

**Written Testimony of**  
**Joanne Irene Gabrynowicz**  
**Before the**  
**Committee on Science, Space and Technology United States House of**  
**Representatives**  
**September 10, 2014**

Chairman Smith, Ranking Member Johnson, Members of the Committee: Thank you for giving me the opportunity to present my view on H.R. 5063, the American Space Technology for Exploring Resource Opportunities in (ASTEROIDS) Deep Space Act. You have provided four questions on specific issues, and I am delighted to respond.

- I. *“Provide feedback on H.R. 5063, the American Space Technology for Exploring Resource Opportunities in (ASTEROIDS) Deep Space Act.”<sup>1</sup>*

All of this written testimony is my “feedback” on H.R. 5063. Under this particular question, I will address one issue.

The issue addressed under this section is the need to more clearly identify which Federal agencies will be relevant to private sector asteroid resource exploration and utilization and for what each agency shall be expressly responsible. As written, the only standard used in H.R. 5063 to determine agency jurisdiction is “appropriateness.”<sup>2</sup> It does not designate who determines which Federal agency is an “appropriate” agency and for what purpose. Jurisdictional disagreements are the reality of everyday Federal administration and politics. Resolution can be difficult and take a long time.

In general, Federal agencies can use the authority granted to them in Executive Orders and their organic statutes to reach agreements that define the scope and implementation of their collaborative activities. These can take the form of interagency agreements, memoranda of understanding, etc. However, to be effective and to have the authority necessary to carry out an agreement’s terms, the agreement ought to be entered into at a high level. To occur at a high level, there must be practical and political incentives strong enough to bring the agencies to discussions. An example of this is the *2012 Memorandum of Understanding Between the Federal Aviation Administration (FAA) and the National Aeronautics and Space Administration (NASA) for Achievement of*

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<sup>1</sup> Letter from Rep. Steven Palazzo, Chair, Space Subcommittee of the U.S. House of Representatives Committee on Science, Space and Technology (August 22, 2014) to Joanne Irene Gabrynowicz, Prof. Emerita, on file with author.

<sup>2</sup> H.R. 5063, 113<sup>th</sup> Cong., § 51301, “The President, through the Administration, the Federal Aviation Administration, and other appropriate Federal agencies,…”

*Mutual Goals in Human Space Transportation.*<sup>3</sup> The Shuttle was retired and responsibility for transportation to the *International Space Station (ISS)* was shifting from the government to the private sector. The FAA had the authority to regulate; NASA had the human spaceflight expertise; the Nation needed transportation to the *ISS*. An agreement was reached at the level of associate administrator. It is unclear whether asteroid resource exploration and utilization will command this kind of attention when needed.

Private sector asteroid resource exploration and utilization is an unprecedented enterprise. It will raise novel issues requiring a wide range of entrepreneurial, technical, economic, legal, policy, space situational awareness, and diplomatic expertise. No one agency houses all that will be needed. Absent a clearer statement of which agency is responsible for what kind of regulation, an unpredictable over-regulated environment that relies on *ad hoc* dispute resolution could be created. It will produce unnecessary risk that is counterproductive to industry.

An interagency structure analogous to the ones that formally govern the Global Positioning System (GPS)<sup>4</sup> and commercial remote sensing<sup>5</sup> ought to be considered. These feature a lead agency that works in coordination with other agencies that each houses a particular expertise relevant to some specific aspect of the system and its operations.

II. *“How does current law provide an industry whose purpose is to potentially extract resources from asteroids?”*<sup>6</sup>

Current law that addresses an industry whose purpose is to potentially extract resources from an asteroid is an amalgam of space and nonspace laws that address existing commercial activities. United States law regulates launches and reentry; the technology, financing, and behavior of various payloads; as well as related activities, intellectual property and export and import control, for example. Laws were promulgated for specific space-related applications as their technologies matured and were available for commercialization: communications satellites; launch vehicles and services; remote sensing; and, GPS. To the extent that a private asteroid mission uses any of these applications, the laws that govern these activities will also govern the part of an asteroid mission that employs them. For example, an asteroid mission launched or operated by a U.S. citizen will require a launch license from the U.S. Department of Transportation/FAA/Office of Commercial Space Transportation.<sup>7</sup> Depending on

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<sup>3</sup> Available at [http://www.nasa.gov/pdf/660556main\\_NASA-FAA%20MOU%20-%20signed.pdf](http://www.nasa.gov/pdf/660556main_NASA-FAA%20MOU%20-%20signed.pdf)

<sup>4</sup> 51 U.S.C. § 50112.

<sup>5</sup> Licensing of Private Land Remote-Sensing Space Systems, 15 C.F.R. § 960 (2006).

<sup>6</sup> Palazzo, *supra* note 1 at 1.

<sup>7</sup> 51 U.S.C § 50901, et. seq.

its use of communications spectrum and equipment, it will likely also need a license from the Federal Communications Commission. If advertising in space is part of the business plan of an asteroid mission, the advertising must be “nonobtrusive”.<sup>8</sup> The Department of Commerce/National Oceanic and Atmospheric Administration is responsible for licensing commercial remote sensing and has already determined that due to the profile of one planned private asteroid mission, it will not require a license. The license requirement could change for other missions with different profiles.

There is one Federal Court case regarding an asteroid claim.<sup>9</sup> The plaintiff alleged “ownership” of *Asteroid 433/Eros* based on a “registration” claim made by him at an online “registry”. He asserted that NASA infringed his “property rights” and sought compensation for “parking” and “storage” fees as well as special damages. He sought declaratory judgment for five causes of action based on the Fifth, Ninth, and Tenth Amendments to the United States Constitution.<sup>10</sup> The plaintiff did not raise the issue of whether natural or juridical persons could claim asteroids.<sup>11</sup> The case was dismissed by the District Court and lost on appeal. The Court held that the plaintiff/appellant did not present a claim for which the District Court may provide relief.

Despite this relevant body of law there are “gaps” in the law that will have to be raised by private sector asteroid resource exploration and utilization. Some of them are known. Some are not. This will be addressed in the next section.

III. *“What are the greatest challenges to legislating and regulating an industry of this nature?”<sup>12</sup>*

One of the greatest known challenges to legislating and regulating an industry of this nature is establishing uniform licensing and regulations of the activities on-orbit and at the asteroid. This is often referred to as “on-orbit authority.”

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<sup>8</sup> 51 U.S.C. § 50902 (9) and § 50911. “ ‘[O]btrusive space advertising’ means advertising in outer space that is capable of being recognized by a human being on the surface of the Earth without the aid of a telescope or other technological advice.”

<sup>9</sup> Gregory William Nemitz, Plaintiff - Appellant, v. National Aeronautics And Space Administration; et al., Defendants – Appellees, No. 04-16223, United States Court of Appeals for the Ninth Circuit, 126 Fed. Appx. 343; 2005 U.S. App. Lexis 2350 (2005).

<sup>10</sup> Robert Kelly, *Case Note, Nemitz v. United States, A Case of First Impression: Appropriation, Private Property Rights and Space Law Before the Federal Courts of the United States*, 30 J. Space L. 297, 298 (2004).

<sup>11</sup> See *Id.* 309.

<sup>12</sup> Palazzo, *supra* note 1 at 1.

Space, itself, is a global commons and is governed by international law.<sup>13</sup> However, as a State-Party to the Outer Space Treaty the United States is obligated to authorize and continually supervise the activities of non-governmental entities in outer space.<sup>14</sup> The United States meets this obligation through Federal licensing regulations. Objects that go into space are licensed, registered on the U.S. registry and are governed by U.S. law.

At this time, no agency has a specific Congressional grant of on-orbit authority. The FAA has authority to license launches and reentries. It does not have authority to license a private sector object that is intended to stay in orbit for a period of time.<sup>15</sup>

Some contemporary space issues such as orbital debris, space traffic management, planetary contamination by Earth-origin missions, and satellite servicing have caused some agencies to take regulatory action or make internal procedural requirements that go beyond licensing and operating satellites. For example, NASA promulgated a technical standard that seeks to limit the post-operational life of a space object to 25 years.<sup>16</sup> The FCC adopted this standard as a formal rule for satellites it licenses.<sup>17</sup> The FCC also requires license applicants to file a plan to avoid debris creation and deorbiting the satellite at the end of its life. Different procedures are required for satellites in low Earth orbit and those in geostationary orbit. NOAA reviews commercial remote sensing license applications for post-mission disposal on a case-by-case basis.<sup>18</sup> The Planetary Protection Subcommittee of the NASA Advisory Committee has recommended reviewing commercial activities to prevent outbound contamination.<sup>19</sup>

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<sup>13</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, opened for signature Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty]. Art. III.

<sup>14</sup> *Id.* Article VI.

<sup>15</sup> Timothy Robert Hughes & Esta Rosenberg, *Space Travel Law (and Politics): The Evolution of the Commercial Space Launch Amendments Act of 2004*, 31 J. Space L. 1, at 49-50.

<sup>16</sup> NASA, *Process for Limiting Orbital Debris, NASA-STD-8719.14 (with Change 4)*, NASA, Washington, D.C., 2009, available at <http://www.hq.nasa.gov/office/codeq/doctree/871914.pdf>.

<sup>17</sup> *In the Matter of Mitigation of Orbital Debris, Second Report and Order*, 19 FCC Rcd 1157, paragraphs 84-85 (2004). See [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-04-130A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-130A1.pdf); Federal Register publication, 69 FR 54581, 54585 (September 9, 2004).

<sup>18</sup> NOAA, available at <http://www.nesdis.noaa.gov/CRSRA/licenseHome.html>.

<sup>19</sup> NAC Planetary Protection Subcommittee, <http://science.nasa.gov/media/medialibrary/2010/03/31/NASArecommendationNo v08 .pdf>.

Taken together, these administrative actions demonstrate attempts at a nascent on-orbit authority. There needs to be a specific coordinated grant of on-orbit authority to the agencies that are best suited to provide the predictability and stability to legislate and regulate an industry of this nature. Finally, as space law follows technological development,<sup>20</sup> legislation and regulations must be flexible to adapt to new technologies.

IV. *“What particular issues should be considered in proceeding with legislation of this kind, i.e., potential impacts on international treaties?”*<sup>21</sup>

The international space law legal regime contains a number of well-accepted legal principles: nonappropriation of space by Nation-States;<sup>22</sup> a liability regime;<sup>23</sup> and, national supervision of nongovernmental entities,<sup>24</sup> for example. However, what constitutes customary legal principles of international space law beyond the well-accepted principles is uncertain. Only those issues most relevant to private sector asteroid resource exploration and utilization will be addressed here.

There is a distinction between the appropriation of territory and the appropriation of natural resources. The treaty regime is clear that appropriation of territory is prohibited.<sup>25</sup> The treaty regime<sup>26</sup> is unclear and contradictory regarding the appropriation of natural resources. Although there are specific provisions proscribing appropriation there are also specific provisions for the “exploitation of...natural resources”<sup>27</sup>. There are also specific provisions that permit the placement of “personnel, space vehicles, equipment, facilities, stations and installations...”<sup>28</sup> needed to extract resources. Further the appropriation of resources appears to be among the rights included in the “use” clauses of the

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<sup>20</sup> See Joanne Irene Gabrynowicz, *One Half Century and Counting: the Evolution of U.S. National Law and Three Long-Term Emerging Issues*, 4 Harvard L. & Policy Rev., 405, 423-425 (2010)

<sup>21</sup> Palazzo, *supra* note 1 at 1.

<sup>22</sup> Outer Space Treaty *supra*, Art. II note 13.

<sup>23</sup> Convention on International Liability for Damage Caused by Space Objects, opened for signature Mar. 29 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187.

<sup>24</sup> Outer Space Treaty *supra*, Art. VI note 13.

<sup>25</sup> OST, Art. II; Moon Agreement, Art. 11 (2).

<sup>26</sup> The United States has not ratified the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, *opened for signature* Dec. 18, 1979, 1363 U.N.T.S.21 [hereinafter Moon Agreement]. Therefore the United States is not legally bound by it. However, to effectively address the lack of legal clarity regarding space-based resources the Moon Agreement must be included in a discussion of the full *corpus* of international space law. Further, it must be noted that the United States was a leading participant in the development of the Moon Agreement and its adoption by the U.N. General Assembly.

<sup>27</sup> Moon Agreement Art. 11 (5).

<sup>28</sup> Moon Agreement Art. 8 2. (b).

treaties.<sup>29</sup> Taken together, the plain meaning of the word “use” in all of these provisions as well as the clearest and most important treaty provisions<sup>30</sup> indicates that the drafters and the signatories approved of the use, including extraction, of outer space resources.

What remains unclear is the ownership status of the resources when they are collected. Unlike some other global commons<sup>31</sup>, no agreement has been reached as to whether title to extracted space resources passes to the extracting entity. On the high seas, for example, it is long settled law that title to fish extracted from the ocean passes to the extracting entity. On the seabed “title to minerals shall pass upon recovery in accordance...” with the governing treaty.<sup>32</sup> In the Antarctic mineral resource activities are to be conducted in accordance with the terms of the Antarctic Treaty System.<sup>33</sup> In the absence of agreement legal opinion, *opinio juris*, is divided regarding the ownership status of extracted space resources.<sup>34</sup> Unsurprisingly, much of it divides along lines of political opinion.

In sum, the treaty regime does seem to allow asteroid resource exploration and utilization entities to extract resources if those activities are consistent with international law and United States obligations. There is no legal clarity regarding the ownership status of the extracted resources. It is foreseeable that the entity’s actions will be challenged at law and in politics.

Related to the issue of extraction is the definition of “commercial”. In the United States, the term “commercial” is defined by *who the actor is*. “Commercial” means the “private sector”. In most of the rest of the world including in western, industrialized nations, “commercial” is defined by *what the actor does*. In those

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<sup>29</sup> OST, Art. I; Art. III, and, Art. IX. Moon Agreement, Art. 2, Art. 3, Art. 4, Art. 5, Art. 6, Art. 8, Art. 9, Art. 10, Art. 11, and, Art. 15.

<sup>30</sup> OST Art. 1; Moon Agreement, Art. 4.

<sup>31</sup> A comparative analysis of the law applicable to terrestrial and space resource extraction is beyond the scope of this testimony. It is necessary to note however that agreements regarding extraction of resources from other global commons’ have been reached.

<sup>32</sup> UN Convention on the Law Of the Sea III, Art. 1. Dec. 10, 1982, 1833 U.N.T.S.

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<sup>33</sup> Chapter XI Regulation of Antarctic Mineral Resource Activities: CRAMRA, available at U.S. Department of State, <http://www.state.gov/e/oes/rls/rpts/ant/>.

<sup>34</sup> Compare Alan Wasser & Douglas Jobe, *Space Settlements, Property Rights, and International Law: Could a Lunar Settlement Claim the Lunar Real Estate it Needs to Survive?*, 73 J. Air L. & Commerce 72 (2008), with Press Release, International Institute of Space Law, Statement of the Board of Directors of the International Institute of Space Law (IISL) (Mar. 22, 2009), available at [http://www.iislweb.org/html/20090322\\_news.html](http://www.iislweb.org/html/20090322_news.html).

Nations, “commercial” means “generates revenue”.<sup>35</sup> In the systems that use this definition, governments can, and do, generate revenue through commercial activities. The definition of “commercial” as it applies to space has also been discussed in the United States Congress.<sup>36</sup> The draft bill uses the term “commercial entities” and “private entity” interchangeably. Since this Bill, were it to become law, will inevitably draw the attention of the international space community it would be prudent to clarify that the intent of the law is to facilitate the commercial activities of the United States private sector.

As with the ownership status of extracted resources, there is no legal clarity regarding the superior status of a claim found to be “first in time”. World history is filled with examples of terrestrial land claims being perfected by land being claimed first and then productively utilized. No analogous claims have ever been made in space. Therefore the status of an asserted superior right to conduct specific commercial asteroid resource utilization activities is a question of first impression.

The world’s most successful space-based commercial activity to date is satellite telecommunications. Telecommunications law had to address the issue of “first in time” claims as they applied to geosynchronous orbital slots early in its history. Some Nation-States championed a slot allocation system based on “first-come, first-served”. Others advocated a slot allocation system based on principles of equity. Satellite telecommunications law is a complex and dynamic body of law the scope of which is beyond the invited testimony. Suffice it to say that these two positions—“first come first served” and equity—continue to compete in a complicated and highly politicized international legal regime. The competition between the positions has included producing some practical results such as distinguishing between access and appropriation as well as creating different categories of orbital allotments and assignments.

Telecommunications law, *per se*, is not a precedent for asteroid resource utilization rights. However, as both telecommunications satellite activities and asteroid resource utilization activities occur in space they both have to contend with some of the same international space law principles and international politics. It is to be expected that an assertion of a superior right to conduct commercial asteroid resource utilization activities will be challenged at law and in politics.

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<sup>35</sup> See *Frans von der Dunk, The Moon Agreement and the Prospect of Commercial Exploitation of Lunar Resources, 32 Annals Air & Space L.* 91, 93 (2007).

<sup>36</sup> See NASA Authorization Act, Pub. L. No. 106-391 §§ 303, 309, 114 Stat 1577, 1593 (2000); Human Space Flight Assurance and Enhancement Capability Act, H.R. 4804, 111<sup>th</sup> Cong. § 8 (2010)

## Conclusion

H.R. 5063 acknowledges and addresses some issues that arise from the unprecedented activity of private sector asteroid resource utilization. It also acknowledges and addresses some of the United States' existing international obligations regarding activities in space. Not all relevant issues are provided in the bill, and given the ambiguities existing in space law, it is unlikely that it possible to do so. If made into law, it should be expected that there would be both legal and political challenges to its terms. International space law contains many gaps and ambiguities. It is logical and appropriate to attempt to resolve those ambiguities in favor of the U.S. national interest. At the same time, they must be consistent with international law and United States' obligations.

I thank the committee for giving me this opportunity and thank you for your work to develop the law of space.