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[Translation]

Nishimura Institute of Advanced Legal Studies
Report by the Space Resource Development Laws Study Group

December 2016

Nishimura Institute of Advanced Legal Studies

Otemon Tower, 1-1-2 Otemachi, Chiyoda-ku, Tokyo 100-8124, Japan

Nishimura Institute of Advanced Legal Studies (NIALS)
Attendees of the Space Resource Development Laws Study Group meetings (titles omitted)

<<Chairperson>>

Kazuhiro Nakatani, Professor, The University of Tokyo Graduate Schools for Law and Politics

<<Group Members>> (in Japanese alphabetical order)

Setsuko Aoki, Professor, Keio University Law School
Motoko Uchitomi, Part-time Lecturer, The University of Tokyo Policy Alternatives Research Institute
Soichiro Kozuka, Professor, Gakushuin University Faculty of Law
Takeshi Hakamada, Founder and CEO, ispace, Inc.
Kojiro Fujii, Attorney-at-law, Nishimura & Asahi
Atsushi Mizushima, Attorney-at-law, Nishimura & Asahi

<<Details of the Study Group Meetings>>

1st meeting	(Friday, June 17, 2016)
Speaker:	Kazumochi Kometani, Attorney-at-law, Nishimura & Asahi
2nd meeting	(Friday, July 13, 2016)
Speaker:	Koji Nishimoto, Professor, Senshu University School of Law
3rd meeting	(Friday, July 22, 2016)
Speaker:	Yukifumi Wakao, General Manager, International Legal Department JX Nippon Oil & Gas Exploration Corporation
4th meeting	(Wednesday, August 31, 2016)
Speaker:	Setsuko Aoki, Professor, Keio University Law School Soichiro Kozuka, Professor, Gakushuin University Faculty of Law

<<Secretariat>>

Kazumochi Kometani, Attorney-at-law, Nishimura & Asahi
Taku Nemoto, Attorney-at-law, Nishimura & Asahi
Akihiko Izu, Attorney-at-law, Nishimura & Asahi

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Part 1 Purpose of the Study Group and Proposals by the Study Group

1. Purpose of the Study Group

(1) Progress in the Industrialization of Space Resource Development

The global space industry is continuously growing, and the size of the space industry is expected to grow rapidly hereafter due to a significant reduction in the cost of rocket launches, among other things.

As an industry, space resource development is drawing global attention. In short, space resource development refers to the activities of exploring and mining non-biological resources such as water and minerals ("space resources") on the moon or asteroids, and then either utilizing those resources within outer space as energy (e.g. rocket fuel) for the rapidly expanding range of space activities, or utilizing those resources after taking them back to Earth. From both a technological and commercial standpoint, the utilization of space resources within space is expected to become viable and be implemented prior to the utilization of space resources on Earth. Many companies dealing with the space resource development business are assuming, as their initial business model, that commercial utilization of space resources will take place within space. Please refer to Figures 1 and 2 below for diagrams of the flow of events in the supply and utilization of space resources within outer space, and the flow of events in resource bases for prospecting, mining, treatment, and storing in outer space, as well as the anticipated business operators in each of the related industrial areas.

Recently, companies dealing with the space resource development business have been engaging in fund-raising as well as research and development with overseas governmental institutions or companies, and industrialization of space resource development is progressing rapidly.

Figure 1: Supply and Utilization of Space Resources within Outer Space

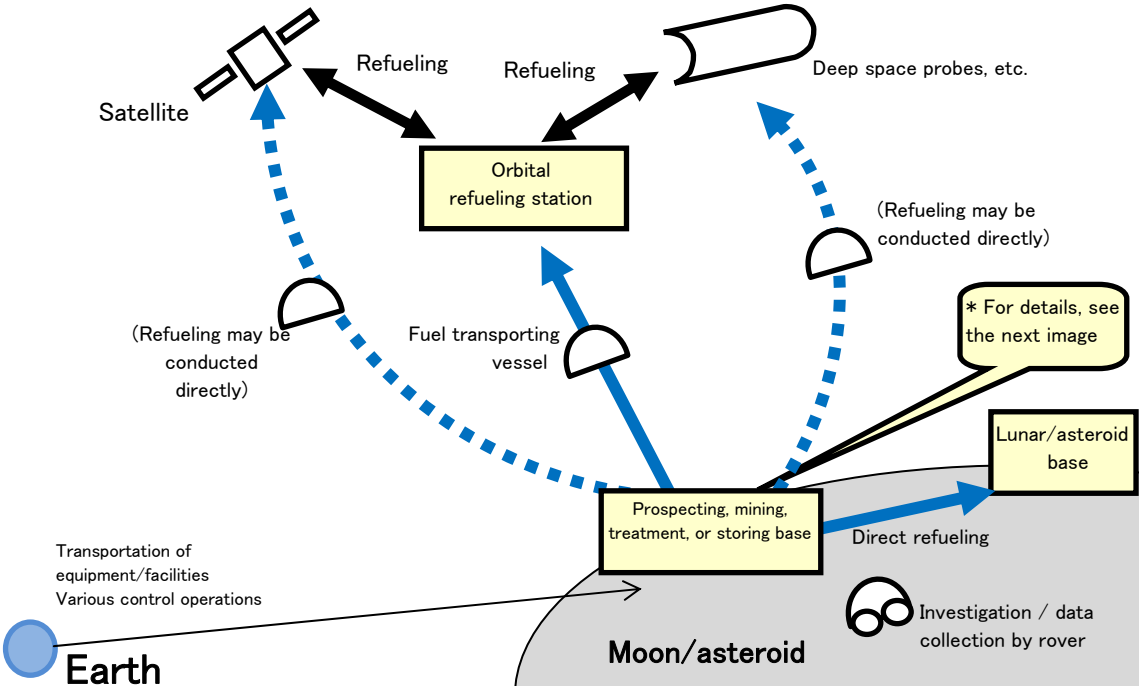
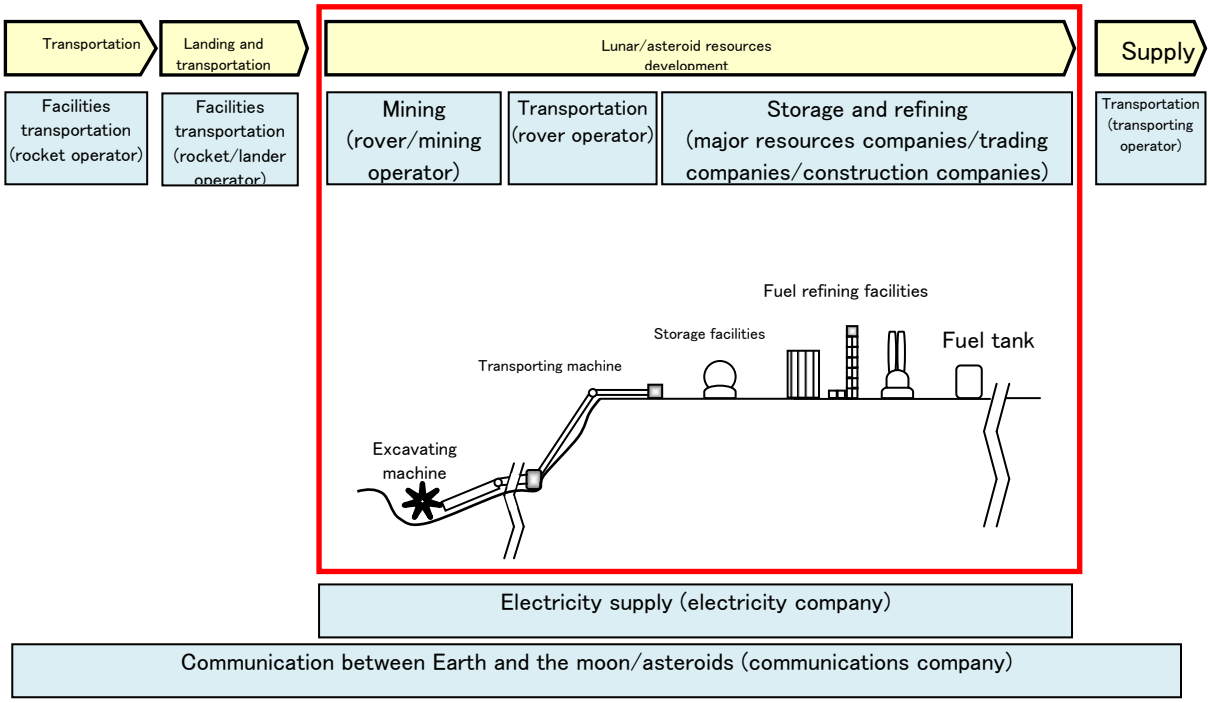


Figure 2: Flow of Events in Resource Bases for Prospecting, Mining, Treatment, and Storing in Outer Space, as Well as Anticipated Business Operators in Each of the Related Industrial Areas



(2) Need for Organizing Legal Issues Regarding Space Resource Development

As it is becoming increasingly likely that space resource development will become an actual industry, foreign governments and research institutions have started to consider what kind of legal system should govern space resource development. The Commercial Space Launch Competitiveness Act (H.R. 2262) (the "CSLCA[1]"), which is referred to in this Report, is the best tangible example of this consideration.[2]

In addition, the Hague Space Resources Governance Working Group[3] has been established in Europe with the voluntary participation of multi-stakeholders, including governmental institutions, international institutions, scholars, and enterprises, of various countries not limited to European counties. It is currently working on constructing a proposed legal framework that would appropriately support space resource development. The Hague Space Resources Governance Working Group's project is drawing attention.

For Japan as well, space resource development may be a promising industry in the future. In June 2010, the Institute of Space and Astronautical Science (ISAS) of the Japan Aerospace Exploration Agency (JAXA) became the first entity in the world to successfully bring samples back to Earth from a celestial body, using the explorer Hayabusa. Additionally, Japan has made significant

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1 Abbreviation of the Commercial Space Launch Competitiveness Act.

2 Also, on November 11, 2016, Luxembourg published a draft law on exploration and use of space resources, which provides, among other things, that the owning of space resources is permitted, and the framework for the Luxembourg government's authorization system regarding exploration and use of space resources (see the following link for the English translation of the draft law: http://www.gouvernement.lu/6481974/Draft-law-space_press.pdf).

3 For details of its activities, see the following link: http://law.leiden.edu/organisation/publiclaw/iiasl/working-group/the-hague-space-resources-governance-working-group.html

achievements in terms of the underlying technologies necessary for space resource development, such as orbit and attitude control, terrain matching technology, and laser altimetry technology, and thus has some technological superiority over other countries in the area of space resource development. Further, there are numerous private business operators in Japan, including leading companies and venture companies, that have an interest in space resource development.

As such, in Japan, where there is an increasing likelihood that space resource development will become an actual industry, it appears that, as of this point in time, adequate consideration has not yet been given to domestic and foreign legal issues, to the framework that should ideally be established under international law, or to the consideration of a legal system that will facilitate development of the space resource industry. These considerations are critical when contemplating and engaging in the space resource development business. Inadequacies in the understanding of legal issues, and in the construction of a legal system regarding space resource development, may be factors which obstruct the progress of space resource development as an industry.

Thus, NIALS has organized the Space Resource Development Laws Study Group (the "Study Group") with the aim of organizing legal issues regarding space resource development and considering the kind of legal system which should be established for space resource development. This Report is the results of the Study Group's activities.

2. Study Group's Proposals

(1) Content of the Report

In order for space resource development to develop as an industry, it is important that private business operators be permitted to have ownership of the resources which they mine and obtain in outer space. Given the foregoing, this Report first considers whether such operators can have ownership rights in the resources which they mine and obtain in the course of space resource development (Part 2 of the Report).

Secondly, under the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (the "Outer Space Treaty"), States which are parties to the Outer Space Treaty bear international responsibility for national activities in outer space, 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 the Outer Space Treaty. Accordingly, the Japanese government must establish a framework for authorization and supervision regarding space resource development by domestic private business operators to assure that such activities are carried out in conformity with the provisions set forth in the Outer Space Treaty. In addition, in order to promote the industrialization of space resource development, it is important to assure foreseeability of consequences for private business operators. Thus, development of the legal system is required to provide that foreseeability. Furthermore, due to the nature of the space resource development business, coordination with other countries is expected to be important. Thus, this Report also considers a framework of authorization and supervision regarding space resource development (Part 3 of this Report).

(2) Study Group's Proposals

The Study Group's proposals, based on the considerations in Parts 2 and 3 of this Report, are as set out in items (1) through (3) below:

Proposal (1) **It is proposed that the Japanese government show a willingness to clarify the way that domestic rules apply to space resource development. Relevant industry practices should then develop within the country. As the relevant industry practices develop, the Japanese government should gradually establish relevant rules to govern the developing industry. The Japanese government should also**

proactively participate in the building of international frameworks regarding space resource development.

Proposal (2) **It is proposed that the Japanese government clarify that private business operators are permitted to have ownership under Japanese law of the resources which they mine and obtain in outer space in the course of space resource development.**

Proposal (3) **It is proposed that the Japanese government establish a framework of authorization and supervision regulations regarding space resource development, within the existing domestic legal system, which includes the Space Activities Act, and also outside the domestic legal system, as well as aim at building a framework for coordination among countries which are preparing for or engaging in space resource development.**

With respect to Proposal (1), the Study Group pointed out the following issues: it is actually very difficult to, among other things, organize an international institution to authorize and supervise space resource development. Additionally, the number of countries capable of engaging in space resource development is very limited, and accordingly it may be meaningless to organize such an institution at this time. Similarly, with respect to space resources mined or obtained by private business operators in the course of space resource development, we think that it would be difficult to reach an international agreement at the Committee on the Peaceful Uses of Outer Space (COPUOS) or other organization to permit miners to have the right to use or own the resources they mined or obtained, because generally such organizations require consensus. Accordingly, it can be said that the possibility that an international institution could be organized or an international agreement could be reached with regard to these points in the near future is very low.

In light of these circumstances and the fact that countries capable of engaging in space resource development are very limited, it is highly probable that basically, rules regarding space resource development will be established as follows: (i) relevant industry practices are established in countries that take the lead in space resource development; and (ii) for issues that require international coordination, the countries taking the lead in space resources development shall take the initiative and establish rules regarding each issue. The fact that the CSLCA has actually been signed by the President of the United States shows that the United States intends to go in the above-stated direction. In addition, the CSLCA is intended to develop, among other things, a specific authorization system for space resource development. The signing of the CSLCA can be viewed as the U.S. government's express manifestation of its inclination to accumulate relevant practices nationally regarding space resource development before an industry develops.

Accordingly, the Study Group views the situation as follows: while there is the potential for the industrialization of space resource development, in order to develop space resource development as an industry, the Japanese government must: 1) support a development of domestic rules that will facilitate space resource development by private businesses; 2) take the lead in establishing relevant industry practices before the development of the industry; 3) gradually clarify rules in accordance with such accumulation; and 4) become involved in the building of international frameworks alongside the other countries that are capable of engaging in space resource development.

The Study Group proposes that Japan's basic direction should be as stated above, and at the same time proposes that the Japanese government should specifically proceed with Proposals (2) and (3) stated above.

With respect to Proposal (2), as detailed in Part 2, it is thought that there are no prohibitive norms in international law nor obstacles under the relevant rules in international law with regard to private individuals' ownership of space resources. Specifically, in light of (i) through (v) below, among other factors, it is thought that Japan is not prohibited by international law from affirming private

ownership rights in space resources; (i) under the Outer Space Treaty, there are no provisions that specifically prohibit private individuals from owning space resources; (ii) the "Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries"[4] (the "Space Benefit Declaration"), which was adopted in 1996 as a resolution of the United Nations General Assembly, does not deny private individuals' owning space resources; (iii) the International Institute of Space Law, which was established in 1960 and consists of space law scholars representing various countries over the world, specifically declares in its position paper that the ownership of space resources is not denied under current international law; and (iv) the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (the "Moon Agreement"), which expressly denies ownership of un-mined space resources, does not expressly deny the ownership of space resources that have been mined; and (v) Japan is not a contracting party to the Moon Agreement, and the provisions of the Moon Agreement have not in any event become international customary law, with the exception of the provisions that parallel those of the Outer Space Treaty and that have thus become international customary law pursuant to the Outer Space Treaty.

While the current situation can be construed as stated above, if the Japanese government lacks a specific stance regarding space resource development, this may give rise to a situation where it is impossible for domestic private business operators and investors to appropriately manage space resource business risks because they cannot ascertain the legal risks they may face. Accordingly, it is considered that, from the viewpoint of the facilitation of space resource development by private business operators, it is important for the Japanese government to first affirm private ownership rights in space resources, and to then make it publicly known through official publications or by codifying such into domestic law.

Further, after going through the stage of specification as stated above, in order to help assure the safety of transactions by private business operators involved in space resource development from unknown legal risks, it is important to form international frameworks among countries involved in space resource transactions to establish universal agreements regarding parties' rights in international space resource transactions, such as a mutual recognition framework regarding conditions for the acquisition of rights in space resources and the scope of such rights.

With respect to Proposal (3), as detailed in Part 3, in order for the Japanese government to completely fulfil its international responsibility, it is important that it establishes a framework for authorization and continuing supervision of space resource development, both within the existing domestic legal system which includes the Space Activities Act, and also outside such system.

If a system for the authorization and continuing supervision of private business operators' space activities is not established, this may give rise not only to issues regarding the safety of citizens, but also to the issue that space resource development may be obstructed despite the fact that it is not prohibited under the Japanese legal system, because private business operators will not be sure that their space resource development activities are lawful, and may thus shrink from engaging in those activities. In order to promote the space resource development industry, it is necessary to establish such a system regarding authorization and continuing supervision of space resource development.

Accordingly, in light of the fact that there is a possibility that private business operators that are under the control of the Japanese Government will actually engage in space resource development in the near future, in order to completely fulfil its international responsibility and to eliminate obstructions preventing private business operators from engaging in space resource development, we think that the Japanese government must consider the points discussed in Part 3, 2(1) and (2) below (requirements and conditions for the authorization, and effect of the authorization), and then clarify or give shape to

[4] The United Nations General Assembly Resolution 51/122 at its 51st session, adopted on December 13, 1996.

an effective and realistic framework for the authorization and supervision of space resource development.

Moreover, the Study Group believes that with respect to issues that require coordination, the Japanese government also needs to gradually begin coordinating with various relevant countries, as stated in Part 3, 2(3) below.

Part 2 Ownership of Space Resources

1. Is ownership of celestial bodies permitted under international law?

As a preliminary issue to considering whether it is permitted to own space resources that have been mined, we considered whether it is possible to own celestial bodies. The general consensus is that the Outer Space Treaty does not permit ownership of a celestial body itself.

Article II of the Outer Space Treaty states as follows: "Outer 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." It is commonly understood that this Article also prohibits private individuals from owning celestial bodies. In modern times, a private individual's right to own land and the conditions therefor are determined by the laws of the country of his or her nationality; if a private individual manages or uses land that is not under any national jurisdiction and declares ownership of such land, such declaration of ownership will be legally recognized only after the country of his or her nationality incorporates the land into its territory and accepts that private individual's claim. If a private individual's country is a member state of the Outer Space Treaty, the country cannot ratify his ownership of a celestial body because Article VI of the Outer Space Treaty prescribes as follows: "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 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 the present Treaty." Accordingly, in a legal sense, international law does not permit private individuals to own celestial bodies.[5] Furthermore, as stated above, in the drafting process of the Outer Space Treaty, it was agreed that the term "national" as used in Article II of the Outer Space Treaty includes not only States, but also private individuals.

Based on the above reasoning, it is generally accepted that neither States nor private individuals can acquire ownership of celestial bodies under the Outer Space Treaty.

2. Is ownership of space resources permitted under international law?

Even if the Outer Space Treaty forbids States or private individuals from owning celestial bodies, it does not necessarily follow from such that private individuals are prohibited from owning space resources. Thus, the Study Group considered whether the Outer Space Treaty went so far as to prohibit ownership of space resources by private individuals.

We have concluded that, for the following reasons, owning resources that have been mined within outer space may be permitted under the Outer Space Treaty and other international laws.

(1) Non-Existence of Prohibitive Provisions in the Outer Space Treaty

First of all, there are no provisions in the Outer Space Treaty that specifically prohibit private individuals from owning space resources.

Furthermore, in the drafting process of the Outer Space Treaty, while France and Belgium expressed the view that ownership by private individuals of space resources should not be permitted, the United States expressed the view that only ownership of the land of celestial bodies should be prohibited. Therefore, prohibition on owning space resources was not contemplated in the drafting process.[6]

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5 "Introduction to Space Law for Entrepreneurs" edited by Souichiro Kozuka and Masahiko Sato (2015, Yuhikaku), p. 38 [Setsuko Aoki]

6 Based on a statement by Ms. Aoki, a group member, at a Study Group meeting.

Therefore, based on the principle presented by the judgment in the Case of the S.S. "Lotus"[7] that a State can freely exercise jurisdiction (sovereignty) over its territory as long as there are no prohibitive norms under international law (the so-called "Lotus principle"), we think that, under international law, States can permit private individuals to own space resources.

(2) Non-Existence of Obstacles under Relevant Rules

However, regarding whether an act can be freely conducted if the act is not prohibited, the Study Group pointed out that it is necessary to check for relevant rules under international law, as an advisory opinion (1996) of the International Court of Justice on the legality of nuclear weapons took the stance that for matters not explicitly prohibited by international agreements, it is necessary to further identify international laws relevant to peripheral matters to determine whether or not they are legal.

For example, regarding whether it is permitted to own space resources, it is possible to strictly interpret Article I of the Outer Space Treaty, which stipulates that "the exploration and use of outer space . . . shall be carried out for the benefit and in the interests of all countries," such that it forbids private individuals from owning space resources, under the notion that a private individual owning space resources is only beneficial to the country to which he or she belongs and is not beneficial to all countries.

However, in this regard, the Study Group pointed out that the approach taken by the Space Benefits Declaration serves as a useful reference.

In the Space Benefits Declaration, the interpretation of Article I of the Outer Space Treaty was adjusted to a certain degree. Under the declaration, Article I of the Outer Space Treaty is deemed to be a provision which is aimed at allowing all countries to enjoy benefits from exploration and use of outer space, not through direct distribution of the outcomes of space activities, but through improvement (assistance) in conditions for participation of developing countries, such as sharing information and transferring technology to the extent possible. Thus, the Study Group pointed out as follows: although the Space Benefits Declaration does not have an immediate legal effect because it is only a resolution of the General Assembly, we should think that direct distribution of resources that have been mined is not required in light of the fact that the Space Benefits Declaration was adopted with such content; and such a way of thinking can be described as being consistent with the stance of not denying ownership by a State or a private business operator under the jurisdiction of the State of the outcomes of space activities.

Under the Moon Agreement, natural resources in all celestial bodies within the solar system, other than Earth, including those in orbits around those celestial bodies, and in other trajectories to those celestial bodies or those orbits (Article 1) are the common heritage of mankind (Article 11, paragraph 1); therefore, "[n]either the surface nor the subsurface of the moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person" (Article 11, paragraph 3). This clearly forbids of ownership of space resources. However, the Study Group agreed that because these provisions of the Moon Agreement had not become customary international law, non-member states of the Moon Agreement were not bound by the Moon Agreement.

Based on the above, the Study Group concluded that owning space resources may be permitted because it found no provisions that could become obstacles for the recognition ownership of space resources, as a result of the Study Group's research on not only international space law but also relevant international rules in peripheral areas such as the environment, resources, and energy.

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[7] Judgement by the Permanent Court of International Justice on September 7, 1927.

(3) The Conclusions of the International Institute of Space Law and the Domestic Laws of Other Countries

In fact, the conclusions of the International Institute of Space Law and the domestic laws of other countries are in line with the above interpretation, as well.

The position paper of the International Institute of Space Law expressly declares that ownership of space resources is not denied under the current international law.[8]

The U.S.'s CSLCA permits U.S. citizens to commercially use space resources, and Luxembourg's Draft Law[9] regarding private space resource development also permits space resources to be owned.

In accordance with the above, we are of the view that there is an international trend towards recognizing ownership of space resources.

(4) Right to Use Space Resources

Separately from the issue regarding ownership of space resources, in a Study Group meeting, the view was expressed that if there is strong international opposition to the recognition of ownership of space resources (in particular, those mined for purposes other than scientific research), or if differences in the relevant schemes of ownership as established by each country become an obstacle to reaching agreement regarding recognition of ownership of space resources, then it might suffice, for the purposes of space resource development, to set aside discussions regarding ownership and recognize the right to use space resources, i.e., the title to use and dispose of space resources. In other words, even if it is not permitted to recognize ownership by a private individual of space resources, a lack of ownership of space resources may not necessarily be a problem if the following two rights are granted: 1) the right of a private individual to use certain space resources without being regarded as having committed unjust enrichment or tort[10] in relationships with third parties; and 2) the right of the State responsible for the private individual to be exempted from any international responsibility for his or her acts.[11]

On the other hand, in a Study Group meeting, it was also pointed out that in the case that individuals and States rely upon such rights of use ―which are narrower than rights of ownership―, it is unclear whether or not an entity could also have the right to demand the return of space resources from third parties or the right to demand cessation of interference by third parties as a part of its right to use space resources. In response to this, the Study Group considered that it may be possible to resolve such issues through the use of the consultation framework under Article IX of the Outer Space Treaty. Article IX of the Outer Space Treaty states in relevant part that:

> A State Party to the Treaty which has reason to believe that an activity or experiment planned by another State Party in outer space . . . would cause potentially harmful interference with activities in the peaceful

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8 For the position paper of the International Institute of Space Law, see the following link.

http://www.iislweb.org/docs/SpaceResourceMining.pdf

9 See footnote 2. Luxembourg also announced its policy to become a European hub in space resource development.

10 We think that it will be necessary to separately consider how the governing law will be decided if a tort occurs in transportation, delivery, or the like of space resources within outer space.

11 Although the details of ownership differ from one country to another, we are using Japanese law as an example for the purpose of our consideration so that you can easily form a mental picture.

> exploration and use of outer space . . . may request consultation concerning the activity or experiment.

In any event, because the Study Group considers that ownership of space resources is viable, as stated above, we think that it would be appropriate to continue the study with ownership of space resources as the main premise.

(5) Prohibition of Ownership of Celestial Bodies and Types of Space Resource Development

Even if ownership of space resources is not prohibited under international law, the mining of space resources will also likely require the establishment of mining areas on celestial bodies and the installation and operation of large structures on celestial bodies.

In a Study Group meeting, the risk was identified that, depending on the manner in which they are carried out, these acts may fall under the category of "appropriation . . . by means of use or occupation", which is prohibited by Article II of the Outer Space Treaty. In short, there is disagreement over the proper interpretation of this Article. One interpretation is that use and occupation in any manner not explicitly prohibited by the Outer Space Treaty, the Charter of the United Nations, or other international laws is not otherwise forbidden by this Article. The other interpretation is that use and occupation that essentially gives rise to the same effect as owning celestial bodies is prohibited by this Article, even if it is done in a manner not explicitly prohibited under international law. The drafters (in particular, the United States and the Soviet Union) took a view that was closer to the first interpretation. They seem to have taken a stance which denies that the acquisition or ownership of outer space itself is established by use or occupation in a manner not explicitly prohibited by the Outer Space Treaty. However, proper interpretation in regard to this issue is not certain at present.

We will further discuss this issue in Part 3, 2(1) below, as this issue is connected to the issue of what types of space resource development activities will be permitted by each country when countries actually build their frameworks for authorization and continuing supervision of space resource development activities.

3. Issues Regarding Harmonization of Rights When the Ownership of Space Resources is Recognized

(1) Identification of Issues

Even if international law recognizes ownership of space resources, individual countries may differ in whether or not they recognize or protect rights of ownership or use in space resources, depending on the treaties that have been signed by the particular country in question and the domestic legal system of that country.

The Study Group identified an issue regarding this: in a business relationship between a developer and a resource user, where the two parties are not governed by the laws of the same country, if either of the parties' countries does not recognize ownership of space resources or imposes conditions for, or details regarding, ownership or use of space resources that differ from those of the other party's country, a certain degree of harmonization might become necessary.

It is generally expected that the type of contracts for a transaction in which a resource user obtains space resources from a space resource developer who has obtained ownership of the space resources is a sale and purchase contract. Sale and purchase contracts are contracts where transfer of ownership is an essential element. Thus, with respect to transborder transactions, we think that harmonization may be required, depending on whether both countries concerned recognize ownership of space resources, and depending on specifically what rights they recognize regarding space resources and under what conditions they recognize them .

On the other hand, with respect to transactions between a developer and a resource user within one country, there will be no issue regarding harmonization as described below because there will be only one country whose laws govern both parties and therefore there will be no conflict regarding the recognition or details of the ownership.

(2) Outline of Problematic Situations

As stated above, when a developer and a resource user who are from different countries enter into a sale and purchase contract for space resources, harmonization will be required depending on the details of the rights recognized by the countries concerned with respect to space resources. For example, if the developer's country recognizes ownership of space resources while the resource user's country does not, the resource user cannot obtain ownership of the space resources even if it purchases the space resources through a sale and purchase contract. The Study Group has outlined the various problematic situations that may arise in cases where a sale and purchase contract for space resources is entered into between entities under the authority of different countries based on the possible combinations of treaties the relevant countries may have signed:

	Pattern 1	**Pattern 2**	**Pattern 3**
Developer's Country[12] (Country A)	Outer Space Treaty	Outer Space Treaty	Outer Space Treaty
Resource User's Country (Country B)	Outer Space Treaty + Moon Agreement (Denies ownership of space resources that have been mined, as well as un-mined resources.)	Outer Space Treaty + Moon Agreement (Acknowledges ownership of space resources that have been mined.)	Outer Space Treaty

A. Pattern 1

Pattern 1 involves a situation in which the developer's related country (Country A) is a contracting party to the Outer Space Treaty only, while the space resource user's related country (Country B) is a contracting party to the Moon Agreement and has taken the strict stance that it denies not only the validity of ownership rights in un-mined space resources, but also the validity of ownership rights in space resources that have been mined.

In Pattern 1, the resource user's right to use space resources may not be protected. This is because the resource user's related country (Country B) denies ownership of space resources even if they have been mined. Thus, for example, if space resources that the resource user obtained in Country B from a developer are stolen or damaged by a third party, we believe that the resource user's interests would not be protected.

B. Pattern 2

Pattern 2 involves a situation in which the developer's related country (Country A) is a contracting party to the Outer Space Treaty only, while the space resource user's related country (Country B) denies the validity of ownership rights in un-mined space resources because it is a contracting party to the Moon Agreement but interprets the Moon Agreement flexibly such that it acknowledges the validity of ownership rights in, or some right to use, space resources that have been mined.

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[12] At present, none of the countries that are capable of engaging in space resource development is a signatory to the Moon Agreement. Therefore, our discussion here is based on the premise that the developer's country is a contracting party to the Outer Space Treaty only.

In Pattern 2, it is possible for the resource user to use space resources that have been mined; however, the conditions for allowing the use of space resources imposed by Country B may be different from those of the developer's related country (Country A).

The scope and conditions for rights granted with respect to space resources that have been mined may be different between Country A and Country B, depending on the countries' respective interpretations of Article I of the Outer Space Treaty, which stipulates that "the exploration and use of outer space . . . shall be carried out for the benefit and in the interests of all countries . . . ."

C. Pattern 3

Pattern 3 involves a situation in which both the developer's country (Country A) and the space resource user's country (Country B) are contracting parties to the Outer Space Treaty only.

In Pattern 3, we consider that the space resource user can use the space resources it obtains from the transaction.

Even in this case, however, the scope and conditions for rights granted with respect to space resources may be different between Country A and Country B, depending on their respective interpretations of Article I of the Outer Space Treaty, which stipulates that "the exploration and use of outer space . . . shall be carried out for the benefit and in the interests of all countries . . . ."

(3) Consideration of Possible Solutions

A. Foreign Nationals Law-Type Framework

The Study Group considered whether it would be possible to use a type of legal framework which respects the ownership rights granted to a foreign national in accordance with the laws of their nation as a solution to permit resource users to use space resources lawfully obtained by the nationals of other nations. Such frameworks typically stipulate that in the relevant country, rights lawfully obtained by foreign nationals in foreign countries shall be protected.

However, the Study Group pointed out that in any of the above Patterns, constructing such a framework is not a thorough solution for the following reasons: building such a framework is meaningful for the developer in that the rights obtained by the developer in accordance with the standards of Country A may be recognized in Country B. However, the success of the transaction requires more than just Country B's recognition of the rights of a developer from Country A; to be successful, the transaction also requires that Country B will recognize the rights of a resource user from Country B once the resource user has purchased those rights from the resource developer from Country A.

Furthermore, with respect to Pattern 2, there seems to be an additional issue. Because the resource user's country (Country B) must comply with treaties to which it is a contracting party, even if the developer has rights in Country A, it may not be possible for Country B to recognize the developer's rights via establishment of such a foreign rights recognition law if Country B does not have the right to use resources itself.

B. Mutual Recognition-Type Framework

The Study Group considered the possibility that, in the situations outlined in Patterns 2 and 3 above, another option could be to permit the resource user to use space resources by building a mutual recognition-type framework.

More specifically, if the developer's country (Country A) and the resource user's country (Country B) each recognize the other country's systems concerning space resource development, ownership of resources under Country B's legal system could be recognized for a resource user in Country B who obtained resources lawfully developed under the legal system of the country of the developer (Country A), even if the conditions for the accrual of ownership of, or the right to use, space resources in Country B are different from those in Country A.

When a system concerning mutual recognition like this is created, there may be cases where countries form a common view with respect to the appropriateness of certain conditions for authorization concerning space resource development. In this regard, there is a possibility that the Hague Space Resources Governance Working Group mentioned above will compile certain practice guidelines, which could be used to formulate standards upon which countries may settle. We would like to monitor the Hague Space Resources Governance Working Group for further developments in the creation of such guidelines.

In the Study Group, there was an opinion that it may be necessary to build a framework for mutual recognition like this between countries involved in space resource transactions in order to ensure the safety and security of transactions by private business operators involved in space resource development as, without such a framework, private business operators may be unable to predict the legal consequences of such sales transactions.

Part 3 A Legal Framework for Authorization and Supervision Regarding Space Resource Development

1. Obligations under International Law Pursuant to Article VI of the Outer Space Treaty

As we stated in Part 1 above, the Outer Space Treaty states in the first sentence of Article VI, "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 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 the present Treaty," and then it states in the second sentence, "The activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty."[13]

In this way, Article VI of the Outer Space Treaty has made it clear that the treaty adopts a centralized responsibility system, i.e., if a private individual carries out an act in violation of an international law regarding space, such as the Outer Space Treaty, the country of his or her nationality must take international responsibility for the violation vis-à-vis the relevant foreign countries.[14] Therefore, in order for the Japanese government to completely fulfil its international responsibility to assure that the activities of Japanese private business operators are carried out in compliance with the relevant international laws, such as the Outer Space Treaty, we think that it is important that the Japanese government establish a legal framework for authorization and continuing supervision of space resource development, both within the existing domestic legal system, which includes the Space Activities Act, and also outside such system.

For private business operators, when they receive authorization for their space resource development activities from the government, the lawfulness of those is guaranteed by the government. By contrast, if a system for the authorization and continuing supervision of space resource development is not established, private business operators may not be able to receive sufficient assurance that their space resource development activities are legal, and space resource development may be obstructed by the legal uncertainty despite the fact that it is not prohibited under the Japanese legal system. In other words, private business operators may be faced with a situation in which they cannot take appropriate business risks because they are concerned about unknown legal risks.

The Study Group members were in agreement that, in light of the fact that there is a possibility that private business operators of Japanese nationality would engage in space resource development in the near future, it was necessary to start considering how the framework for authorization and continuing supervision of space resource development should be constructed. Accordingly, the Study Group examined this issue .

2. Country-by-Country Framework for Authorization and Supervision

With respect to the framework for the authorization and continuing supervision of space resource development activities, one possible idea is to establish a domestic legal framework in each country and also build a legal framework for coordination among countries, as mentioned in (3) below.

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13 There is disagreement on the scope of "the appropriate State Party" that can provide authorization and continuing supervision. One of the views is that, in addition to territorial countries and countries of nationality, other countries that regard themselves as "the appropriate State Party" fall under the category of the "the appropriate State Party." ("Introduction to Space Law for Entrepreneurs" edited by Souichiro Kozuka and Masahiko Sato (2015, Yuhikaku) p.p. 46-47 [Setsuko Aoki])

14 "Introduction to Space Law for Entrepreneurs" edited by Souichiro Kozuka and Masahiko Sato (2015, Yuhikaku) p. 46 [Setsuko Aoki]

In considering the contours of such a potential framework, it is helpful to refer to the CSLCA. The CSLCA states in §51302 that commercial exploration and commercial recovery of space resources by United States citizens are subject to authorization and continuing supervision by the Federal Government. A report regarding the CSLCA[15] clearly concluded that the United States has national responsibility under Article VI of the Outer Space Treaty and also stated that the United States government will consider how to implement an authorization system in line with Article VI of the Outer Space Treaty. The report then states the following: the United States will not implement a comprehensive regulatory frameworks covering all space activities. The report also states that the legal framework that is to be built should not be one that imposes burdens on private companies but one that encourages private companies, on the condition that the framework fulfils the United States' obligations under treaties and that safety is ensured. The United States will consider a legal framework in which the U.S. Federal Aviation Administration (FAA) shall supervise reviews undertaken by each government department or agency.[16]

(1) Requirements and Conditions for Authorization

A. Requirements and Conditions to Ensure Private Compliance with Japan's Obligations under the Outer Space Treaty

As shown by the first sentence of Article VI of the Outer Space Treaty, the purpose of creating a framework for the authorization and continuing supervision of space resource development is to assure that the activities of private business operators from each member state are carried out in conformity with the provisions of the Outer Space Treaty. Therefore, we think that the requirements and conditions for authorization must ensure that private business operators comply with the obligations imposed on each country by the Outer Space Treaty.

In a Study Group meeting, it was pointed out that, for example, imposing the following requirements and conditions was a possible idea.

(A) Influence on the Space Environment and Earth Environment

Article IX of the Outer Space Treaty obligates the contracting parties to pursue studies of outer space, including the moon and other celestial bodies, and conduct exploration of them in a manner as to avoid harmfully contaminating outer space and also so as to avoid adverse changes in the environment of Earth resulting from the introduction of extraterrestrial matter.

Therefore, we think that, as a requirement and condition for authorization, the space resource development that private business operators intend to carry out must not cause any adverse changes to outer space or, if they intend to bring back extraterrestrial matter, to the environment of Earth.[17] We will revisit this later in (3)C below.

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15 See the report under Sec. 402 of the Commercial Space Launch Competitiveness Act.

16 The report under Sec. 108 of the Commercial Space Launch Competitiveness Act also contains the same statements.

17 For example, as stated in (3)C below, with respect to the prevention of epidemics (such as preventing microbes of Earth origin, attached to a satellite, from propagating themselves within outer space and causing changes to the space environment), since 2002, the Committee on Space Research (COSPAR), which is an international organization in the field of space science, has informed a wide range of international consortiums, such as the Committee on the Peaceful Uses of Outer Space (COPUOS), of the unified COSPAR Planetary Protection Policy (which does not have a legally binding effect) prepared by the Panel on Planetary Protection, and has recommended that the policy be used as international standards. Based on the COSPAR Planetary Protection Policy, each country is formulating policies in accordance with the type of exploration carried out by the country.

(B) Setting the Permissible Period of Use

As stated in Part 2, 1 above, Article II of the Outer Space Treaty is construed as prohibiting the ownership of outer space, including the moon and other celestial bodies.

On the other hand, it seems that it will be essential in many cases to establish bases on celestial bodies to enable the mining of space resources. Thus, we think that the realistic solution to handle this actual business necessity, while also ensuring compliance with the above provision of the Outer Space Treaty, is to permit certain areas of celestial bodies to be used for a defined period of time in conjunction with authorizing space resource development.[18]

In this regard, it will be necessary to carefully consider the acceptable duration for rights of use so as not to, in practice if not in name, permit those areas to be owned by Japanese entities which receive authorization from the Japanese government. These considerations should include, among other things, the number of years for which an entity may use areas of a celestial body, whether or not to allow use for different periods of time depending on the details of a proposed development activity, and other matters. As stated below, we think it desirable to ensure, through consultation among countries, that the period of use granted to the same type of activities does not differ from one country to another.

(C) Interference with the Space Activities of Other Countries

Article IX of the Outer Space Treaty states, "If a State Party to the Treaty has reason to believe that an activity or experiment planned by it or its nationals in outer space, including the Moon and other celestial bodies, would cause potentially harmful interference with activities of other States Parties in the peaceful exploration and use of outer space, including the Moon and other celestial bodies, it shall undertake appropriate international consultations before proceeding with any such activity or experiment."

In a Study Group meeting, it was pointed out that due to the provision above, the requirements for authorization of space resource development activities must include a requirement that the contemplated space resource development activity is not likely to cause harmful interference with existing activities of another State.

In order to assess whether or not a proposed activity would comply with this requirement, we think that it shall be necessary to develop an information system through which a country can apprise itself of the space activities of other countries and of the business operators of other countries. It will also be necessary to establish an international framework through which the proper priority of the space activities of different States or of business operators from different countries is decided. We will discuss this later on in our report.

(D) Obligation to Remove Facilities

Where any of the facilities or other such physical structures or fixtures installed on a heavenly body for use in space resource development will remain unremoved after the expiration of the period of authorization for the proposed space resource development, if the remaining facilities or other physical structures or fixtures may interfere with the activities of other persons who intend to engage in space resource development, this may give rise to an issue under Article IX of the Outer Space Treaty, which imposes upon the States Parties the obligation to hold consultations in the event of possible harmful interference with activities of other member states.

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[18] Luxembourg's draft law regarding private space resource development also states that authorization for resource development will be issued per project with a defined term.

In a Study Group meeting, it was pointed out that, for the purpose of avoiding a situation in which abandoned facilities or structures are interfering with others' space activities, the issuance of authorization for space resource development activities may need to be conditioned upon, when necessary, an obligation to remove the facilities and the like that it intends to use for space resource development from the relevant area. The necessity for such a requirement should take into account the details of the facility plans and the like.

(E) Consideration of the Common Interest of Mankind

The Outer Space Treaty states in its preamble, "Recognizing the common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes," and also states in Article I, "The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries."

a. Sustainability

Firstly, the statements contained in the Outer Space Treaty and reproduced above may give rise to discussions about whether it is necessary to set a limit on the amount of space resources subject to development so as not to damage the interests of other countries or all mankind in those space resources, as well as whether or not the use of space resources should be required to be sustainable. What is being discussed here is sustainability in the sense of sustainable growth as discussed by the United Nations. Separately from the foregoing, there are active discussions in the space field regarding the promotion of long-term sustainability in outer space activities. The Study Group considers analysis from the viewpoint of sustainable growth, as opposed to long-term sustainability, to be a matter to be dealt with in the future.[19]

From the viewpoint of sustainable growth, we think that it is appropriate to proceed as follows.

If "the common interest of all mankind" is interpreted as requiring sustainability, and "sustainability" is construed as prohibiting any use of non-renewable resources, then it will be impossible to conduct space resource development. However, if we look to the course of resource development on Earth thus far as a guideline, it is clear that despite the fact that oil, natural gas, coal, etc. are non-renewable resources, no measures have been taken to prevent them from being developed or used. Thus, in the case of resource development on Earth, it seems that "sustainability" is not understood to mean refraining from diminishing finite resources, but rather it is understood to be analyzed from the perspective of whether or not it is beneficial to mankind for one to engage in an activity which uses finite resources.

In a Study Group meeting, it suggested that sustainability regarding space resource development should similarly be interpreted from the perspective of whether use of the relevant resources will contribute to the sustainable growth of mankind. When space activities are carried out, if the use of space resources for space activities will be more efficient than the use of resources from Earth, we

[19] Sustainability has been generally discussed in the context of how a balance between the environment and development should be kept. For example, the "Rio Declaration on Environment and Development" from the United Nations Conference on Environment and Development states, "Human beings are at the centre of concerns for sustainable development" (Principle 1). On the other hand, to date, sustainability within outer space has been discussed under the concept of long-term sustainability of outer space activities. For example, the Working Group on the Long-term Sustainability of Outer Space Activities was established in the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space (COPUOS). In June 2016, the COPUOS agreed to the first set of guidelines for the long-term sustainability of outer space activities (Report of the Committee on the Peaceful Uses of Outer Space, para. 130, ANNEX (A/71/20)). In this Report by NIALS, we do not consciously make a distinction between these concepts; however, we think that these concepts of sustainability need to be sorted out in the future.

think that the use of space resources should be considered to contribute to sustainability in such a sense.

b. Distribution of Benefits to Developing Countries

As a second issue, discussions may arise regarding whether it is necessary to give special consideration to developing countries. Specifically, the statements of the preamble and Article I of the Outer Space Treaty above may give rise to the argument that the benefits of space resource development should not be monopolized by countries that take the lead in space resource development and that it is necessary to enable developing countries to enjoy the benefits of such development as well.

In this regard, in the Study Group meetings, it was suggested that the principle under the Space Benefits Declaration should be followed with respect to distribution of benefits to developing countries. The Space Benefits Declaration states that "All States . . . should contribute to promoting and fostering international cooperation on an equitable and mutually acceptable basis" in the exploration and use of outer space for peaceful purposes (paragraph 3)[20] and stipulates as follows (paragraph 5):

> International cooperation, while taking into particular account the needs of developing countries, should aim, *inter alia*, at the following goals, considering their need for technical assistance and rational and efficient allocation of financial and technical resources:
>
> (a) Promoting the development of space science and technology and of its applications;
>
> (b) Fostering the development of relevant and appropriate space capabilities in interested States;
>
> (c) Facilitating the exchange of expertise and technology among States on a mutually acceptable basis.

Thus, for the distribution of benefits to be "equitable" as regards developing countries, the Space Benefits Declaration does not require that resources that have been developed by a developed country be distributed to developing countries or that certain areas be kept unused for future development by developing countries, but rather it requires more generally that in aiming at, among other matters, the development of space science and technology and the development of space capabilities, States must consider the need of developing countries for technical assistance and rational and efficient allocation of financial and technical resources.

In this regard, the Study Group referred to the framework for development of the deep seabed under the United Nations Convention on the Law of the Sea ("UNCLOS") as a potential framework for the distribution of benefits to developing countries. In UNCLOS, the deep seabed is described as an area "beyond the limits of national jurisdiction,"[21] and the UNCLOS states that resources of the deep seabed are the "common heritage of mankind."[22] The UNCLOS not only prohibits States from claiming or exercising sovereignty or sovereign rights over resources of the deep seabed but also prohibits States and juridical persons from appropriating resources from the deep seabed or recovering or alienating minerals from it. Instead, the UNCLOS states that the International Seabed Authority

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20 The Space Benefits Declaration states that particular attention should be given to the benefit for and the interests of developing countries and "countries with incipient space programmes stemming from such international cooperation conducted with countries with more advanced space capabilities" (paragraph 3).

21 Article 1, paragraph 1, item (1) of the UNCLOS.

22 Article 136 of the UNCLOS.

("ISA") acquires and exercises all rights regarding resources of the deep seabed for all mankind.[23] Then, with respect to resource development, the UNCLOS adopts two methods: in the "parallel" method, development by entities that belong to the ISA and development by states and private companies are conducted in parallel;[24] and in the "banking" method, if states or private companies intend to develop the deep seabed, they must make an application for two mining areas that are expected to have equivalent commercial value, then they may acquire a right of development for either of the mining areas, and the ISA will develop the other mining area through the its own entities or in alliance with developing countries.[25]

The Study Group considered the possibility of building a similar framework for space resource development. However, the Study Group has concluded that it was not necessary to implement a space resource development system to benefit developing countries that is based upon the framework for resource development in the deep seabed, considering the following factors: 1) the above-mentioned framework for deep seabed development has not functioned well; 2) the Space Benefits Declaration which, as discussed above, already addresses space resource development, does not expect States carry out resource development in a manner similar to that of deep seabed development under the UNCLOS.

Based on the above, it is not necessary to condition authorization for space resource development upon the establishment of areas reserved for development by developing countries or to distribute resources that have been developed to developing countries. Special consideration for developing countries should take the form of the provision of technical assistance or the like to developing countries by the countries that take the lead in space resource development. We think that it is necessary to discuss how frameworks for such technical assistance or the like should be designed in the future. One possible framework would require that business operators who engage in space resource development disclose technology regarding space resource development to developing countries in some way.

Because the Space Benefits Declaration states that it is necessary to allocate financial resources to developing countries, one possible idea to fulfill that mandate is to build a system in which license fees which must be paid to receive space development resource authorization are collected from business operators who engage in space resource development and then distributed to developing countries. However, based on the Space Benefits Declaration, it appears that simply distributing funds related to space development to developing countries is not enough. Rather, the funds collected as license fees need to be used for the developing countries' development of space-related technology. Naturally, such license fees must not destroy the profitability of space resource development by private business operators, lest the fees deter space resource development by private operators altogether. Furthermore, if a framework which aims to benefit developing countries in this fashion is built, we think that it would be necessary that the same framework is implemented by each country, such as through formulation of an international fund, rather than having each country build its own individual framework. Otherwise, competitive conditions for business operators from different countries will vary, and businesses in one country which does not levy significant fees for the sake of developing countries will obtain an unfair advantage over the businesses of another country which levies and contributes more funds to developing countries.

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[23] Article 137 of the UNCLOS.

[24] Article 153 of the UNCLOS.

[25] Annex III, Article 8 of the UNCLOS.

(F) Use for Peaceful Purposes

Article IV of the Outer Space Treaty states, "The Moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes."[26] Therefore, we think that the requirements for authorization must include the requirement that the proposed space resource development constitute a peaceful purpose.[27]

B. Requirements and Conditions that Are Not Mandated by the Outer Space Treaty

Although they are not mandated by the Outer Space Treaty, the following matters can be requirements and conditions for authorization regarding space resource development:

(A) Safety of Other Participants on Earth and in Outer Space

In the Study Group meetings, it was suggested that a provision requiring that the safety of other participants on Earth and in outer space will not be threatened by the proposed space resource development may need to be included in the requirements for authorization, in addition to the provisions of Article IX of the Outer Space Treaty, which covers instances where harmful interference with other countries may arise.

(B) Payment of License Fees

In addition to (A) above, although it is not obligatory under the Outer Space Treaty, a country could require the payment of license fees to receive authorization to develop space resources, as has been done in the situations of other types of resource development, such as oil or gas.

In this regard, the Study Group compared the relationship between a government and a private business operator in space resource development to the relationship between a government and a business operator in the area of oil development.

In oil development, the government and the business execute a mining area agreement. One type of mining area agreement is a "license agreement," which is classified as a type of concession agreement, and countries that enter into license agreements for the purpose of controlling oil development include the United Kingdom and Australia. In such license agreements, the oil-producing country in question, which must have mining rights in the land, grants the relevant business operator(s) authorization and license for exploration and development work, and the relevant business(s) operator,

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26 However, Article IV of the Outer Space Treaty states that "[t]he use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited" and that "[t]he use of any equipment or facility necessary for peaceful exploration of the Moon and other celestial bodies shall also not be prohibited."

27 However, "use for peaceful purposes" referred to here does not immediately mean "exclusion of military use." In this regard, Article IV of the Outer Space Treaty establishes provisions regarding the types of armaments management separately for outer space itself and for the moon and other celestial bodies. Specifically, (1) with respect to outer space, Article IV stipulates that (i) any objects carrying nuclear weapons or any other kinds of weapons of mass destruction shall not be placed in orbit around Earth and that (ii) such weapons shall not be stationed in outer space in any other manner. On the other hand, (2) with respect to the moon and other celestial bodies, Article IV limits the method of use by stipulating that (i) nuclear weapons or any other kinds of weapons of mass destruction shall not be installed on celestial bodies and that (ii) all member states of the Outer Space Treaty shall use the moon and other celestial bodies exclusively for peaceful purposes. With respect to (2)(ii), while the establishment of military bases, installations and fortifications, the testing of any type of weapons, and the conduct of military manoeuvres on celestial bodies is forbidden, the use of military personnel for scientific research or for any other peaceful purposes or the use of any equipment or facility necessary for peaceful exploration of the moon and other celestial bodies is not prohibited.

at its discretion, conducts development and pays the relevant oil-producing country royalties and income taxes in exchange of the development. In a "production sharing contract," which is executed as a type of mining area agreement by some other countries including Southeast Asian countries and Qatar, the relevant oil company acts as a contractor of the relevant oil-producing country, which must have mining rights and rights of ownership of infrastructure, and the oil company pays cash royalties or distributes oil to the government in lieu of royalties,[28] or pays corporate taxes to the relevant oil-producing country.

With respect to space resource development, one possible idea is to build a framework which follows the methods adopted in the licensing for oil development, whereby the relevant country receives payment of license fees or royalties from the business operator to whom the country granted authorization. However, with respect to royalties for oil development in the countries named in the preceding paragraph, we think that their frameworks for royalties are based on the fact that mining rights to resources and rights to underground resources, for example, are vested in those countries, although the details of the systems of royalties differ from one country to another. In contrast, with respect to space resource development, as stated in Part 2, 1 above, Article II of the Outer Space Treaty prohibits countries from owning outer space, including the moon and other celestial bodies. We think that the notion of a nation acquiring rights to resources that form a part of the moon or other celestial bodies would contradict that principle.

In the first place, the reason why an authorization system for space resource development is required is that, as stated in 1 above, under the Outer Space Treaty, each country has international responsibility for the space activities of, and is required to supervise, business operators from that country. Authorization is not required on the basis that a private business operator is receiving development rights which are vested in the country which issues the authorization. Therefore, there is a difference between the purpose of the oil development authorization systems and the purpose of requiring authorization for space resource development.

Based on the above, in our view, creating an obligation that private business operators pay license fees to receive authorization for space resource development, by imitating the practice under the authorization system for oil development of imposing an obligation to pay royalties, would not be appropriate.

Whether license fees for authorization should be imposed on private business operators is an issue that needs to be considered in the future; however, we think that there would need to be a reason justifying the imposition of license fees on private business operators despite the difference between development of space resources and development of resources on Earth, such as oil. For example, as stated in A(E) above, one possible idea is to impose license fees to be used for the advancement of developing countries' space technology, which is required under the Space Benefits Declaration. However, if this idea is put into practice, attention must be paid so as not to destroy or excessively reduce the profitability of space resource development by private business operators, as stated in A(E) above. In addition, it will be necessary to build a system to ensure that the funds collected as license fees are used by developing countries for the development of space-related technologies and not for other purposes.

(2) Effect

There are two components to an authorization for space resources development: (i) authorization for (lifting a prohibition on) resource development activities in certain areas and for a certain period; and

[28] In the case of a production sharing contract, an amount of oil which should have a value corresponding to the costs of the development operation will be subtracted from the volume of production and set aside for the business operator, and then the remaining oil, which should have a value equal to the profit that would have been made from selling the oil from the development operation, will be distributed among the relevant oil-producing country and the relevant business operator(s).

(ii) for activities that require exclusivity, such as mining of resources,[29] the granting of an exclusive right of development (mining right).

With respect to (ii) above, it is possible to obtain exclusivity, at least as against other domestic business operators, by obtaining authorization for space resource development. On the other hand, as long as an authorization system is only a domestic system and is not recognized by the governments of other countries, this "exclusivity" is only a domestic exclusivity and cannot be asserted against other States or business operators from other countries. This issue will be further discussed in (3)A below.

(3) Issues that Require International Coordination

As stated in (1) and (2) above, although it is possible to build domestic frameworks for space resource development on a country-by-country basis, issues arise under such a patchwork of individual domestic systems that require coordination with other countries. Issues that require international coordination, which may arise when building domestic authorization systems for space resource development, are set forth below.

A. Coordination of Authorizations for Development

As stated in (2) above, if authorization for development is granted on a country-by-country basis, authorization given under such system can be asserted against other domestic business operators; however, it cannot be asserted against foreign business operators without something more. In addition, if two or more different countries give authorizations for development of the same site, such authorizations will conflict with each other.

Article IX of the Outer Space Treaty stipulates that, if an activity planned by a State Party or its nationals in outer space would cause potentially harmful interference with the activities of other States Parties, such State Party shall undertake international consultations prior to proceeding with the activity. Given the foregoing, the Study Group pointed out as follows: Article IX of the Outer Space Treaty contemplates a situation in which a State Party's space resource development activities, which are lawful in that State Party, compete with the activities of other States Parties, which are also lawful within those other State Parties. Namely, the situation is where an activity planned by a State Party or its nationals in outer space "would cause potentially harmful interference with activities of other States Parties" and under the Outer Space Treaty, each state party would have an obligation to undertake prior international consultations.

Based on the above, the Study Group further pointed out that it is necessary to create a forum for engaging in prior consultations or subsequent coordination among relevant countries.

With respect to the way such a forum should be designed, we think that the system adopted by the International Telecommunication Union (ITU) for the allocation of frequency bands, for example, may serve as a useful reference.[30] Frequency bands are acquired in accordance with the ITU's rules regarding radio. Specifically, (i) the ITU distributes frequencies by type of activity; (ii) the competent ministry of each country allocates frequencies domestically in accordance with the distribution of frequency designated by the ITU; (iii) the head of the ITU-R (ITU Radiocommunication Sector) is notified of such allocation of frequency; and (iv) such allocation is registered to the Master International Frequency Register (MIFR) after an examination, unless there is

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[29] In contrast, exploration of resources does not require long-term use of certain areas, and it is necessary to ensure that exploration activities can be carried out across a wide area. Thus, we think that it is not necessary to grant exclusivity of rights for the exploration of resources.

[30] The ITU also serves as a forum for undertaking international coordination regarding orbits of geostationary satellites.

technical interference found. Upon registration, the frequency will be subject to international protection.[31]

As such, the kind of framework that should be built for the coordination of authorizations for development granted on a domestic, country-by-country basis is an issue which should be considered in the future, using existing frameworks for international coordination as a reference. Further, upon such consideration, the manner of dealing with instances in which authorization for development has been issued and recorded but lies unused and no resource development is actually taking place under the authorization, should be addressed as another issue.[32]

B. Period of use

Also, with respect to the period granted for the right of use in a situation where space resource development as stated in 2(1) A(B) above involves use of a certain area, if the period granted for the right of use that each country grants for activities of a particular type is solely determined by each individual country without regard to the periods granted by other countries, then business operators in each such country will be subject to different conditions and compete on unequal terms. In addition, if there is no framework coordinating the periods for the rights of use that can be authorized for any given activity, governments may compete with other governments, granting longer and longer periods for rights of use so as to provide their national business operators with conditions that are more advantageous than those that are provided by the governments of other countries, and consequently, the period of use granted by each country may be longer than appropriate. This may result in the requirements under Article II of the Outer Space Treaty being eviscerated, and space resource development being obstructed.

Accordingly, the Study Group believes that the relevant countries should develop common standards regarding the period for rights of use granted for space resource development.

C. Environment

As stated in 2(1) A(A), Article IX of the Outer Space Treaty stipulates that the "States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter."

However, the Outer Space Treaty does not clarify the specific content and level of "harmful contamination of outer space" which is prohibited under the treaty. The Study Group pointed out that, as discussed in 3 below, since environmental issues exert heavy influence over the establishment of rules and also restricts the activities of relevant countries in the Arctic Ocean and the Antarctica, and that such issues may exist similarly in outer space. Accordingly, we think that it is necessary to reach international agreement in the future regarding the content and level of "harmful contamination," which is prohibited in outer space.

Accordingly, for example, with respect to the prevention of epidemics (such as the prevention of microbes of Earth origin, attached to a satellite, from propagating themselves within outer space and causing changes to the space environment), since 2002, the Committee on Space Research (COSPAR) has informed a wide range of international consortiums, such as the Committee on the Peaceful Uses

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31 However, with respect to satellite communications, shortwave broadcasts, and medium wave broadcasts, regarding which interference issue may arise among the relevant countries, the relevant countries are to engage in international coordination in terms of technology before such notice is given.

32 For example, with respect to the ITU, the act of applying for frequency and orbital position without any intention of actually using it has been referred to as the "paper satellite issue," and how this issue should be addressed has been considered.

of Outer Space (COPUOS), of the unified COSPAR Planetary Protection Policy prepared by the Panel on Planetary Protection, and has recommended that the policy be used as an international standard. Based on the COSPAR Planetary Protection Policy, each country is formulating policies in accordance with the type of exploration carried out by that country. We think that such an example will be helpful in considering a method for reaching international agreement regarding the content and level of "harmful contamination" which is prohibited in outer space.

Attention should be paid so that the content of such an international agreement does not, for example, prohibit any changes whatsoever to the current status of the moon and other celestial bodies, which would largely obstruct space resource development. In addition, agreements regarding the level of protection of historical and scientific heritage in outer space (for example, the place on the lunar surface where the moon explorer landed under the Apollo program in the 1960's and 1970's) may be an area of similar concern issue in the future, although they are not an environmental issue.

D. Assistance to Developing Countries

As discussed in 2(1) A(E) above, the Space Benefits Declaration requires in general terms that States consider the need of developing countries for technical assistance and rational and efficient allocation of financial and technical resources, in aiming at, among other things, the development of space science and technology and the development of space capabilities.

If each of the countries that take the lead in space resource development independently attempt to provide technical assistance and allocate financial and technical resources to developing countries, the conditions under which business operators from the relevant countries compete with one another will vary due to differences in the developing country aid systems of their countries. In addition, if countries that take the lead in space resource development attempt to avoid placing their own business operators at a competitive disadvantage, it is likely that they will end up in a "race to the bottom," each seeking to demand less and less contribution from their business operators toward assistance to developing countries. As a result, they will not conduct sufficient provision of technical assistance and allocation of financial and technical resources to developing countries.

Accordingly, the Study Group believes that it is desirable that provision of technical assistance and allocation of financial and technical resources to developing countries be conducted under an international framework and in accordance with common standards shared among all relevant countries. As such, we think that how countries should establish an international framework and common standards regarding the provision of technical assistance and allocation of financial and technical resources to developing countries pursuant to the Space Benefits Declaration will be issues that require consideration in the future.

E. Framework for Dispute Resolution

The Study Group raised the issue in its meetings that building an international framework for dispute resolution regarding space resource development should be considered.

Specifically, there will be an issue of how to construct a dispute resolution framework for disputes in which a private business operator's right to carry out space resource development is infringed by a private business operator of another country. Further, the proper construction of a framework providing for litigation against the government responsible for a private business operator that has obstructed or damaged the space activities of another is another issue that should be resolved.

We think that there are multiple options for such dispute resolution, including the following: 1) for the courts of the relevant countries to have jurisdiction over such disputes as in the case of disputes on

Earth; 2) to utilize the Permanent Court of Arbitration;[33] 3) to extend the arbitral proceedings of the United Nations Commission on International Trade Law (UNCITRAL) to such disputes; and 4) to establish an international institution having jurisdiction over dispute resolution regarding space activities.

Even if a private business operator is permitted to have the right to own resources it mined in outer space, such operator's rights may not be protected adequately without a system for dispute resolution regarding those rights. We think that in order to facilitate space resource development, it is necessary to remove uncertainty regarding dispute resolution, and the proper way for building an international framework for dispute resolution is a large issue that should be considered in the future.

3. International Framework for Authorization and Supervision

While building a framework for authorization and supervision of space resource development on a domestic, country-by-country basis (together with a framework for coordination among countries) may be an option, building a framework for authorization and supervision primarily run by international institutions is another option.

With respect to this point, the Study Group has considered the framework for the governance of the Arctic Ocean, the Antarctic Ocean, and the deep seabed as a reference.

(1) Arctic Ocean

The governance of the Arctic Ocean (the Arctic Ocean area)[34] is characterized by a combination of hard laws and soft laws.

First, in terms of hard laws, rules of the UNCLOS are applied to issues regarding territorial sea, exclusive economic zones, and the continental shelf. In addition, various treaties related to the IMO (International Maritime Organization) play an important role with respect to navigation by ships. Together with the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto(MARPOL 73/78) and the International Convention for the Safety of Life at Sea (SOLAS), rules and standards regarding "safety of ships" and "prevention of pollution of (marine) environment from ships" are established as recommendations or guidelines, subject to the resolutions of the IMO's general assembly or committees. If a dispute arises, such rules or standards so established are applied to navigation of the Arctic Ocean. Further, agreements on the protection of investment, and rules pursuant to WTO agreements also govern the relationships between countries in issues regarding the Arctic Ocean.

Also, frameworks for dialogue and cooperation have been constructed to supplement hard laws, and within such frameworks, soft laws, which have no legally binding effect, have been established. For example, eight Arctic states, as well as non-Arctic States, international organizations, and NGOs participated as observers in the Arctic Council, which was established in 1996 for the purpose of protecting the environment and promoting cooperation, coordination and interaction among the Arctic States on common arctic issues, in particular issues of sustainable development and environmental protection in the Arctic, with the involvement of the Arctic indigenous communities and other Arctic inhabitants. The Arctic Council established working groups regarding six themes, including among them the protection of the marine environment, which endeavor to understand the current status of the Arctic Ocean, to make future predictions regarding it, and to establish plans of action and guidelines

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33 However, the Permanent Court of Arbitration only has jurisdiction over disputes between a state and a state, or between a state and a company; therefore, other arbitral proceedings must be utilized for the resolution of disputes between private companies.

34 Under international law, a definition of neither "Arctic Ocean" nor "Arctic" is established.

based on the foregoing.[35] Such soft laws are also established by the IMO and other international institutions.[36]

As such, the Arctic Ocean coastal states[37] and the Arctic states[38] play a central role in establishing a hybrid regime for each issue with respect to the control of the Arctic Ocean. Under that hybrid regime, various entities and a number of forums have created hard laws and soft laws. Specifically, issues regarding legal status, attribution, and borders of sea areas are addressed within the framework of the UNCLOS, among other things. Use of sea areas, including navigation by ships, environmental conservation issues, and the exercise of jurisdiction by coastal states regarding the same, are addressed by establishing guidelines under the IMO-related treaties and within a framework of dialogue and cooperation, such as in the Arctic Council. It can be stated that the above-mentioned regime for the Arctic Ocean is such that, beginning with the premise that coastal states have territorial sovereignty, the coastal states' exercise of their jurisdiction is handled in cooperation with and supervised by other interested states, with public values such as environmental conservation or freedom of navigation working as adjustment factors.

(2) Antarctic Ocean

With respect to Antarctica, unlike the Arctic Ocean, there is no established territorial sovereignty, and the Antarctic Treaty System has been established against such a background. The system employed prevents potential conflict regarding territorial sovereignty and prevents competition for exercise of jurisdiction among consultative countries by utilizing the concepts of peaceful use, international cooperation on scientific investigations, and other public values as adjustment factors.

Specifically, the Antarctic Treaty, to which 53 countries are currently contracting parties, claims to rights to territorial sovereignty in Antarctica are suspended. The Antarctic Treaty also stipulates that "Antarctica shall be used for peaceful purposes only" (Article I), and that international cooperation in scientific investigation in Antarctica shall be promoted (Articles II and III). Further, among the contracting parties to the Antarctica Treaty, those that have established bases in Antarctica and have actively implemented scientific investigations (29 countries) hold meetings regularly (Antarctic Treaty Consultative Meetings), exchange information, and discuss the promotion of international cooperation. To date, the Consultative Meeting has adopted 200 or more recommendations and measures regarding environmental conservation in Antarctica.

As such, in Antarctica, a method has been established, with the Consultative Meetings at its core, for the establishment of relevant rules and for joint control. With respect to the Antarctic, which is the subject of the Antarctic Treaty, the Convention on the Regulation of Antarctic Mineral Resource Activities was established; however, before it became effective, mineral resource activities other than scientific investigations were entirely prohibited until 2048 due to a need for stricter environmental protection (Articles 7 and 25 of the Protocol on Environmental Protection to the Antarctic Treaty).

(3) Deep Seabed

The system for governing the deep seabed is as stated in 2(1), A(A).

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35 For example, in 2009, the guidelines regarding oil and natural gas development ("Arctic Offshore Oil and Gas Guidelines"), established by the working group for the protection of the Arctic marine environment, were adopted in the Ministerial Meeting.

36 For example, in 2002, the "Guidelines for Ships Operating in Arctic Ice-Covered Waters" (MSC/Circ. 1056 MEPC/Circ. 399, 2002) were established by the IMO's Sub-Committee on Ship Systems and Equipment.

37 The United States, Canada, Denmark, Norway, and Russia.

38 The Arctic Ocean coastal states and Iceland, Sweden, and Finland.

Under the UNCLOS, it is stipulated that the deep seabed is the "common heritage of mankind," and that the ISA shall acquire and exercise all rights regarding resources of the deep seabed, for all mankind. Also, as discussed above, two methods are adopted with respect to resource development of the deep seabed: in the parallel method, development by entities that are the ISA's development institutions and development by states or private companies are conducted in parallel; and in the banking method, if states or private companies intend to develop the deep seabed, they must make an application for two mining areas that are expected to have equivalent commercial value, then acquire a right of development for either of the mining areas, and then the ISA will develop the other mining area through its entities or in alliance with developing countries.

(4) Consideration

Likewise, for space resource development, one option would be to introduce a framework similar to the one adopted for the deep seabed, in which an international institution acquires and exercises all rights regarding space resources for all mankind. However, in a Study Group meeting, the following points were raised: 1) the framework for controlling the deep seabed does not function well; 2) it is actually very difficult to obtain the consensus necessary to organize such an international institution; and 3) under circumstances where the number of countries capable of engaging in space resource development is very limited, it would not have much meaning to organize such an institution.

Accordingly, it is thought to be essentially appropriate and realistic for each country to develop a framework for authorization and continuing supervision regarding space resource development, and to aim at building a framework for coordination between countries proceeding with space resource development, as necessary. For example, before the establishment of the rules regarding the deep seabed as stated in (3) above, the United States, West Germany, the United Kingdom, France, Japan, Italy, the Netherlands, and Belgium, which were the countries then capable of exploring the deep seabed, established the "Provisional Understanding Regarding Deep Seabed Matters" in 1984 as a framework for coordination regarding exploration of the deep seabed.[39]

The governance system in the Arctic Ocean, which employs a framework where rules are established by a relatively small number of countries concerned, serves as a useful reference with respect to the international coordination regarding space resource development, because the number of countries capable of engaging in space resource development is also very limited, as is the case in the governance of the Arctic Ocean. For issues such as mandated assistance to developing countries, in which the number of countries concerned will be larger, it may be manageable to increase the number of countries that are involved in rule establishment. Utilizing existing treaties and existing international frameworks is desirable where possible; however, only a small portion of the issues regarding space resource development can be addressed by existing treaties or international frameworks. The above-stated Hague Space Resources Governance Working Group may formulate guidelines regarding certain industry practices, and that group's product will draw attention.

As stated in 2(3), the way in which to proceed with international coordination is an issue that requires further consideration. It was pointed out in a Study Group meeting that, when establishing new rules, caution should be paid so that the concept of the "common heritage of mankind" will be refrained from being introduced to the governance of space resource development in the same manner as it has been introduced in the governance of the deep seabed and in the Moon Agreement, so that space resource development will not be obstructed. In Antarctica, rules had been established mainly by countries which have actively advanced into Antarctica; however, environmental protection was determined to be an issue which has priority over resource development, and consequently, resource

[39] Before such establishment, in 1980, the United States, West Germany, the United Kingdom, and France executed the "Agreement concerning interim arrangements relating to polymetallic nodules of the deep sea bed." The only country which was capable of exploring the deep seabed at that time was the Soviet Union.

development has been suspended in Antarctica. We think that it is necessary to take care that space resource development is not suspended as it was in the case of Antarctica, and to proceed by balancing space resource development and other public values.

Part 4 Conclusion

As discussed above, the Study Group considered the legal issues regarding ownership of space resources and a framework for authorization and supervision regarding space resources development.

The Study Group hopes that this report will stimulate discussion on a global scale on the legal framework surrounding space resources exploration and utilization.

The Study Group also hopes that development of a legal framework on space resources development will be promoted in accordance with the proposals of the Study Group, namely, that the Japanese government should (1) promote domestic rules that enable and facilitate space resources exploration and utilization by private businesses, (2) clarify that private businesses are capable of having property rights in the space resources that they mine, and (3) establish a framework for authorization and supervision of space resources development.

End.