STUDENT ARTICLE

"IT'S DANGEROUS BUSINESS . . .": THE POSSIBLE EFFECTS OF THE SPACE RESOURCE EXPLORATION AND UTILIZATION ACT OF 2015 ON PLANETARY DEFENSE

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"The question to ask is whether the risk of traveling to space is worth the benefit. The answer is an unequivocal yes, but not only for the reasons that are usually touted by the space community: the need to explore, the scientific return, and the possibility of commercial profit. The most compelling reason, a very long-term one, is the necessity of using space to protect Earth and guarantee the survival of humanity."

~ William E. Burrows[1]

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[1] William Burrows, *Space and Civilization*, WSJ (Feb. 3, 2003), http://www.wsj.com/articles/SB10442391855747920 64 (last visited Jan. 14, 2017).

I. INTRODUCTION

As of the early twentieth century, Science fiction has provided an endless stream of films, television, and books imagining the hypothetical first discovery of extraterrestrial biological materials by mankind. The (now cliché') plot tends to begin with initial jubilation by the discoverers, followed by in-depth testing of the mysterious material, and of course, the inevitable eradication of the crew, colony, or planet by a suddenly deadly alien lifeform. The humans involved are almost always on either a deep-space mining mission or building new human settlements in outer space. The idea of mankind entering outer space as colonizers and entrepreneurs has been a staple of our collective imagination for many years; however, what once existed only in our imagination is now quickly approaching reality, expedited by the desire of governments and private entities to push human commercial industry into outer space.

There are now a host of private companies preparing to conduct space transportation and space-resource utilization, hoping to mine comets, asteroids, and even the moon for valuable resources. In November of 2015, gasoline was added to the fire of these hopes when the President signed into law the U.S. Commercial Space Launch Competitiveness Act (CSLCA),[2] opening the floodgates for commercial space resource utilization by United States citizens. Similarly, Luxembourg recently became the first European State to consider legislation granting its citizens the right to commercially utilize space resources.[3] This emerging legislation is a major victory for companies like Deep Space Industries[4], Bigelow Aerospace[5], and Planetary Resources[6]; however, it remains unclear what effects the

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[2] U.S. Commercial Space Launch Competitiveness Act, 51 U.S.C. § 10101 (2015) [hereinafter the CSLCA].

[3] *Luxembourg's New Space Law Guarantees Private Companies the Right to Resources Harvested in Outer Space in Accordance with International Law*, GOUVERNEMENT.LU (Nov. 11, 2016), http://www.gouvernement.lu/6481433/11-presentation-spaceresources.

[4] *Asteroid Mining: An unlimited future for all mankind*, DEEP SPACE INDUS., https://deepspaceindustries.com/mining/ (last visited Nov. 5, 2016).

[5] *B330*, BIGELOW AEROSPACE, http://www.bigelowaerospace.com/b330/ (last visited Nov. 29, 2016).

[6] *Our Technology Today, Enables The Vision Of Tomorrow,* PLANETARY RESOURCES, http://www.planetaryresources.com/technology/#technology-overview (last visited Nov. 5, 2016).

2015 CSLCA will have on the defense of our planet from (now commercially incentivized) private companies mining extraterrestrial materials. Is the current legal framework for these activities prepared to handle it?

For decades NASA has implemented mandatory planetary protection policies—based on the Committee on Space Research's (COSPAR) planetary protection guidelines—for every NASA mission.[7] In fact, all members of the Outer Space Treaty are also members of COSPAR.[8] For example, NASA, Roscosmos, JAXA, and ESA have all adopted COSPAR's guidelines into their state practice. However, do the same standards that apply to NASA's space resource-related missions also apply to commercial entities under the CSLCA? Although NASA (a government entity) has clearly defined guidelines for planetary protection and contamination control, the CSLCA does not make any mention of these guidelines in relation to the private sector. Nor does it directly indicate an intent to identify protection specific regulations in the future. The Act merely states that the president shall—within 180 days after the date of enactment—submit to Congress a report that specifies "the authorities necessary to meet the international obligations of the United States, including authorization and continuing supervision by the Federal Government; and recommendations for the allocation of responsibilities among Federal agencies for the activities described . . ."[9] Completely absent from this act is any mention of environmental protection measures relating to space resource utilization, or how the Government will go about regulating the commercial space resource industry in a way that ensures the security of the space environment and the Earth itself.

Although the President's Executive office did provide a report in April 2016, it contains no language directly addressing the need

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[7] *Mission Requirements*, NASA: OFFICE OF PLANETARY PROTECTION, https://planetaryprotection.arc.nasa.gov/requirements (last visited Nov. 10, 2016). More information about the origin's and function of COSPAR will be provided later in this article.

[8] *Members*, COSPAR, https://cosparhq.cnes.fr/about/members (last visited Nov. 15, 2015).

[9] 2015 Space Act, 51 U.S.C. § 51302(a)(3) (2015).

to develop measures for planetary defense or possible contamination.[10] This creates a potential for future confusion and uncertainty regarding not only the need for private companies to conduct space-mining activities responsibly, but also the Government's responsibility to oversee the activities of non-governmental entities in accordance with the Outer Space Treaty. Furthermore, a new Commander-in-Chief has entered office whose space policies will undoubtedly differ significantly from that of the previous administration. Although this author believes space-resource utilization is an essential aspect of humanity's future endeavors—and survival—in space, many uncertainties now exist as to how the Government will regulate commercial space mining in a way that not only ensures the United States' compliance with its international treaty obligations, but also protects the Earth from possible contamination by haphazardly collected extraterrestrial materials.

In order to address these uncertainties, this article first provides a brief analysis of the Space Resource Exploration and Utilization Act of 2015—which grants American citizens the right to sell, possess, own, transport, or use "any asteroid resource or space resource" obtained "in accordance with applicable law[.]"[11] Next, it assesses the legality of space resource utilization by summarizing the arguments both for and against this controversial activity. Finally, this article argues that the framework for commercial space resource utilization (provided by the CSLCA) is capable of neither fulfilling the United States' international treaty obligations nor protecting the security of the Earth's environment, and should be supplemented by COSPAR'S planetary protection guidelines as implemented by NASA.

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[10] John P. Holdren, Office of Science and Technology Policy, *Letter submitted in fulfillment of a reporting requirement contained in the U.S Commercial Space Launch Competitiveness Act (Public Law 114-90, herein referred to as "the Act"), signed into law November, 25th, 2015* (2016) [hereinafter the Presidential Report].

[11] CSLCA, 51 U.S.C. § 51303 (2015).

II. SPACE RESOURCE UTILIZATION

A. Why mine celestial bodies?

Before attempting to parse the various legal arguments for and against space-mining, one must ask why governments and private entities are even attempting to pursue these expensive and complicated activities? The answer is fairly simple: between the Moon and some nearly 1,400 asteroids in a close proximity to Earth, there is a virtually infinite supply of both valuable minerals and humanity's most sacred resource: water.[12] The Moon alone contains massive amounts of accessible aluminum, iron, silicon, hydrogen, manganese, chromium, potassium, oxygen, and the highly sought after Helium-3 (a potential fuel for fusion power reactors).[13] Both oxygen and hydrogen are abundant throughout the lunar regolith, providing essential components for the creation of rocket fuel. These materials are essential for the construction and support of future lunar bases, orbital space stations, and deep-space exploration missions.[14]

In fact, Helium-3 is believed capable of eventually replacing fossil fuels on Earth, "[i]t has been estimated that twenty-five tonnes of Helium-3 can provide all the power that the United States needs in a year."[15] Furthermore, NASA has confirmed that near-Earth asteroids are massive depositories of minerals and water, creating incredible potential for both Earth-based commercial development and the future of space exploration;

> It has been estimated that the mineral wealth resident in the belt of asteroids between the orbits of Mars and Jupiter would be equivalent to about 100 billion dollars for every person on Earth today. Whereas asteroids are rich in the mineral raw materials required to build structures in space, the comets are rich resources for the water and carbon-based molecules necessary to sustain life . . . It seems likely that in the next

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[12] Fabio Tronchetti, *The Moon Agreement in the 21st Century: Addressing its Potential Role in the Era of Commercial Exploitation of the Natural Resources of the Moon and Other Celestial Bodies*, 39 J. SPACE L. 493-95 (2010).

[13] *Id.* at 493-94.

[14] *Id.*

[15] *Id.* at 495.

> century when we begin to colonize the inner solar system, the metals and minerals found on asteroids will provide the raw materials for space structures and comets will become the watering holes and gas stations for interplanetary spacecraft.[16]

With the inevitable evolution of mankind into an interplanetary species quickly approaching, it only follows that entrepreneurial entities around the world would begin laying the foundation, both legally and technologically, for extraterrestrial resource mining.[17]

B. The 2015 CSLCA

However, despite the apparent practical and industrial potential of space-mining, there stands a decades old argument regarding the status of space resources that hinges on the nature of outer space itself. Are the mineral and water resources imbedded in celestial bodies available for exploitation by mankind, or does international law bar their commercial utilization under the principle of non-appropriation? At the center of this argument—at least, for United States citizens—is title IV of the 2015 U.S. Commercial Space Launch Competitiveness Act, also known as the Space Resource Exploration and Utilization Act of 2015. The CSLCA explicitly provides 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, 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.[18]

Furthermore, it requires the President of the United States to

> (1) facilitate commercial exploration for and commercial recovery of space resources by Unite States citizens;

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[16] *Near-Earth Objects as Future Resources*, NASA, http://neo.jpl.nasa.gov/neo/resource.html (last visited Nov. 21, 2016).

[17] *Asteroid Mining: An unlimited future for all mankind*, DEEP SPACE INDUS., https://deepspaceindustries.com/mining/ (last visited Dec. 15, 2016).

[18] CSLCA, *supra* note 10.