

THE COMMERCIAL EXPLOITATION OF MINERAL RESOURCES IN OUTER SPACE.

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Introduction: Within the next 3-5 years, humans are likely to return to the Moon. Human exploration of the solar system is likely to follow. As we venture into these regions, we will need to use the mineral resources found on celestial bodies. This paper focuses on one particular use of such resources: their exploitation on a commercial basis.

Commercial activities may take various forms. Space-related commercial activities generally involve private industry, government, or both together in Public-Private Partnerships. Regardless of form, commercial ventures are motivated by a quest for profit.

In addressing commercial exploitation, this paper ignores the actor(s) and concentrates on the motivation -- to make a reasonable profit on the investment placed at risk. Many believe it will be possible to make such a profit from mineral resources in outer space if a suitable legal regime is established.

For a legal regime to be suitable for commercial exploitation of mineral resources in outer space, it must protect investments and permit orderly exploration and recovery. On Earth, nations routinely have legal regimes granting such protection through deeds, registration systems, leases and other contracts. The regimes protect exclusive rights to a specified area, for a particular purpose (extraction of a mineral), for a certain period of time. Although the regime must protect against harmful interference by others, it does not have to grant title. Very often, a mining venture will not have title to the area being mined. What the venture must have is a “miner’s right” of use or usufruct. This is a right to use the property of another and take the fruits. Furthermore, for a legal regime to be considered suitable for commercial exploitation in outer space, it generally must be expected to remain stable during the course of the venture.

This paper examines the commercial exploitation of mineral resources in outer space under the Outer Space Treaty² (“OST”) and the Artemis Accords³ (“Accords”). While the Accords are not a Treaty, they establish principles under which signatories will operate in space. The Moon Agreement is not examined herein. It emerged from the United Nations in 1979, and has only 17 Parties. One nation has withdrawn. Its relevance to the subject matter is primarily academic.

The Outer Space Treaty: The OST establishes general principles for the use and exploration of outer space. Because it uses general terms, it is subject to varying interpretations. Despite its ambiguities, it has 116 Parties, including all of the space powers, and is often

referred to as the Magna Charta or Constitution of space law.

The OST establishes a legal regime favorable to commercial activities in space. It implicitly recognizes the legitimacy of activities by private enterprise in space, although nations bear responsibility and liability for the activities of their non-governmental entities.⁴ Furthermore, space activities must be conducted with due regard to the corresponding interests of other Parties, and if an activity may cause harmful interference with the space activities of other Parties, consultation must occur before the activity may proceed.⁵

While natural resources are not specifically addressed in the OST, several provisions are relevant to the exploitation of space resources. Article I establishes that the exploration and use of outer space shall be conducted “for the benefit and in the interests of all countries...and shall be the province of all mankind.”⁶ This “common benefits” clause imposes no requirement for direct sharing of benefits in any specific manner, but requires only that space activities be beneficial in a general sense. Article I also establishes the freedom of exploration and use of outer space.

Article II establishes that outer space is “not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”⁷ The non-appropriation clause implements the freedom of use principle -- appropriation is inconsistent with freedom of use.

Even given this broad applicability, the issue of what activities (other than an outright claim of sovereignty) would constitute an appropriation, raises difficult questions. Notwithstanding, the mere act of mining resources is not an appropriation of the area actively being mined. It is an exercise of freedom of use. A claim to title over an area, however, would amount to appropriation. Titles are granted by sovereign entities. A claim of exclusive rights to exploit certain mineral resources in a specified area amounts to more than simply mining one area, but it is less than a claim of title. The crucial issue regarding commercial exploitation of space minerals is whether this type of a “usufructuary” claim would constitute an appropriation of the area claimed.

A strong argument can be made that a usufructuary claim of exclusive rights to exploit certain minerals within a reasonably limited area of outer space, for a limited time, would not constitute “appropriation,” particularly if the user expressly disavows any intent to appropriate. Ultimately, the legitimacy of such uses will depend upon their reasonableness.

In summary, mining is a permissible exercise of the freedom of use guaranteed by the OST. By itself, however, the OST may not provide a legal regime suitable for commercial exploitation of space resources. Commercial operations require a stable and reasonably certain legal environment to, among other things, facilitate investment. The Artemis Accords, and the practice of states pursuant to the Accords, may provide sufficient certainty.

The Artemis Accords: The Accords are a set of non-binding principles designed to guide civil space exploration. Originated by the United States in 2020, along with seven other initial signatory nations, the Accords emphasize the commitment of the signatory nations to the OST. As of January 2026, 61 countries have signed the Accords. This includes most of the world's space powers. Russia and China, however, have not signed the Accords.

The Accords include principles on peaceful purposes, transparency, interoperability of systems, emergency assistance to those in need, registration of space objects, open sharing of scientific data, as well as the mitigation of orbital debris, including the safe, timely, and efficient disposal of spacecraft at the end of their missions. With respect to the issues addressed in this paper, the Accords have provisions relevant to the extraction and utilization of space resources.

Signatories are to provide public information regarding the location and general nature of their operations and they pledge to prevent harmful interference by coordinating operations and establishing "safety zones" around activities. The size, scope, and duration of safety zones are to reflect the type of operations and be based on scientific standards. Safety zones are to be temporary, ending when the relevant operations cease. Signatories commit to respect the OST principle of free access in their use of safety zones, as well as the principle of due regard.

The Accords affirm that extracting and using space resources is permitted under the OST and international law. Resource extraction and utilization is to be executed in a manner that complies with the OST and employs methods providing for safe and sustainable activities.

Many provisions underscore a commitment to existing space treaties and responsible conduct standards. As the number of nations joining the Accords grows, and activities in furtherance with the Accords commence, the Accords could help shape emerging customary international law, which forms through state practice combined with *opinio juris* (the belief that such practice is legally required).

The Accords do not currently constitute customary international law. However, if the Accords are followed

by its signatories, this practice of states will influence the ultimate development of customary international law, particularly where international law is unsettled, such as with respect to resource extraction and safety zones.

Conclusion: The path forward will depend on the extent to which all spacefaring nations adopt conforming practices, and whether they declare these practices are legally required (*opinio juris*). At a minimum, the Accords serve to support an interpretation of the OST that is favorable to commercial exploitation of space resources. State practice will guide the way and, hopefully, provide the stability needed for investment in space resource commercialization.

References: [1] Chair, Space & Satellite Industry Group, Greenberg Traurig, 1144 15th St., Suite 3300, Denver, CO 80202; skip.smith@GTLaw.com [2] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies, January 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, (entered into force October 10, 1967). [3] Artemis Accords (2020), NASA & U.S. Department of State. Full text available at: United Nations A/75/699 Annex (2021). [4] OST, Art. 6 & 7. [5] OST, Art. 9. [6] OST Art. 1. [7] OST Art. 2.