encourage the private sector to build rockets, to take risks, and to shoot for the heavens." 161 Cong. Rec. H3514 (daily ed. May 21, 2015) (statement of Representative Smith). *See generally* John Adolph, *The Recent Boom in Private Space Development and the Necessity of an International Framework Embracing Private Property Rights to Encourage Investment*, 40 INT'L LAW. 961 (2006).

57. Lauren E. Shaw, *Asteroids, The New Western Frontier: Applying Principles of the General Mining Law of 1872 to Incentivize Asteroid Mining*, 78 J. AIR L. & COM. 121, 124 (2013) ("Implementing a scheme that offers ownership of extracted resources without bestowing complete sovereignty is necessary to avoid an impending legal limbo. . . . If private sector miners of asteroids know this right already exists, they will have more incentive to extract resources. This, in turn, would increase the chances of successful missions, resulting in numerous scientific and explorative benefits . . . .")

> including to possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law, including the international obligations of the United States.[58]

While the USCSLC does contain definitions for "space resources" and "asteroid resources," the term "obtained" is never defined in the proposed legislation.[59] Furthermore, the only report compiled for either piece of legislation contains no discussion of what "obtained" means in connection with the statute or the possible implications of defining "obtained" in different ways.[60]

The USCSLC concludes its guarantee of property rights in space resources by saying that the resource must be "obtained in accordance with applicable law, including the international obligations of the United States."[61] By doing so, Congress explicitly recognized that any property rights allocated to U.S. citizens must be reconciled with both domestic precedent and international policy obligations. Therefore, to better understand space regulations intended to comport with international and domestic precedent, it is prudent to analogize the USCSLC and space law generally to other property rights paradigms that deal with similar issues.[62] The high seas and Antarctica, by virtue of being far away, hard to reach, extra-national, and mineral-rich locations, are the two most commonly cited property regimes for informing and understanding space policy.[63]

A. UNCLOS and the Law of the High Seas

The high seas are particularly useful for the purposes of this comparison because, as is the case with space resources in the OST, sea-bed resources are viewed as "the common heritage of mankind, the

58. USCSLC § 51303.

59. "The term 'asteroid resource' means a space resource found on or within a single astero*id*." *Id.* at § 51301(1). "The term 'space resource' means an abiotic resource in situ in outer space [and] includes water and minerals." *Id.* at 51301(2)(A)–(B).

60. H.R. Rep. No. 114-119 (2015).

61. USCSLC § 51303.

62. *See generally* Rosanna Sattler, *Transporting a Legal System for Property Rights: From the Earth to the Stars*, 6 CHI. J. INT'L L. 23 (2005) (analyzing how Antarctic property law and ocean property law regimes could inform new space policy); Testimony of Gabrynowicz, *supra* note 14, at 8 (using the high seas and Antarctica to inform her interpretation of the SPACE Act's property provisions); Nelson, *supra* note 24 (using the 1988 Convention on the Regulation of Antarctic Mineral Resource Activities and the U.N. Convention on the Law of the Sea as analogous legislation to "the legal status of mining in remote, extra-national areas such as outer space"); Timothy G. Nelson, *The Moon Agreement and Private Enterprise: Lessons from Investment Law*, 17 ILSA J. INT'L & COMP. L. 393 (2010) (comparing potential space property law with the Sea-Bed Regime and the Antarctic Mineral Resources Treaty).

63. *See supra* note 62.

exploration and exploitation of which shall be carried out for the benefit of mankind as a whole."[64] On the high seas, "it is long settled law that title to fish extracted from the ocean passes to the extracting entity."[65] Furthermore, international agreements generally prohibit restrictions on high seas fishing; the Convention on the Law of the Sea declares, "[a]ll States have the right for their nationals to engage in fishing on the high seas."[66] UNCLOS, the single most important piece of international law governing the ocean,[67] also provides regulations on sea-bed mining and mineral extraction.[68]

As an initial matter, the guarantee of property rights in UNCLOS seems to incorporate many of the same characteristics of the property guarantee in the USCSLC.[69] UNCLOS says, "[t]itle to minerals shall pass upon recovery in accordance with this Convention."[70] This guarantee is very similar to the USCSLC's that U.S. citizens "shall be entitled to any asteroid resource or space resource obtained."[71] However, language in UNCLOS provides a helpful clarification to its guarantee of property rights where the USCSLC remains silent: "[p]rospecting shall not confer on the prospector any rights with respect to resources. A prospector may, however, recover a reasonable quantity of minerals to be used for testing."[72] The implications of this clarification are that, at least for sea-bed mining, the extraction of samples for testing purposes in a given area that contains resources is not sufficient to confer property rights over the

64. United Nations Convention on the Law of the Sea pmbl., 1833 U.N.T.S. 397 (Dec. 10, 1982) [hereinafter "UNCLOS"]; OST art. XI.

65. Gabrynowicz testimony, *supra* note 14, at 8.

66. UNCLOS art. 116.

67. Peter Prows, *Tough Love: The Dramatic Birth and Looming Demise of UNCLOS Property Law (And What is to be Done About it)*, 42 TEX. INT'L L.J. 241, 243 ("[T]he 1982 United Nations Convention on the Law of the Sea . . . represents the culmination of thousands of years of international relations, conflict, and now nearly universal adherence to an enduring order for ocean space. Its adoption marked the most significant achievement for international law since the U.N. Charter . . . .").

68. UNCLOS Annex III. It is also important to note that while the United States has never ratified UNCLOS, it nonetheless is an adherent to the fundamental policies in the convention and therefore the convention still serves as a useful comparison for property rights in asteroid resources. Christopher Mirasola, *Why the US Should Ratify UNCLOS: A View from the South and East China Seas*, HARV. NAT'L SEC. J. (Mar. 15, 2015), http://harvardnsj.org/2015/03/why-the-us-should-ratify-unclos-a-view-from-the-south-and-east-china-seas/ ("[M]uch of UNCLOS is based on customary principles of international law to which the U.S. already adheres . . . ."). The discussion over UNCLOS coincided with and fell victim to the same problems that plagued the Moon Agreement. Part XI of the convention established the creation of an international authority that would regulate mining operations. Seen as potentially hindering private US business interests, the Reagan Administration refused to ratify the treaty, and it has gone unratified to this day. *See* Nelson, *supra* note 24.

69. UNCLOS Annex III.

70. *Id.* art. 1.

71. USCSLC § 51303.

72. UNCLOS Annex III, art. 2. Prospecting is defined as the "search for mineral deposits in a place, especially by means of experimental drilling and excavation." *Id.*

underlying resources. The precedent set by UNCLOS, if adapted and used to interpret the language in the USCSLC, would mean that if a commercial entity managed to land on an asteroid and retrieve samples from it, the entity's only property rights would be in the material that was actually removed from the astero*id.*[73] There would be no property rights to the underlying resources.[74]

B. CRAMRA and Antarctic Mining Provisions

Antarctica, "[l]ike the moon, Mars, and asteroids . . . is also a vast expanse of land that is undeveloped and contains mineral deposits," and is therefore also a useful comparison point for space law regimes.[75] Antarctica is governed by a series of treaties known together as the Antarctic Treaty System.[76] "While the structure of the Antarctic treaty . . . would seem to be an ideal model [for space law] given its widespread acceptance and substantive provisions, it fails to deal with a crucial aspect of space development—the mining of minerals."[77] As a result, the "present situation is that all mineral resource activities, except scientific research, are prohibited under Article 7 of the Protocol on Environmental Protection

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73. This interpretation could have relatively immediate implications as at least two space mining companies, Planetary Resources and Deep Space Industries, are making plans to begin asteroid prospecting and sampling. Caitlin O'Keefe, *How We Choose Our Near-Earth Asteroid Targets*, PLANETARY RESOURCES (Aug. 28, 2015) http://www.planetaryresources.com/2015/08/how-we-choose-our-asteroid-targets/ ("Right now, we are building the Arkyd rendezvous prospectors—highly capable, low cost spacecraft . . . ."); *Prospecting*, DEEP SPACE INDUSTRIES, https://deepspaceindustries.com/prospecting/ ("Deep Space Industries will soon launch its first prospecting missions, using advanced, small spacecraft . . . to explore and study Near Earth Asteroids . . . ."); *See also* Kaufman, *supra* note 7 ("Prospecting using miniaturized 'cubesat' probes the size of a laptop will begin by 2015, company executives [for Deep Space Technologies] announced. They plan to return collections of asteroid samples to Earth not long after.").

74. UNCLOS provides one possible interpretation of the "obtained" language in the USCSLC. The advantages and disadvantages of such a policy will be discussed further in Part V.

75. Sattler, *supra* note 62, at 32. Sattler also notes that "[t]he development and utilization of Antarctica, like the development of these celestial bodies, is expensive, requires great technical innovations, and provides unique challenges to humans working in that environment." *Id.*

76. The treaties that make up the Antarctic Treaty System are: Antarctic Treaty, Dec. 1, 1959, 12 U.S.T. 794; Agreed Measures for the Conservation of Antarctic Fauna and Flora, Oct. 10, 2003, 17 U.S.T. 996; Convention for the Conservation of Antarctic Seals, June 1, 1972, 29 U.S.T. 441; and Convention and Conservation of Antarctic Marine Living Resources, May 20, 1980, 33 U.S.T. 3476.

77. Sattler, *supra* note 62, at 33. The treaty system "regulates scientific study, provides for the exchange of information between parties, and provides guidelines for other management operations. Several provisions address the handling of waste and the protection of native species. The Treaty System also provides crucial guidelines for the safety and rescue of humans on Antarctica." *Id.* (footnotes omitted). The reason that the Antarctic Treaty did not cover the question of minerals is because "to do so would be premature." Convention on the Regulation of Antarctic Mineral Resource Activities introductory note, June 2, 1988, 27 I.L.M. 868 (1988), http://www.state.gov/documents/organization/15282.pdf [hereinafter "CRAMA"].

to the Antarctic Treaty."[78] The protocol is clear and concise on this issue, stating that "[a]ny activity relating to mineral resources, other than scientific research, shall be prohibited."[79] However, the lack of agreement on a permissive mining regime was not for lack of trying or desire by the international community. CRAMRA was convened to establish an international mining regime, only to unsuccessfully conclude in 1988 after six years of negotiation.[80] The six years of negotiation and drafting are demonstrative of the fact that a significant portion of the international community believes "that participation in Antarctic mineral resource activities should be open to all States which have an interest in such activities" as well as "that the effective regulation of Antarctic mineral resource activities is in the interest of the international community as a whole."[81] In this sense, the failure of the international community to arrive at a consensus on CRAMRA serves as a cautionary tale, one where all property interests in Antarctic resources are necessarily foregone despite the desire of many nations to create schemes that allow for such rights.[82]

Nonetheless, because CRAMRA is the most expansive attempt at legislating mineral extraction in Antarctica, it may aid in interpreting similar regulations contained in the USCSLC. Further, the fact that CRAMRA provides the most finely-articulated enunciation of the conditions under which property rights are allocated makes it especially useful for interpreting the meaning of the USCSLC's guarantee.[83] In lieu of a direct assertion of property rights, "[t]he Convention makes provisions for three levels of mining activities: prospecting, exploration

78. CRAMRA introductory note (CRAMRA was convened to "elaborate a regime governing Antarctic mineral resource development should it ever come about.").

79. Protocol on Environmental Protection to the Antarctic Treaty art. 7, Oct. 4, 1991, http://www.ats.aq/documents/recatt/att006_e.pdf. The prohibition on mining was "formalized in the 1991 Madrid Protocol banning Antarctic mining for fifty years." Nelson, *supra* note 62, at 406.

80. CRAMRA introductory note. "It was a necessary condition for the entry into force of the Convention that all states with claims to territorial sovereignty in Antarctica should be parties to it. In 1989 it became apparent that this would not happen." *Id.* The treaty fell apart as Australia, whose assent was required for the treaty to take effect and was "a leading Antarctic state and one that played a key role in the negotiation of the Convention, announced in May 1989 that it [wa]s opposed to the Convention and that it would rather support the declaration of Antarctica as a World Park or a Wilderness Reserve." Sam Blay & Ben M. Tsamenyi, *Australia and the Convention for the Regulation of Antarctic Mineral Resource Activities (CRAMRA),* 26 POLAR REC. 195 (1990).

81. CRAMRA pmbl. (recognizing "that Antarctic mineral resource activities could adversely affect the Antarctic environment or dependent or associated ecosystems . . .").

82. *Id.* However, seeing as "practical difficulties and costs of extraction mean that Antarctica is not under immediate threat from mineral exploitation," combined with the substantial environmental concerns mining activities in Antarctica would necessarily implicate, it is potentially more appropriate that the international community prohibits any mineral extraction. *Human Impacts on Antarctica and Threats to the Environment- Mining and Oil*, COOL ANTARCTICA, http://www.coolantarctica.com/Antarctica%20fact%20file/science/threats_mining_oil.php.

83. *See generally* CRAMRA art. 37.

and development."[84] "Mining activities under the Convention are regulated through a complex structure of institutions."[85] One of those institutions, the Regulatory Committee, is responsible for issuing permits for both the exploration and the development of mineral resources.[86] Prospecting, on the other hand, does not "require authorisation by the institutions" created by CRAMRA.[87] By allowing for prospecting, exploration, and development, CRAMRA implies that the title to resources obtained in the course of permitted mineral resource activities could pass to the extracting entity, albeit with a significant amount of restrictions and oversight.[88] After all, why would there be a need to create an extensive legislative regime governing the extraction of mineral resources if no one could own the resources that one managed to extract?

For this Note's purposes, CRAMRA's articulation of what does not qualify for property rights protections is more important than CRAMRA's failure to include a specific guarantee of property rights.[89] CRAMRA

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84. Blay & Tsamenyi, *supra* note 80, at 196; CRAMRA Chapter III (prospecting); CRAMRA Chapter IV (exploration); CRAMRA, Chapter V (development).

85. Blay & Tsamenyi *supra* note 80, at 196 (citations omitted).

> The primary institution of the Convention is the Commission, which is composed of all ATCPs [Antarctic Treaty Consultative Parties] party to the Convention, sponsoring states which are not ATCPs and any parties which may be actively engaged in substantial scientific, technical or environmental research in the area to which the Convention applies directly relevant to [sic] decisions about Antarctic mineral resource activities.

Id. ATCPs, or Antarctic Treaty Consultative Parties, are the primary decision makers on Antarctic policy; the qualifications for being an ATCP are that the States must "demonstrate their interest in Antarctica by 'conducting substantial research activity there.'" Parties, SECRETARIAT OF THE ANTARCTIC TREATY *(last visited Nov. 16, 2015) http://www.ats.aq/devas/ats_parties.aspx?lang=e (quoting 12 U.S.T. 794 art. IX.2) (emphasis omitted).*

86. CRAMRA art. 44, *i*53. Under the proposal, "[a]t any time during the period in which an approved . . . exploration permit [is] in force for an Operator, the Sponsoring State may, on behalf of that Operator, lodge with the Regulatory Committee an application for a development permit." *Id.* The Chairman of the Commission populates a new Regulatory Committee by making "a recommendation to the Commission concerning the membership of the regulatory committee [within 90 days] of "identification of an area [eligible for permit consideration]." *Id.* art. 29.3.

87. *Id.* art. 37.2.

88. *See generally id.*

89. In addition to governing what an entity must do to be allowed to develop mining activities, CRAMRA requires that:

> No Antarctic mineral resource activity shall take place until it is judged, based upon assessment of its possible impacts on the Antarctic environment and on dependent and on associated ecosystems, that the activity in question would not cause:
>
> a) significant adverse effects on air and water quality;
>
> b) significant changes in atmospheric, terrestrial or marine environments;
>
> c) significant changes in the distribution, abundance or productivity of populations of species of fauna or flora;
>
> d) further jeopardy to endangered or threatened species or populations of such species; or
>
> e) degradation of, or substantial risk to, areas of special biological, scientific, historic, aesthetic or wilderness significance.

explicitly establishes that prospecting is not sufficient to establish property rights by declaring: "[p]rospecting shall not confer upon any Operator any right to Antarctic mineral resources."[90] CRAMRA defines prospecting as:

> [A]ctivities, including logistic support, aimed at identifying areas of mineral resource potential for possible exploration and development, including geological, geochemical and geophysical investigations and field observations, the use of remote sensing techniques and collection of surface, seafloor and sub-ice samples. Such activities do not include dredging and excavations, except for the purpose of obtaining small-scale samples, or drilling, except shallow drilling into rock and sediment to depths not exceeding 25 metres . . . .[91]

Considering that prospecting does not confer property rights, its definition essentially lists activities which are insufficient to create property rights under CRAMRA. This definition implies that the gathering of samples and observational testing of an area, no matter how extensive, would never have been sufficient under CRAMRA to confer property rights to the underlying minerals.[92]

Interestingly, the definition of prospecting specifically excludes "dredging and excavations, except for the purpose of obtaining small-scale samples, or drilling, except shallow drilling into rock and sediment to depths not exceeding 25 metres."[93] Instead, these activities are categorized as "[e]xploration" under CRAMRA, which is defined as "activities . . . aimed at identifying and evaluating specific mineral resource occurrences or deposits, including exploratory drilling, dredging and other surface or subsurface excavations required to determine the nature and size of mineral resource deposits and the feasibility of their development, but excluding pilot projects or commercial production."[94] It is possible that the definition of prospecting, specifically in regards to what it excludes, was meant to delineate the circumstances under which property rights would be allocated. In other words, it is possible that when the drafters of CRAMRA said that dredging, excavating, and drilling below certain depths is not prospecting (keeping in mind that prospecting cannot confer property rights in CRAMRA), they did so hoping to establish those

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Id. art. 4.2.

90. *Id.* art. 37.1. CRAMRA defines "[m]ineral resources" as "all non-living natural non-renewable resources, including fossil fuels, metallic and non-metallic minerals." *Id.* art. 1.6.

91. *Id.* art. 1.8.

92. *Id.*

93. *Id.*

94. *Id.* art. 1.9.

activities as sufficient to confer property rights.[95]

Looking more closely at the definitions of prospecting, exploration, and development in CRAMRA, it appears that they may have significant implications for how the treaty allocates property rights.[96] The definitions are meant to provide an exact set of minimum standards that create property rights in resources. Under this interpretation, the extracting entity has a right to property as soon as its excavations and dredging are no longer for the purpose of obtaining "small-scale samples" or when its drilling extends to depths below twenty-five meters.[97] This means that property rights accrue at the exact point where prospecting activities cease to be prospecting activities and become exploration or development activities. Unlike prospecting, both exploration and development activities require the assent, in the form of permits, of the Regulatory Committee under CRAMRA.[98] Also, unlike prospecting, neither of the provisions on exploration or development contain the disclaimer that activities of their respective types will not confer property rights on the underlying resources. Therefore, this interpretation has intuitive appeal as the point at which the Convention implies that the property rights are conferred coincides with the point at which international permission is required for the activity.

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95. *Id.*

96. Development is defined as "activities, including logistic support, which take place following exploration and are aimed at or associated with exploitation of specific mineral resource deposits, including pilot projects, processing, storage and transport activities." *Id.* art. 1.10.

97. *Id.* art. 1.8.

98. *Id.* art. 37.2; *See also id.*, Chapter IV (Exploration) & Chapter V (Development).

C. Impact of Analogous Resource Paradigms

UNCLOS and CRAMRA both provide insight into how the USCSLC should be interpreted, though their contributions are somewhat conflicting. Under both regimes, prospecting is expressly barred from conferring any type of property rights in the resources. This principle should be easily incorporated into the USCSLC because there is evidence of a consensus in the international community that prospecting and sample-gathering are insufficient to form the basis of a claim to unextracted resources in extraterritorial areas.[99] Where the UNCLOS and CRAMRA analyses potentially differ is in their treatment of what CRAMRA calls "exploration" activities.[100] Under CRAMRA, it appears that certain activities, can form the basis of a claim in the underlying resources, if they are extensive enough and if given permission by the regulatory committee.[101] UNCLOS has no analogous provision, and it is silent on whether activities that go above and beyond prospecting can be construed as conferring property rights. UNCLOS, therefore, can only be read as asserting that exploration activities cannot form the basis for a property rights claim. There are two reasons why the UNCLOS understanding of property is more applicable to the USCSLC. First, CRAMRA never went into effect, and therefore, its value as a model for space law adaptation is lessened.[102] Second, CRAMRA creates an extensive series of regulatory bodies to oversee and give permission for all mining activities.[103] Seeing as no such international body exists under the USCSLC, CRAMRA's value as an analogy is further diminished.

Still, to resolve the remaining question of whether any activity short of actual physical removal of the resource from the object can constitute a property right claim under the USCSLC, it is useful to examine relevant domestic property law provisions. By using the word "obtained," the legislature appears to be invoking the basic property law principle that "real estate and substances removed thereon is different" in the eyes of the law.[104] "While unsevered, minerals form part of the land, and as such are real estate. When severed, they become personal chattels."[105] The

99. Additionally, if the SPACE Act was interpreted as asserting that certain prospecting activities could be *sufficient* to form the basis of property rights, then the Act could potentially be legislating unextracted resources themselves, which is prohibited by the OST. Letter from Henry Hertzfield, *supra* note 15, at 2.

100. CRAMRA, *supra* note 77, art. 1.10 & Chapter IV.

101. *See supra* notes 86–101 and accompanying text.

102. Blay & Tsamenyi, *supra* note 80.

103. *Id.* at 196.

104. Pop, *supra* note 25, at 135.

105. Charles Sweet, *A Dictionary of English Law* 529 (1882).

traditional formulation of this rule, known as the rule of capture, is that "one can establish ownership only by capturing or 'reducing to possession' a flow from the asset."[106] The rule of capture is exemplified by wildlife and crude oil: "ownership is established only when a hunter bags a goose or when a barrel of oil is brought to the surface. The stock itself, be it the population of geese or the oil reservoir, remains unowned."[107] The rule of capture, combined with the analysis of comparable international property law regimes, tends to show that when Congress uses the word "obtains," it means to expressly preclude property rights claims derived from preparatory activity of any kind. Under the USCSLC, an entity therefore only has property rights to the physical material that it is able to extract from the source.

The question remains: Is the establishment of property rights in extracted space resources desirable? The USCSLC was passed by unanimous consent in the Senate and was passed overwhelmingly in the House, an impressive feat in a political climate riddled with bipartisan gridlock.[108] In fact, based on the *Congressional Record*, those who argued against the legislation did so on grounds largely unrelated to the establishment of property rights.[109] Regardless, many still question the wisdom of a U.S. law creating commercial property rights.[110] Some commentators suggest that the impact of passing the USCSLC will not be on international *law*, but rather on international *politics*.[111] It is also reasonable to suggest that the USCSLC could trigger mirroring legislation in other space-faring nations, which could create heated competition, controversy, and possibly chaos.[112] Despite the concerns of some,

106. Dan Lueck, *The Rule of First Possession and the Design of the Law*, 38 J.L. & ECON. 393, 403–04 (1995).

107. *Id.* at 404.

108. *See* 161 Cong. Rec. H8185-01, H8194 (daily ed. Nov. 16, 2015) (letter from Christine Anderson, CEO of Spaceport America) ("In May, your original SPACE Act passed the House 284-133—a 68 percent margin that included 236 Republicans and 48 Democrats. Now that the Senate has unanimously supported this bipartisan compromise, we would hope that all 435 House Members could vote in the national interest to approve this historic legislation.").

109. *See, e.g.*, *id.* at H8191 (testimony of Representative Eddie Bernice Johnson) (pointing to concerns over certain liability immunities in the bill given to NASA and commercial space entities as her rationale to vote against the bill).

110. *See generally* Katrina Pascual, *U.S. Space Mining Law is Potentially Dangerous and Illegal: How Asteroid Mining Act May Violate International Treaty*, TECH TIMES (Nov. 28, 2015), http://www.techtimes.com/articles/111534/20151128/u-s-space-mining-law-is-potentially-dangerous-and-illegal-how-asteroid-mining-act-may-violate-international-treaty.htm.

111. Gabrynowicz testimony, *supra* note 14, at 6 ("The potential legal impact of this kind of legislation on international treaties is likely to be modest. The potential political impact of this kind of legislation on the international treaties is likely to be sizable.").

112. Nelson, *supra* note 24 ("The 'political' complications bear reflection, especially if rival space powers such as Russia, India and China were to enact rival legislation.").

establishing property rights in extracted resources carefully navigates international treaties and accomplishes the goal of taking the first major step toward the creation of a space resource industry. Since asteroids can serve as a water source throughout the galaxy, incentivizing commercial asteroid development serves the additional purpose of increasing the capacity for human space flight.[113] Accordingly, establishing commercial property rights in "obtained" resources is a forward-thinking and landmark piece of legislation which is necessary for the establishment of an industry. The provisions discussed in this Note are worthy of the bipartisan support they received.

III. THE OMISSION OF THE RIGHT TO HARMFUL INTERFERENCE IN THE USCSLC; EXAMINING PREVIOUS USCSLC DRAFTS TO UNDERSTAND THE RIGHT'S FUTURE

In addition to the establishment of property rights for extracted space resources, the USCSLC asserts that one of the legislation's goals is to prevent those engaged in the commercial recovery of space resources from encountering harmful interference from other parties.[114] The USCSLC mandates that:

> The President, acting through appropriate Federal agencies, shall . . . promote the right of United States citizens to engage in commercial exploration for and commercial recovery of space resources *free from harmful interference*, in accordance with the international obligations of the United States and subject to authorization and continuing supervision by the Federal Government.[115]

Despite the fact that the right to freedom from harmful interference was prominently featured in the version of the USCSLC that passed the House, the right was relegated to a single mention in the bill that was ultimately passed by the Senate and signed by President Obama.[116] More importantly, the USCSLC does not contain the enforcement provisions present in earlier versions.[117] The *Congressional Record* contains no discussion of harmful interference or any rationale for why the final draft of the USCSLC omitted the enforcement mechanisms present in earlier drafts.[118]

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113. *See* Steigerwald, *supra* note 8.
114. USCSLC § 51302(a)(3).
115. *Id.* (emphasis added).
116. SPACE Act, H.R. 1508, 114th Cong. § 51303(b)–(e) (2015).
117. *Id.*; *see generally* USCSLC.
118. *See generally* 161 Cong. Rec. H8185-01 (daily ed. Nov. 16, 2015).

The term "freedom from harmful interference" is a recurring term that was present both in bills that inspired the USCSLC and in previous versions of the USCSLC itself.[119]

However, the term was first used in a space law setting in the OST.[120] In the context of the OST, the principle of avoiding harmful interference was "guided by the principle of co-operation and mutual assistance" between participating nations.[121] If a party to the Treaty "has reason to believe that an activity or experiment planned by it or its nationals in outer space . . . would cause potentially harmful interference with activities of other States Parties in the peaceful exploration and use of outer space . . . it shall undertake appropriate international consultations before proceeding . . . ."[122] "Harmful interference" appears to have two connotations within the OST. First, the signatories employ the term to prevent the parties from interfering with the productive activities of other nation states engaging in private endeavors. Second, the term is used to curb the activities of the parties that may harm the environment.[123]

The term "harmful interference" was first articulated in the United States by the ASTEROID Act, which stated that "[a] United States commercial asteroid resource utilization entity shall avoid harmful interference to other spacecraft."[124] The proposed right was later expanded in the SPACE Act. Instead of precluding harmful interference only to other spacecraft, it imposed a general duty to "avoid causing harmful interference in outer space."[125] In each act, the principle of harmful interference is labeled and introduced as a safety measure.[126] The creation of a new cause of action enforces the right because it creates liability for the companies that cause damage to other commercial actors engaging in

119. American Space Technology for Exploring Resource Opportunities in Deep Space Act H.R. 5063, 113th Cong. § 51302(c) (2014) (never passed in the House) [hereinafter "ASTEROIDS Act"]; SPACE Act § 51303(b).

120. OST art. IX.

121. *Id.* ("States Parties to the Treaty . . . shall conduct all their activities in outer space, including the moon and other celestial bodies, with due regard to the corresponding interests of all other States Parties to the Treaty.").

122. *Id.* The OST also maintains the analogous position that a party to the treaty that "has reason to believe that an activity or experiment planned *by another* State Party in outer space . . . would cause potentially harmful interference with activities in the peaceful exploration and use of outer space . . . may request consultation concerning the activity or experiment." *Id.* (emphasis added).

123. *Id.* ("States Parties to the Treaty shall pursue studies of outer space . . . and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter . . . .").

124. ASTEROIDS Act § 51302(c).

125. SPACE Act § 51303(b).

126. In each act, the description of harmful interference is contained in the "Safety of Operations" subsection of the bills. ASTEROIDS Act § 51302(b); SPACE Act § 51303(b).

commercial enterprises in space.[127]

However, when each of the previous acts defined the contours of the cause of action, what were ostensibly safety regulations began to exhibit property law elements.[128] Each bill establishes that a "United States commercial space resource utilization entity may bring a civil action for appropriate legal or equitable relief, or both . . . for any action by another entity subject to United States jurisdiction causing harmful interference to its operations with respect to an asteroid resource utilization activity in outer space."[129] Each bill goes on to provide a similar three-element threshold test to determine if an entity is eligible to assert the cause of action.[130] The more recent SPACE Act requires the plaintiff to show that the entity "(A) acted in accordance with all existing international obligations of the United States; and (B) was first in time to conduct the activity," in addition to proving that the activity itself "is reasonable for the exploration and utilization of asteroid resources."[131] One difference between the two tests is that the ASTEROIDS Act only requires that the activity be "derived upon a reasonable basis,"[132] instead of being reasonably related to the specific purpose of "exploration and utilization" of asteroid resources.[133]

Considering the novelty of the regulation, it is necessary to address the legality of such a provision before proceeding to an investigation into the implications of creating a harmful interference cause of action.[134] Some may argue that the inception of the harmful interference cause of action is an assertion of jurisdiction over the disputed astero*id.*[135] Regardless, the right to freedom from harmful interference is most likely compliant with U.S. treaty obligations and the OST.[136] It is compliant because neither the SPACE Act nor the ASTEROIDS Act "grant U.S. jurisdiction to an *asteroid or any asteroid resource.*"[137] Instead, they "grant U.S. jurisdiction

127. SPACE Act § 51303(c); ASTEROIDS Act § 51302(b).

128. SPACE Act § 51303(d); ASTEROIDS Act § 51302(c).

129. SPACE Act § 51303(c); ASTEROIDS Act § 51302(d). The proposed cause of action does not contain a requirement that the conduct be intentional or negligent, and it seems to create strict liability for individuals causing harmful interference.

130. SPACE Act § 51303(d); ASTEROIDS Act § 51302(b).

131. SPACE Act § 51303(d). The SPACE Act also mandates that "[t]he district courts of the United States shall have original jurisdiction over an action under this chapter without regard to the amount in controversy." *Id.* at § 51303(e).

132. ASTEROIDS Act § 51302(b).

133. SPACE Act § 51303(d)(2).

134. Letter from Henry Hertzfield, *supra* note 15, at 2–6 (responding to allegations that the SPACE Act violates the OST because it asserts U.S. jurisdiction in outer space).

135. *See id.*

136. *Id.*

137. *Id.* at 2.

to *companies* that fall under U.S. jurisdiction . . . with the intent of adjudicating claims of 'harmful interference' between those companies."[138] Therefore, if a right to be free from harmful interference were to become U.S. law, the United States would not be claiming that it has jurisdiction over any space territory, which the OST would prohibit.[139] Instead, the bills are invoking the United States' right to personal jurisdiction over its subjects, entitling it to regulate "conduct in the extraterrestrial realms, and in regard to the extraterrestrial realms."[140] This right is well-recognized and uncontested.[141] The concern that the creation of a cause of action that protects the right to be free from harmful interference from one's competitors might violate the OST would be further mitigated by the express disclaimer contained in the USCSLC which specifically asserts that the bill contains no claim of sovereignty.[142]

While it appears that the creation of a new cause of action protecting commercial actors' rights to freedom from harmful interference from their competitors comports with international law, the implications of such a cause of action may be broader than initially revealed by a cursory investigation. In order to determine the impact of the legislation, it is necessary to answer two related questions. First, at what point do the protections attach to a mining enterprise? Second, when does an activity undertaken by a competitor become actionable under the statute?

The first question, determining when an enterprise accrues the protections guaranteed by the proposed cause of action, is answered by examining the conditions under which the protections of the statute attach.[143] In order for a commercial mining enterprise to receive the protections under the hypothetical causes of action in each statute, the activity must be in accordance with U.S. international obligations, "first in time", and reasonable.[144] The first of these requirements, that the activity

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138. *Id.* Going one step further, "[p]rotecting entities from 'harmful interference' is consistent with, and indeed furthers, the purposes of the OST, that requires 'due regard' be given to other's space activities and requires advance consultations if a proposed activity 'would cause potentially harmful interference.'" *Id.*

139. Pop, *supra* note 25, at 34.

140. *Id.*

141. *Id.* at 34–35 ("Thus, the 1967 and 1979 documents are not called 'Treaty on the legal status of outer space' and 'Agreement on the legal status of the Moon,' but 'Treaty on Principles **Governing the Activities** of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies' and '**Agreement Governing the Activities** of States on the Moon and Other Celestial Bodies.'").

142. USCSLC § 403.

143. SPACE Act § 51303(d).

144. *Id.*; ASTEROIDS Act § 51302(b). The SPACE Act also specifies that each party in the action must be considered a "United States commercial space resource utilization entity," which is defined as "an entity providing space resource exploration or utilization services, the control of which is held by

is consistent with international obligations, would not have a meaningful impact on which asteroid mining activities gain the protections of the statute.[145] The third requirement, that the activity is reasonable for the exploration and utilization of asteroid resources, similarly is unlikely to affect the claims of any party who is actually eligible to assert a cause of action.[146]

The requirement that the activity be "first in time," on the other hand, would result in the cause of action—what is supposed to be a safety regulation—having significant property law consequences.[147] Without considering the implications of the creation of a right to freedom from harmful interference, property interests only accrue under the USCSLC at the moment a given resource is reduced to possession.[148] In other words, the USCSLC contains no mechanism for a prepossessory interest in an asteroid or asteroid resources.[149] If a commercial actor's substantial activity can trigger certain safety-oriented protections before possession, then, by definition, the cause of action has created a type of "prepossessory interest" in the enterprise.[150] The prepossessory interest

persons other than a Federal, State, local, or foreign government." SPACE Act § 51301(4). The term also requires that the company be subject to U.S. jurisdiction either legally or voluntarily. *Id.* § 51301(4)(A)–(C).

145. Recall that the USCSLC contained a provision declaring that authorizing the commercial ownership of space resources is not an assertion of sovereignty or jurisdiction over celestial bodies. USCSLC § 403. Therefore, according to Congress, any activities that are limited to resource extraction, and have been properly licensed, will be considered consistent with U.S. international obligations. *Id.*

146. The SPACE Act bars all parties from bringing a harmful interference suit unless the entity bringing suit is providing space resource exploration or utilization services. SPACE Act § 51303(c). As a result, as long as the company qualifies as a commercial space resource entity, its normal business operations should generally meet the standard of reasonableness for the exploration and utilization of asteroid resources. The reasonableness standard is even easier to satisfy in the ASTEROIDS Act, which only requires that the activity be "derived upon a reasonable basis." ASTEROIDS Act § 51302(b).

147. SPACE Act § 51303(d); ASTEROIDS Act § 51302(b).

148. *See supra* Part. II (discussing property rights under the USCSLC).

149. *See supra* Part II. Here, property law surrounding lost or abandoned property can serve as a useful analogy for space law: "[t]he law protects not only the title finally acquired by one who finds lost or abandoned property but also the right of the person who discovers such property, and is actively and ably engaged in reducing it to possession, to complete this project without interference from another." *Treasure Salvors, Inc. v. Unidentified Wrecked and Abandoned Sailing Vessel*, 640 F. 2d 560, 572 (1981). "[I]n order to acquire a legally cognizable interest in lost or abandoned property a finder need not always have 'manual' possession of the thing. Rather, a finder may be protected by taking such constructive possession of the property as its 'nature and situation' permit." *Id.*

150. SPACE Act § 51303(d). The court in *Pierson v. Post* first established a prepossessory interest: "actual bodily seizure is not indispensable to acquire right to, or possession of, wild beasts; but that, on the contrary, the mortal wounding of such beasts, by one not abandoning his pursuit, may . . . be deemed possession of him . . . ." Pierson v. Post, 3 Cai. R. 175, 178 (N.Y. Sup. Ct. 1805). The notion later expanded to include when an entity "undertakes significant but incomplete steps to achieve possession of a piece of . . . property and the effort is interrupted by the unlawful acts of

implicated by the potential harmful interference cause of action is analogous to the traditional formulations of the term, all of which create an actual recognizable property right.[151] Rights derived from a harmful interference cause of action cannot therefore *technically* be considered a prepossessory interest, as the protections confer no actual property rights.[152] The cause of action may nonetheless function in much the same way by giving legal protections to actors who have taken substantial steps toward, yet have not completed, extracting resources.

Considering the "first in time" requirement is likely to be the operative condition of the SPACE Act's harmful interference provision, the proposed statute may give actors exclusive rights to space objects simply by being the first enterprise to reach a certain prepossessory benchmark.[153] The questions then become: What type of activities will be proscribed by the statute? How is harmful interference defined? Defining harmful interference will determine the extent of the protections given to enterprises before extraction of resources. The notion of "harm" in the space context is a very different concept than the notion of "harm" in the Earth context.[154] Space is a far more dangerous place for man and machine alike.[155] As a result, even the smallest amount of activity undertaken by a competitor in the same vicinity as an enterprise that has reached a specific location first would have the potential to harmfully interfere with the actions of the "first in time" party. It is even plausible that asteroid landings are so tenuous and the enterprise so generally dangerous—for both the people and the technology involved—that any targeting of the

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others." Popov v. Hayashi, No. 400545, 2002 WL 31833731, at 6 (Cal. Super. Ct. Dec. 18, 2002).

151. *See supra* note 150.

152. *See supra* note 126 and accompanying text (establishing "harmful interference" as a safety measure).

153. *See supra* notes 143–144 and accompanying text for why the "first in time" requirement is determinative.

154. Dara O Briain, *What Makes Space Travel So Dangerous?* BBC iWONDER, http://www.bbc.co.uk/guides/zctgq6f (last visited July 18, 2016) ("We were made to live on Earth, not in the extreme conditions we find in space. So when astronauts . . . leave our planet they have to take their environment with them." "[A]stronauts might experience temperatures as low as [-200F] and as high as [250F] . . . ."); *Asteroid Mining: The Most Dangerous Job In the Solar System*, COLONY WORLDS (July 11, 2007), http://colonyworlds.com/2007/07/asteroid-mining-the-most-dangerous-job-in-the-solar-system.html ("Another danger of asteroid miners will be radiation. Since most . . . asteroids lack a magnetic field, asteroid outposts will be at the mercy of the Sun's wrath, not to mention cosmic rays . . . ." "[M]iners also face the dangers of micrometeorites piercing holes through their suits and stations or . . . encountering a meteor shower from an incoming comet.").

155. *Risk Assessment Improves the Entire Project's Chance of Success*, MUNICH RE, https://www.munichre.com/touch/space/en/spectrum-of-services/space-risk-assessment/index.html (last visited July 18, 2016) ("Once . . . in orbit, it is too late to carry out any repairs. Any damage that occurs in orbit can have a devastating effect. Even minor damage can lead to a total loss and to the failure of the entire project.").

same asteroid would result in the potential to implicate harmful interference concerns.[156]

Thus, the first enterprise to land on an asteroid could effectively lay claim to that asteroid under the pretense that any other operations targeting that asteroid would potentially harmfully interfere with the original mission.[157] As a result, for every commercial activity in space, a zone of danger will need to be established with the goal of demarcating the point where activity within a certain distance presents too great a risk of harmful interference to authorize any activity. Regardless of where the boundaries are drawn, the zone of danger will necessarily be coterminous with a newly formed quasi-property right. For example, say a court rules that coming within five hundred feet of an asteroid probe is too dangerous and thus poses an impermissible risk of harmful interference. Then the entity that simply lands a probe on an asteroid effectively has exclusive domain over the five hundred feet of land and, by extension, the underlying resources.[158] While the OST does not fully address the issue of extracted space minerals, the treaty is very clear that property claims over plots of land and entire celestial bodies are forbidden.[159] Therefore, the unintended potential consequences of a harmful interference cause of action may circumvent the intentions of the OST.[160]

Nonetheless, the right to freedom from harmful interference as articulated by the SPACE Act and ASTEROIDS Act, or a similar statute, should inevitably become a crucial component of regulating commercial action in space.[161] The USCSLC already articulates the broader goal that commercial actors should be free to pursue business enterprises in space unencumbered by the interference of other actors.[162] Furthermore, the fact that Congress has already considered such a provision is evidence that the

156. The cause of action allows for "appropriate legal or equitable relief, or both." In other words, it is possible that companies are eligible to recover damages after the fact, or stop other companies from taking action in the first place. SPACE Act § 51303(c). The language used in the SPACE Act that allows an entity to bring an action against another entity that "caus[es] harmful interference to its operations with respect to an asteroid resource utilization activity in outer space," implicates human, mechanical, and property components of the operations. *Id.*

157. *Id.*

158. At this point in time, it is impossible to determine what a realistic zone of danger might encompass. Given the dangers and difficulties of space, see *supra* notes 154–153, it is plausible to imagine that zones of danger—even if reasonably based on technological necessities—could result in de facto property rights for large swaths of mineral-rich and valuable land.

159. *See supra* Introduction.

160. Though the legislative record contains no discussion of the topic, the notion that a fully fledged harmful interference law might conflict with the OST is one possible explanation for the action being omitted in the final version of the bill.

161. *Id.*; SPACE Act § 51303(d); ASTEROIDS Act § 51302(b).

162. USCSLC § 51302(a)(1)–(3).

proposal is responsive to an issue that requires attention.[163] More importantly, a harmful interference statute—in some form—is inevitable for the simple reason that it is necessary. The OST mandates that no individual country can have jurisdiction over space itself, creating a scenario where regulating space issues is largely dependent on international agreement.[164] Therefore, "[o]ne of the greatest known challenges to legislating and regulating [the space industry] is establishing uniform licensing and regulations of the activities on-orbit and at the astero*id*."[165] One major exception to this rule is that individual countries are allowed to regulate and supervise the activities of non-governmental entities in outer space.[166] The only way for the United States to protect commercial space operations that its citizens undertake is to create an entirely new cause of action. Seeing as Congress already has declared an intention to protect the rights of its citizens to engage in space resource exploitation,[167] it is only a matter of time before the harmful interference cause of action resurfaces. Regulating the safety in the nascent space mining industry will be of paramount importance as the industry approaches feasibility. Despite the unintended property consequences of protecting commercial actors against harmful interference, implementing effective safety protections should be the prevailing concern.

IV. CONCLUSION

To many, the prospect of mining asteroids is closer to science fiction than reality. In truth, there are many technological hurdles to overcome before the space resource industry comes to fruition. Still, the potential rewards associated with asteroid mining are quite literally astronomical. Perhaps more importantly, the ability to harvest asteroids for water and fuel could be one of the biggest advances in our capacity to survive and travel deep into space. The USCSLC incentivizes commercial actors to develop the technology to extract resources from asteroids by giving enterprises the rights to the tremendous abundance of precious minerals contained within them. The involvement of the private sector will be crucial in attaining the technology not only for asteroid mining but for all

163. SPACE Act § 51303(d); ASTEROIDS Act § 51302(b).

164. OST art. III; Gabrynowicz testimony, *supra* note 14, at 4 ("Space, itself, is a global commons and is governed by international law.").

165. Gabrynowicz testimony, *supra* note 14, at 4.

166. In fact, regulation and supervision of the private actors that operate in space is pursuant to an obligation imposed by the OST. OST art. VI; Gabrynowicz testimony, *supra* note 14, at 5 (also noting that "[t]he United States meets this obligation through Federal licensing regulations.").

167. USCSLC § 51302(a)(1)–(3).

facets of space travel. The USCSLC is congressional recognition that the establishment of property rights for commercial actors is a step that needs to be taken long before entities are ready to launch mining missions. Without the legal certainty that asteroid mining can result in the acquisition of property, there will never be the requisite financial support to catalyze the space resource industry. While the USCSLC is a good start, it fell short of all that it could have established. A cause of action protecting the right to freedom from harmful interference for space-faring U.S. companies was discussed and ultimately dismissed from the bill. Such a provision is an inevitable addition U.S. lawmakers will need to make and include in future space legislation. However, since enforcement mechanisms for the right to freedom from harmful interference may have unintended property consequences, it may be wiser to refine the cause of action prior to it becoming law. The USCSLC proves that US policymakers have embraced the fact that, when it comes to space, the technological advancements of tomorrow are borne out of the regulatory foundation of today.

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