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Mining the Final Frontier: Keeping Earth's Asteroid Mining Ventures from Becoming the Next Gold Rush

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Mining the Final Frontier: Keeping Earth's Asteroid Mining Ventures from Becoming the Next Gold Rush

Matthew Feinman*

INTRODUCTION

“Space: The Final Frontier.”¹ While that phrase has been a call to arms for generations of science fiction fans and space enthusiasts to look up at the night sky in wonder and amazement, it has increasingly become a siren call for private space pioneers. Since man first went to space in 1961, humankind has been pushing the boundaries of experimentation, research, and exploration into the cosmos.²

Even though Earth's supply of certain rare and precious metals may be reaching depletion, researchers have found that asteroids are likely to contain vast quantities of these resources.³ Today, there are companies attempting to tap into this potential wealth of resources to make them available for use, both on Earth and in space.⁴ Before these companies can begin mining, stronger property laws are needed to ensure that the Asteroid Belt of our solar system is not described as the next California Gold Rush and as having the lawlessness associated with it.⁵

Part I of this Article discusses the development of new technologies for asteroid mining and exploration. Part II parallels the impending race to Asteroid resources to the race to find gold during the California Gold Rush. Part III further examines existing United Nations agreements in the context of space exploration,

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¹ *Star Trek*, INTERNET MOVIE DATABASE, <http://www.imdb.com/title/tt0060028/> (last visited Mar. 4, 2014).

² Katie Scott, *Timeline: Humans in space*, WIRED (July 20, 2009, 12:00 AM), <http://www.wired.co.uk/news/archive/2009-07/20/timeline---the-history-of-humans-in-space> (Yuri Gagarin in April for the USSR and Alan Shepard in May for the United States).

³ See *infra* Part II(A).

⁴ See *infra* notes 21–26.

⁵ See *infra* Part III.

and identifies their shortfalls related to the issues of asteroid mining. Part III also provides language for a proposed treaty and recommends changing the current regulatory regime by specifically changing the classification of asteroids as real property to that of chattel. Finally, Part IV concludes by summarizing the need for the development of adequate regulations over property in space before mining operations become a reality.

I. ASTEROID MINING: TECHNOLOGIES AND POTENTIAL REWARDS

The first time a space probe made a fly-by of an asteroid was in 1991 when the Galileo, on its way to Jupiter, passed within 1,000 miles of the asteroid Gaspara.⁶ Since Galileo's passage of Gaspara, scientists have been studying the properties of asteroids and their potential benefits to Earth.⁷ In the twenty-three years since, researchers have discovered that asteroids may hold the key to solving the Earth's resource depletion worries.⁸

A. Asteroid Resources May Be Significant

Terrestrial supplies of certain resources are dwindling, and our usage is causing the world to run out of commodity elements.⁹ Some estimates speculate that some of our most valuable resources will be depleted on the short to medium term.¹⁰ As the supply of Earth's resources is no longer able to meet demands, some scientists have theorized that asteroids may contain additional resource reserves.¹¹

⁶ *Galileo*, ENCYCLOPEDIA ASTRONAUTICA, <http://www.astronautix.com/craft/galileo.htm> (last visited Mar. 4, 2014); *Galileo*, NASA, http://www.jpl.nasa.gov/history/90s/Galileo_1991.htm (last visited Mar. 4, 2014).

⁷ Kevin Bonsor, *How Asteroid Mining Will Work*, HOW STUFF WORKS, <http://science.howstuffworks.com/asteroid-mining1.htm> (last visited Mar. 4, 2014).

⁸ *Id.*

⁹ *Global Resources Stock Check*, BBC (June 18, 2012, 12:00 AM), <http://www.bbc.com/future/story/20120618-global-resources-stock-check>; *How Long Will It Last?*, NEWSSCIENTIST, <http://www.newscientist.com/data/images/archive/2605/26051202.jpg> (last visited Mar. 4, 2014) (infographic showing the amount of time Earth's resources will last at current usage rates before running out); Raymond Beauchemin, *'Peak metal' problems loom, warns scientist*, THE NATIONAL (Aug. 7, 2008, 12:00 AM), <http://www.thenational.ae/news/world/europe/peak-metal-problems-loom-warns-scientist#full>.

¹⁰ NEWSSCIENTIST, *supra* note 9 (stating that some of Earth's resources could be depleted in as early as twenty years with continued rates of consumption); Beauchemin, *supra* note 9 (stating "Earth has 10 years left of indium, which—although only one gram of it is used in a 32-inch liquid-crystal display (LCD) television—is absolutely essential to the screen's clarity. Indium is also used in the windows of aeroplanes and trains").

¹¹ Bonsor, *supra* note 7.

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Many 21st century technologies use rare earth metals found in elements such as iron, gold, and platinum.¹² For example, wind turbines and solar panels—providers of clean, renewable energy—consume rare earth metals during their construction, which are currently only available in terrestrial mines.¹³ Unfortunately, the demand for these required metals continues to rise and, as the usage of the metals increase despite decreasing supplies, the economical extraction of the metals on Earth will continue to become more difficult.¹⁴ Elements like platinum, gold, and nickel are needed in everyday items such as batteries, jewelry, and computer chips;¹⁵ but estimates indicate the world does not have enough of these materials to last even another 100 years.¹⁶ Finding additional stores of these essential elements is paramount in our quest for new technologies.

There are many uses for the resources found on asteroids, both in the exploration of the solar system and development of technologies on Earth.¹⁷ In space, resources could be used in a myriad of ways. For example, if water can be found, which is believed to be existent on some asteroids, it can help sustain an exploratory ship or colony.¹⁸ Using solar energy, the water found could also be broken down into its hydrogen and oxygen components, which can then be used to form the basic building blocks of rocket fuel.¹⁹ Eventually, companies and governments will have the possibility of getting into space with less fuel and will be able to refuel as they pass the asteroid belt on the way to the edge of the solar system. In the short-term, this space-made fuel can be used to extend satellite life and fuel additional mining ventures.

¹² Renee Cho, *Rare Earth Metals: Will We Have Enough?*, STATE OF THE PLANET (Sept. 9, 2012, 11:21 AM), <http://blogs.ei.columbia.edu/2012/09/19/rare-earth-metals-will-we-have-enough/>; Beauchemin, *supra* note 9.

¹³ Beauchemin, *supra* note 9.

¹⁴ *Id.*

¹⁵ NEWSIDENTIST, *supra* note 9.

¹⁶ *Id.* (Providing that a 36–45 year supply of gold remains, while platinum, is likely to run out in just 15 short years, if current technological trends persist. Nickel, which is needed for necessities like batteries and wind turbines will only last us another 57–90 years.)

¹⁷ Bonsor, *supra* note 7; Donald K. Yeomans, *Why Study Asteroids?*, JET PROPULSION LABORATORY/CALIFORNIA INSTITUTE OF TECHNOLOGY (Apr. 1998), http://ssd.jpl.nasa.gov/?why_asteroids (Although not a topic of this Article, Donald Yeomans at the California Institute of Technology's Jet Propulsion Lab briefly mentions about using the resources to colonize and explore the solar system.)

¹⁸ Bonsor, *supra* note 7.

¹⁹ Steve Connor, *How to Turn Water into Rocket Fuel—Scientists Unlock Power of the Sun*, THE INDEPENDENT (Aug. 1, 2008, 12:00 AM), <http://www.independent.co.uk/news/science/how-to-turn-water-into-rocket-fuel-ndash-scientists-unlock-power-of-the-sun-882613.html>.

In addition to extending satellites' life span while in space, we need remedies for energy problems here on Earth. It is more than possible for the mining industry to provide a solution in this context. Estimates state there are roughly one to two million asteroids in the solar system that are a kilometer in diameter.²⁰ Each of these asteroids is projected to weigh roughly two billion tons and "contain 30 million tons of nickel, 1.5 million tons of metal cobalt, and 7,500 tons of platinum."²¹ The value of these items, for both private companies and governments around the world could be significant with the dollar value being somewhere in the trillions or higher.²² With nickel selling for \$14,575 per ton,²³ cobalt selling for \$26,600 per ton,²⁴ and platinum at \$1,454 per ounce, mining one single asteroid could be more than profitable.²⁵ The asteroid's resources could easily be used on Earth for the same purposes as on-planet resources, but without having to extract it from the Earth. This is important as all three of these elements can be used in fuel-cell technology, as well as in other new, high-tech devices.²⁶

B. The Pioneers of the Asteroid Gold Rush: The Companies and Technologies in the Asteroid Mining Industry

Two companies have taken early positions in the asteroid mining field, Planetary Resources and Deep Space Industries ("DSI").²⁷ Planetary Resources' primary goal is to bring "the natural resources of space within humanity's economic sphere of influence, propelling our future into the 21st century and

²⁰ Adam G. Quinn, *The New Age of Space Law: The Outer Space Treaty and the Weaponization of Space*, 17 MINN. J. INT'L L. 475, 500 n.217 (2008); Bonsor, *supra* note 7.

²¹ Bonsor, *supra* note 7.

²² *Id.* See, e.g., *LME Nickel*, LONDON METAL EXCH., <https://www.lme.com/metals/non-ferrous/nickel/> (last visited Nov. 1, 2013) (This equals \$437.25 billion in gross sales from one asteroid.).

²³ *LME Nickel*, *supra* note 22.

²⁴ *LME Cobalt*, LONDON METAL EXCH., <https://www.lme.com/metals/minor-metals/cobalt/> (last visited Nov. 1, 2013) (This equals \$39.9 billion in gross sales.).

²⁵ *Platinum Prices and Platinum Price Charts*, INVESTMENTMINE, <http://www.infomine.com/investment/metal-prices/platinum/> (last visited Nov. 1, 2013) (Equates to \$46.528 billion per ton. This equals \$348 billion 960 million in gross sales from the platinum.).

²⁶ See *Nickel in Elecs.*, NICKEL INST., <http://www.nickelinstitute.org/NickelUseInSociety/MaterialsSelectionAndUse/Electronics> (last visited Apr. 7, 2014); see also Alison Snyder, *High-Tech Demand Sparks Return of Cobalt Mines*, MIT TECHNOLOGY REV. (Aug. 30, 2011, 12:00 AM), <http://www.technologyreview.com/news/425273/high-tech-demand-sparks-return-of-cobalt-mines/>; see also Martin Creamer, *The Uses of Platinum-Group Metals*, MINING WEEKLY (Nov. 10, 2006, 12:00 AM), <http://www.miningweekly.com/article/the-uses-of-platinumgroup-metals-2006-11-10>.

²⁷ PLANETARY RESOURCES, <http://www.planetaryresources.com/> (last visited Nov. 1, 2013); DEEP SPACE INDUSTRIES, <http://deepspaceindustries.com/> (last visited Nov. 1, 2013).

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beyond.”²⁸ To accomplish this, Planetary Resources currently is developing three pieces of proprietary technology to explore and mine potential asteroids.²⁹ The first model, a space telescope called the ARKYD-100, can be used to find near-earth asteroids.³⁰ The second model, called the Interceptor ARKYD—200, studies asteroids that pass between the Earth and the Moon.³¹ Finally, the third model, a Rendezvous Prospector, ARKYD-300, is designed to scout distant asteroids and quickly relay back data about its findings.³²

The vision of DSI, an asteroid mining and harvesting company, is to increase the prosperity of Earth’s people by using resources found in space.³³ In addition to asteroid mining, DSI is also experimenting with harvesting solar power by using satellites, which are studying and mining asteroids, to also face the sun twenty-four hours a day.³⁴ The solar power will allow DSI to keep their technologies working around the clock, without having to rely on external power sources to operate.³⁵ DSI currently has five technologies in development to achieve their goals. Two of these inventions will scout ahead and find suitable asteroids to mine, while the final three inventions all have to do with harvesting the asteroids and returning resources to Earth.³⁶

DSI’s first invention is the Firefly.³⁷ The Firefly is a type of probe designed to perform unmanned scouting missions to potentially minable asteroids and to study their properties and compositions.³⁸ The first Firefly is expected to launch in

²⁸ *What if the greatest discovery of natural resources didn’t take place on Earth?*, PLANETARY RESOURCES, <http://www.planetaryresources.com/mission/> (last visited Nov. 1, 2013).

²⁹ *There are No Roads Where We’re Headed. But We Have a Map.*, PLANETARY RESOURCES, <http://www.planetaryresources.com/technology/> (last visited Nov. 1, 2013) [hereinafter PR Tech].

³⁰ *Id.*

³¹ *Id.*

³² *Id.*

³³ *Mission*, DEEP SPACE INDUSTRIES, <http://deepspaceindustries.com/mission/> (last visited Mar. 1, 2014).

³⁴ *Id.*

³⁵ *Id.*

³⁶ *Expeditions/Technology*, DEEP SPACE INDUSTRIES, <http://deepspaceindustries.com/explore/> (last visited Mar. 1, 2014).

³⁷ *Id.*

³⁸ *Id.*

2015.³⁹ The Dragonfly—DSI’s second invention and is essentially an upgrade of the Firefly—would be responsible for collecting asteroid materials and returning them to Earth for experimentation, processing, and mineral extraction.⁴⁰ In 2016, DSI plans to begin launching Dragonfly satellites to capture and return 50-100 pounds of asteroid material.⁴¹

According to DSI, the availability of fuel while in space will be one of the primary factors that will boost or stall any future manned missions.⁴² If DSI can bring carbonaceous asteroids⁴³ close enough to harvest, the Mars mission shuttles will no longer be as heavy when they launch because they will no longer need to carry all the propellant necessary to get to Mars.⁴⁴ The shuttles could simply launch into space, refuel at a DSI facility, and head out towards Mars.⁴⁵ The Harvester, DSI’s third invention, will mine for water, metals, and resources for building materials, as well as harvest solar energy.⁴⁶ The Microgravity Foundry, DSI’s fourth invention, will take asteroid materials and use them as the “ink” for 3-D printing in space, which will then be used to create vital components needed to maintain machinery in space.⁴⁷ Finally, DSI’s fifth invention, the Propellant Refinery will harvest the water and hydrocarbons found in asteroids and refine them into propellant and usable water.⁴⁸

³⁹ Irene Klotz, *Into Deep Space: Second U.S. Firm Takes Aim at Mining Asteroids*, REUTERS (Jan. 23, 2103, 10:24 AM), <http://www.reuters.com/article/2013/01/23/us-space-mining-idUSBRE90L14E20130123>.

⁴⁰ *Expeditions/Technology*, *supra* note 36; Markus Hammonds, *Asteroid Mining: Booming 21st Century Gold Rush?*, DISCOVERY NEWS (Feb. 4, 2013, 12:20 PM), <http://news.discovery.com/space/asteroids-meteors-meteorites/could-asteroid-mining-drive-21st-century-space-industry-130204.htm>.

⁴¹ *See* Klotz, *supra* note 39.

⁴² *Asteroids*, DEEP SPACE INDUSTRIES, <http://deepspaceindustries.com/asteroids/> (last visited Mar. 1, 2013).

⁴³ *Id.* (water-rich near Earth asteroids).

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *Asteroids*, *supra* note 42.

⁴⁷ *Id.*

⁴⁸ *Id.*

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C. Asteroid Resources Can Be Used to Propel Us into the Future

“Humans must colonize planets in other solar systems
 . . . or face extinction.”⁴⁹

—Stephen Hawking

The Earth is plagued with famine,⁵⁰ war,⁵¹ disease,⁵² the fear of nuclear annihilation,⁵³ and those are only some of the “local” threats we face. Other threats include, tiny meteorites that are consistently pelting the atmosphere every day.⁵⁴ Almost all of these meteorites burn up in the atmosphere, but there are occurrences of meteorites reaching the Earth’s surface. For example, on February 15, 2013, over Chelyabinsk, Russia, one meteorite passed through the atmosphere and did not burn up.⁵⁵ Luckily, the meteor exploded before hitting the ground.⁵⁶ It is estimated that the meteor had the strength of at least 500 kilotons,⁵⁷ 25 times stronger than the atomic bomb dropped on Nagasaki, Japan, in 1945.⁵⁸

⁴⁹ *Hawking: Humans Must Colonize Other Planets*, NAT’L BROAD. CORP. (Nov. 30, 2006, 7:32 PM), <http://www.nbcnews.com/id/15970232/#.UtLw3WRDUE4>.

⁵⁰ Nafeez Ahmed, ‘Whole world’ at risk from simultaneous droughts, famines, epidemics: scientists, THE GUARDIAN (Dec. 17, 2013, 9:29 AM), <http://www.theguardian.com/environment/earth-insight/2013/dec/17/planet-climate-change-risk-drought-famine-epidemic>.

⁵¹ *List of Ongoing Conflicts*, WARS IN THE WORLD (last visited Apr. 7, 2014), <http://www.warsintheworld.com/?page=static1258254223>.

⁵² *Disease Outbreak News*, WORLD HEALTH ORG., <http://www.who.int/csr/don/en/> (last visited Apr. 7, 2014); *Recent Outbreaks and Incidents*, CDC, <http://www.bt.cdc.gov/recentincidents.asp> (last visited Apr. 7, 2014).

⁵³ NUCLEAR THREAT INITIATIVE, <http://www.nti.org/> (last visited Apr. 7, 2014); Elad Benari, *Dempsey: Israel Knows We’ll Strike Iran if Need Be*, ARUTZ SHEVA (Apr. 3, 2014, 3:43 AM), <http://www.israelnationalnews.com/News/Tag.aspx/10170>; Choe Sang-Hun et al., *In Focus: North Korea’s Nuclear Threats*, N.Y. TIMES (Apr. 16, 2013, 12:00 AM), http://www.nytimes.com/interactive/2013/04/12/world/asia/north-korea-questions.html?_r=0.

⁵⁴ Lynn Carter, *How Many Meteorites Hit Earth Each Year?*, CORNELL (Feb. 2003), <http://curious.astro.cornell.edu/question.php?number=470>.

⁵⁵ Dan Verango, *Russian Meteor’s Air Blast Was One for the Record Books*, NAT’L GEOGRAPHIC (Nov. 6, 2013, 12:00 AM), <http://news.nationalgeographic.com/news/2013/11/131106-russian-meteor-chelyabinsk-airburst-500-kilotons/>.

⁵⁶ *Id.*

⁵⁷ *Id.*

⁵⁸ *Hiroshima and Nagasaki, Children of the Atomic Bomb: A UCLA Physician’s Eyewitness Report and Call to Save the World’s Children*, UNIV. CAL. L.A. (Oct. 10, 2007, 7:55 PM), <http://www.aasc.ucla.edu/cab/200708150001.html>.

These threats and dangers are very real, and the human race needs alternatives. Stephen Hawking has been quoted as saying that “. . . once we spread out into space and establish independent colonies, our future should be safe.”⁵⁹ To this end, there are a number of companies currently developing technology to live off world.

The Eros Project’s mission is to colonize a near-Earth asteroid.⁶⁰ The Eros Project is the brainchild of Orbital Development, a company dedicated to the advancement of space travel.⁶¹ During this project, Orbital Development plans to create a city on one end, a tunnel leading to the other end, and a shipyard at the end of the tunnel.⁶² The Lifeboat Foundation, a 501(c)(3),⁶³ on the other hand, is a group devoted to defending Earth and protecting its people, while also developing means to leave this planet should the need arise.⁶⁴ Lifeboat recognizes the inherent dangers of living on Earth,⁶⁵ and is preparing to move the citizens of the world off the planet if and when the worst should happen.⁶⁶

Each of these companies has something in common—all need the means and materials to make their missions a reality. It is not cheap to go to space as launching a Space Shuttle can cost the U.S. between \$1 and \$1.3 billion per launch.⁶⁷ Add to that the cost of the materials needed to build a colony and the prices will only increase.⁶⁸ Mars One, a nonprofit foundation with plans to have four colonists land on Mars in 2023, estimates that the initial launch will cost \$6 billion.⁶⁹

⁵⁹ *Hawking: Humans Must Colonize Other Planets*, *supra* note 49.

⁶⁰ *The Eros Project Overview*, THE EROS PROJECT, <http://www.erosproject.com/433erosproj.html?source=ErosProject> (last visited Mar. 9, 2014) (discussing that Orbital Development, a local firm, has initiated the Eros Project to bring the issue of property rights in space to federal courts in the United States and is currently working on developing off world travel).

⁶¹ ORBITAL DEV., <http://www.orbdev.com/> (last visited Apr. 7, 2014).

⁶² THE EROS PROJECT, *supra* note 60.

⁶³ *Join Us*, THE LIFEBOAT FOUND., <https://lifeboat.com/ex/join.us> (last visited Mar. 9, 2014).

⁶⁴ *About*, THE LIFEBOAT FOUND., <http://lifeboat.com/ex/about> (last visited Mar. 9, 2014).

⁶⁵ *Id.*; *see also* Verango, *supra* note 55.

⁶⁶ *About*, *supra* note 64.

⁶⁷ Carol Pinchefskey, *5 Horrifying Facts You Didn’t Know About the Space Shuttle*, FORBES (Apr. 18, 2012, 8:56 AM), <http://www.forbes.com/sites/carolpinchefskey/2012/04/18/5-horrifying-facts-you-didnt-know-about-the-space-shuttle/>.

⁶⁸ Rob Coppinger, *Private Mars Colony Project Undaunted by Application Shortfall*, SPACE (Aug. 28, 2013, 7:00 AM), <http://www.space.com/22556-private-mars-one-colony-applications.html>.

⁶⁹ *Id.*

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The technology created by companies like Planetary Resources and DSI could help with these colonization endeavors. Launches from Earth could be cheaper if the shuttles were able to refuel at a DSI Propellant Refinery.⁷⁰ Planetary Resources' ARKYD-300 could scout ahead for possible colonization sites on both asteroids and planets.⁷¹ Imagine a scenario where a DSI Harvester mines the minerals needed to create a colony, and then the shuttle takes those materials, along with a DSI Microgravity Foundry, to build the colony itself.⁷²

D. Understanding the Laws of Mining Uncharted Territory

Some astrophysicists and reporters have questioned whether asteroid mining would become the next Gold Rush.⁷³ If true, then asteroids, like mining settlements, must be claimed.⁷⁴ As discussed below, the U.S. Government found it difficult to regulate the mining claims of the Gold Rush.⁷⁵ Consequently, the Government often recognized miners' rights and the legislature did not make any laws disturbing the customs set forth by the mining districts.⁷⁶ To this day, these mining customs are still part of the laws of California.⁷⁷ To understand the future of mining rights in uncharted territory, it is necessary to look to the past and see how these issues were handled.

II. PROPERTY LAW DURING THE GOLD RUSH

In January of 1848, gold was discovered on a ranch in Northern California.⁷⁸ From 1849 to 1850, California's population grew by nearly 90,000 people who set

⁷⁰ See *Expeditions/Technology*, *supra* note 36.

⁷¹ PR Tech, *supra* note 29.

⁷² See *Expeditions/Technology*, *supra* note 36.

⁷³ See, e.g., Hammonds, *supra* note 40.

⁷⁴ See *History of the American West, 1860-1920: Photographs from the Collection of the Denver Public Library*, LIBRARY OF CONG. (last visited Nov. 1, 2013), <http://www.loc.gov/teachers/classroommaterials/connections/hist-am-west/history2.html> [hereinafter LOC]; Karen Clay et al., *Order Without Law: Property Rights During the California Gold Rush*, 42 EXPLORATIONS IN ECON. HISTORY 155, 158 (2005). See also WILLOUGHBY RODMAN, HISTORY OF THE BENCH AND BAR OF SOUTHERN CALIFORNIA 85 (William J. Porter ed., 1909).

⁷⁵ See Clay et al., *supra* note 74.

⁷⁶ See RODMAN, *supra* note 74, at 160.

⁷⁷ CAL. CIV. PROC. CODE § 748 (West 1872).

⁷⁸ LOC, *supra* note 74; Clay et al., *supra* note 74.

out to find gold of their own.⁷⁹ This time period is known as the California Gold Rush.⁸⁰

When Mexico signed over the California territory to the United States at the conclusion of the Mexican War in early 1848, neither the U.S. nor Mexico knew of the discovery of gold.⁸¹ By the end of the year, however, 40,000 miners heard about the discovery and made their way to California.⁸²

Prior to the annexation of the California territory, Mexican mining law, based on Spanish legal foundations, governed the mines and miners in the area.⁸³ Mexican laws had very specific regulations regarding a wide number of mining issues, including, but not limited to, territory acquisition, territory retention, trespassing, and theft.⁸⁴ At that time, the mineworkers were on the property at the approval of the Mexican government.⁸⁵ Once the United States took over the territory, however, the area came under U.S. military authority.⁸⁶ In early 1848, the Mexican laws and customs relative to the use of mines were abolished, even though no new laws were given to replace them.⁸⁷ Although the land was owned by the United States, it had not yet been opened for settlement thereby making miners technically trespassers on the land.⁸⁸ The U.S., however, decided to recognize their claims and “resolved not to interfere, but to permit all to work freely.”⁸⁹ The California government also decided to allow these self-governed workers to continue as they were.⁹⁰ Congress attempted to propose legislation over the next

⁷⁹ LOC, *supra* note 74.

⁸⁰ *Id.*

⁸¹ Clay et al., *supra* note 74, at 158.

⁸² *Id.*

⁸³ RODMAN, *supra* note 74.

⁸⁴ *Id.* at 86.

⁸⁵ *Id.* at 85–86.

⁸⁶ 1 CURTIS H. LINDLEY, A TREATISE ON THE AMERICAN LAW RELATING TO MINES AND MINERAL LANDS WITHIN THE PUBLIC STATES AND TERRITORIES AND GOVERNING THE ACQUISITION AND ENJOYMENT OF MINING RIGHTS IN LANDS OF THE PUBLIC DOMAIN § 41 (3d ed. 1914).

⁸⁷ *Id.* (paraphrasing Colonel Mason); Clay et al., *supra* note 74, at 160.

⁸⁸ RODMAN, *supra* note 74, at 87.

⁸⁹ *Id.* (quoting Colonel Mason).

⁹⁰ Clay et al., *supra* note 74, at 160.

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three presidential terms to lease or sell the land, but none of the proposals were adopted.⁹¹

This state of affairs left the question of how to regulate the worksites up to the miners themselves.⁹² There were over 140 mining districts in place by September of 1850 (when California officially achieved statehood), and a reported 500 by 1866.⁹³ While it is assumed that the lack of governmental oversight would have produced lawlessness among the districts,⁹⁴ it has been shown that many of the districts had strict rules regarding claims, size limits on claims, restrictions for claim holders, and protection for the rights of those claim holders.⁹⁵

There were many forms in which miners could protect their property rights and ensure the relative safety of their crew.⁹⁶ One example comes from the memoir of Lemuel Clarke McKeeby, a miner during the Gold Rush.⁹⁷ One day, while working a claim, McKeeby and his crew found a group of “Southerners” working McKeeby’s land.⁹⁸ When they attempted to move the men off the land, the conversation became extremely heated.⁹⁹ The Southerners vowed to return the next day “and work that claim or die.”¹⁰⁰ McKeeby, along with his Crew Captain McDowell, roused their crew and armed themselves.¹⁰¹ As McKeeby stated:

... [I]t was planned that as soon as any violence took place on either side we should instantly commence shooting and to make this shooting effective each man selected and named the man on whom he would open fire. Then we opened the cabin door and marched out single file, McDowell at the head, each man with a pick

⁹¹ *Id.*

⁹² *Id.*

⁹³ *Id.*

⁹⁴ RODMAN, *supra* note 74, at 88.

⁹⁵ Clay et al., *supra* note 74, at 163.

⁹⁶ *Id.* at 168–71.

⁹⁷ *The Memoirs of Lemuel Clarke McKeeby*, 3 CAL. HISTORICAL SOC’Y Q., No. 1, July 1924, at 126, 145, available at <http://www.jstor.org/discover/10.2307/25613616?uid=3739864&uid=2&uid=4&uid=3739256&sid=21103821309317>.

⁹⁸ *Id.*

⁹⁹ *Id.*

¹⁰⁰ *Id.*

¹⁰¹ *Id.*

or shovel over the left shoulder and the right hand on his pistol, already cocked, held in his pocket. . . . The other parties did not appear which I have always considered fortunate for us as well as for our opponents. . . .¹⁰²

While violence was considered an acceptable form of protecting one's claim, there were many miners who made their living claim-jumping.¹⁰³ Although many miners wanted to handle their property rights on their own, in the later part of 1850 and early part of 1851 a number of court cases surrounding property rights began to appear in the California court system.¹⁰⁴ Even though miners brought property rights cases to the state courts, the courts were reluctant to go against district regulations already in place.¹⁰⁵ This is evident in the 1864 case of *Morton v. Solambo Copper Mining Co.*¹⁰⁶ The court in *Morton* determined that:

[T]here is no reason why Judges or lawyers should wander, with counsel for the appellant in this case, back to the time when Abraham dug his well, or explore with them the law of agency or the Statute of Frauds in order to solve a simple question affecting a mining right, for a more convenient and equally legal solution can be found nearer home, in the "customs and usages of the bar or diggings embracing the claim" to which such right is asserted or denied.¹⁰⁷

Eventually, California courts began to look to the overarching majority of district rules and customs and began to balance those against eccentric rules that might have only been found in one or two districts.¹⁰⁸ The courts used the standard

¹⁰² *Id.* at 145–46.

¹⁰³ Clay et al., *supra* note 74, at 169 (According to BLACK'S LAW DICTIONARY 925 (9th ed. 2009)) ("Jumping a Claim" is historically defined as "The act of taking possession of public land to which another has previously acquired a claim. The first occupant has the right to the land both under squatter law and custom and under preemption laws of the United States.").

¹⁰⁴ *Id.* at 170.

¹⁰⁵ *See, e.g.*, *Morton v. Solambo Copper Mining Co.*, 26 Cal. 527 (1864).

¹⁰⁶ *Id.* at 527.

¹⁰⁷ *Id.* at 533.

¹⁰⁸ Clay et al., *supra* note 74, at 171.

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customs that were found throughout the majority of district rules to decide their opinions.¹⁰⁹

The practice of the California courts utilizing mining district laws was discussed, in a manner that neither adopted nor opposed the practice, by the United States Supreme Court, which stated “[f]or eighteen years—from 1848 to 1866—the regulations and customs of miners, as enforced . . . by the courts and sanctioned by the legislation of the State, constituted the law governing property in mines and in water on the public mineral lands.”¹¹⁰ The Supreme Court interpreted legislation passed by Congress to allow the districts to rule with their own laws and customs “so far as the same were not in conflict with the laws of the United States.”¹¹¹ Even today, in 2014, California still recognizes what could be considered to be “lawful lawlessness,” as evidenced in the state’s Code of Civil Procedure:

In actions respecting mining claims, proof must be admitted of the customs, usages, or regulations established and in force at the bar or diggings embracing such claims; and such customs, usages, or regulations, when not in conflict with the laws of this State, must govern the decision of the action.¹¹²

III. UNITED NATIONS’ LAWS ON SPACE USAGE

Once past property laws and customs regarding mining are understood, if we are to go out into space to mine and explore new opportunities, current laws regarding space travel and usage must be analyzed to find any gaps or openings where new regulations can or should be established. The United Nations Office of Outer Space Affairs (“UNOOSA”) is responsible for promoting the peaceful use of outer space.¹¹³ UNOOSA is the administrative office for the United Nations’ Committee on the Peaceful Uses of Outer Space (“COPUOS”).¹¹⁴ COPUOS was created as a part of the United Nations General Assembly Resolution 1348 (XIII) in

¹⁰⁹ *Id.* (discussing that the courts frequently kept their analysis as broad as possible because of the significant number of rules governing property rights).

¹¹⁰ *Jennison v. Kirk*, 98 U.S. 453, 458 (1878).

¹¹¹ *Id.* at 459.

¹¹² CAL. CIV. PROC. CODE § 748 (West 1872).

¹¹³ UNITED NATIONS OFFICE FOR OUTER SPACE USAGE (UNOOSA), <http://www.unoosa.org/oosa/en/OOSA/index.html> (last visited Mar. 1, 2014).

¹¹⁴ *Id.*

1958.¹¹⁵ It was founded to “avoid the extension of present national rivalries into” the new field of space travel, exploration, and usage.¹¹⁶ Among the treaties, agreements, and conventions COPUOS oversees are the Outer Space Treaty,¹¹⁷ the Liability Convention,¹¹⁸ and the Moon Agreement.¹¹⁹

A. *Outer Space Treaty*

The Outer Space Treaty (“OST”) was written as an overview of the rules regarding the usage of space, including the Moon and other celestial bodies, to ensure it is shared peacefully and for the benefit of all mankind.¹²⁰ The Outer Space Treaty has been fairly well accepted by the international community with 102 Parties and 26 Signatories, out of the total 193 Member States of the UN.¹²¹

Article II of the OST could hinder the usages of asteroids for mining.¹²² Article II 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.”¹²³ This could mean that, unless the changes advocated for in this Article are put in place, mining claims would not be recognized once companies and governments start to reach asteroids and begin mining.

The countries in which asteroid mining companies are located will be particularly interested in Article VI of the OST. Even though Article VI of the OST is of particular concern to the United States, it may soon be the province of other Western countries, Russia, and China. Article VI reads: “States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried

¹¹⁵ *Id.*

¹¹⁶ G.A. Res. 1348 (XIII), at 5, U.N. Doc. A/RES/1348 (XIII) (Dec. 13, 1958).

¹¹⁷ G.A. Res. 2222 (XXI), U.N. Doc. A/RES/1348 (XIII) (Dec. 19, 1966) [hereinafter Outer Space Treaty or OST].

¹¹⁸ G.A. Res. 2777 (XXVI), U.N. Doc. A/RES/2777 (XXVI) (Nov. 29, 1971) [hereinafter Liability Convention].

¹¹⁹ G.A. Res. 34/68, U.N. Doc. A/RES/34/68 (Dec. 5, 1979) [hereinafter Moon Agreement].

¹²⁰ OST, *supra* note 117, at art. I.

¹²¹ *Status of International Agreements relating to Activities in Outer Space*, UNOOSA, <http://www.unoosa.org/oosa/en/SpaceLaw/treatystatus/index.html> (last visited Nov 1, 2013); *Member States*, UNITED NATIONS, <http://www.un.org/en/members/about.shtml> (last visited Nov. 1, 2013).

¹²² OST, *supra* note 117, at art. II.

¹²³ *Id.*

on by governmental agencies or by non-governmental entities. . . .”¹²⁴ It is important to note that once the technology to mine asteroids becomes more widely available and economically feasible, federal governments will probably not want to be held liable for private mining companies’ accidents or obligations simply because the private mining company is domiciled within that government’s jurisdiction.

B. Liability Convention

Article III of the 1971 Liability Convention attempts to reverse the severity of the liability caused by Article VI of the Outer Space Treaty, by stating that a launching State is liable to another State for the damage or harm it has caused “only if the damage is due to its fault or the fault of the persons for whom it is liable.”¹²⁵ This can be interpreted to mean if the injured party was negligent, the launching State may avoid liability.

Though the Liability Convention fully addresses a number of liability issues related to space activities, one area the Liability Convention does not discuss is liability for the damage caused to a celestial body. Just as the United States has had to establish liability measures in place to protect and conserve its National Parks, liability measures may need to be established to limit potential harm to celestial bodies.¹²⁶

C. Moon Agreement

Even though the Moon Agreement has not passed, and therefore is not a binding treaty, the language in the Agreement provides an example of how future legislation should, and should not, be worded.¹²⁷ When reading the Moon Agreement, there is nothing barring the free usage and claiming of asteroids (which are currently considered celestial bodies) for their resources until Article 11.¹²⁸ Article 11, Paragraph 3, however, states:

Neither the surface nor the subsurface of the Moon [or any other celestial bodies], nor any part thereof or

¹²⁴ *Id.* at art. VI.

¹²⁵ Liability Convention, *supra* note 118, at art. III.

¹²⁶ *Cf.* 16 U.S.C. § 19jj-1 (2012) (providing liability schemes for the United States’ protection of national parks).

¹²⁷ See David Johnson, Note, *Limits on the Giant Leap for Mankind: Legal Ambiguities of Extraterrestrial Resource Extraction*, 26 AM. U. INT’L L. REV. 1477 (2011).

¹²⁸ Moon Agreement, *supra* note 119, at arts. 1–10.

natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or nongovernmental entity or of any natural person. The placement of personnel, space vehicles, equipment, facilities, stations and installations on or below the surface of the Moon [or any other celestial bodies], including structures connected with its surface or subsurface, shall not create a right of ownership over the surface or the subsurface of the Moon, [or any other celestial bodies,] or any areas thereof.¹²⁹

Paragraph 3 contradicts the goals of asteroid mining companies.¹³⁰ Paragraph 6 continues this concept by stating that States must inform the United Nations, the public, and the international scientific community of the discovery of any natural resources.¹³¹ Further, Paragraph 7 contends that among the purposes of the Agreement, an international regime be set up to promote:

- (a) The orderly and safe development of the natural resources of the Moon;
- (b) The rational management of those resources;
- (c) The expansion of opportunities in the use of those resources;
- (d) An equitable sharing by all States Parties in the benefits derived from those resources, whereby the interests and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the Moon, shall be given special consideration.¹³²

The only positive quality, in the eyes of mining companies, is that the Moon Treaty is not binding on the countries that have not signed it—which includes the United

¹²⁹ *Id.* at art. 11, para. 3.

¹³⁰ *Id.*

¹³¹ *Id.* at para. 6.

¹³² *Id.* at para. 7.

States.¹³³ In fact, some scholars have even considered the Moon Treaty to be a complete failure.¹³⁴

One of the primary downfalls of the Moon Treaty is the “Common Heritage of Mankind” doctrine (“CHM”).¹³⁵ The Moon Treaty’s use of the term “common heritage” in contrast to the Outer Space Treaty’s use of the phrase “province of all mankind,” has caused some confusion.¹³⁶ The term “province,” contained in the Outer Space Treaty, is believed to describe *res communis* (“Public Domain”).¹³⁷ The Moon Treaty’s change from “province” to “common heritage” has caused developing nations to proclaim that the phrase can now be defined as either *res communis humanitatus* (translated as “Matter of Common Humanity”) or *res publicae* (“Common Property”).¹³⁸

Developed countries will look to the Law of the Sea to show the failure of CHM, and, by extension, the Moon Agreement.¹³⁹ The Law of the Sea, which is the only other UN treaty that uses CHM, was negotiated at the same time as the Moon Treaty, and both used similar language.¹⁴⁰ The mining efforts both at sea and in space are expensive—and CHM seems to require the sharing of all property (real and personal) with developing nations.¹⁴¹ Why would investors and privately held companies put their money into a venture that would not allow them to profit? This is one of the many reasons why the U.S. decided not to sign both the original 1982 Law of the Sea and the revised 1994 Law of the Sea.¹⁴²

Most importantly, it should be noted that a State who is not party to a treaty is only held responsible for the provisions of the treaty “if the provisions have

¹³³ Johnson, *supra* note 127, at 1497 & n.111; *see also* Vienna Convention on the Law of Treaties art. 34, May 23, 1969, 1155 U.N.T.S. 331 [hereinafter Vienna Convention].

¹³⁴ Glenn Harlan Reynolds, *Who Has the Right to Mine an Asteroid?*, POPULAR MECHANICS (Mar. 26, 2013, 6:30 AM), <http://www.popularmechanics.com/science/space/news/who-has-the-right-to-mine-an-asteroid-15265082>.

¹³⁵ Brian M. Hoffstadt, *Moving the Heavens: Lunar Mining and the “Common Heritage of Mankind” in the Moon Doctrine*, 42 UCLA L. REV. 575, 587 (1994).

¹³⁶ OST, *supra* note 117, at art. 1.

¹³⁷ Hoffstadt, *supra* note 135; *see also* CARL Q. CHRISTOL, THE MODERN INTERNATIONAL LAW OF OUTER SPACE 316 (1982).

¹³⁸ Hoffstadt, *supra* note 135, at 588.

¹³⁹ *See id.* at 593.

¹⁴⁰ *Id.* at 593–94.

¹⁴¹ *Id.* at 597.

¹⁴² *Id.* at 602–03.

become customary international law.”¹⁴³ Currently, in 2014, there are no customary international laws regarding space mining. Therefore, neither the U.S., nor any other space-faring nation, can be bound by the customs imposed by the Moon Treaty, as the nations that did sign on are in no position to create extraterrestrial customs.

Ultimately, because the OST, as it is currently phrased, will not allow for companies to claim rights for mining asteroids and no other treaties adequately cover mining operations on asteroids, there must be a change in the regulations to allow for mining asteroids for needed minerals to be a successful venture.

IV. PROPOSED LEGAL FRAMEWORK FOR THE USAGE OF ASTEROIDS FOR MINING

A. *The Need to Change UN Regulations*

In 1980, Dennis Hope staked a claim on lunar property and established the Lunar Embassy in order to sell plots of land on the Moon.¹⁴⁴ It was Lunar Embassy’s belief, and still is, that because the United Nations, the United States Government, and the Russian government did nothing to contest the claim of the lunar property, that Hope was able to copyright his claim and sell deeds to the land.¹⁴⁵ Hope claimed the OST applied only to appropriations by national governments and not the private citizens living in those countries.¹⁴⁶ When making those claims, however, he neglected to realize that four years prior, in 1976; the Second Circuit upheld a UN regulation as being binding on both the member states and its inhabitants.¹⁴⁷

Twenty-one years after Dennis Hope staked his first claim in space, NASA’s Near Earth Asteroid Rendezvous (“NEAR”)-Shoemaker probe landed on an asteroid designated 433 Eros.¹⁴⁸ Upon its landing, NASA was contacted by Gregory Nemitz who claimed NASA had trespassed on his property.¹⁴⁹ Nemitz

¹⁴³ Johnson, *supra* note 127, at 1497.

¹⁴⁴ MATTHEW J. KLEIMAN, THE LITTLE BOOK OF SPACE LAW 163–64 (2013); *About Lunar Land*, LUNARLAND, <http://www.lunarland.com/about-us.html> (last visited Feb. 23, 2014).

¹⁴⁵ See *About Lunar Land*, *supra* note 144.

¹⁴⁶ KLEIMAN, *supra* note 144, at 163–64.

¹⁴⁷ See *Filartiga v. Pena-Irala*, 630 F.2d 876 (2d Cir. 1980) (explained in more depth in subsection B of Part IV).

¹⁴⁸ KLEIMAN, *supra* note 144, at 164; *The Eros Project*, *supra* note 60.

¹⁴⁹ *Id.*

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maintained that “his alleged property interest in the asteroid . . . is based on his registration on the Archimedes Institute¹⁵⁰ website and his filing of a Uniform Commercial Code security interest in California as both debtor and creditor with the asteroid identified as the collateral.”¹⁵¹ When NASA and the U.S. State Department informed him that his claims were invalid, he filed a lawsuit in federal court to obtain recognition of his claims.¹⁵² Not only did the court dismiss the case, but the opinion also cited both the Moon Agreement and the OST as proof that Nemitz was unable to claim private property in space.¹⁵³ Nemitz attempted to appeal the District Court’s decision, but the Ninth Circuit affirmed the lower court’s ruling.¹⁵⁴

As long as the UN’s treaties outlaw property rights on any celestial body, including asteroids, there will not be any opportunity for ownership in space.¹⁵⁵ The lawlessness that threatened the Gold Rush districts could therefore be duplicated in space.¹⁵⁶ Only by changing the language of the treaties, or adopting a new regulation that defines asteroids as chattel or personal property instead of celestial bodies, can the hope of asteroid mining become a true reality without also having the “lawful lawlessness”¹⁵⁷ that accompanied the 19th Century Gold Rush follow the next generation of miners to their destinations.¹⁵⁸

B. The UN Needs a New Treaty

Given the inadequacies of the present treaties and their general disregard in the international communities, the UN should consider developing a new treaty. By facilitating a new treaty, the UN can create a legally binding baseline on property

¹⁵⁰ *Nemitz v. United States*, No. CV-N0300599-HDM (RAM), 2004 WL 3167042 at *1 (D. Nev. Apr. 26, 2004) (explains that the Archimedes Institute creates a registry of people who “claim” property in space, but it does not, and cannot, confer actual property rights—which, as the court explains, the Archimedes Institute says so directly on their website).

¹⁵¹ *Id.*

¹⁵² *See id.*

¹⁵³ *Id.* at *2.

¹⁵⁴ *Nemitz v. NASA*, 126 F. App’x 343 (9th Cir. 2005). It should be noted that even though the Court in *Nemitz* cited to the OST and the Moon Agreement as support for its finding these agreements are not binding on U.S. citizens and U.S. companies.

¹⁵⁵ *See generally* OST, *supra* note 117, at art. II.

¹⁵⁶ *See supra* Part II.

¹⁵⁷ The author uses “lawful lawlessness” throughout the paper to refer to the general circumstances of circumstances not having sufficient controlling laws and resulting in general lawlessness. The Gold Rush and the nature of property ownership is an explicit example of the nature of having “lawful lawlessness.”

¹⁵⁸ *See infra* §§ (V)(C)–(D).

rights in space for Member States to follow.¹⁵⁹ It can be deduced that a topic such as asteroid mining would be unregulated at its infancy. As seen in the 1840's and 1850's during the Gold Rush, local laws can develop unaccompanied fairly quickly¹⁶⁰ and can become difficult to regulate once government attempts to step in.¹⁶¹

Although UN General Assembly Resolutions are not legally binding,¹⁶² there is precedent to give weight to the UN's Resolutions.¹⁶³ The *Filartiga* court gave special credence to the UN Resolution, completely rejecting an earlier opinion, stating:

We must conclude that the dictum in *Dreyfus v. von Flinck*,¹⁶⁴ to the effect that “violations of international law do not occur when the aggrieved parties are nationals of the acting state,” is clearly out of tune with the current usage and practice of international law. The treaties and accords cited above, as well as the express foreign policy of our own government, all make it clear that international law confers fundamental rights upon all people vis-à-vis their own governments.

In *United States v. Bond*, which is pending before the Supreme Court, the Supreme Court will be analyzing the issue of whether treaty acts will be binding law on U.S. citizens and corporations.¹⁶⁵ The main issue in *Bond* is whether or not “the Tenth Amendment¹⁶⁶ has [any] bearing on Congress's ability to legislate in furtherance of the Treaty Power in Article II, § 2 of the Constitution.”¹⁶⁷ ¹⁶⁸ If the

¹⁵⁹ See generally United Nations Cyberschoolbus, *The General Assembly*, UNITED NATIONS, <http://www.un.org/cyberschoolbus/untour/subgen.htm> (last visited Mar. 1, 2014).

¹⁶⁰ See Clay et al., *supra* note 74, at 160.

¹⁶¹ *Id.* at 171.

¹⁶² United Nations Cyberschoolbus, *supra* note 159.

¹⁶³ See *Pena-Irala*, 630 F.2d at 882.

¹⁶⁴ *Dreyfus v. von Flinck*, 534 F.2d 24, 31 (2d Cir. 1976).

¹⁶⁵ *United States v. Bond*, 681 F.3d 149 (3d Cir. 2012), *cert. granted*, 133 S. Ct. 978 (2013).

¹⁶⁶ U.S. CONST. amend. X (“The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.”).

¹⁶⁷ U.S. CONST. art. II, § 2 (“[The President] shall have Power, by and with the Advice and Consent of the Senate, to make Treaties, provided two thirds of the Senators present concur. . . .”).

¹⁶⁸ *Bond*, 681 F.3d at 151.

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Supreme Court affirms *Bond*, the case will serve as precedent over treaties' effect on citizens such that the UN's current treaties on space property ownership will govern the claiming and use of property in space.

C. Asteroids as Personal Property, Not Real Property

Some legal commentators have questioned whether or not asteroids should be considered "celestial bodies," as they are currently referred to in the United Nations' Outer Space Usage Treaties, or whether they should be seen as chattel because they are moveable property.¹⁶⁹ While it is not feasibly possible to move a planet or a moon, asteroids can be captured, slowed down, and relocated.¹⁷⁰ This reclassification could be the change that governments and companies need to allow for the claiming of rights on asteroids.

Boundaries represent another issue related to the distinction between real property and chattel.¹⁷¹ The Earth, Mars, the Moon, other planets, and planetoids move in an orbit around their respective bodies (e.g., the Moon orbits the Earth, the Earth orbits the Sun, etc.). The placement and orbits of planets and planetoids are highly predicable and relatively static.¹⁷² Asteroids, however, are much more difficult to predict, and can have dynamic orbit patterns.¹⁷³ Asteroids are irregularly shaped and occasionally collide with each other.¹⁷⁴ Because specific boundaries cannot be set for asteroids, it can be difficult to claim that asteroids are real property. By their very essence, an observant country with a telescope could attempt to claim an asteroid as their property, but, if not watched closely, it could collide with another and break apart. In that case, it would be difficult to claim the resulting pieces as their original property.

¹⁶⁹ Andrew Tingkang, Note, *These Aren't the Asteroids You're Looking for: Classifying Asteroids in Space as Chattels, Not Land*, 35 SEATTLE U. L. REV. 559, 580 (2012).

¹⁷⁰ *Id.* at 581.

¹⁷¹ *Id.*

¹⁷² *Bode's Law*, CORNELL, http://www.astro.cornell.edu/academics/courses/astro201/bodes_law.htm (last visited Nov 1, 2013) (stating that the placement of the planets' axis can be found through the formula $a=4+n$, with $n=0, 3, 6, 12, 24 \dots$ where each value of $n>3$ is double the amount of the value preceding it. To convert to astronomical units, divide by 10 so that the final equation is $a = 0.4 + 0.3 \times 2^n$ and, for $m = -\infty, 0, 1, 2, \dots$).

¹⁷³ *Asteroids: Structure and Composition of Asteroids*, EUROPEAN SPACE AGENCY, http://www.esa.int/Our_Activities/Space_Science/Asteroids_Structure_and_composition_of_asteroids (last visited Nov. 1, 2013).

¹⁷⁴ *Id.*

D. *Proposal of New Legislation*

The theory of classifying asteroids as chattel,¹⁷⁵ in combination with the “lawful lawlessness” of the California Gold Rush districts,¹⁷⁶ should be the next step towards the usage of outer space. Work has already begun in the United States on new laws for the usage of interplanetary property.¹⁷⁷ When the final regulation is drafted for the exploration and mining of asteroids, there are a number of provisions that should be included in the treaty. A proposed treaty is laid out below, both with the proposed language of the treaty itself and explanations of the articles.¹⁷⁸

1. Introduction

Treaty on Legal Principles Governing the Activities of States In the Use of Asteroids for Exploration, Research, and Mining

The States Parties to this Treaty:

Noting the achievements of States in the exploration and use of the Asteroids,

Recognizing that Asteroids, as natural satellites of the Sun, have an important role to play in the exploration of, and resource gathering in, outer space,

Desiring to prevent Asteroids from becoming areas of international conflict,

Convinced that a Treaty on Legal Principles Governing the Activities of States in the Use of Asteroids for Exploration, Research, and Mining, will further the purposes and principles of the Charter of the United Nations,

Have agreed on the following:

¹⁷⁵ Tingkang, *supra* note 169, at 563.

¹⁷⁶ RODMAN, *supra* note 74, at 88.

¹⁷⁷ Wayne White, President and CEO, SpaceBooster LLC, Presentation about Commercial Space Activities and the Law at the Southern Methodist University Lunar Commerce Roundtable (June 24, 2005) (presentation available at <http://www.docstoc.com/docs/23738579/PPT-White>); Wayne White, *Proposal for a Multilateral Treaty Regarding Jurisdiction and Real Property Rights in Outer Space*, SPACE FUTURE (2001), http://www.spacefuture.com/archive/proposal_for_a_multilateral_treaty_regarding_jurisdiction_and_real_property_rights_in_outer_space.shtml.

¹⁷⁸ The Author has created this treaty provided in this Article. The proposed treaty contains language that has been contained directly in other UNOOSA treaties along with language developed specifically by the Author to address the concerns addressed throughout this paper.

2. Article 1

1. *The provisions of this Agreement shall relate to Asteroids in the solar system, until such time that travel outside the Solar System shall be feasible, at which time asteroids found outside of the Solar System shall be included in this Agreement.*
2. *For the purposes of this Agreement, reference to Asteroids shall include all those located within the designated “Asteroid Belt,” as well as those found elsewhere in the solar system.*
3. *Asteroids will be deemed to be separate from Celestial Bodies, the usage of which is described in the Outer Space Treaty. Instead, Asteroids will be considered to be chattel—moveable personal property that can be claimed by a single owner and held against other parties.*

In this proposed treaty, asteroids are considered chattel instead of celestial bodies because they are moveable objects that can be claimed by a single owner and held against other parties. Removing the “celestial body” classification, described in the OST¹⁷⁹ and the Moon Agreement,¹⁸⁰ allows asteroids to become claimable property, studied in privacy and without fear of trespass or theft, and mined by the company or government that staked its claim first.

3. Articles 2-3

Article 2

All activities on Asteroids, including their exploration and use, shall be carried out in accordance with international law, in particular the Charter of the United Nations, and taking into account the Declaration on Principles of International Law concerning Friendly Relations and Co-operation among States in accordance with the Charter of the United Nations, adopted by the General Assembly on 24 October 1970, in the interest of maintaining international peace and security and promoting international co-operation and mutual understanding, and with due regard to

¹⁷⁹ OST, *supra* note 117.

¹⁸⁰ Moon Agreement, *supra* note 119.

the corresponding interests of all other States Parties.

Article 3

1. *Asteroids shall be used by all States Parties exclusively for peaceful purposes.*
2. *Any threat or use of force or any other hostile act or threat of hostile act on any asteroid is prohibited. It is likewise prohibited to use an asteroid in order to commit any such act or to engage in any such threat in relation to the earth, the moon, another asteroid, spacecraft, the personnel of spacecraft or man-made space objects.*
3. *States Parties shall not place in orbit around or other trajectory to or around an asteroid objects carrying nuclear weapons or any other kinds of weapons of mass destruction or place or use such weapons on or in the moon.*
4. *The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on an asteroid shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration, research, and/or mining of an asteroid shall also not be prohibited.*

The proposed treaty includes provisions pulled directly from the language of the Moon Agreement.¹⁸¹ By including this language, companies and countries can be assured the world will stand behind them if another entity were to infringe on their rights once an asteroid is claimed.

4. Article 4

1. *States or Non-Government Entities, whomever is making the claim, must be present on site to make their claim.*
 - a. *“Present” is defined as having a physical presence on site, either through manned or*

¹⁸¹ *Id.*

unmanned spacecraft, when the claim is made.

i. As an example, a Party cannot stake a claim on an Asteroid while on Earth and maintain its superiority on the claim before arriving on site.

2. Parties can and should, but are not required to, alert their home State of which Asteroid they are attempting to reach for claiming purposes.

a. If alerting the home State, the Alerting Party shall submit a plan to the home State showing how they intend to claim the asteroid within not more than three (3) months.

b. While an alert is not necessary, if a Party has alerted their home State of such intention, the State shall inform the Secretary-General of the United Nations in order to ensure the Party's attempt has not been preempted and to alert other parties of the Attempting Party's intent to claim that asteroid.

ii. An alert shall have the same effect as a claim provided that the Alerting Party does not deviate from the claiming plan given to their home State.

c. If a Party reaches an asteroid that was claimed prior to the new Party's arrival, the new Party's claim is invalid, even if the attempt began before the claimed Party's claim was registered.

3. Once a claim is lawfully made, work must begin on the site (in the form of either mining, research, or moving the asteroid into a location where mining or research can occur) within sixty (60) days of the claim.

a. After sixty (60) days has elapsed without any work being done on the asteroid, the claiming Party loses their claim.

b. With respect to paragraph (a) above, any Party who loses their claim may recertify the claim by beginning work on the asteroid before any other Party can claim the asteroid for themselves.

4. *Claims made by States must be registered with the Secretary-General of the United Nations on a biannual basis. Claims made by Non-Government Entities must register their claims with their respective home State to secure their claim.*

a. *Non-Government Entity claims registered to a State must be registered by the State with the Secretary-General of the United Nations on a biannual basis, at minimum.*

5. *Claims made by Non-Government Entities shall be valid for a period of not less than five (5) years.*

One of the problems with allowing companies and countries to claim property that is so far away¹⁸² is that they could claim property that may take three to six months, or more, to reach.¹⁸³ Therefore, Parties can register their attempts (to ensure that no other party has already claimed the asteroid) and must be present, either with a manned or unmanned spacecraft. After the claim is made, the claiming Party has to begin work on the site within sixty days or lose its claim to the asteroid.

5. Article 5

1. *In exploring and using an asteroid, States Parties shall take measures to prevent the disruption of the existing balance of its environment, whether by introducing adverse changes in that environment, by its harmful contamination through the introduction of extra-environmental matter or otherwise. States Parties shall also take measures to avoid harmfully affecting the environment of the Earth through the introduction of extraterrestrial matter or otherwise.*

2. *States Parties shall inform the Secretary-General of the United Nations of the measures being adopted by them in accordance with Paragraph 1 of this Article and shall also, to the maximum extent feasible, notify him in advance of all placements by them of radioactive*

¹⁸² Near Earth Asteroids are those classified as those with orbits less than 1.3 times the distance of the Earth to the Sun but greater than 98.3% of the same distance. *Frequently Asked Questions*, NEAR EARTH OBJECT PROGRAM (Feb. 24, 2014, 12:00 AM), <http://neo.jpl.nasa.gov/faq/> (see the question “*What Are Atiras, Atens, Apollos and Amors?*”).

¹⁸³ Traci Watson, *Obama plan to land on asteroid may be unrealistic for 2025*, USATODAY (June 21, 2010, 10:39 AM), http://usatoday30.usatoday.com/tech/science/space/2010-06-20-asteroid-obama-nasa-plan_N.htm?csp=hf.

materials on the asteroids and of the purposes of such placements.

3. *States Parties shall report to other States Parties and to the Secretary-General concerning asteroids that have special scientific interest in order that, without prejudice to the rights of other States Parties, consideration may be given to the designation of such areas as international scientific preserves for which special protective arrangements are to be agreed upon in consultation with the competent bodies of the United Nations.*

Pulling directly from Article 7 of the Moon Treaty,¹⁸⁴ this provision maintains the natural balance of order on the asteroid, as well as keeps the Earth safe from harmful extraterrestrial materials.

6. Article 6

1. *States Parties may pursue their activities in the exploration and use of an asteroid anywhere on or below its surface, subject to the provisions of this Agreement.*

2. *For these purposes States Parties may, in particular:*

(a) *Land their space objects on an asteroid and launch them again from that asteroid;*

(b) *Place their personnel, space vehicles, equipment, facilities, stations and installations anywhere on or below the surface of an asteroid.*

Personnel, space vehicles, equipment, facilities, stations and installations may move or be moved freely over or below the surface of an asteroid.

3. *Activities of States Parties in accordance with Paragraphs 1 and 2 of this Article shall not interfere with the claims of other States Parties on an asteroid. Where such interference may occur, the States Parties concerned shall undertake consultations in accordance with article 11 of this Agreement.*

¹⁸⁴ Moon Agreement, *supra* note 119.

This provision maintains a Party's right to use its asteroid as the Party sees fit,¹⁸⁵ and allows it to bring its vehicles, operators, and equipment for use on the asteroid.

7. Articles 7-11

Article 7

- 1. States Parties shall adopt all practicable measures to safeguard the life and health of persons on an asteroid. For this purpose they shall regard any person on an asteroid as an astronaut within the meaning of Article V of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies and as part of the personnel of a spacecraft within the meaning of the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space.*
- 2. States Parties shall offer shelter in their stations, installations, vehicles and other facilities to persons in distress on an asteroid.*

Article 8

- 1. States Parties shall retain jurisdiction and control over their personnel, vehicles, equipment, facilities, stations and installations on their claimed asteroid. The ownership of space vehicles, equipment, facilities, stations and installations shall not be affected by their presence on the asteroid.*
- 2. Vehicles, installations and equipment or their component parts found in places other than their intended location shall be dealt with in accordance with Article 5 of the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space.*
- 3. In the event of an emergency involving a threat to human life, States Parties may use the equipment, vehicles, installations, facilities or supplies of other States Parties on an asteroid.*

¹⁸⁵ While this provision claims that the Party may use the asteroid as they see fit, their activity may not conflict with Article 5 above it.

Prompt notification of such use shall be made to the Secretary-General of the United Nations or the State Party concerned.

Article 9

A State Party which learns of the crash landing, forced landing or other unintended landing on the moon of a space object, or its component parts, that were not launched by it, shall promptly inform the launching State Party and the Secretary-General of the United Nations.

Article 10

1. *States Parties to this Agreement shall bear international responsibility for national activities on the asteroids, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in this Agreement. States Parties shall ensure that non-governmental entities under their jurisdiction shall engage in activities on any asteroids only under the authority and continuing supervision of the appropriate State Party.*

2. *States Parties recognize that detailed arrangements concerning liability for damage caused on an asteroid, in addition to the provisions of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies and the Convention on International Liability for Damage Caused by Space Objects, may become necessary as a result of more extensive activities on an asteroid. Any such arrangements shall be elaborated in accordance with the procedure provided for in Article 14 of this Agreement.*

Article 11

1. *A State Party which has reason to believe that another State Party is not fulfilling the obligations incumbent upon it pursuant to this Agreement or that another State Party is interfering with the rights which the former State has under this Agreement may request consultations with that State Party. A State Party receiving such a request shall enter into such*

consultations without delay. Any other State Party which requests to do so shall be entitled to take part in the consultations.

Each State Party participating in such consultations shall seek a mutually acceptable resolution of any controversy and shall bear in mind the rights and interests of all States Parties. The Secretary-General of the United Nations shall be informed of the results of the consultations and shall transmit the information received to all States Parties concerned.

2. *If the consultations do not lead to a mutually acceptable settlement which has due regard for the rights and interests of all States Parties, the parties concerned shall take all measures to settle the dispute by other peaceful means of their choice appropriate to the circumstances and the nature of the dispute. If difficulties arise in connection with the opening of consultations or if consultations do not lead to a mutually acceptable settlement, any State Party may seek the assistance of the Secretary-General, without seeking the consent of any other State Party concerned, in order to resolve the controversy. A State Party which does not maintain diplomatic relations with another State Party concerned shall participate in such consultations, at its choice, either itself or through another State Party or the Secretary-General as intermediary.*

Articles 7-11 of this proposed treaty pull their language directly from Articles 10 and Articles 12-15 of the Moon Treaty, respectively.¹⁸⁶ These articles discuss safety measures for space travelers and workers, Party liabilities, responsibilities, the need to help one another when a Party is in trouble or crashes, and the requirement for peaceful conflict resolution.¹⁸⁷

¹⁸⁶ Moon Agreement, *supra* note 119 (except that references to the Moon or other “celestial bodies” have been altered to refer to Asteroids).

¹⁸⁷ *Id.*

8. Article 12

1. *References in this Agreement to States shall be deemed to apply to any international intergovernmental organization which conducts space activities if the organization declares its acceptance of the rights and obligations provided for in this Agreement and if a majority of the States members of the organization are States Parties to this Agreement and to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies. States members of any such organization which are States Parties to this Agreement shall take all appropriate steps to ensure that the organization makes a declaration in accordance with the foregoing.*

2. *Any non-governmental company or agency shall be deemed a representative of the State in which it is incorporated or resides. While the company or agency shall be held to the laws of its home State, the State will ultimately be responsible for any negative actions of the company.*

Article 12 of this treaty expands the language of Article 16 of the Moon Agreement¹⁸⁸ to include the responsibilities and status of non-governmental companies or agencies. Through this article, non-governmental entities are to be considered representatives of their home State and, as such, are responsible to their State for any damages they incur while in space.

9. Articles 13-17

Article 13

Any State Party to this Agreement may propose amendments to the Agreement. Amendments shall enter into force for each State Party to the Agreement accepting the amendments upon their acceptance by a majority of the States Parties to the Agreement and thereafter for each remaining State Party to the Agreement on the date of acceptance by it.

¹⁸⁸ *Id.*

Article 14

Ten years after the entry into force of this Agreement, the question of the review of the Agreement shall be included in the provisional agenda of the General Assembly of the United Nations in order to consider, in the light of past application of the Agreement, whether it requires revision. However, at any time after the Agreement has been in force for five years, the Secretary-General of the United Nations, as depository, shall, at the request of one third of the States Parties to the Agreement and with the concurrence of the majority of the States Parties, convene a conference of the States Parties to review this Agreement.

Article 15

- 1. This Agreement shall be open for signature by all States at United Nations Headquarters in New York.*
- 2. This Agreement shall be subject to ratification by signatory States. Any State that does not sign this Agreement before its entry into force in accordance with Paragraph 3 of this Article may accede to it at any time. Instruments of ratification or accession shall be deposited with the Secretary-General of the United Nations.*
- 3. This Agreement shall enter into force on the thirtieth (30th) day following the date of deposit of the fifth (5th) instrument of ratification.*
- 4. For each State depositing its instrument of ratification or accession after the entry into force of this Agreement, it shall enter into force on the thirtieth (30th) day following the date of deposit of any such instrument.*
- 5. The Secretary-General shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or accession to this Agreement, the date of its entry into force and other notices.*

Article 16

Any State Party to this Agreement may give notice of its withdrawal from the Agreement one year after its entry into force by written notification to the Secretary-General of the United Nations. Such withdrawal shall take effect one (1) year from the date of receipt of this notification.

Article 17

The original of this Agreement, of which the Arabic, Chinese, English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Secretary-General of the United Nations, who shall send certified copies thereof to all signatory and acceding States.

These final five articles, end all of the treaties on file with the UNOOSA.¹⁸⁹ They have been left, unaltered, as they were written in the Moon Agreement.¹⁹⁰

V. CONCLUSION

As resources on Earth dwindle, the need for mining asteroids will become increasingly necessary.¹⁹¹ Millions of dollars invested into these mining endeavors could become trillions of dollars worth of precious metals, fuel sources, and energy.¹⁹² World governments are faced with two options in charting the future: allow the asteroid mining race to become the next Gold Rush, complete with its own set of laws and lack of regulation by the United Nations; or put plans in place today to be better prepared for future needs.

Before companies like Planetary Resources and Deep Space Initiatives reach into the cosmos a significant amount of research and development will still be needed. When they are ready to venture into space, in the absence of clear regulations and oversight, these modern miners will begin their journey into the next Gold Rush. Like the miners of 1848, these space cowboys will rush in search of the next big “score” while the governments of the world try to scramble to piece together regulations that might ultimately, if the past is any indicator, have to

¹⁸⁹ See OST, *supra* note 117; see also Liability Convention, *supra* note 118; see also Moon Agreement, *supra* note 119.

¹⁹⁰ Moon Agreement, *supra* note 119.

¹⁹¹ BBC, *supra* note 9.

¹⁹² See *supra* notes 21–26 and accompanying text.

conform to the customs already put in place by the mining companies themselves.¹⁹³ If legislation is not in place before the miners start their work, there is great potential for the lawlessness that could have occurred in the 1840's and 1850's.¹⁹⁴ The danger and potential for harm has increased exponentially since the days of jumping from claim to claim.¹⁹⁵

Once international regulations are put into place, work can begin within the individual countries to create legislation for their citizens. Some have begun working towards preparing the United States for this new industry,¹⁹⁶ but the international community must be united on the policies and customs that will allow for peaceful and safe operations. Only by planning ahead and preparing for the next chapter in technology and mining laws can we truly hope to be equipped to explore the Final Frontier.

¹⁹³ See OST, *supra* note 117, at art. II (Current regulations do not allow the ownership of property in space, which needs to be changed to allow companies to stake claims.); *see also supra* notes 21–26 (There are potentially quintillions (a million-trillion) of dollars at stake in the asteroid mining industry. There is too much at risk to allow mining companies to create the laws and customs that the world must conform to.).

¹⁹⁴ RODMAN, *supra* note 74, at 88.

¹⁹⁵ *The Risks and Dangers of Space Exploration*, EDQUEST SCIENCE, <http://edquestscience.com/pdf/ES-SE-4notes.pdf> (last visited Nov. 1, 2013).

¹⁹⁶ 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 (2013).

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