

JOURNAL OF SPACE LAW

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out of man's activities in outer space

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ANNOUNCEMENT

The Journal of Space Law is pleased to announce that Dr. Carl Q. Christol has graciously consented to serve as guest editor of this issue. Dr. Christol is Professor of International Law and Political Science, and Chairman of the Department of Political Science at the University of Southern California. He is a member of the Advisory Panel on International Law of the U.S. State Department and a former President of the U.S. Membership of the International Institute of Space Law, International Astronautical Federation. He is a graduate of the University of South Dakota and received his Ph.D. from the University of Chicago and his LL.B. from the Yale Law School.

Dr. Christol, has contributed significantly to the development of the current issue of the Journal and the Journal expresses its gratitude to him for soliciting and providing articles, materials and generous advice. The Journal regrets that the article by Dr. Michael G. Bourély on the Legal Framework of the Spacelab/Space Shuttle Program in Comparison with the Apollo/Soyuz Test Program, could not be included in this issue due to printing limitations. It is expected that it will be published in the next issue.

The Journal cordially welcomes this outstanding lawyer, professor, and public servant to the position of guest editor and sincerely appreciates his contribution.

DISARMAMENT AND "PEACEFUL PURPOSES" PROVISIONS
IN THE 1967 OUTER SPACE TREATY

Marko G. Markoff*

I. THE TWO PROHIBITIVE RULES OF ARTICLE IV

Within the system of fundamental principles and rules governing the activities of states in the exploration and use of outer space, the provisions of Article IV of the 1967 Outer Space Treaty¹ are of special legal interest. First, they set forth one of the most important arms control developments in present international law. Second, certain rules flowing from such developments are readily affected by the pressures of the political complex and are, therefore, subject to different interpretations. Such developments and forces particularly influence the legal meaning of the expression "peaceful purposes" as used in the wording of Article IV, as well as other Treaty provisions.

In order to understand the real legal sense of the term "peaceful" in the framework of the 1967 Principles Treaty, a short analysis will be made of the substance of the arms control provisions in Article IV.² This article deals with military activities in outer space. It restricts them in two ways.

A complete *non-militarization* is achieved as regards the Moon and the other celestial bodies by the prohibitive norm in paragraph 2 of Article IV. It ensures a use "exclusively for peaceful purposes" and expressly forbids the establishment of military bases, installations and fortifications; the testing of any type of weapons, and the conduct of military maneuvers on other planets. The demilitarized status of the Moon and other celestial bodies, however, is not affected by the use of military personnel for scientific research or for any other peaceful purposes. Moreover, the use of "any equipment or

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¹Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, January 27, 1967, [1967] 18 U.S.T. 2410, T.I.A.S. 6347, 610 U.N.T.S. 205 (hereinafter referred to as "Principles Treaty", "Outer Space Treaty", "Space Treaty", "Treaty on Outer Space", "1967 Treaty" or just "Treaty").

²Article IV reads:

States Parties to the treaty undertake not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner.

The moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any types of weapons and the conduct of military maneuvers on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the moon and other celestial bodies shall also not be prohibited.

facility" is also not prohibited, if that use is "necessary for peaceful exploration of the Moon and other celestial bodies".

The second part of the arms control program included in Article IV, paragraph 1, relates to *partial disarmament* in outer space, generally. The first paragraph of that article establishes a ban of *certain* military uses of all outer space areas including the orbital zones around the Earth, namely:

- a) the placing in orbit around the Earth any objects carrying nuclear weapons or any other kind of weapons of mass destruction;
- b) The stationing of such weapons in outer space in any manner; and
- c) The installing of such weapons on celestial bodies.

Substantial authority supports the view that the term "celestial bodies" covers the Moon too, even though the Moon was not expressly mentioned in paragraph 1 nor in the second sentence of paragraph 2 of Article IV.³ It has also been officially acknowledged⁴ that "stationing" in outer space means also "deployment" around the Moon or any other celestial body, by means of orbital planetary objects or deep space probes.

The ballistic rockets, the ICBM's and FOBS's,⁵ as well as all military space objects not carrying nuclear or other mass destruction weapons, are not included in the prohibitive system of Article IV (1). Furthermore, as to those activities prohibited, enforcement can become illusory, since the prohibitive provisions are not joined with inspection measures, as they are on the Moon and, by anticipation, on other celestial bodies.⁶ Although it is doubtful that detecting the nature or the purpose of an orbiting spacecraft by means

³Cf. Treaty on Outer Space, Hearing on Executive D Before the Committee on Foreign Relations, U.S. Sen., 90th Cong., 1st Sess. (hereinafter cited as "Hearing") at 22 (1967); J. E.S. Fawcett, *International Law and the Uses of Outer Space* 35 (1968).

⁴See U.N. Docs. A/7221 (September 10, 1968) and A/BUR/SR.175 at 3 (October 21, 1968) with the explanations of the representatives of the United States, Soviet Union and Great Britain.

⁵On the "earthly situation" with regard to ICBM's, see Staff of the U.S. Sen. Committee on Aeronautical and Space Sciences, 90th Cong., 1st Sess., Report on Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies: Analysis and Background Data (hereinafter cited as "Staff Report") at 26 (Comm. Print 1967). For the FOBS's, ("Fusée à orbit partielle", missile in partial orbit) cf. the comment of the Swiss Federal Council in its Message of April 30, 1969, in 121 Feuille Fédérale 869-870 (v. I, No. 19 of May 16, 1969).

⁶The relevant Article XII of the Space Treaty reads:

All stations, installations, equipment and space vehicles on the moon and other celestial bodies shall be open to representatives of other States Parties to the Treaty on a basis of reciprocity. Such representatives shall give reasonable advance notice of a projected visit, in order that appropriate consultations may be held and that maximum precautions may be taken to assure safety and to avoid interference with normal operations in the facility to be visited.

of anti-satellite space devices, or by reconnaissance space objects, could ever lead to appreciable results, the incomplete disarmament provision of Article IV (1) has as a consequence produced an intensification of the space military efforts of the space powers, at least in respect to the enlarged verification and detection capabilities and bombs-in-orbit developments.

The real innovations of the prohibitive system of Article IV are the non-armament provisions in paragraph 2. However, they relate to remote and uninhabited planetary areas like the Moon and other celestial bodies. Military activities were not carried out there at the time the Treaty was adopted. Moreover, one of the practical aspects of using a celestial body for military purposes, the testing of nuclear weapons, had already been prohibited by the 1963 Limited Test Ban Treaty.⁷ It was relatively easy to achieve a general agreement to ban military uses of areas which were not yet utilized for such purposes and which showed a rather narrow range of possibilities for strategic use.

Although no serious difficulty arose in the Legal Sub-Committee of the U.N. Committee of the Peaceful Uses of Outer Space (COPUOS) when the final draft of Article IV was discussed,⁸ the language contained in the arms control provisions of that article gives rise to a series of questions.

First, the Treaty leaves without a positive law response the problem of the legal meaning of the expression "peaceful purposes" as used not only in Article IV, but also in other provisions of the Treaty, as well as in many U.N. General Assembly Resolutions and Declarations. What does "use for peaceful purposes" mean in the context of a treaty dealing only with *partial* disarmament?

Second, the main provision on a complete non-militarization of the Moon and the other celestial bodies in Article IV (2) contains the expression "exclusively for peaceful purposes", whereas other sentences of the same paragraph relating to the allowed use of military personnel, facilities or equipment, speak merely of "peaceful purposes", or "peaceful exploration". In Paragraph 2 of the Treaty's preamble, as well as in Articles IX and XI, only the term "peaceful" has been used. Is there any difference in the legal meaning of "exclusively peaceful" and "peaceful"?

Finally, as a fundamental treaty principle the "common interests" provision of Article I, paragraph 1 provides that exploration and use of the outer space shall be carried out for the benefit and in the interests of all countries.⁹ As a consequence of these

⁷Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water, August 5, 1963, [1963] 14 U.S.T. 1313, T.I.A.S. 5433, 480 U.N.T.S. 43.

⁸For more details on the negotiations in the Legal Sub-Committee (5th N.Y. Sess.), see U.N. Docs. A/AC.105/C.2/SR.63 and *ff.*, particularly SR.66 at 6 (July 25, 1966).

⁹Article 1, paragraph 1 of the Space Treaty reads:

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, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.

provisions several questions must be asked: What is the legal status of all non-prohibited, "defensive" military activities under the 1967 Treaty? Could they be considered perfectly lawful, as they are under classical international law which does not know of such provision as the "common interests" principle?

Without taking into account the scope and the specific obligation implied by Article I (1) of the 1967 Treaty, it is hardly possible to give a satisfactory explanation of the genuine legal sense of the language used in the Article IV and of the significance of disarmament measures in the present international law of outer space.

II. THE DIFFERENT INTERPRETATIONS OF "PEACEFUL"

Early discussions in the Legal Sub-Committee and in other U.N. organs have shown that States, and especially the two major space powers, do not have identical understanding of the legal sense of "peaceful". Opposite doctrinal views have also been expressed thereon.

Without entering into detailed analysis of all aspects of the controversy,¹⁰ it may be summed up as follows:

a) For the official authorities of several western States and for a part of the doctrine, "peaceful" is not regarded as the opposite of "military" but is meant as "non-aggressive" only,¹¹ and therefore condones "defensive" military activities. Since no contractual prohibition of outer space military uses other than those expressly mentioned in Article IV (1) of the Treaty exists, all military "non-aggressive" activities in outer space remain as lawful as they are in terrestrial, sea and air law. To consider "peaceful" as "non-military" would mean to exclude from Treaty provisions all defensive military uses of or through outer space. However, the lack of prohibitive provisions, except for the nuclear and mass destruction weapons, shows, according to the "non-aggressive" theory, that "peaceful" could not signify "non-military". Such an interpretation is also in accord with the actual practice of the major space powers. The interpretation of "peaceful

¹⁰See generally, M. Markoff, *Traité de Droit international public de l'espace* 357-67 (1973).

¹¹See Staff Report, *supra* note 5, at 11; see also Staff of the U.S. Senate Comm. on Aeronautical and Space Sciences, 87th Cong., 2nd Sess., Report on Soviet Space Programs, 1962-65, ch. VI (written by Krivickas and Ruis), at 496-7 (Comm. Print 1966). Cf. Feldman, The Report of the United Nations Legal Committee on the Peaceful Uses of Outer Space, Proc. 2nd Colloquium on the Law of Outer Space 19ff. (Vienna, 1960); Beresford, Surveillance of Aircraft and Satellites: A Problem of International Law, 27 J. Air L. & Comm. 110 (1960); Cooper, Self Defense in Outer Space and the United Nations, in I. Vlasic (ed.) *Explorations in Aerospace Law* 41 (Montreal, 1968); Finch, Outer Space for Peaceful Purposes, 54 A.B.A.J. 365-67, 110 (1968); McMahon, Legal Aspects of Outer Space, 38 Brit. Y.B. Int'l. L. 339-60 (1962); Meyer, Die Auslegung Des Begriffs 'friedlich' im Lichte des Weltraumvertrags, 18 Zeitschrift für Luftrecht und Weltraumrechtsfragen (hereinafter cited as "Z.L.W.") 28-39 (1969). Cf. also U.N. Docs. A/AC.105/C.2/SR.20 at 4 and A/CONF. 34/1X.3 at 12 (1968). C. Christol's reference in "The International Law of Outer Space" (vol. LV., Naval War College, Navpapers 15031) at 33 et seq. (1966) dates prior to the introduction, as a legally binding treaty provision, of the "common interests" principle in Article I (1) of 1967 Treaty.

purposes' as being non-aggressive and beneficial", has been affirmed in the United States Senate Committee on Foreign Relations, during the debate about the Treaty's ratification.¹²

b) According to a second school of thought, supported by other States represented in COPUOS and by many authors,¹³ "peaceful" is intended as "non-military". The same term has been used in Article I of the 1959 Antarctic Treaty in the context of complete demilitarization. Even without taking into account the semantic sense of "peaceful" (a military activity could never be "peaceful" since it bears always, actually or potentially, violence), the term should no longer be interpreted in space law in the same manner it has been in classical international law relating to the earth, sea or air. Pre-spatial law has never known the principle of "use in the interests of all countries" introduced as a recommendation in Resolution 1721 (XVI) and converted into a perfect legal norm with binding force in Article I (1) of the 1967 Treaty. Although military defensive uses of outer space by means of conventional weapons remain not prohibited, the general acceptance of the principle set forth in Article I (1) can only mean that without being expressly prohibited, military activities with non-nuclear weapons in outer space, even if "defensive" in nature, are not lawful. That is because no military activity, in present circumstances, could be carried out "in the interests of all countries"; even if "defensive" and "beneficial", it can be in the interests of a sole State, or a group of States, only.

The "non-aggressive" interpretation of "peaceful" has its background in the failure of the early talks on complete disarmament in outer space. That failure was however inevitable, without an undertaking to ban all nuclear and conventional "earth" weapons, such as missiles, aircrafts and submarines. Disarmament in outer space is closely connected with the whole disarmament problem. In the absence of parallel and co-ordinated measures, under strict international control, with respect to a gradual ban of the arsenal of weapons such as strategic bombers or nuclear submarines, the prohibition of inter-continental missiles, or of non-nuclear space military objects, would constitute a unilateral and therefore an unrealistic step toward disarmament.

The "non-aggressive" theory tends to justify the development of the space military potential and the deployment of non-nuclear weapons in outer space, including the use of

¹²Hearing, *supra* note 3, at 59.

¹³Ch. Chaumont, *Le Droit de l'Espace* 96 (2d ed., 1970); R.K. Woetzel, *Sovereignty and National Rights in Outer Space*, Proc. 5th Colloquium on the Law of Outer Space 1-44 (1962); D. Goedhuis, *General Questions on The Legal Regime of Space*, in Int'l. Law Ass'n. (I.L.A.), 50th Report 72 at 77ff. (1962); P. de La Pradelle, *Espace et Relations Internationales*, 25 *Revue générale de l'air et de l'espace* 245 (1962); cf. Goedhuis, *The Present State of Space Law*, in I.L.A., *The Present State of International Law* 218 (1973). Krivickas' and Ruisis' attempt, followed by A. Meyer and others, to set down the whole discussion on "peaceful" within a bipolar political framework is obviously not accurate. See Krivickas and Ruisis, *supra* note 11; Meyer, *supra* note 11. Neither is the problem a "semantic" one, as supposed by Krivickas and Ruisis (*id.* at 497). It concerns the juridical and not the linguistic meaning of "peaceful". Moreover, the latter sense is generally understood as "non-military," not only as "non-warlike". Cf. the authoritative statement of the former Chairman of COPUOS, presently President of the International Court of Justice, Prof. Manfred Lachs in his "The Law of Outer Space" 106 (1972).

space objects and stations for military communications and strategic reconnaissance. In accordance with such ends, and following the classical interpretation of "peaceful," not excluding non-aggressive activity, defensive military activities in outer space have been regarded as permissible and even "beneficial".

It can be pointed out, however, that in many official statements of the United States, in 1957 and particularly during 1958, the term "peaceful", as used in the context of early satellite projects and outer space uses solely for scientific purposes, was regarded as the opposite of "military",¹⁴ and not merely of "non-aggressive".

The "non-aggressive" and "beneficial" interpretation has also been adopted in Section 102 (a) of the National Aeronautic Space Act of 1958, which states:

The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind.¹⁵

Under that Act, development of space weapon systems, military defensive operations and activities, including research for defense, are compatible with the terms of the Section 102 (a) policy of "peaceful purposes". However, the declaration of intent in the enactment is a general statement of a goal, without binding force in international law. Neither the municipal statute, nor the congressional declaration of intent could create international law rules.

The declaration of intent in the congressional enactment and the analogous principle formulated as a general recommendation to States in U.N. G.A. Res. 1721 (XVI), reaffirmed in the 1963 Declaration of Principles, were *converted in a dispositive international law provision* incorporated in the Space Treaty.¹⁶ That important *metamorphosis* has not been accurately understood by a series of jurists who have, years after the acceptance of the Treaty, assumed the "non-aggressive" thesis.

¹⁴For instance, see Staff of U.S. Sen. Comm. on Aeronautical and Space Sciences, Report: Documents on International Aspects of the Exploration and Use of Outer Space, 1954-1962, 88th Cong., 1st Sess. 52,66 (Doc. No. 18; 1963); Memorandum by United States, United Kingdom, and France on the Agenda for a Summit Conference May 28, 1958, *id.* at 5. Cf. G.A. Res. 1148 (XII) of November 14, 1957: "... The joint study of an inspection system designed to ensure that the sending of objects through outer space shall be *exclusively for peaceful and scientific purposes*." (Emphasis added).

¹⁵S. Doc. No. 18, *supra* note 14, at 66.

¹⁶Article I, paragraph 1. For text, see *supra* note 9. The starting point of this provision, in the system of the United Nations space law documents, is paragraph 2 of the preamble of G.A. Res. 1472A (XIV) of December 12, 1959:

Believing that the exploration and use of outer space should be only for the betterment of mankind and to the benefit of states irrespective of the stage of their economic or scientific development.

At the beginning, this could only mean a statement of policy expressed by the General Assembly as a desire devoid of any legal effect.

III. THE EXPRESSION "PEACEFUL PURPOSES" IN THE WORDING OF THE 1967 OUTER SPACE TREATY

In order to determine the legal meaning of "peaceful", one should keep in mind that no principle of peaceful use has been included in the body of the Outer Space Treaty. As a matter of fact, the general principle of peaceful uses figures in Paragraph 2 of the Preamble only. No mention of "peaceful" exists in any of the three fundamental articles (I-III) providing basic principles and rules of space law.

An expression "exclusively for peaceful purposes"¹⁷ is included in paragraph 2 of Article IV, where it qualifies the specific regime of complete non-militarization of the Moon and the other celestial bodies.

Two additional references to the sole word "peaceful" are further included in the text of the following sentences of Article IV (2). Finally, the term "peaceful" is also used in both Articles IX and XI, in a context where no difficulties of interpretation might arise.

During the preparatory work in the Legal Sub-Committee, an attempt was made to include the provision containing the expression "for peaceful purposes" in the text of

Paragraph 2 of the preamble of G.A. Res. 1721A (XVI) of December 20, 1961, again used the same wording without any modification, as did paragraph 3 of the preamble of the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space. G.A. Res. 1962 (XVIII) of December 24, 1963. The Declaration, however, repeated the expression in paragraph one of the body of the text, stating that:

1. The exploration and use of outer space shall be carried on for the benefit and interest of all mankind.

In space law doctrines and practice, "The 1963 Declaration has been considered as a draft international agreement on the subject, not as a General Assembly resolution having the force only of a recommendation. See the statement of Mr. Morozov (USSR) at 57th meeting of the Legal Sub-Committee, 5th N.Y. Sess., July 12, 1966, U.N. Doc. A/AC.105/C.2/SR.57 at 9 (1966).

¹⁷The expression, "exclusively for peaceful purposes" appears for a first time in the relevant documents of the U.N. in G.A. Res. 1148 (XII) of November 14, 1957. Line "f" (1) states that upon its entry into force, a disarmament agreement will provide for:

The joint study of an inspection system designed to ensure that the sending of objects through outer space shall be exclusively for peaceful and scientific purposes.

In the context of that resolution "exclusively for peaceful and scientific purposes" can mean only "non-military" and not merely "non-aggressive". This is to be seen clearly from line (b) of the same paragraph 1 of the resolution which sets "peaceful use" as an opposite to the words "military purposes" and not only to "military non-aggressive" purposes.

The same expression "exclusively for peaceful purposes" has been used again in G.A. Res. 1348 (XIII) of December 13, 1958. It is to be noted that in G.A. Res. 1472 (XIV) of December 12, 1959, emphasis has been laid on the "benefit" provisions of the second paragraph of the preamble while the "peaceful purposes" expression has been maintained in paragraphs 4 and 6 of the preamble, without the adverb "exclusively." A regret of not having done the whole work that was to be done, can clearly be felt in this acknowledgment.

Article I. The proposal, supported by the delegations of India and Argentina,¹⁸ did not reach the unanimity requested. It was clear that States which interpreted "peaceful" as synonymous to "non-military" were not able to assume a direct contractual obligation to use the whole outer space "peacefully", without the parallel undertaking of practical steps and measures of general disarmament.¹⁹

For the same reason, a further proposal of India²⁰ was equally unacceptable. It aimed to extend the application field of the expression "exclusively for peaceful purposes" as used in paragraph 2 of Article IV, to *all* outer space areas. Since the Treaty did not prohibit *all* military activities in outer space, the acceptance of the principle of use "exclusively for peaceful purposes" would obviously be in conflict with the other treaty provisions. Moreover, the Legal Sub-Committee of COPUOS has never been authorized to take any decision in the field of general disarmament.

After attempt to include in the text of the leading Article I, the expression "use for peaceful purposes" had failed, its inclusion in the title of the Treaty also failed.²¹ So it remained in the preamble only. The care taken to avoid ambiguous interpretation was certainly the first cause for that refusal, too.

Being included in the preamble, where it appears at present, it may theoretically mean either "non-military" or "non-aggressive". In the first sense, its meaning covers the scope of the "common interests" principle of Article I (1) and involves the duty to refrain from any military use of outer space. In its second interpretation, "peaceful" encompasses military "defensive" activities and brings in harmony treaty provisions and present social reality. It forbids aggressive use of outer space only.

If the last interpretation were to receive support, it is necessary to ask whether it was necessary to inaugurate the Treaty with such a solemn declaration as that of Article I (1). It is more logical to suppose that even for the supporters of the "non-aggressive" interpretation, the sentence of paragraph 2 of the preamble signified non-military uses. As noticed in an authoritative comment, "if it were intended to forbid aggressive use only, mere reference to international law and the Charter of the United Nations would have sufficed."²²

On the other hand, it may be submitted that the withdrawal of any mention of

¹⁸See U.N. Doc. A/AC.105/C.2/SR.65, at 11 (1966); cf. also SR.66, at 3 (Mr. Ruda—Argentina; Mr. Rao—India).

¹⁹Cf. the explanation given by the Soviet representative Mr. Morozov, in U.N. Doc. A/AC.105/C.2/SR.66, at 6-7 (July 25, 1966).

²⁰Proposal of Mr. Rao (India), *Id.* at 6.

²¹The title of the Draft Treaty has been taken from the title of the 1963 Declaration of Principles. See U.N. Doc. A/AC.105/C.2/SR.63, at 6 (July 20, 1966). In its Article I, the Soviet Draft contained no mention of "peaceful uses."

²²See M. Lachs, *supra* note 13 in *fine*, at 106.

"peaceful" in the wording of Article I enabled the authors of the Treaty to formulate the principle of non-military use of outer space under the disguised form of the "common interests" provision.²³

As far as the "peaceful uses" principle is concerned, it is clear that it remained as a declaration of intent, since a preamble cannot lay contractual obligations with binding force. For some delegations, and particularly for the United States representative,²⁴ the sentence of paragraph 2 of the preamble, as well as the provision in Article I (1), implied an expectation which, he said, "everybody shares and believes in." For other delegations, the inclusion of the "peaceful purposes" principle in the preamble constituted a "practical solution"²⁵ which does not preclude but, on the contrary, supposes further elaboration of agreements ensuring that outer space should be fully demilitarized and used exclusively for "peaceful", i.e. for "non-military" purposes.

IV. THE FUNCTION OF THE KEY PROVISION OF ARTICLE I (1) IN INTERPRETING THE TERM "PEACEFUL"

In order to avoid misunderstandings and ambiguity inherent to "peaceful", a new principle implying a fixed obligation to use outer space exclusively for peaceful purposes, without specific reference to the language of "peaceful purposes," has been introduced into the text of the Treaty. This has been accomplished through the provision in the Principles Treaty that the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries. The principle of peaceful purposes has been achieved through a form of circumlocution in which several words are employed rather than the single word "peaceful." This has produced a prescription which is a logical derivation and which undoubtedly excludes all military uses of outer space.

²³For a further analysis, see *infra*, subtitle 4 of this study.

²⁴See statement of Mr. Arthur J. Goldberg, Ambassador of the United States to the United Nations, in Hearing, *supra* note 3, at 6.

²⁵Statement of Mr. Morozov, of the USSR, U.N. Doc.A/AC.105/C.2/SR.66 at 6 and, particularly, at 7 (1966):

A number of questions would of course remain to be dealt with, after the elaboration of the treaty, particularly the use of outer space for exclusively peaceful purposes. The problem has been in part solved (c.a.) by the ban on placing in orbit around the Earth any object carrying nuclear weapons or any other kinds of weapons of mass destruction. The Soviet Union like many other peaceful countries, was naturally in favour of a total ban of the use of outer space for military purposes.

A regret for not having done the whole work that was to be done, may clearly be felt in this official acknowledgment.

One can also ask if it would perhaps not be preferable to postpone the conclusion of the Treaty until positive results in the U.N. Disarmament Committee were reached. The very small progress toward general disarmament achieved up to now shows, however, that such a policy would have been a wrong one. A lot of important practical problems relating to activities carried out in outer space would have been left without any positive legal regulation on the international level. The chaotic situation which would have resulted would undoubtedly be detrimental to world peace and security.

It is of greatest importance for realizing the true legal sense of the Article I (1) provision to know that a proposal to withdraw the sentence referring to "the benefit and interests of all countries", from the draft paragraph 1 of Article I and to put it in the preamble²⁶ was rejected by the Legal Sub-Committee. It seems, therefore, correct to submit that the intent of the authors could only have been to create a treaty obligation with binding force under international law, and not merely a statement of goals and good will.²⁷

Although it is unlikely that this was the opinion of the United States ambassador to the United Nations, it is well established that no comment and no objection was made by him with respect to the final wording of paragraph 1 of Article I.²⁸

Such comments were, however, made by him in his analysis of Article I, as well as in the statement he made before the Senate Committee on Foreign Relations in order to obtain consent and approval of the signed Treaty.

According to these comments, which may be considered as an official expression of the governmental views on the subject matter, Article I (1) is merely "a guide for space powers in developing their programs and conducting their activities in space".²⁹ It is "quite general in character", since it was "intended to be a statement of goals and objectives" only.

These explanations did not satisfy the majority of the Committee. In a series of interventions and statements, several Committee members expressed their concern about the concept of using outer space for the benefit and in the interests of all countries, which appeared to them as "indefinite" and "vague".³⁰

The Reporter tried then to defend the supposed non-obligatory character of the "common interests" provision. His arguments were not convincing. It appeared that the principle set forth in Article I (1) was in point of fact a contractual obligation with binding force for all States parties to the Treaty:

²⁶See the proposal of Mr. Krishna Rao of India, Summary Report of 63d meeting, 5th Session of Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space, U.N. Doc. A/AC.105/C.2/SR.63, at 7 (1966).

²⁷The intent of the Sub-Committee has been that a "solemn, treaty obligation should be created, confirming with legal force that outer space, including the Moon and the other celestial bodies, should be free for exploration and use for the benefit and in the interests of all countries . . ." See the statement of Mr. Darwin of the United Kingdom, Summary Report of 70th meeting, 5th Session of Legal Sub-Committee of the Committee on the Peaceful Uses of Outer Space, U.N. Doc. A/AC.105/C.2/SR. 70 at 4 (1966).

²⁸But see the statements of Mr. Goldberg in Summary Report of the 63d Meeting, 5th Session of the Legal Sub-Committee of the Committee on the Peaceful Uses of Outer Space, U.N. Doc. A/AC.105/C.2/SR. 63 at 2,3,5 (1966).

²⁹Hearing, *supra* note 3 at 52.

³⁰*Cf. Id.* at 30-31.

If Article I were a preamble that would be one thing. But it isn't; it is an article, and a treaty obligation, and I think it brings us into an obligation to make the use of outer space available to all countries, to treat our use of that for the benefit and in the interests of all countries. Indeed that is exactly what it says.³¹

Seeking to uphold the view that no direct obligation could arise from Article I (1) and urging that the function of Article I (1) was only to provide a "broad perspective" the Reporter, who was the U.S. representative in the Legal Sub-Committee of the COPUOS, insisted that the "common interests" provision was not self-executing. He asserted that as a statement of general purpose, this rule would have to be developed by means of further negotiations and arrangements on the international level.³²

The accent put on the non-self-executing nature of the Article I (1) provision tended to minimize the validity of the "common interests" principle and to reduce its importance as an international law norm with binding force. Such an approach was certainly in harmony with the classical theory of self-executing and non-self-executing treaties, as known in American doctrine and practice in the municipal application of treaties since 1796.³³ It failed, however, to take into consideration new developments in municipal jurisprudence³⁴ and international law. Even when further legislative or executive implementing acts are needed in order to permit national courts or administrative authorities to apply a non-self-executing provision, it remains subject to compulsory execution or application in the municipal legal order. By virtue of the contractual nature of the treaty provision, which is legally binding on all contracting parties, a non-self-executing treaty rule is as operable as the self-executing ones; only its application is subject to different executory procedure, involving the legislative and the executive, rather than the judicial department. The efficacy, not the validity of the norm or its binding force, is affected by its non-self-executory nature. The Reporter's explanation received the following comment in the Senate Committee:

Any article is operable. If this were a preamble it might be interpreted in one way, but this is not a preamble. Article I is just as operable as Article IV or Article V or Article VII and this business of the treaty being non-operable in part and operable in other parts, self-executing in part and non-self-executing in part, is ambiguous.³⁵

³¹*Id.* at 59 (statement of Senator Albert Gore, Tennessee).

³²*Id.* at 12, 35 (statement of Mr. Goldberg).

³³See generally S. Crandall, *Treaties, Their Making and Enforcement* 162 (2d ed., 1916). A leading case in this matter is *Foster v. Neilson*, 27 U.S. (2 Peters) 253, 314-315 (1829) with the statement of Chief Justice Marshall interpreting Article 8 of the Treaty of February 22, 1819, between Spain and Florida. Cf. L. Erades & W. Gould, *The Relation Between International Law and Municipal Law in the Netherlands and in the United States* 329 (1961).

³⁴See e.g., *Sei Fujii v. State*, 217 P.2d 481 (Cal. App. 1950); modified by *Sei Fujii v. State*, 242 P.2d 617 (Cal. 1952); Q. Wright, *National Courts and Human Rights—The Fujii Case*, 45 Am. J. Int'l. L. 68-82 (1951).

³⁵The objection was formulated by Senator Gore, see Hearing, *supra* note 3, at 33.

As a result of the debate, a proposal was advanced to adopt an *interpretative reservation* to Article I, in order to preserve national interests and to prevent communication, reconnaissance or other "non-aggressive" military space objects from falling within the "common interests" rule's field of application.³⁶

Only after an energetic intervention of the then Secretary of State warning that the problem of a formal reservation could be "very substantial" since "nations have already signed,"³⁷ and after the statement of the then Chairman of the Joint Chiefs of Staff assuring that "no military objection" would arise to United States becoming party to the Treaty,³⁸ was the proposed official reservation rejected by the Senate Committee.

Nevertheless, it remains clear that the Article I (1) provision was ratified by the United States under the *tacit* interpretative reservation in respect to the non-compulsory character of the "common interests" principle. This is perhaps the principal reason for the "wait and see" approach put forth by commentators who have dealt with the legal content of Article I. Particularly significant is the astonishing silence of some recent space law books and studies with regard to the legal questions concerning the scope and the applicability of Article I (1).³⁹

That those who have been concerned with the political implications of the "common interests" principle should view its implementation somewhat hazily, is to be expected. The provision needs further concretization on an international level, and legislative or executive implementing acts in municipal law in order to become directly applicable. Nonetheless, its obligatory character and binding force remain quite unaffected by the specific dynamics of its application. Moreover, international law does not recognize the validity of "tracit" reservations which have not been formulated under the conditions set forth in Article 23 of the 1969 Vienna Convention on the Law of Treaties.

It is also irrelevant to argue that supposed "tacit consent" and practice of States since 1967 have given rise to a customary rule of permissible use of military non-

³⁶In order to prevent such consequences, the Committee's Chairman, Sen. J.W. Fulbright (Arkansas) said he "really would prefer article I to have been in the preamble." *Id.* at 37. *Cf.* proposal in the Legal Sub-Committee by the representative of India, *supra* note 20.

³⁷See the statement of Mr. Dean Rusk, Secretary of State, in Hearing, *supra* note 3, at 37.

³⁸On verification capability of *unilateral* weapons in space procedures, see the explanations of Gen. Earle G. Wheeler. *Id.* 84-85, 89, 92.

³⁹See e.g., S.H. Lay and H.J. Taubenfeld, *The Law Relating to Activities of Man in Space* (1970) at 98 and 101 where the authors—three years after the entry into force of the Space Treaty—expound the thesis that "the test is not and cannot be based on a definition of 'peaceful' or 'military'" and that "peaceful in the sense of the United Nations Charter and in normal use in international law means the opposite of 'aggressive' and no more," but fully ignore the existence and legal consequences of the principle set out in Article I (1). For a judicious criticism of this negative attitude, see H. Francke, 21 Z.L.W. 145-149 at 148 (1972).

aggressive objects such as reconnaissance satellites.⁴⁰ No consensus could be presumed on the basis of a practice limited to a few States, since official protestations have in fact been made, since 1967, against the use of space objects which were harmful to the interests, recognized and protected by positive international law, of other States.⁴¹

In spite of the present practice of some States, the "common interests" provision of Article I (1) continues to keep its validity as a perfect treaty obligation, and not merely as a declaration of intent showing "prevailing consensus at a time".⁴² As already pointed out, by including that provision in the body of the Treaty, and not putting it in the preamble, the authors of the Treaty clearly manifested an intention to consider Article I paragraph 1 as a fixed contractual obligation and not solely as a statement of goals without legal binding force. With its entry into force, the "common interests" rule achieved an independent significance and legal meaning, and any "*reservatio mentalis*", or further unilateral interpretation of it, are irrelevant under general international law.⁴³

Lawyers should not be unduly impressed with the novelty of the Article I (1) principle. Whereas the word "peaceful" has been differently understood, there seems to be little doubt that "use in the interests of all countries" means "use for non-military purposes".⁴⁴ The interdependence between "peaceful" in the sense of "non-military" and "use in the interests of all countries" is evident, although it had not been revealed expressly during the preparatory work of the Treaty.

It is Article I (1) and not Article IV, that fixes and determines the fundamental criterion of reference relating to the legal use of outer space. This criterion mandates the

⁴⁰ See e.g., M. Dausès & D. Wolf, *L'espionnage par satellites et l'ordre international*, 3 *Revue générale de l'air et de l'espace* (R.G.A.E.) at 295 (1973). No mention of the decisive importance of the "common interests" principle is made in this article to clarify the legal nature of strategic reconnaissance by space objects.

⁴¹ For a formal protest against the use of reconnaissance satellites, see *Al Ahram*, August 21, 1970, p. 1; *Tribune de Lausanne*, August 21, 1970, p. 32, and as a positive result, the unlawful aerospace survey of the Suez Canal area has been stopped. The public subjective right arose from the principle of Article I (1) of the Outer Space Treaty and has also been claimed by the Government of Cambodia in order to prevent the alleged unlawful use of a mirror-satellite to turn night into day throughout a vast area of Viet-Nam and neighboring countries, including Cambodia, for strategic purposes. The protestation has been addressed to the President of the United Nations Security Council. As a result, the project of the U.S. Department of Defense has not been carried out. See the letter dated May 3, 1968, from the Cambodian representative, to the United Nations, U.N. Doc. S/8574 (1968). For a Soviet official protestation against the use of military reconnaissance (spy) satellites, see the statement of the Chief Marshal of the Soviet Air Force, K. Vershinin in the *New York Herald Tribune* (Paris ed.), April 13, 1966, p. 2, col. 5. Retaliatory practice in this field of space activities cannot provide the basis for a new customary international law. For a further discussion on the subject, see *supra* note 10 at 373-380.

⁴² Cf. the brief account of the 68th annual meeting of the American Society of International Law (Space Stations: Present and Future) by W. Heymer, 23 *Z.L.W.* 177, 180 (1974).

⁴³ On the "objective existence" of the text of a treaty, as having its own value, independent of the will of the parties, see A. Favre, *Principes du Droit des gens* 251-260, at 252 (1974); cf. Articles 31, 32 of the Vienna Convention on the Law of Treaties.

⁴⁴ Cf. M. Lachs, *supra* note 13, at 105-106.

exploration and use of outer space in the interests of all states. The principle set forth in Article I (1) is intimately connected with the preamble's prescription of use for peaceful purposes, as well as with the disarmament provisions of Article IV, paragraph 1 and 2. The "soft law" of Article I (1) has been reinforced by the prohibitive rules of Article IV, which constitute a "hard law" of duly specified and self-executing treaty obligations. Yet Article IV constitutes but a limited, or partial application of the general principle contained in Article I (1). The objectives of the obligations established in Article IV are to prohibit a variety of, but not all, possible military activities in outer space. The objective of the fixed treaty obligation in Article I (1) is to obtain from all States Parties and especially from the major space powers, the required domestic legislative and executive implementing acts, to ensure that use of outer space should really be "for the benefit and in the interests of all countries".

The range of action of the rule set forth in Article I (1) is larger than the scope of the principle of "use for exclusively peaceful purposes". For instance, the unilateral use of the geostationary orbit can be really "exclusively peaceful", that is without any strategic implication, but such a use may nevertheless appear unlawful under present space law, since it is opposite to the "common interests" rule. The geostationary orbit constitutes a limited natural resource, and no lawful use of it could be duly recognized, if it is not coordinated with the legally protected interests of the other countries.

V. "EXCLUSIVELY" AS ADDITIONAL EMPHASIS ON "PEACEFUL"

A further question relates to the proper sense of the adverbial expression "exclusively peaceful" as used in the first sentence of paragraph 2 of Article IV.

In the system of specific arms control measures set forth in both paragraphs of Article IV, the qualification "exclusively peaceful" characterizes the particular use of the Moon and other celestial bodies. This use, as pointed out above, excludes all kinds of military, and not only "warlike", activities on planets other than the Earth. The mandate to use "exclusively for peaceful purposes" does not apply to all of the space environment. In the orbital space around the Earth, or in the deep space, no prohibition presently exists with respect to "non-aggressive" military use, excepting the nuclear and mass destruction weapons' ban in Article IV (1). However, the mandate to use "in the interests of all countries" replaces, in the system of the Treaty, the more restricted order to use "exclusively for peaceful purposes".

The difference between the two rules consists in the fact that the "common interests" provision is a programmatic clause of a non-self-executing nature, whereas the "exclusively peaceful" principle, so far as the use of the Moon and the other planets is concerned, requires *no additional agreements* and measures to be directly applicable. The scope and meaning of the "exclusively peaceful purposes" principle is clearly explained by the further provisions of a prohibitive character contained in paragraph 2 of Article IV. Without directly violating international law, the enforcement of the "common

interests" rule can be blocked by the lack of additional legislative, or executive, provisions promulgated by national authorities. Without affirmative national action the "common interests" rule could become a dead letter yet, the breach of a prohibitive norm is an international crime, for which a series of sanctions are available.

As far as the legal system set forth in Article IV (2) is concerned, a curious situation may be noticed. On the one hand, there is the expression "exclusively peaceful" applied to the use of the Moon and other celestial bodies. On the other hand, the sole term "peaceful" has been included with respect to the purpose of using military personnel, equipment or facility. One could suppose that "peaceful", in latter cases, would mean something different from "exclusively peaceful".

The opinion has been expressed in space law doctrine⁴⁵ that "peaceful", in the above mentioned provisions of Article IV (2), might really cover "defensive", non-aggressive, military activities too. This assumption has partially been founded in the language contained in paragraph 2, when compared with the analogous provision of Article I of the Antarctic Treaty. In the latter, all measures of military nature are expressly prohibited, whereas in Article IV (2) of the Space Treaty only examples are given, without indicating a general prohibition of "all" activities of a military character.

However, the list of the prohibited uses in Article IV (2) is an explanatory, not an exhaustive one. The presence of the two "peaceful" provisions relating to the use of military personnel and "any equipment," is therefore not to be understood as being a concession in favour to the "non-aggressive" interpretation of "peaceful", but as a necessary illustration of the legal concept of "military". That meaning is to be determined by the purpose and real application of a given space activity, and not by the presence of "military" components in the use such as the status (civil or military) of the crew, or the nature of the space equipment. Therefore, the expression "any equipment" should not be interpreted to include arms or weapons, but rather mean equipment to support lawful space activity, such as exploration instruments, uniforms, cosmic suits, etc. Any breach in this understanding would endanger future exploration on other celestial bodies and would jeopardize the whole disarmament system of Article IV (2). No "exclusively peaceful" exploration can be conceived under the cover of military "defensive" arms.⁴⁶

⁴⁵*Cf.* J.E.S. Fawcett, *supra* note 3, at 34-36. *Cf.* also a more recent statement of the U.S. delegate, Mr. A. Frutkin in COPUOS, U.N. Doc.A/AC.105/PV.113 at 8 (September 7, 1972). The need for a special approach for analyzing the Space Treaty is stressed by Brooks in his *Legal Aspects of the Lunar Landings*, 4 *Int'l. Lawyer* 415-432 at 427 (1970).

⁴⁶The intent of the United Nations General Assembly has obviously not been to cover military preparations, or military defensive activities, while speaking of use of outer space "exclusively for peaceful and scientific purposes." See C.W. Jenks, *Preliminary Report to the Bruxelles Session of the Institut de Droit International*, 50 *Annuaire de l'Institut*, pt. 1, 128-383, at 171 (1963).

If presence of life were to be found on another planet (such eventuality does seem unrealistic nowadays and for a long time in the future)—and the need to protect astronauts from biological danger becomes actual, particular provisions concerning the use of specific defensive instruments (not necessarily arms) may be elaborated.

The specific emphasis on "exclusively" can be perceived also by comparison to a series of provisions in the newly proposed law for the sea-bed and the ocean floor. Paragraph 3 of the U.N. General Assembly Resolution 2660 (XXV) of 1970 contains the expression "exclusively for peaceful purposes" with respect to the acknowledgment that certain ocean areas may be reserved for the common interests of mankind. This provision was not included in the 1970 Treaty on the prohibition of the emplacement of nuclear weapons and other weapons of mass destruction on the sea-bed and the ocean floor and in the subsoil thereof. Moreover, the language "for peaceful purposes" and not the adverbial sentence containing the expression "exclusively for. . .", has been incorporated in the preamble only, just as in the case of the preamble of the Outer Space Treaty.

The different degrees of intensity in which the term "peaceful" figures in both treaties, seem to correspond with the different legal realities to which it should apply. Where a complete demilitarization has been established, the restrictive expression "exclusively peaceful" has been utilized in the wording of the Treaty (Article IV, 2). The same expression does figure in Resolution 2660 also, but there it cannot mean a contractual obligation with binding force, inasmuch as that resolution has not been unanimously agreed by the United Nations General Assembly. Since no complete disarmament of the sea-bed and the ocean floor has been achieved by the 1970 Treaty, the term "peaceful" only has been used in its preamble, in the same manner as in the preamble of the Space Treaty. In both places the term constitutes an acknowledgment, a recommendation and an expectation only, even for contracting parties for which "peaceful" did, and does really, mean "non-military".⁴⁷ Similarly, "exclusively peaceful", as contained in Resolution 2660 applies to a general intent only, not to a fixed legal regulation under general international law.

The views of the Swiss government as to the meaning of Article IV (2) may be quoted in order to show that "peaceful", as used in that paragraph of the Space Treaty, could not mean something very different from "exclusively peaceful", that is "non-military". The Swiss Federal Council preferred to use the expression "for non-military purposes" instead of "for any other peaceful purposes" as contained in the third sentence of paragraph 2. "Peaceful" has therefore been understood as synonymous to "non-military" in the context of Article IV, and even in the text of the whole Treaty:

Military personnel and installations can nevertheless be used in the whole outer space for non-military purposes.⁴⁸

That "peaceful" signifies, according to the genuine semantic sense of the word, "non-military", and not merely "non-aggressive" in the language of all newly created international agreements, is to be seen in Article II of the Statute of the Atomic Energy

⁴⁷*Cf.* Summary Report of 66th meeting, 5th Session of Legal Sub-Committee of Committee on Peaceful Uses of Outer Space, U.N. Doc. A/AC.105/C.2/SR.66 at 7 (1966).

⁴⁸See, Message, *supra* note 5 at 870.

Agency⁴⁹ and particularly in Article I of the 1959 Antarctic Treaty, where the provision "Antarctica should be used for peaceful purposes only" covers a regime of complete disarmament and non-militarization of that area. "Any measure of a military nature" (second sentence of Article I) is expressly prohibited. The analogy between this text and paragraph 2 of the 1967 Treaty is obvious.⁵⁰

VI. THE CONCEPT OF "LAWFUL" IN SPACE

Legality means conformity with an existing, *i.e.*, valid, legal rule or principle. There are two kinds of law norms in the international legal order, dispositive and prohibitive. Therefore, the criteria for lawfulness in general international law are more complicated than in municipal law.

A conduct is lawful until inhibited by established principles or rules of law; a conduct of a state is unlawful when contrary to a clearly established principle or rule of international law.

All forms of military, and not only "warlike", uses of outer space, including defensive activities, are in conflict with the clearly established principle set forth in Article I (1) of the Space Treaty. Non-aggressive, or defensive, uses of outer space cannot be lawful since almost all existing states have agreed on that principle. Such uses are still legally permissible under the international law relating to earthly, sea or air activities but they are prohibited by the law of outer space.

The principle of Article I (1) is not a "*de lege ferenda*" provision; it expresses a fixed treaty obligation addressed to all contracting parties and in particular to all space powers. That obligation is to take all necessary measures including implementing acts to ensure its practical application. That obligation does exist *de lege lata*, since the Outer Space Treaty is a valid international law document.⁵¹

It has recently been submitted in space law doctrine⁵² that the provision of Article I (1) of the 1967 Treaty lacks legal force, since the Treaty allowed—if only by implication—military uses of outer space. Prevailing protection of national interests in the

⁴⁹In the text, "the contribution of atomic energy to peace, health and prosperity throughout the world" is linked with the goal that it be "not used in such a way to further *any military purposes*." (Emphasis added). For details, see B. Cheng, *International Co-operation and Control: From Atom to Space*, 15 *Current Legal Problems* 266 (1962); G. Zhukov, *Atomic Demilitarization of the Cosmos*, 34 *Sovetskoe Gosudarstvo i Pravo* 79-89 (1964).

⁵⁰On similarities to the Antarctic Treaty, *cf.* C. Christol, *supra* note 11, at 257-259.

⁵¹*Cf.* V. S. Vereschchetin, *Kosmos, Sortrudnichestvo, Pravo* (Space, Collaboration, Law) 21 (1974), emphasizing the obligatory character and the binding force under international law of the Treaty.

⁵²*Cf.* D. Goedhuis, *The Present State of Space Law in International Law Association 1873-1973, The Present State of International Law* 201-24, at 210 (1973).

Treaty, above any other interests, as well as implicit "authorization" of military "non-aggressive" uses (excepting those expressly mentioned in Article IV, 2), provide evidence, according to that opinion, for the negligible, if any, value of the rule of Article I (1).

However, lack of prohibition does not mean, under present international law, permission, or authorization. Claiming that a given military, non-aggressive activity which has not been expressly prohibited in the Space Treaty, is "permissible" and therefore a "lawful" one, sets international law back half a century, to the voluntaristic sentence of the Permanent Court of The Hague in the *Lotus* case (September 7, 1927).⁵³

If several military "defensive" uses of outer space remain yet not prohibited, this does not necessarily mean that they are legal and lawful under space law. As noticed in American space law doctrine, "international law does not consist of a detailed and all-encompassing set of prohibitions".⁵⁴ Before engaging in space activities, a State should verify not only if the activity may fall within prohibited principles and rules such as those included in both paragraphs of Article IV, but also if they are in harmony with fundamental *dispositive* rules prescribing specific lines of conduct. Such a rule is the "common interests" principle of Article I (1) of the Space Treaty. It is the key provision that determines the legal parameters of every activity in space.

It is quite superfluous to argue in order to "prove" the inaccuracy of the "common interests" rule, that nothing was said in the Treaty about who is going to determine whether or not a particular use is "in the interest of all countries".⁵⁵ Article II (7) of the United Nations Charter provides clearly that jurisdiction and control over national territory belong only to the nation-state. This means that in the case of remote sensing by satellite over a foreign territory, it is the State concerned that will be competent to decide whether or not the given activity is consistent with its legally protected interests.

Introducing a separate legal regime of activities performed on Earth as a consequence of the uses of outer space⁵⁶ seems to be an inadequate method of eliminating difficulties which arise from the application of the "common interests" rule of activities such as remote sensing or monitoring by space objects. Without using outer space, no activity such as space photography or data collection and interpretation would be possible. If the function of a tool placed in outer space is "entirely earth-oriented", its activity could no longer be treated as a genuine space activity. Though it flies in a space environment which has been declared as "free for exploration and use by all States" (Article I, paragraph 2 of the Treaty), the right of "free" flight becomes extinct when the

⁵³P. C. J. I. Series A, No. 10 at 18; On the problematic value of the principle according to which all that is not expressly prohibited is implicitly permissible, see C. Rousseau, *Droit international public* 233 (7th ed., 1973).

⁵⁴C. Christol, *supra* note 11, at 267.

⁵⁵See D. Goedhuis, *supra* n.52, at 210.

⁵⁶*Cf.* E. Galloway, *The Role of the United Nations in Earth Resources Satellites*, Proc. 15th Colloquium on the Law of Outer Space 21 (1973).

activity of the flying object does not satisfy the requirements of the "common interests" rule.⁵⁷

The overriding military aspects and strategic implications of a great number of activities in space do not attach a "hypocritical flavour" to the demand to use space in the interest of all countries.⁵⁸ Neither is it an "idealistic approach" to claim the necessity of international control in this field. The verification capabilities of national space reconnaissance objects are too limited and constitute a half-measure. Specific characteristics of the activities in space demand a general solution to the inspection problem as a part of complete disarmament.

CONCLUSION

As result of this inquiry, it appears that:

a) The expression "exclusively for peaceful purposes" is used in Article IV (2) of the Space Treaty in order to ensure that the Moon and other celestial bodies will be treated as completely demilitarized areas by reason of the prohibitive legal system established in that Treaty.

b) In order to avoid ambiguity, and bearing in mind that no full disarmament has been achieved in all of the space environment, the Treaty was drawn so as to avoid the expression "use for peaceful purposes" in the leading Article I. Instead, the drafters accepted "use in the interests of all countries". So the term "peaceful" remains either in provisions where no danger of controversy could arise (Articles IX and XI), or in the preamble where "peaceful" cannot be linked with a fixed treaty obligation. On the other hand, however, the "common interests" principle in Article I (1) implies a fixed contractual obligation to refrain from any activity that would not be in the interests of all states. In our divided world, any military activity including defensive or "non-aggressive activity", cannot be beneficial for all countries and thus cannot satisfy the fundamental requirement of the key provision of Space law.

It is possible to eliminate the discrepancy between the obligation resulting from Article I (1) and the lack of complete prohibitive rules in the arms control system of Article IV (1). Instead of looking for a new customary law that would change the provision of Article I (1), or waiting for it to die away by a slow process of atrophy, real steps should be undertaken by States, and particularly by the major space powers, to implement the "common interests" principle by a series of new international arrange-

⁵⁷ The freedom of outer space is not an original privilege arising from the nature of the space environment, but a legal consequence of the tacit refusal by states to claim national sovereign rights to that area. The renunciation has, however, been made on condition that exploration and use of outer space, including the orbital zones around our planet, should be exclusively for peaceful and scientific purposes, or, in other words, for the benefit and in the interests of all countries.

⁵⁸ Cf. F. Schick, *International Law in Outer Space*, 18 Bull. Atomic Scientists 3 (No. 9, November 1962).

ments ensuring its efficacy. A true fulfilment of the obligation set forth in Article I (1) can only be achieved if all military uses of outer space are expressly prohibited. Measures intended for the purpose of general disarmament would at the same time constitute real steps toward the carrying into effect of the basic principle of Article I (1).

The disarmament of outer space appears, in the light of the analysis of that treaty provision, a binding legal obligation resulting from a generally accepted multilateral agreement under international law. It is not merely a political issue, as the disarmament on the Earth still is. To recall the obligatory character of the legal norm set forth in the leading article of the Space Treaty—and to demand further practical measures of arms control and demilitarization—seems to be an essential task of the United Nations Committee on the Peaceful Uses of Outer Space.

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INTRODUCTION

Within the past several years, and with increasing present concern, attention has been called to what has been described as the stratospheric ozone problem.¹ A layer or belt of ozone is situated between 10 and 20 miles above the earth's surface. If the ozone in this belt is reduced, it will become increasingly possible for larger amounts of ultraviolet radiation to be received at ground level. This may lead to a larger incidence of skin cancer for human beings as well as other harms to earth and ocean-oriented events and activities.

Atmospheric ozone, as a global and renewable resource, is subject to scientific, economic, and social (including political and legal) considerations. In order to maximize the condition in which earth and ocean needs will be sustained through the presence of an optimum amount of ozone in the ozone layer, it is necessary to consider the costs of its improvident use and conversely the benefits to be realized from its proper use.

At the outset it must be stated that there is a considerable amount of uncertainty on the part of experts in the field of atmospheric chemistry as to the seriousness or potential seriousness of the present situation. This results from the fact that a number of forces are thought to be contributing to the perturbations of the stratospheric ozone layer. Differing outlooks have resulted from uncertainties as to the completeness and finality of scientific data and conclusions. This has the potential for clouding the policy responses available to decision makers charged with protecting public safety and welfare.

One major effort to assess the causes of potential danger has reached the conclusion that "There are more than 30 possible causes of observable changes in UV radiation on the ground."² Factors—both natural and man-made—identified either in theory or through verifiable experimentation, or both, suggest that one or more of the following do have or may have the potential for inducing changes in surface UV radiation levels: supernova explosions, volcanism, the effluents of high-flying jet and other fuel-burning vehicles (including space objects), earth-based industrial activities, agricultural activity including the use of nitrogen-based fertilizers and the application to crops of pesticides

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¹This subject has been treated in greater detail in my paper on *The International Legal and Institutional Aspects of the Stratosphere Ozone Problem*, A Report, U.S. Sen. Comm. on Aeronautical and Space Sciences, 74th Cong., 1st Sess. (August 15, 1975).

²A. Grobecker, S. Coroniti, and R. Cannon, Jr., *Report of Findings, The Effects of Stratospheric Pollution by Aircraft*, Final Report, U.S. Dept. of Transportation XXIV (1974).

and fungicides, accumulated chlorofluoromethanes from refrigeration systems and aerosol spray cans, and nuclear weapon testing, among others.

Concern over the possibility of man's inadvertent adverse influence upon the atmosphere first came to prominence with an awareness that high-flying aircraft produce carbon monoxide and hydrocarbons which interact with the atmosphere thereby producing nitrogen oxides (NO_x) and sulfur oxides (SO_x). More recently the possibility that the chlorofluoromethanes may produce ozone perturbations has been a subject under scientific inquiry and a matter of public awareness and concern. From the scientific point of view it is known that a chain of causation exists for the chlorofluoromethanes and that the steps in the chain proceed somewhat as follows: artificial and natural chlorine sources are transported through the troposphere and possible sinks, there is transport in the stratosphere, there is the condition of photodissociation with the release of chlorine atoms, there is an entry of the chlorine into a catalytic chain with the resultant destruction of ozone, there is a transport back to the troposphere, and there is a loss by precipitation.

Scientific methodology requires the gathering of data, an analysis of such data, the formulation of a hypothesis, a prediction of consequences, the testing of such consequences, and the modification of the hypothesis on the basis of facts and logic. Taking this methodology into account, some scholars who have examined the role of the chlorofluoromethanes as they interact chemically with other substances in the ozone layer have arrived at the conclusion that earth needs, at present, have been or are likely to be prejudiced.

Others take the position that there is no empirical evidence to support the theory that ozone is being destroyed by man's activities, and they assert that at this time it is not possible to draw valid conclusions merely from laboratory experiments and theoretical reasoning. The latter group point out that ozone is a renewable resource and that it is constantly being formed even as it decomposes. It is also their view that the mechanisms of decomposition are numerous, and that natural causes may be affected by many variables. Moreover, both man-made and natural influences upon ozone take place at various levels of intensity. Thus, these experts do not know if there is a serious problem of ozone destruction at this time. Hence, they require more empirical evidence than is presently available before they acknowledge that there is in fact a meaningful ozone depletion problem. This outlook has been influenced by the numerous possible causes of observable changes in UV radiation on the ground, as well as by the complexity of the causative interactions.

THE ROLE OF SPACE OBJECTS

Space objects can be used in two quite opposing ways in the context of the stratospheric ozone problem. In the first instance it is necessary to determine if fuels employed by such objects are likely to contribute to perturbations in the ozone layer.

Secondly, there is the prospect that space objects can serve as vehicles for the carrying of sensing or monitoring equipment so that scientific data can be acquired and subsequently used for socially desirable purposes.

There has been some concern, which is not so acute at this time as it has been earlier, that the Space Shuttle might contribute to atmospheric pollution. As planned, the Space Shuttle will possess a main engine. It will also have a second component in the form of a solid rocket motor or boosters. The main engine has been designed so as to employ three liquid oxygen/liquid hydrogen, high chamber pressure engines.³ The solid rocket booster elements of the Space Shuttle employ a fuel which includes chlorine. Effluents from these engines will be disposed of in the troposphere and in the stratosphere, as well as beyond.

Space Shuttle operations using the foregoing fuels can produce effluents consisting of water, oxides of nitrogen, hydrogen chloride, carbon, carbon compounds, and silicon. The main engines use a hydrogen/oxygen fuel, with water being the only exhaust product. While water does have the potential for enacting catalytically with ozone, it has been reported that "because of the relatively high ambient concentration of water in the stratosphere (about 10^{12} molecules/cm³) the water from the Shuttle's main engine has negligible effects."⁴ This finding has also been supported by data gathered concerning water emissions from high-flying jet aircraft, where there has been an increase in the ozone as a result of emissions of water, rather than depletion.

The solid rocket booster elements of the Space Shuttle system will consist of two "reusable solid propellant rockets."⁵ One major effluent from the solid rocket boosters will be hydrogen chloride (HCl).⁶ It was once believed that the presence of hydrogen chloride in the stratosphere might possibly produce adverse effects on the stratospheric ozone. Thus, as recently as January, 1975, Dr. James C. Fletcher, NASA Administrator, stated that

Chlorine atoms are known to catalyze the decomposition of ozone in a way very similar to the oxides of nitrogen. If the hydrogen chloride exhaust product is converted to chlorine atoms, primarily through reaction with hydroxyl radicals, then depletion of ozone could occur.⁷

This particular concern has surfaced as early as 1972 and was reflected in the Environmental Impact Statement for the Space Shuttle Program prepared in July of that

³H. R. Rep. Nos. 93-918, 93d Cong., 2d Sess. (1974) cited hereinafter as H. R. Rep. Nos. 93-818.

⁴Hearings on Planetary Science and the Earth's Upper Atmosphere, 94th Cong., 2d Sess., at 203 (1975), cited hereinafter as Hearings on Planetary Science.

⁵H. R. Rep. Nos. 93-918, *supra* n.3, at 8.

⁶Hearings on Planetary Science, *supra* n.4, at 195, 204.

⁷*Id.* at 204.

year. This concern has led to studies of the relationship of such hydrogen chloride and stratospheric ozone. One such study accepts the view that each shuttle launch will "deposit 227,600 kgm of HCl in the atmosphere by combustion of the perchlorate oxidizer."⁸ These authors concluded that since it is expected that there will be no more than 50 Space Shuttle launches in any one year, chlorine in the atmosphere from this source would constitute only a "minor" element of the totality of chlorine compounds to be found in the stratosphere.⁹ These authors considered chlorine produced by major volcanism and by the use of chlorofluoromethanes to constitute larger potential environmental hazards.

More recently Professor H. S. Johnston of the University of California has compared the respective threats to the global ozone by the Space Shuttle, supersonic transports, and chlorofluoromethanes. He has stated that

Fifty space shuttles per year would inject 0.003 megatonnes of chlorine per year into the stratosphere . . . One megatone per year of natural stratospheric NO_x destroys 70% of the naturally produced ozone. On the basis of simple comparisons between stratospheric pollution rates and one megaton, we see that the space shuttles do not pose a serious threat to global ozone but that both supersonic transports and chlorofluorocarbons do pose such a serious threat.¹⁰

NASA has conducted investigations of the effects of HCl on the stratospheric ozone through its Shuttle Environmental Effects Program. By January of 1975 the situation merited this description:

Preliminary calculations, using one dimensional models, indicated a potential ozone reduction of 0.4% based on a projected 60 Shuttle launches a year. This is an aggregate reduction that would take 20 years to attain, not the reduction per year. Also, the calculations indicate that the 0.4% value would be reached after 20 years of Shuttle operations averaging 60 flights per year. If Shuttle operations cease or if the propellant in the SRM's is changed to a nonchlorine containing compound, the ozone would be restored to its original level in less than thirty years. There exists a large uncertainty in the 0.4% number because of uncertainties in the rate of key chemical reactions and the fact that ambient stratospheric concentrations of many of the important chemical species have never been measured.¹¹

Because of uncertainties as to the possible adverse impact of HCl on the stratospheric ozone, NASA in August, 1974, initiated a study for an alternate propellant. NASA has indicated that it would change the solid rocket motor chlorine propellants if it were demonstrated that this fuel, and its effluents, would have an adverse effect on man, other animals, and plants.

⁸R. Cicerone and D. H. Steadman, *The Space Shuttle and Other Atmospheric Chlorine Sources*; Hearings Before the Subcommittee on Public Health and Environment of the House Comm. on Interstate Commerce, *Fluorocarbons—Impact on Health and Environment*, 93d Cong. 2d Sess. 266 (1974). Cited hereafter as "Fluorocarbons—Impact on Health and the Environment."

⁹*Id.* at 267.

¹⁰H. S. Johnson, *The Application of Newly Obtained Data from Studies of Supersonic Transports to the Chlorofluorocarbon Problem* 5 (n.d.).

¹¹Hearings on Planetary Science, *supra* n. 4, at 204.

A second major effluent from the solid rocket boosters will be oxides of nitrogen (NO_x). Early in 1974 NASA considered that it was possible that the interaction of the booster exhaust with stratospheric constituents might produce oxides of nitrogen, and that this might react with stratospheric ozone thereby depleting the quality of the ozone. During the intervening period this concern seems to have become groundless.

By July, 1974, it was possible for NASA to report to the Senate Committee on Aeronautical and Space Sciences that important progress has been made with respect to the hypothesized effects on the stratosphere of oxides of nitrogen. As to space objects at altitudes of 50,000 feet NASA reported that

The primary source of NO_x has been shown to be atmospheric nitrogen and oxygen entrained in the plume, rather than constituents of the rocket propellants. Also, the amount of NO_x so generated appears to be insignificant. These calculations must still be extended to higher altitudes and must further consider the parallel burning of the solid and liquid rockets of the Shuttle. However, inclusion of these factors is not expected to yield a significant increase in the predictions of NO_x quantities.¹²

Following further investigations of Space Shuttle fuels it has been possible for NASA to conclude that "it appears very likely that the space shuttle will have a negligible effect on the protective ozone layer."¹³ This appears to be attributable to two specific facts. First, the fuels to be used appear not to be composed of elements which have substantially adverse influences on ozone, nor has it been proven that prior general launches have produced such harms. Second, the number of projected Space Shuttle flights is quite limited. The contrast with hundreds of daily flights by jet aircraft in the lower stratosphere is marked.

Additional studies have been directed toward determining if the Space Shuttle would produce atmospheric-changing conditions in the mesosphere—lying above the earth between 30 and 50 miles—during reentry. It has been suggested that it is possible that the Space Shuttle might produce such atmospheric contaminants as nitric oxide, carbon, carbon compounds, and silicon in the mesosphere. However, this concern seems ill-founded and one study has concluded that "long-range environmental effects of repeated flights appear negligible."¹⁴

It would be somewhat ironic if the Space Shuttle and other space objects, which have the capacity to serve as a means to assist in the gathering of data relating to the condition of the atmosphere, were to constitute a source of environmental deterioration. In commenting on this possibility Cicerone and Stedman have observed that

¹²*Id.* at 180-182.

¹³Statement of Dr. M. S. Malkin, Director, Space Shuttle Program, Office of Manned Space Flight, in House Comm. on Science and Technology, Subcomm. on Space Science and Applications: 1976 NASA Authorization, Vol. II, pt. 3, 94th Cong., 1st Sess. 1861 (1975).

¹⁴Watson and Viegas, Preliminary Evaluation of Atmospheric Pollution by Reentry of a Space Shuttle Vehicle, NASA Technical Memorandum X-62, 130 at 1. (Ames Research Center, Moffet Field, Cal., Feb. 1973).

Current and future levels of atmospheric HC1 need to be ascertained. If Space Shuttle flights were to contribute to these needed measurements, then the understanding of the atmosphere generated could possibly outweigh their halogenous input.¹⁵

SPACE OBJECTS AND ENVIRONMENTAL SENSING

When modern sensing is accomplished by space objects nothing is being done that is not being done in other ways. The difference is that the other ways are slower, more tedious, more cumbersome, less specific, generally more ineffective, and, considering the return, probably more expensive. Among the platforms best suited to support remote measurements of the global, human, and marine environments is the space object.¹⁶ However, for space object data to be accorded optimum reliability, it is frequently necessary to make comparative use of data acquired from ground-based facilities, balloons, aircraft, and sensing rockets, as well as space objects. Moreover, each type of vehicle has special capabilities allowing for the acquisition of a highly varied body of data.

Up to the present space objects have been used effectively for the gathering of atmospheric data. The Nimbus-type object has been used to obtain information on temperatures, presence of aerosols, the quality of the ozone, and the existence of water vapor. The Atmospheric Explorer E, to be launched in January, 1976, will acquire ozone data. The Space Shuttle which will become operational at the end of the present decade will carry a number of active and passive instruments for monitoring or sensing the contents of the upper atmosphere which runs upward from a point located 25 miles above the surface of the earth. It is expected that the Atmospheric, Magnetospheric, and Plasmas-in-Space Payloads (AMPS) will be able to study the atmosphere from the troposphere, which ranges upward from 7½ miles above the earth to a distance of 75 miles.¹⁷ AMPS will include instruments including:

cooled infrared limb scanning radiometers, spectrometers for the visible and ultraviolet infrared, occultation and airglow radiometers for the visible and ultraviolet, and lidars for backscatter, fluorescence, sodium layer detection, temperature, and wind determination.¹⁸

At the present time the Stratospheric Aerosol and Gas Experiment (SAGE) is being conducted to determine the impact of aerosols on the quality of the ozone layer.¹⁹

Concern over the quality of the ozone in the stratosphere has called attention to

¹⁵Fluorocarbons—Impact on Health and the Environment, *supra* note 8 at 268.

¹⁶The term "the global environment" has been used to identify space, the moon and celestial bodies.

¹⁷See Hearings on S. 573, pt. 1, 94th Cong. 1st Sess. 280, 281, 607 (1975).

¹⁸Gille, Remote Measurements, in D. M. Hunten (ed.), *The Stratosphere, 1975-1980*, Report of a Workshop, May 28-30, 1975, at 27 (Goddard Space Flight Center, Greenbelt, Maryland, 1975).

¹⁹See Hearings on S. 573, 94th Cong. 1st Sess. pt.3, 78-79 (1975).

the need to improve the quality of instrumentation to measure accurately the presence of chlorofluoromethanes as well as a variety of other chemical substances, including nitrogen and sulfur, as they are found in the atmosphere. Such instruments, when mounted on space objects, have the present capacity—and over time will have an enhanced capacity—to monitor dangerous pollutants situated also on the ocean and on land.

INTERNATIONAL ENVIRONMENTAL LAW

A developing international environmental law is being accomplished by the perfection of instruments which can be mounted on space objects in order to gather evidence of the presence of pollutants. The emergence of international environmental law was stimulated by the United Nations Conference on the Human Environment, Stockholm, June 5-16, 1972. The 113 States in attendance adopted a Declaration consisting of 26 Principles, an Action Plan for the Human Environment consisting of 109 Recommendations, and a Resolution on Institutional and Financial Arrangements.²⁰ The meaning of the Stockholm Principles and Recommendations was summarized by Maurice F. Strong, Secretary-General of the Conference, when he stated that the States present attached importance to "every nation's responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or areas beyond the limits of national jurisdiction."²¹

Principles 6, 21, and 22 of the Stockholm Declaration have direct applicability to the legal aspects of the preservation and protection of the environment. Principle 6 states that the discharge of toxic substances must be halted. Principle 21 accepts the view that States have the sovereign right to exploit their own resources pursuant to their own environmental policies, but it also prescribes that States possess "the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction."²² Principle 22 provides that "States shall cooperate to develop further the international law regarding liability and compensation for the victims of pollution and other environmental damage caused by activities within the jurisdiction or control of such States to areas beyond their jurisdiction."²³ Conference Resolutions 70-109 relate to pollution generally including the view that it is the function of governments to minimize national practices involving the release into the environment of toxic or dangerous substances.²⁴

²⁰U.N. Doc. A/CONF.48/14 and Corr. 1 (1972); 11 Int'l. Legal Materials 1416 (1972).

²¹U.N. Doc. A/CONF., Press Release HE/S/80 at 2 (June 16, 1972); Strong, One Year After Stockholm, 51 For. Aff. 690 (1973).

²²U.N. Doc. A/CONF.48/14 and Corr. 1 (1972); 11 Int'l. Legal Materials 1416 (1972).

²³*Id.* at 1416.

²⁴*Id.* at 1449-1464.

CONCLUSION

Undoubtedly it is too soon to say that final proof exists that effluents produced by the scientifically and technologically advanced States have produced such harms to the ozone of the stratosphere that substantial harms have been caused on the surface of the earth. But, if the quality of the stratospheric ozone layer is substantially reduced, it is likely that larger amounts of UV will be received on earth and that this will be detrimental to human health, for example, through a higher incidence of skin cancer.

Further, within recent years substantial efforts have been made to develop rules of law for the global environment of space, for the marine environment of the ocean, and for the human environment of man. For each portion of the whole environment there has been some attention given to the development of law allowing those who have suffered detriment from pollutants to recover monetary damages for such harms. For example, under the Auspices of the Inter-Governmental Maritime Consultative Organization (IMCO) a "Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage" was signed in Brussels on December 18, 1971.²⁵

In considering the direction which international environmental law ought to take States have been forced to attempt to understand their interests and the genuine interests of their nationals. Advanced States, which are now experiencing the accumulated forces of past pollutorial practices, are leading in the efforts to develop an international law of the environment. Outlooks respecting the status of national development cling to perspectives of future national rights and duties. Developing States are attempting to fathom whether the development of such environmental rights and duties will allow for the assessment of damages against them as they focus on their own industrial development. Sometimes in the interest of their own development they have coupled their developmental drive with the alleged "freedom to pollute." There is a need to ascertain the respective tolerances in international environmental law as it begins to apply to States possessing highly variant stages of development. In the formulation of such legal policies it is well to remember that the atmosphere is global by definition and that pollutants produced in one part of the world are readily transported to far distant parts of the world.

If there is to be an effective international environmental law there will be a basic need to be able to acquire evidence of the presence of pollutants and their sources. At this time there is no formal international agreement which specifically prohibits the acquisition of such data via sensing procedures, including sensing carried out by space objects. The trend as reflected in international practice is wholly in the other direction. At the present time a community of interest is growing in the accumulation of sensed data for the condition of the total environment. In the United States there are new-found concerns as to the condition of the ozone in the stratospheric ozone layer.

²⁵11 Int'l. Legal Materials 284 (1972).

It is highly probable that space objects will play an increasingly important role in the identification of the general health of the stratospheric ozone layer. The utility of space objects for this purpose, and the importance of acquiring verifiable scientific data, will allow for this activity to be characterized as a peaceful use of the space environment. Such activity will therefore qualify as comporting with the principles contained in the 1967 Treaty on Principles Governing the Activities of State in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies.²⁶ Through the peaceful and continuing use of space objects in sensing activities there will be the progressive development of international space law. With the maturity of such law there will also be a very substantial inducement to international environmental law to enlarge its expanding frontiers. The mutuality of relationships between these two areas of international law will prove to be beneficial to both. Of more importance, the basic needs of mankind in an ever more interdependent world will be accorded suitable protection.

²⁶18 U.S.T. 2410; T.I.A.S. 6347; 610 U.N.T.S. 205.

**AGREEMENT BETWEEN
THE UNITED STATES
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)
AND THE
NATIONAL SPACE DEVELOPMENT AGENCY OF JAPAN (NASDA)
FOR SPACECRAFT LAUNCHING AND ASSOCIATED SERVICES
TO BE FURNISHED BY NASA IN CONNECTION WITH
THE LAUNCHING OF NASDA SPACECRAFT***

This Agreement is entered into between the U.S. National Aeronautics and Space Administration (hereafter called "NASA") and the National Space Development Agency of Japan (hereafter called "NASDA") and sets forth the terms and conditions under which NASA will furnish spacecraft launching and associated services to NASDA, at the request of NASDA and on a reimbursable basis for the launching of the Geostationary Meteorological Satellite (hereafter called "GMS"), the Medium-Capacity Geostationary Communications Satellite for Experimental Purpose (hereafter called "CS"), and the Medium-Scale Broadcasting Satellite for Experimental Purposes (hereafter called "BSE").

This Agreement is made pursuant to the Memorandum of Understanding between the Science and Technology Agency of Japan (hereafter called "STA") and NASA dated June 6, 1975 which sets forth the general understandings between STA and NASA as to the conditions under which NASA will furnish launching and associated services to NASDA for spacecraft on a reimbursable basis, and as to the responsibilities of the parties in connection with the launchings. It is intended by the parties that the specific terms and conditions set forth in this Agreement will be in accord with the general understandings set forth in the Memorandum of Understanding.

ARTICLE I—DESCRIPTION OF SERVICES TO BE FURNISHED BY NASA

1. The spacecraft launching and associated services to be furnished by NASA in connection with NASDA's spacecraft shall consist of the following:

a. Providing three Delta-type launch vehicles, in accordance with detailed interface requirements to be agreed upon between NASA and NASDA, and using its best efforts to launch the GMS, CS, and BSE spacecraft into transfer orbits.

b. Providing, upon NASDA's exercise of the options given in Article III, Paragraph 1.d., a fourth, fifth, and sixth Delta-type launch vehicle and using its best

*Text of Agreement made available by courtesy of NASA. For reference, see 73 Dept. St. Bull. 106 (1975). Annexes A-D, pertaining to cost estimates and Annex E relating to payment schedule are omitted. For a similar agreement between the U.S. and Indonesia, see Dept. of State Press Release 171, March 26, 1975.

efforts to launch the spacecraft into transfer orbits.

c. Providing suitable working areas, in accordance with requirements to be agreed upon by NASA and NASDA, for all prelaunch activities of the spacecraft including the apogee motor, at the Air Force Eastern Test Range (hereafter called ETR), and for NASDA's checkout of the spacecraft.

d. Providing tracking and data acquisition support for the prelaunch and launch phases and insertion of the spacecraft into transfer orbit.

e. Providing Spaceflight Tracking Data Network/NASA Communications System (hereafter called "STDN/NASCOM") support as may be requested by NASDA and agreed upon by NASA, and as specified in the SIRD ("Support Instrumentation Requirement Document") for NASDA to effect injection of the GMS, CS, and BSE satellite into final orbit. Such support shall be limited to use of existing facilities.

f. Providing results on the transfer orbit achieved, based on vehicle telemetry and tracking data.

g. Providing supporting studies and analyses as requested by NASDA and agreed to by NASA.

h. To the extent feasible, providing other miscellaneous services within the general scope of this Agreement required in connection with the program to launch three NASDA spacecraft, but not necessarily associated with a particular launching, as requested from time to time by NASDA and agreed to by NASA.

2. Requests for changes to the spacecraft launching and associated services to be furnished by NASA under this Agreement, whether or not styled as a request for miscellaneous services, may be agreed to by the parties as indicated in Paragraphs 2.a., 2.b., and 2.c.

a. Requests by NASDA for services (hereafter called "changes") outside of the general scope of the spacecraft launching and associated services to be furnished by NASA under this Agreement [which determination as to scope will be made by NASA], may be agreed to by NASA and such Agreement shall be evidenced solely by an amendment to this Agreement. However, if a request for a change, which falls outside of the general scope of this Agreement, is deemed by NASDA and NASA to be a limited change as described in Paragraph 2.b., then such a limited change may be agreed to by mutual written agreement between the NASDA Project Manager and the NASA Project Manager, without further formal amendment of this Agreement.

b. A limited change (and the total number of limited changes) referred to in Paragraph 2.a. may be undertaken to the extent that it is anticipated that it will

not exceed an estimated cost of \$100,000 for each launching. The mutual written agreement between the NASDA Project Manager and the NASA Project Manager for such a limited change will specify, at a minimum, the nature of the services to be performed by NASA, the estimated cost to be incurred by NASA, the time of performance, and contain the signatures of both Managers.

c. A requested change which does not constitute a change in the general scope of services to be furnished by NASA under this Agreement, as determined by NASA, may be agreed to by NASA and such agreement shall be evidenced solely by a written agreement between the NASDA Project Manager and the NASA Project Manager, without formal amendment of this Agreement.

ARTICLE II—RESPONSIBILITIES, COORDINATION AND DOCUMENTATION

1. Undertakings and Allocation of Responsibilities:

a. In connection with the furnishing by NASA of the launching and associated services provided for under Article I hereof, NASA will undertake the following responsibilities.

(1) Furnishing and updating, as appropriate, and on a timely basis, interface specifications as outlined in the Delta Spacecraft Design Restraints Manual, launch vehicle flight environment, tracking, data acquisition and command support necessary for NASDA to carry out its responsibilities under subparagraph b.(2) below:

(2) Use its best efforts to assure that the launch vehicles have been thoroughly qualified for flight and notifying NASDA in writing that the launch vehicle has been successfully tested and is prepared for the launch operations to begin. NASA will advise NASDA of scheduled project coordination meetings and other launch vehicle reviews to allow for their participation and information.

(3) Managing, with the consultation of the NASDA Project Manager, the launch vehicle-spacecraft integration.

(4) Accepting operational authority over the spacecraft from the start of integration of the spacecraft and the third stage motor and until separation from the launch vehicle. During this period, NASDA shall have the right to place a "hold" on the prelaunching operation.

(5) Managing, scheduling, and using its best efforts to assure that services are provided for the launching and injection of the spacecraft into a

transfer orbit, including its best efforts to assure that safety aspects of the prelaunch and launch operations are considered.

(6) Designating a NASA Project Manager who will be responsible for the performance of all functions, including liaison with NASDA, necessary for management of NASA's undertakings to provide launching and associated services.

b. As a means of facilitating the furnishing by NASA of the launching and associated services provided for in Article I hereof, and in order to identify clearly those services which NASA has no obligation to furnish, NASDA will undertake the following responsibilities which will be accomplished on a timely basis:

(1) Provide to NASA on a date agreed upon in writing by the Project Managers all pertinent mission requirements and constraints necessary to define the integration task and mission operations.

(2) Incorporate provisions in the spacecraft design specifications and test programs to assure spacecraft compatibility with the launch vehicle physical constraints and in-flight environment, and with tracking and data acquisition facilities, as is deemed necessary by NASDA.

(3) Provide to NASA, for review and concurrence, a copy of the GMS, CS, and BSE/Delta interface specifications and, for review, the plans for qualification and acceptance testing of the spacecraft.

(4) Provide flight-ready spacecraft at the launching range, as provided for under Article IV, Paragraph 2, hereof.

(5) Accept operational authority for the spacecraft until start of integration of the spacecraft with the third stage of the launch vehicle and from the point of separation in orbit of the satellite from the launch vehicle.

(6) Notify NASA in writing, prior to each launch, that the spacecraft has been successfully tested in accordance with the qualification and acceptance test plan.

(7) Provide qualification documentation to ensure that the hazardous systems of the spacecraft and their handling meet NASA and launching-range safety requirements.

(8) Determine mandatory launch criteria for the spacecraft and supporting stations.

(9) Provide for all control center functions required by the satellite except as otherwise agreed in accordance with Article I, Paragraph 1.e.

(10) Accept responsibility for injection of the GMS, CS, and BSE satellite into the prescribed or final orbits and maintenance of the satellites on station as required.

(11) Provide NASA, for review, with performance data relating to the spacecraft VHF (or unified S-band) telemetry and tele-command systems, to the extent necessary to ensure that outputs are compatible with the NASA ground receiving network, and are compatible with other uses of the frequency bands involved.

(12) Provide a capability for turning off the satellite transmitters.

(13) Designate a Project Manager for each spacecraft, who will be responsible for ensuring the performance of all functions, including liaison with NASA, of NASDA in connection with the launching and associated services.

2. Coordination Mechanisms:

a. Project Managers

The NASA Project Manager and the NASDA Project Manager will, through consultation, coordinate the activities of NASA and NASDA relating to the furnishing of the launching and associated services, and will call upon other individuals from their respective organizations, including their contractors and consultants, to participate as necessary and appropriate in such consultations.

b. Project Review Group

In order to review and resolve any differences which cannot be resolved by the coordination efforts of the NASA and NASDA Project Managers, a Project Review Group is established, consisting of the NASA Deputy Associate Administrator for Space Science and the NASDA Executive Director for Spacecraft or their representatives, and such additional participants as may be designated by each of them for any meeting of the Group.

c. Key Milestone Dates

Key milestone dates relating to all critical systems that affect the launching and associated services will be exchanged between NASA and NASDA. The Project Managers will advise each other of changes in milestone dates and assess the effect of these changes on critical events in the systems for which each is responsible.

ARTICLE III—SCHEDULING REQUIREMENTS

1. NASDA has called upon NASA to furnish, and NASA agrees to use its best efforts to furnish, subject to the conditions stated in this Agreement, spacecraft launching and associated services for the GMS, CS, and BSE spacecraft:

a. Launching the GMS spacecraft utilizing a Delta-type launch vehicle, in the second quarter of Calendar Year (hereinafter CY) 1977, with best efforts toward launching the GMS in June 1977. A specific launching date will be agreed upon as provided in Paragraph 3. of this Article.

b. Launching the CS spacecraft utilizing a Delta-type launch vehicle, in the fourth quarter of CY 1977, with best efforts toward launching the CS in November 1977. A specific launching date will be agreed upon as provided in Paragraph 3. of this Article.

c. Launching the BSE spacecraft utilizing a Delta-type launch vehicle, in the first quarter of CY 1978, with best efforts toward launching the BSE in February 1978. A specific launching date will be agreed upon as provided in Paragraph 3. of this Article.

d. NASDA shall have an option to call for a backup launching to take place not earlier than 180 calendar days after the date of each scheduled launching. Thus, NASDA shall have options to call for three backup launchings. An option will be exercised through a request by NASDA for NASA to procure an additional Delta-type launch vehicle for purposes of a backup launching. Such a request must be made at least 24 months in advance of an approximate launching date specified by NASDA at the time the request is made, or such shorter period as may be agreed to by NASA. Subject to subparagraph e. below, NASA will use its best efforts to schedule such launching to take place on or about the approximate date specified by NASDA. A specific launching date will be agreed upon as provided for in Paragraph 3. of this Article.

e. When agreeing to a specific launching date pursuant to Paragraph 3. of this Article, nothing in this Paragraph 1. shall be construed as requiring NASA to give priority to a NASDA launching over another launching planned by NASA.

f. For the purposes of this Agreement, the launchings discussed in subparagraph 1.a., b., and c., above shall be deemed to have become a scheduled launching as of the date of execution of this Agreement. The optional launchings discussed in subparagraph 1.d. above shall be deemed to become scheduled launchings as of the date NASDA requests NASA to procure additional Delta-type launch vehicles for purposes of the optional launchings pursuant to subparagraph d. above.

g. Notwithstanding any other provision of this Agreement, with respect to the first, second, third, or backup launchings NASA, at its option, shall not be obligated to carry out these launchings under the terms and conditions of this particular Agreement beyond the planned NASA date of phase-out of the Delta launch vehicle, whatever the cause of the delay, including delays caused by a postponement or deferral of the launching or predecessor launchings. If the launchings do not occur prior to or on that date, and at NASA's option, if it is decided not to schedule the launch at a later date, the provisions of Article V, Paragraph 5.b. hereof shall apply.

2. In connection with any of the launchings provided for under Paragraph 1. of this Article, NASDA shall give NASA as much advance notice as possible of any changes by NASDA in the mission requirements provided by NASDA pursuant to Article II, Paragraph 1.b.(1) hereof. If after consultation with NASDA, NASA determines that such changes will require modifications in the vehicle hardware and/or software, and so notifies NASDA in writing, and if NASDA desires nevertheless to make such changes in the mission requirements, NASA and NASDA shall seek to agree to any necessary change in the launch schedule, and this Agreement will then be appropriately amended. NASA shall use its best efforts to carry out the launchings in accordance with that amendment.

3. The specific date on which a scheduled launching will occur will be as mutually agreed upon in writing by the NASDA Project Manager and the NASA Project Manager. Such agreement shall be made not fewer than 60 calendar days prior to the launching date agreed upon, unless the NASA Project Manager agrees that the launching may take place in fewer than 60 calendar days from the date of such agreement. The specific launching date agreed upon may be changed to an earlier or later date by mutual written agreement of the NASDA Project Manager and the NASA Project Manager. This provision for establishing a mutually agreeable launching date shall not affect the right of NASA to postpone the launching for any of the reasons specified in Paragraph 5. of this Article III.

4. NASDA and NASA shall have the right to defer a launching beyond its specific launch date in the manner specified below:

a. (1) NASDA shall have the right to defer a launching beyond its specific launch date for a total of not more than 15 days of actual range operations by giving notice to NASA in writing of the deferral.

(2) NASDA may defer a launching beyond its specific launch date for more than 15 days of actual range operations by mutual agreement with NASA. If there is a mutual agreement to defer, the deferment shall not affect the right of NASA to postpone a launch for any of the reasons specified in Paragraphs 5.a.(2), (3), (4) and (5) of this Article.

b. (1) NASA shall have the right to defer a launching beyond its specific launch date for a total of not more than 15 days of actual range operations by

giving notice to NASDA in writing of the deferral.

(2) NASA shall have the right to defer a launching for more than 15 days of actual range operations if, in NASA's judgment, the safety or probable success of the launching would be affected due to unfavorable weather conditions, equipment malfunctions, and/or other technical reasons.

5. a. NASA shall have the right to postpone a scheduled launching for any of the following reasons:

(1) If the specific launch date agreed upon for a scheduled launching pursuant to Paragraph 3. of this Article would be deferred for a total of more than 15 days of actual range operations as a result of one or more requests by NASDA for a deferral of the launching.

(2) If NASDA fails to meet in a timely manner any one of its obligations provided in this Agreement, described in Article II, Paragraph 1.b.; Article IV; and Article V, Paragraph 8.b. and 9. However, this right to postpone one or more launches shall not be deemed to limit NASA's other rights and remedies.

(3) If NASA considers it would be necessary to defer the specific launch date agreed upon pursuant to Paragraph 3. of this Article, for a total of more than 15 days of actual range operations because, in NASA's judgment, the safety or probable success of the launching would be affected due to unfavorable weather conditions, equipment malfunctions, and/or other technical reasons. This right to postpone shall apply also to a deferral of a launching for a total of more than 15 days of actual range operations that is directed by the U.S. Air Force Director of Range Operations, Eastern Test Range, for any reason.

(4) If major modifications are required in the vehicle hardware and/or software as a result of changes made by NASDA in the mission requirements, pursuant to Paragraph 2. of this Article.

(5) If NASA is faced with a conflict between the proposed date of launching and that desired for another launching, the NASDA launching will be dealt with on the same basis as others, including U.S. launchings. Each launching will be treated in terms of its own requirements as an individual case including consideration of the financial consequences a delay would cause. NASA will consult with NASDA and with all interested parties in order to arrive at an equitable solution.

b. NASA's right to postpone a scheduled launching will include the right to launch one or more other scheduled launchings from the launch pad assigned to

the postponed NASDA launching. NASA will use its best efforts to avoid scheduling such an intervening launching or launchings, and if such scheduling is unavoidable, to limit, to the maximum extent possible, any increased costs to NASDA as a result thereof; furthermore, that NASA will also use its best efforts to reschedule the postponed launching to take place immediately following the intervening launching or launchings, if so requested by NASDA.

c. NASA and its contractors and subcontractors shall not be liable for any costs, loss of profits, or direct, indirect or consequential damages incurred by NASDA or its contractors as a result of the postponement of a scheduled launching pursuant to subparagraph a. above.

ARTICLE IV—PROVISION OF SPACECRAFT

1. NASDA will procure GMS, CS, and BSE spacecraft, which shall be so fabricated as to permit their launching by Delta type launch vehicle to be provided by NASA. NASA has furnished and will use its best efforts to furnish interface specifications to the extent necessary to permit compatibility of the NASDA spacecraft with a Delta type vehicle.

2. NASDA shall make or have made at least one flight-worthy spacecraft available at ETR by the date which has been agreed upon in writing by the Project Managers as necessary to meet the launch date requirements. NASDA shall also make or have made available at ETR the associated spacecraft ground equipment and personnel required in connection with each launching by the date or dates agreed upon in writing by the Project Managers as necessary to meet the launch date requirements.

ARTICLE V—FINANCIAL ARRANGEMENTS

1. Except as otherwise explicitly provided in this Agreement, and subject to the limitations of costs provided in Article XVIII, NASDA will reimburse NASA for all costs incurred by the United States Government in connection with, or incident to, the furnishing of launching and associated services under this Agreement, and which are properly chargeable to the furnishing of such services, as provided herein. Such reimbursable costs, which hereafter will be referred to as "governmental costs" shall be determined and charged in accordance with the following principles and procedures:

a. NASA Policy Directive (NPD) 8610.5 in effect on the date of this Agreement.

b. The accounting principles and procedures followed in the Delta Project Office.

c. The general accounting principles and procedures of NASA. To the

extent these principles and procedures do not resolve a question as to the reasonableness or allocability of a particular cost, the accounting principles of the Comptroller General of the United States shall be applied by NASA.

2. Such governmental costs shall consist of the following:

a. Nonrecurring costs incurred in connection with the program to launch a NASDA spacecraft, but not associated with a particular launching.

b. Recurring costs incurred in connection with, or, with the consent of NASDA, in anticipation of, any scheduled launching, whether or not such launching actually occurs or is successful. Such costs will include all other governmental recurring costs that are in addition to the estimated recurring-type costs normally associated with a scheduled launching, which may be incurred by NASA under the circumstances described in Paragraph 4. of this Article.

3. The types of governmental costs which shall be reimbursable by NASDA will include nonrecurring and recurring costs and are in general composed of the following cost elements but are not limited to such cost elements:

a. Nonrecurring costs:

(1) NASA contractor costs, including costs for engineering, design and testing which are not peculiar to a mission; costs for performance of analytical studies and calculation of trajectories, performance data, et al., not peculiar to a mission and appropriate overhead and administrative expenses.

(2) Department of Defense (DOD) contract administration costs associated with NASA contract costs included in subparagraph (1) above.

b. Recurring costs:

(1) Cost of the Delta-type launch vehicle provided by NASA for purposes of a NASDA launching, including all stages, engines, and attach fittings therefor, and the cost of any modifications necessary to make the vehicle suitable for use with the spacecraft provided by NASDA.

(2) Cost of transportation of the vehicle from the contractor's plant to ETR.

(3) Cost of propellants.

(4) Cost of launch services (contractual support), including in-plant support and launch site support.

(5) Cost of supporting services.

(6) Cost of other program support.

(7) DOD contract administration costs associated with NASA contract costs included in subparagraphs b.(1), (4), (5) and (6) above.

(8) Costs of project management and engineering support of John F. Kennedy Space Center (KSC) and Goddard Space Flight Center (GSFC), costs of personnel compensation and benefits, and travel performed by NASA personnel, materials and supplies, and tracking and computer support.

(9) Cost of tracking and data acquisition support.

(10) Charges for the use of, or costs of depreciation or other measure of costs for the use of, U.S. Government-owned facilities and capital equipment.

(11) Charges for range support services furnished by the U.S. Air Force (USAF) at ETR.

(12) NASA overhead and administrative expenses which shall be a percentage of the costs or expenses determined under Paragraph 3.b.(8) of this Article.

4. Subject to the limitation of costs provided in Article XVIII, costs that are in addition to the estimated recurring-type costs normally associated with a scheduled launching, as illustrated by but not limited to the following, may be incurred by the U.S. Government in which event they shall be reimbursable by NASDA pursuant to Paragraph 2.b. of this Article.

a. Direct launch services (contractual) costs, as provided for in Paragraph 3.b(4) of this Article, resulting from acceleration of the normal launching preparation time required for a launching. For this purpose, normal launching preparation time means the 90 days programmed by NASA to perform the mission modifications and vehicle checkout at the Huntington Beach facility, plus the 60 days programmed for launching preparations at the launching site at ETR. The extent of acceleration of the normal launching preparation time will be contingent upon the availability of checkout facilities, of air transportation for vehicle shipment, and of launch vehicle facilities at ETR.

b. Direct launch services (contractual) costs, as provided for in Paragraph 3.b.(4) of this Article, resulting from the deferral of a specific launching date agreed upon under Article III, Paragraph 3., unless a determination by NASA for deferral or a NASDA request for deferral is made at least 60 days prior to the then existing launch date. If the requested or determined deferral is to consist of a period greater than 15 days of range operations, NASA, at no additional costs to NASDA, may

extend the deferral period to a longer period of time or postpone the launching in order to accommodate other scheduled launchings.

c. Direct launch services (contractual) costs, as provided for in Paragraph 3.b.(4) of this Article, resulting from the postponement of a NASDA launching, except as provided in subparagraph b. above.

d. Direct launch services (contractual) costs, as provided for in Paragraph 3.b.(4) of this Article, resulting from the storage and/or revalidation of a launch vehicle, to the extent such costs are not included in the estimates of recurring governmental costs for a launching, as furnished to NASDA pursuant to Paragraph 8.a.(1) of this Article. Included in such additional costs will be:

(1) The costs of storage for a vehicle which has been procured for a launching pursuant to this Agreement from the time of acceptance of the vehicle from the contractor by NASA, and until it is removed from storage for the performance of checkout services in connection with a scheduled launching, or until NASDA and NASA agree that the vehicle will be used for a launching other than a NASDA launching, or will otherwise be disposed of, pursuant to Paragraph 5.d. of this Article. If for any reason except for the right exercised pursuant to Article III, Paragraph 5.a.(5), a vehicle is returned to storage after having been removed from checkout in connection with a scheduled launching, NASDA will be liable for any further storage charges that may accrue.

(2) The costs of revalidating the suitability of a vehicle for use in connection with a scheduled launching, where the vehicle was previously checked out, but subsequently placed in or returned to storage and NASA determines that such revalidation is necessary.

e. Costs resulting from the impact on other planned launches by NASA because of the deferral or postponement of a scheduled NASDA launching: If as the result of the deferral of a scheduled NASDA launching occurring less than 60 days prior to the specific launching date agreed upon, the Government incurs additional direct launch services (contractual) costs, as provided for in Paragraph 3.b.(4) of this Article, in connection with the launching preparations for a planned launch by NASA, NASDA will reimburse NASA for such costs, as well as for any additional costs that may be reimbursable under subparagraphs a. and/or b. above. NASDA shall not be required to pay such costs when they result from the postponement of a launching by NASA pursuant to Article III, Paragraph 5.a.(5).

5. Subject to Article VII, Paragraph 1. hereof, NASDA's liability to reimburse NASA for the cost of a Delta-type launch vehicle, as provided for in Paragraph 3.b.(1) of this Article, shall be governed by the following conditions:

a. If the vehicle is used in connection with a NASDA launching, and the

launch actually occurs, whether or not it is successful, NASDA shall be liable for the full costs thereof.

b. If, pursuant to Article III, Paragraph 1.g. hereof, the first, second, and third launchings do not take place on or before the date provided therein and NASA, at its option, does not extend the launch date, NASDA shall be liable for the full costs of the vehicle procured by NASA for such a launching, unless the vehicle is used by NASA for a launching other than a NASDA launching. In this latter event, NASDA will not be obligated to pay the full cost of the vehicle so used, but will pay (i) the cost of any modification made to the vehicle for purposes of using it for a NASDA launching, unless the vehicle as so modified can be used for the NASA launching; (ii) whichever cost is lesser (aa) the cost of remodifying the vehicle in order to use it for another launching selected by NASA. This cost will be reduced by the cost of any modifications which NASA planned to charge the NASA customer who uses the remodified vehicle; or (bb) the cost of remodifying the vehicle to the standard Delta configuration; (iii) the costs of transportation, if any, which are incurred in connection with shipment of the vehicle to ETR for purposes of the NASDA launching, and its return to the production facility; and (iv) any costs arising from revalidation of the vehicle, as provided for in Paragraph 4.d.(2) of this Article.

c. If, after having requested NASA to procure an additional Delta-type launch vehicle for the purpose of a fourth, fifth, or sixth launching pursuant to Article III, Paragraph 1.d. hereof, NASDA terminates its request for the backup launching for which the vehicle was procured, it shall be liable for the full costs of the vehicle procured by NASA for such a launching, unless the vehicle is used by NASA for a launching other than a NASDA launching. In this latter event, NASDA will not be obligated to pay the full cost of the vehicle so used, but will pay the same costs as specified in the second sentence of subparagraph b. above.

d. If a vehicle is not used for a NASDA launching, and cannot be used by NASA for a launching other than a NASDA launching, NASA agrees to cooperate with NASDA in determining what disposition can be made of the vehicle, with a view to mitigating NASDA's costs.

e. The parties recognize that NASDA does not obtain title to, or any other legal or equitable right or interest in, the launch vehicle, itself, or in any other Government property, by reimbursing NASA for part or all of the costs of that vehicle or other Government property, pursuant to this Agreement.

6. NASDA will reimburse the U.S. Government for the following costs which arise out of the performance of this Agreement.

a. Third parties' injury, death, damage or loss:

(1) All governmental costs that may be incurred as a result of the United States' liability for claims of third parties (including claims made under the Convention on International Liability for Damage Caused by Space Objects, T.I.A.S. 7762), for bodily injury or death, or damage to or loss of real or personal property, whether paid by the United States to third parties, or paid by a U.S. Government contractor or subcontractor to third parties and for which the U.S. Government is liable for reimbursement to such contractor or subcontractor. NASDA shall reimburse the U.S. Government for such costs whether or not the injury, death, damage or loss was caused by the negligence of the United States or its contractors or subcontractors.

(2) Notwithstanding subparagraph (1) above, NASDA shall not be required to reimburse the U.S. Government for costs arising out of such claims of third parties to the extent the injury, death, damage or loss:

(a) was caused by the willful misconduct of an employee of the U.S. Government or its contractors or subcontractors; or

(b) occurred prior to the start of assembly of the spacecraft with any stage of the launch vehicle. However, if, after start of such assembly, the spacecraft is disassembled from any stage of the vehicle, NASDA's obligation to reimburse the U.S. Government for such costs shall be suspended upon completion of such disassembly, and shall resume only after the above described start of such assembly.

(3) Subparagraph (2) above is not intended:

(a) to subject the U.S. Government to liability to the extent arising out of acts or omissions of NASDA, or of NASDA's contractors or subcontractors;

(b) to preclude the U.S. Government from seeking contribution in an appropriate case from NASDA, NASDA's contractors or subcontractors, or other persons; or

(c) to obligate the U.S. Government to reimburse, indemnify or hold harmless NASDA or NASDA's contractors or subcontractors for sums they have paid to each other or third parties as damages.

(4) For the purposes of this Paragraph 6.a. and Article XI, NASDA's and the U.S. Government's employees and NASDA's and the U.S. Government's contractors and subcontractors and their employees shall also be deemed to be third parties.

b. Damage to NASA launch vehicle:

Costs incurred as a result of (1) damage to or loss of a third stage of a launch vehicle assigned to a NASDA launching if such damage or loss occurs after the assembly of NASDA spacecraft with such third stage, or during such assembly, or (2) damage to or the loss of the first, second or third stages of such a vehicle, if such damage or loss occurs after the assembly of the spacecraft and third stage with such first and second stages or during such assembly. However, if, after such assembly, the spacecraft is disassembled from any stage of the vehicle, NASDA's responsibility to reimburse NASA for damage or loss of that stage will be suspended upon completion of such disassembly, and shall resume only during or after the above described assembly again takes place.

c. Damage to Government-owned equipment made available to NASDA.

Costs incurred as a result of damage to or loss of any U.S. Government-owned equipment other than damage due to ordinary wear and tear made available to NASDA or its contractors or subcontractors pursuant to Article VI hereof.

d. Damage or loss to other Government property:

Costs incurred as a result of damage or loss of U.S. Government property, real or personal, other than the Government property described in Paragraph 6.b. and c. of this Article, but only if such damage or loss is a consequence of the acts or omissions of NASDA, its contractors, subcontractors, or employees of any of them.

7. To the extent indicated in this Paragraph 7., governmental costs incurred in connection with NASDA's launching that is postponed pursuant to Article III shall be subject to the following special agreement:

a. If NASDA's launching is postponed pursuant to Article III, Paragraph 5.a.(5) hereof, NASDA shall be liable only for those Governmental costs that are properly chargeable to the launching furnished to NASDA in place of the postponed launching and shall not be liable for any costs incurred that arise solely out of the postponement itself.

b. If NASDA's launching is postponed pursuant to Article III, Paragraphs 5.a.(1), (2), (3) or (4) hereof, and if the vehicle made available for purposes of NASDA's launching is used for one other scheduled launching, NASDA shall be liable only for those costs which have been incurred by the U.S. Government that are properly chargeable to the launching furnished to NASDA in place of the postponed NASDA launching.

c. If NASDA's launching is postponed pursuant to Article III, Paragraphs 5.a.(1), (2), (3), or (4) hereof, and if the vehicle made available for purposes of

NASDA's launching is not used for one other scheduled launching, NASDA shall be liable for all governmental costs which have been incurred by the U.S. Government in connection with the postponed launching, up to the date of postponement, plus such costs as are incurred as the result of such postponement, plus such costs as are properly chargeable to the launching furnished to NASDA in place of the postponed NASDA launching.

8. Except as provided in Paragraph 9 of this Article, NASDA shall reimburse NASA for governmental costs incurred in connection with, or incident to, the furnishing of launching and associated services under this Agreement, to the extent such costs are reimbursable under this Agreement, in accordance with the following plan:

a. Estimates of Costs

(1) Annexes A and B to this Agreement set forth, respectively, NASA's initial estimates of the total nonrecurring governmental costs which will be incurred in connection with the project to launch each NASDA spacecraft, and of the total recurring costs normally associated with a Delta-ETR reimbursable launching, including USAF range support charges, and NASA overhead and administrative expense. The estimate of recurring governmental costs (Annex B) shall be applicable to each NASDA launching.

(2) Annex C to this Agreement sets forth NASA's estimate of the total costs of miscellaneous services which may be furnished by NASA at the request of NASDA pursuant to Article 1, Paragraphs 1h. and 2. hereof.

(3) Annex D to this Agreement sets forth NASA's approximate estimates of the amounts of additional recurring type costs that might be incurred under the various circumstances described in Paragraph 4. of Article V. Such estimates shall be only for the advance guidance of NASDA, and will be superseded by the estimates provided for under subparagraph (4) below.

(4) The estimates in Annexes A and B shall be updated by NASA every six months for the purpose of informing NASDA of any change in estimated costs. This shall be accomplished by a letter from NASA to NASDA. Similarly, for the same purpose, NASA shall update these estimates and provide the update to NASDA by letter prior to each launching. At that time the Annexes may be revised by agreement of the parties to reflect the updated estimates.

(5) NASA by letter shall provide NASDA a final estimate to NASDA at or before the time of final review of the actual governmental costs incurred in connection with the launchings. At that time the Annexes may be revised by agreement of the parties to reflect the updated estimate.

b. Payments

(1) In connection with the first, second, and third launching as provided for under Article III, Paragraph 1.a., b., and c. hereof, NASDA will make progress payments, covering nonrecurring and recurring costs, with an additional amount representing a contingency of the estimated costs considered adequate by NASA to cover all costs, in accordance with the schedule provided in Annex E of this Agreement.

(2) Notwithstanding the due date indicated in the progress payments schedule set forth in Annex E, any unpaid balance of the estimated governmental costs for each launching, as provided in Annexes A and B, will be payable within 15 days after the date the launching occurred, whether or not it was successful, or 15 days after the date the launching was scheduled to have occurred, but did not actually occur because of an accident during launching preparations.

(3) In connection with a fourth, fifth, or sixth launching NASDA will make progress payments pursuant to a separate schedule to be agreed upon at the time NASDA requests NASA to procure an additional Delta-type launch vehicle, for the purpose of such launching, as provided for under Article III, Paragraph 1.d. hereof. The provisions of subparagraph (2) above shall also be applicable to progress payment schedules agreed upon pursuant to this subparagraph (3).

(4) If a scheduled launching is cancelled as the result of a notice of termination issued either by NASA or NASDA pursuant to Article VII hereof NASA will, as promptly as possible after the effective date of the notice of termination, furnish NASDA with an estimate of the total governmental costs, itemized in reasonable detail, which were actually incurred in preparation for such launching, and which were incurred as a consequence of the termination, to the extent they have been identified and to the extent they are reimbursable under this Agreement. If the estimated total cost is less than the amount NASDA may already have paid for the launching concerned, NASA will either refund to NASDA the amount of the over payment, or will reflect such amount against amounts otherwise due and payable by NASDA to NASA under this Agreement. If the estimated total of such costs is greater than the amount NASDA may already have paid for the launching concerned, NASDA will make settlement with NASA for the actual governmental costs incurred in connection with the launching concerned, in accordance with the procedures set forth in Paragraph 8.c. of this Article.

c. Final Review:

(1) As promptly as possible, but in any event within three years after the date the third (or if the option is exercised, the fourth, fifth, or sixth) launching occurred unless it was deferred to a later date, or within three

months after all services requested by NASDA which are associated with the launchings have been furnished by NASA, whichever is later, NASA will make a final review of the actual governmental costs incurred in connection with these launchings.

(2) NASA will report the results of its review of actual governmental costs to NASDA, and if the actual governmental costs are less than the amounts previously paid by NASDA to NASA in connection with the launchings, NASA will refund to NASDA the amount of the difference. If the actual governmental costs are more than the amounts paid by NASDA to NASA in connection with the launchings, upon agreement of the parties the limitation of costs included in Article XVIII may be adjusted and NASA shall bill NASDA and NASDA shall pay this additional amount to NASA.

(3) Within 90 days after the receipt of the NASA report, NASDA shall have the right to request a review of its correctness by the Associate Administrator, NASA, who will, in consultation with the Vice President of NASDA, make a final determination of the actual Governmental costs which are reimbursable by NASDA for the launchings involved; for the purpose of the foregoing, the Vice President of NASDA shall be granted access to all pertinent contracts and cost data concerned with making a final determination of the costs. This provision for finality of the Associate Administrator's determination is not intended to affect the right of NASDA to pursue any further remedies available to it before a court of competent jurisdiction. However, NASDA shall first seek its remedy under the Disputes provisions of Article XVI of this Agreement before seeking relief in a court.

(4) NASDA agrees that it shall reimburse NASA for costs incurred by the Government after the final NASDA payment and final review as described in this Article V, but only if (i) the cost would otherwise be reimbursable under this Agreement and (ii) the costs incurred are a consequence of third party claims arising out of this Agreement. Such obligations described in this subparagraph (4) shall not extend past the period of time set forth in the statute of limitations governing claims that are applicable in the jurisdiction in which such claims shall be adjudicated.

9. Subject to the total amount in the Miscellaneous Services account provided in Annex C, NASDA shall also reimburse NASA from time to time for the governmental costs incurred in connection with the provision of miscellaneous services to NASDA, as requested pursuant to Article I, Paragraphs 1.h. and 2. hereof, which are agreed to by the Project Managers pursuant to Article I, Paragraph 2. hereof in accordance with the following plan:

a. At the time of accepting NASDA's request for the particular services to be provided, NASA will furnish NASDA with an estimate of the Governmental

costs of such services and of the time required to provide them. NASA will charge the Miscellaneous Services account with the costs it incurs for such services.

b. Within three months after NASA has completed providing the particular Miscellaneous Services requested, it will make a final review of the actual governmental costs incurred in connection with furnishing such services, and will report the result of such review to NASDA. NASA will also promptly make such adjustment as is necessary, through an additional charge to the Miscellaneous Services account or through a refund to that account because of the difference between the amount previously deposited in the Miscellaneous Services account by NASDA for the services involved, and the amount of actual governmental costs incurred in furnishing them.

c. Within 30 days after the receipt of the NASA report of actual governmental costs, NASDA shall have a right to request a review of its correctness, as provided for under Paragraph 8.c.(3) of this Article.

ARTICLE VI—U.S. GOVERNMENT-OWNED EQUIPMENT

Upon the request of NASDA, NASA may agree from time to time to make items of U.S. Government-owned equipment available for use by NASDA or its contractors for the purposes of the program to launch NASDA spacecraft, under such terms and conditions as are agreed upon in writing by NASA and NASDA at the time the equipment is made available.

ARTICLE VII—TERMINATION OF SERVICES

1. NASA's commitment under this Agreement to furnish the spacecraft launching and associated services requested by NASDA may be terminated by NASA, in whole or in part, a. upon a declaration of war by the Congress of the United States, or b. of a national emergency by the Congress of the United States, or c. upon a NASA determination in writing that NASA is required to terminate such services for reasons beyond its control. In the event of such termination for reasons given in Paragraph 1.c. of this Article, NASA will seek to provide launching services thereafter when possible or through an alternative method of launching the spacecraft, and will enter into discussions with NASDA for that purpose. In the event of such termination for reasons given in this Paragraph 1. of this Article, NASDA shall be obligated to reimburse NASA for governmental costs, as defined in Article V, Paragraphs 1. and 2. hereof attributable to the launchings which actually occurred prior to the effective date of the notice of termination to the extent such costs are reimbursable under this Agreement. NASDA shall not be obligated to reimburse NASA for any governmental costs (except the nonrecurring costs described in Article V, Paragraph 2. hereof and except as provided in the next sentence herein) incurred in connection with a scheduled launching which was cancelled as a result of NASA's notice of termination, including the costs of a vehicle,

vehicle modification, vehicle checkout, and transportation costs, and the cost of restoring to production status a vehicle that was not used as a result of such cancellation. NASDA shall be liable for the governmental costs of miscellaneous services requested pursuant to Article I, Paragraph 2. hereof, which have already been provided by NASA, and for a pro rata portion of any charges agreed upon for the use of Government-owned equipment made available to NASDA or its contractors pursuant to Article VI hereof.

2. NASA shall not be liable for any costs, loss of profits or other direct, indirect or consequential damages incurred by NASDA, its contractors or subcontractors as a result of the termination of services by NASA pursuant to Paragraph 1. of this Article.

3. NASDA shall have the right to terminate, in whole or part, its request for NASA to furnish spacecraft launching and associated services at any time. In the event of such termination, NASDA shall be obligated to reimburse NASA for all governmental costs, as defined in Article V which have been incurred up to the effective date of NASDA's notice of termination, or are incurred as a result of such termination, to the extent such costs are reimbursable under this Agreement; for the cost of miscellaneous services requested pursuant to Article I, Paragraphs 1.h. and 2. hereof, which have already been provided by NASA; and for a pro rata portion of any charges agreed upon for the use of Government-owned equipment made available to NASDA or its contractors pursuant to Article VI hereof.

4. This Article is not intended to limit or govern the right of NASA, in accordance with law, to terminate its performance under this Agreement, in whole or in part, for NASDA's breach of a provision in this Agreement.

ARTICLE VIII—REPORTS AND INFORMATION

1. In accordance with the Memorandum of Understanding between the Science and Technology Agency of Japan and NASA dated June 6, 1975, NASDA and NASA will provide each other with the documents, information and data under the conditions described therein.

2. If any additional information is needed by NASDA or NASA in order to carry out their respective responsibilities under this Agreement, the furnishing of such additional information, and any limitations on its use, will be subject to agreement in advance between the NASDA and NASA Project Managers.
the U.S. Government's contractors or subcontractors.

2. NASDA agrees to reimburse the U.S. Government, as a cost under this Agreement, for any liability that the U.S. Government may incur (including payments made by the U.S. Government to reimburse its contractors and subcontractors for a liability they may incur) for damage, destruction or loss of the NASDA's or the NASDA's contractors' or subcontractors' spacecraft or other tangible personal property, upon

arrival of that property at a site owned, leased or used by the U.S. Government or the U.S. Government's contractors or subcontractors.

3. In accordance with Article V, Paragraph C. of the Annex to the Memorandum of Understanding between STA and NASA dated June 6, 1975, NASDA agrees that it will, upon NASA's request and at NASA's expense, provide NASA with any raw scientific and technical data received by NASDA from the satellite and any reduced data therefrom. Except with the prior permission of NASDA, NASA will not duplicate, disclose, or use any unpublished data so provided.

ARTICLE IX—RIGHTS IN REPORTS AND INFORMATION

1. As used in this Article, the term "Proprietary Data" includes all data which provides information concerning the details of NASDA's or its contractor's designs and secrets of manufacture, such as may be contained in but not limited to their manufacturing methods or processes, treatment and chemical composition of materials, plant layout, and tooling, to the extent that such information is not readily disclosed by inspection or analysis of the product itself and to the extent that NASDA or its aforesaid contractors have protected such information from unrestricted use by others.

2. NASDA shall identify each piece of Proprietary Data furnished to NASA by marking it (for example, by circling, underscoring, or otherwise), and labeling it as being proprietary within the meaning of this Agreement. Except in order to enable NASA to carry out its responsibilities for furnishing the spacecraft launching and associated services under this Agreement, Proprietary Data so marked and labeled shall not be duplicated, used or disclosed by NASA without the written consent of NASDA. This restriction does not limit NASA's right to use or disclose any data, identified as proprietary by NASDA, which NASA obtains or has obtained from any source without restriction, or which is in the public domain.

3. NASA agrees to exert all reasonable efforts to comply with its undertaking under Paragraph 2. of this Article to protect Proprietary Data and further agrees not to obliterate or modify markings made in accordance with Paragraph 2. of this Article, and to include such markings upon any reproduction of such reports or portions thereof.

4. Except as provided in Paragraph 2. of this Article, NASA may duplicate, use and disclose in any manner and for any purpose whatsoever, and authorize others so to do, all information and reports furnished to NASA pursuant to Article VIII hereof.

ARTICLE X—RESPONSIBILITY FOR NASDA PROPERTY

1. Except as provided in Paragraph 3. of this Article, the U.S. Government shall not be responsible, or held liable for damage to, destruction or loss of NASDA's or

NASDA's contractors' or subcontractors' spacecraft or other tangible personal property, upon arrival of that property at a site owned, leased or used by the U.S. Government or

3. Notwithstanding Paragraphs 1. and 2. above, NASDA shall not be required to reimburse the U.S. Government as a cost for any liability that the U.S. Government may incur (including payments made by the U.S. Government to reimburse its contractors and subcontractors for a liability they may incur) for such damage, destruction or loss, to the extent it was caused by the willful misconduct of an employee of the U.S. Government or its contractors or subcontractors.

4. Paragraph 3. above is not intended:

(a) to subject the U.S. Government to liability to the extent arising out of acts or omission of NASDA, or of NASDA's contractors or subcontractors;

(b) to preclude the U.S. Government from seeking contribution in an appropriate case from NASDA, NASDA's contractors or subcontractors, or other persons; or

(c) to obligate the U.S. Government to reimburse, indemnify or hold harmless NASDA or NASDA's contractors or subcontractors for sums they have paid to each other as damages.

5. If a court should hold unenforceable the limitation or liability or NASDA's obligation described in Paragraphs 1. and 2. above, the U.S. Government's liability under this Article shall be limited to direct damages only and not in excess of the total amount paid by NASDA under this Agreement, pursuant to Article V, reduced by payments made by NASDA to NASA for third party and NASDA's claims pursuant to Article V, Paragraph 6.a., Article XI and this Article.

6. NASA undertakes to act diligently and to exert all reasonable efforts to ensure that employees of the U.S. Government and of U.S. Government's contractors exercise a high standard of care in protecting and preserving property of NASDA or its contractors which has been delivered to NASA pursuant to this Agreement.

7. NASA agrees to cooperate with NASDA to the fullest extent possible in obtaining any information, data, reports, contracts and similar materials in connection with any claim that NASDA may have as a result of any damage to, or destruction of, the spacecraft or other property.

ARTICLE XI—THIRD PARTY CLAIMS

1. NASA and NASDA agree that, in the event third party claims are asserted against NASA or NASDA as a result of patent infringement, use of proprietary information, bodily injury, death or damage to or loss of real or personal property,

including claims of contractors or subcontractors of the U.S. Government, arising from or in connection with the spacecraft launching and associated services furnished by NASA under this Agreement, NASA and NASDA will provide each other with all assistance practicable in the defense against such claims.

2.

a. NASDA agrees to reimburse NASA for a pro rata share of any costs incurred by the Government in becoming a licensee under privately owned United States patents not licensed to the Government as of the date of this Agreement, including settlement payments made by NASA as a result of administrative consideration by NASA of claims of infringement of such patents, but only to the extent that any such costs are attributable to products, processes or articles of manufactures actually used by NASA in connection with the furnishing of services to NASDA under the provisions of this Agreement.

b. With respect to privately owned United States patents under which the Government is licensed as of the date of this Agreement, NASDA agrees to reimburse NASA for NASDA's pro rata share of any costs incurred by the Government in the form of a judgment against the United States by a court of competent jurisdiction for the manufacture or use not covered by the license held by the Government of inventions covered by such privately owned patents, but only to the extent that any such costs are attributable to products, processes or articles of manufacture actually used by NASA in connection with the furnishing of services to NASDA under the provisions of this Agreement.

c. The reimbursement by NASDA of costs associated with patent infringement settlements or judgments will be governed solely by this Paragraph 2. Therefore, except as provided in subparagraphs a. and b. above, NASDA shall have no liability to NASA with respect to any third party claims against NASA of patent infringement by NASA in connection with the furnishing of services to NASDA under the provisions of this Agreement. Further, any costs reimbursable to NASA by NASDA under the provisions of subparagraphs a. or b. above shall be reduced pro rata by any amount actually paid to the Government by a third party or to which the Government has a right to payment from a third party as reimbursement or indemnification for any or all of the patent infringement costs cited in subparagraphs a. and b. above.

d. NASA will notify NASDA as promptly as possible of any patent infringement claim asserted against the Government, whether by suit or otherwise, under which NASDA might be liable for reimbursement of costs under subparagraphs a. or b. above; in particular, NASA will notify NASDA prior to any administrative settlement of a claim under subparagraph a. above, and as promptly as possible after the institution of any suit, and preferably before same, based on such a claim. With respect to costs reimbursable by NASDA under subparagraphs a. or b. above, NASA, will, promptly after paying any such costs, present NASDA

with a statement itemizing in reasonable detail such costs and identifying the applicable patents associated therewith. Within 30 days after receipt of the NASA statement of such costs, NASDA shall have the right to request a review of its correctness as provided for under Paragraph 8.c.(3) of Article V of this Agreement.

e. With respect to any suit against the Government based on a claim of patent infringement, the costs for which NASDA would be liable under subparagraph b. above, NASA agrees that, subject to law and regulations of the Department of Justice, NASDA may, at its option, assume primary responsibility for the defense of the suit. In the event that NASDA exercises its option to assume such responsibility, NASA agrees to provide to NASDA, at NASA's expense, such information and assistance as is available to NASA. NASDA's right of election to assume primary responsibility for the defense of such a suit shall not in any way affect any other rights otherwise available to it under this Agreement or general principles of law; in particular, should NASDA not exercise such option, its right to intervene in the suit, under applicable rules of procedure, shall in no way be affected or diminished.

ARTICLE XII—EQUAL OPPORTUNITY

In connection with the performance of any work by NASDA under this Agreement, NASDA agrees that if any recruitment of workers occurs within the United States or its territories or possessions, the provisions of Executive Order 11246 of September 24, 1965, as amended by Executive Order 11375 of October 13, 1967, and the rules and procedures established thereunder, will apply. NASDA also agrees that the substance of this Article XII will be included in any contract or subcontract entered into which involves the performance of work by NASDA under his Agreement if any recruitment of workers in the United States or its territories or possessions is contemplated.

ARTICLE XIII—OFFICIALS NOT TO BENEFIT

No member of or delegate to the United States Congress, or resident commissioner, shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this Agreement if made with a corporation for its general benefit.

ARTICLE XIV—COVENANT AGAINST CONTINGENT FEES

NASDA warrants that no person or selling agency has been employed or retained to solicit or secure this Agreement upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide

employees or bona fide established commercial or selling agencies maintained by NASDA for the purpose of securing business. For breach or violation of this warranty, NASA shall have the right to annul this Agreement without liability on its part, and NASDA shall reimburse NASA for governmental costs as provided in Article V hereof.

ARTICLE XV—APPLICABLE LAW

NASDA and NASA hereby designate the United States Federal Law to govern this Agreement for all purposes, including but not limited to, determining the validity of this Agreement, the meaning of its provisions, and the rights, obligations and remedies of the parties.

ARTICLE XVI—DISPUTES

1. Except for disputes arising from claims made against NASA for money damages in excess of NASA's authority to settle administratively or pay out of its current appropriated funds, any dispute, whether or not involving an alleged breach of the Agreement, concerning a question of fact arising under this Agreement which is not disposed of by agreement shall be decided by the Associate Administrator, who shall reduce his decision to writing and mail or otherwise furnish a copy thereof to NASDA. The decision of the Associate Administrator shall be final and conclusive unless, within sixty (60) days from the date of receipt of such copy, NASDA mails or otherwise furnishes to the Associate Administrator a written appeal addressed to the NASA Administrator. The decision of the Administrator or his duly authorized representative for the determination of such appeals shall be final and conclusive unless determined by a court of competent jurisdiction to have been fraudulent or capricious, or arbitrary, or so grossly erroneous as necessarily to imply bad faith, or not supported by substantial evidence. In connection with any appeal proceeding under this clause, NASDA shall be afforded an opportunity to be heard and to offer evidence in support of an appeal. Pending final decision of a dispute hereunder, NASDA shall proceed diligently with the performance of the Agreement and in accordance with the decision of the Associate Administrator.

2. This "Disputes" clause does not preclude consideration of law questions in connection with decisions provided for in Paragraph 1. above. Nothing in this Agreement shall be construed as making final the decision of any administrative official, representative, or board on a question of law.

ARTICLE XVII—LIMITATION OF U.S. GOVERNMENT LIABILITY

Notwithstanding any other provision of this Agreement, the U.S. Government's liability to NASDA arising under this Agreement, whether or not arising as a result of an

alleged breach of this Agreement, shall be limited to direct damages only and not in excess of the total amount paid to NASA by NASDA pursuant to Article V, reduced by payments made by NASDA to NASA for third party and NASDA's claims pursuant to Article V, Paragraph 6.a., Article X, and Article XI.

ARTICLE XVIII—LIMITATION ON COSTS

1. Except as provided in Paragraph 2. of this Article, NASDA's obligation to reimburse NASA for all costs incurred by the United States Government under this Agreement is hereby limited not to exceed the price of \$48,191,000, payable at the times specified in the progress payment schedule, Annex E, or the separate schedule, to be agreed upon for the fourth, fifth, or sixth launching.

2. NASDA's obligations to reimburse NASA for all costs incurred shall not be limited as described in Paragraph 1. above, to the extent, if any, the costs arise out of third party or NASDA's claims, as described in Paragraph 6. of Article V, Article X, or Article XI, or to the extent NASA and NASDA may otherwise agree.

ARTICLE XIX—LIMITATION OF NASA'S OBLIGATION

1. NASA agrees to use its best efforts to perform the work described in Article I and other portions of this Agreement within the price set forth in Article XVIII. NASA agrees to perform or have performed work under this Agreement up to the point at which, in the event of termination pursuant to Article VII, the cost of the work performed and the projected settlement cost of such termination, as estimated by NASA, would not exceed the price payable to NASA under this Agreement (the depletion point). NASA shall not be obligated to continue performance of the work under this Agreement beyond such a point.

2. NASA shall give written notice to NASDA at the time that the combined costs of performing the work described in this Agreement and the projected termination settlement costs referred to in Paragraph 1. above reaches approximately eighty-five percent (85%) of the total price of this Agreement. In case the total price of the Agreement shall be insufficient to continue work under this Agreement, such notice shall state the estimated date when the total price of the Agreement shall be insufficient to continue work under this Agreement as described in Paragraph 1. above, and an estimation of the amount of additional money necessary to complete the work set forth in the Agreement.

3. NASDA, upon receiving such notice as described in Paragraph 2. above, shall have the option of notifying NASA in writing, that it wishes to amend this Agreement to increase the total cost payable to NASA; to revise Annexes A through C, as appropriate; and to revise the progress payment schedule, Annex E, in order to pay NASA the

additional funds necessary for completion of the work described in this Agreement. Such notice of intent on the part of NASDA shall be conveyed to NASA prior to the total price depletion point described in Paragraph 1. above. If NASDA does not notify NASA prior to the depletion point of its intent to increase the price of the Agreement, the Agreement shall be deemed terminated by NASDA at the time such depletion point is reached. If NASDA chooses to inform NASA in writing prior to the depletion point that it does not intend to increase the price of the Agreement, the Agreement shall be deemed terminated by NASDA at the time such notice is received by NASA.

4. The execution of the amendment to the Agreement which increases the overall price of the Agreement and the modification of the progress payment schedule shall be completed as soon as reasonably possible. If a delay in executing such an amendment to the Agreement delays the scheduled launch date(s) by more than fifteen (15) days, NASA shall have the right to postpone the launching of one or more spacecraft in the manner described in Article III, Paragraph 5.a. of this Agreement or to consider the Agreement terminated in accordance with Paragraph 3. above.

5. Nothing in this clause shall affect the rights of the parties to this Agreement to terminate this Agreement pursuant to Article VII.

ARTICLE XX--CREDIT FOR FUNDS PAID FOR CERTAIN MISCELLANEOUS SERVICES

NASA shall credit to NASDA's account under this Agreement the \$300,000 which had been paid by NASDA to NASA for certain miscellaneous services under a contract entered into between NASA and NASDA and effective October 4, 1974. That contract, "For Preliminary and Consulting and Other Miscellaneous Services To Be Furnished by NASA In Support of the Launch of Three NASDA Spacecraft Missions" is incorporated herein by this reference. The provisions of this Agreement shall govern and take precedence over those in the contract to the extent of any inconsistency.

ARTICLE XXI--DEFINITIONS

1. **APPROXIMATE LAUNCH DATE:** A day selected by NASDA in a period of time (normally a calendar year quarter) specified or determinable in this Agreement, which NASDA believes to be appropriate for a launch of a particular spacecraft and communicates that fact to NASA in writing as far in advance as possible of the launching.

2. **GOVERNMENT CONTRACTORS:** Includes U.S. Government contractors and subcontractors at every tier.

3. **HOLD:** A temporary cessation of launch preparation activities. A hold may cause a delay beyond a specific launch date, and, to the extent that it does so, it shall result in a deferral.

4. DEFER: The delay of one or more launchings beyond a specific launch date.
5. POSTPONE: The deferral of one or more launchings for a period of time. The time to postpone includes the right vested in NASA to remove a spacecraft and/or launch vehicle from a launch pad, disassemble and transport it, and place the vehicle in storage, and to launch one or more other scheduled launchings from the launch pad assigned to the postponed launching. NASA shall use its best efforts in attempting to reschedule and launch a postponed launching.
6. SCHEDULED LAUNCHING: A proposed launching, pursuant to Article III, Paragraph 1.a., b., and c. which is agreed to by NASDA and NASA. It does not include a launching which NASDA has an unexecuted option to request.
7. SPECIFIC LAUNCH DATE: A day agreed to by NASDA and NASA, pursuant to Article III, Paragraph 3. of this Agreement, for a scheduled launching of a particular spacecraft.
8. SPACECRAFT: Includes all components of a space object prior to being placed in an orbit and prior to separation from the launch vehicle. It excludes the launch vehicle and any component thereof. For the purposes of Article X only, a spacecraft shall also include a spacecraft that has achieved a transfer orbit.
9. SATELLITE: A spacecraft that has achieved an orbit and has separated from the launch vehicle.
10. OPERATIONAL AUTHORITY OVER OR FOR THE SPACECRAFT: To control, regulate and schedule access to the spacecraft, its functions and systems for any purpose. This authority does not empower the U.S. Government to operate or test any function or system of the spacecraft without the approval of NASDA.

ARTICLE XXII—EFFECTIVE DATE OF AGREEMENT

This Agreement shall enter into force as of the date of its signature by both parties.
IN WITNESS WHEREOF, the parties have executed this Agreement.

National Space Development
Agency of Japan

National Aeronautics and
Space Administration

BY:

BY:

for Hideo Shima
President

Noel W. Hinners
Associate Administrator
for Space Science

Date: July 19, 1975

Date: July 9, 1975

EVENTS OF INTEREST

1. *XVIIIth Colloquium on the Law of Outer Space, Lisbon, September 21-27, 1975.*

The Colloquium of the International Institute of Space Law chaired by Professor I.H.Ph. Diederiks-Verschoor, took place during the 26th Congress of the International Astronautical Federation in Lisbon from September 21-27, 1975. It devoted four sessions to space law. This Colloquium, however, was not quite like the preceding meetings. The uncertain circumstances decreased the number of participants to thirty or forty. This, however, made it possible to have more discussion than usual. Also, it was a pleasure to have representatives of the United Nations Committee on the Peaceful Uses of Outer Space, Mr. Perek and Mr. Padang present. In addition, Mr. Pouliquen from the International Telecommunications Union was also present. All took an active part which stimulated the discussions.

On the first topic "space and energy", which was for the first time on the agenda, the Introductory Report had been given by Dr. Fasan. It was quite a pioneering study. Dr. Fasan gave a general view of the problem of this complicated subject. In the discussion Mr. Majorski (U.S.S.R.) stressed the necessity of following the guidelines of the 1967 Treaty to solve questions, which Dr. Fasan underlined, answering that all problems had to be resolved by cooperation and mutual understanding. Other papers on this subject were given by Mr. Stoebner (France) and Dr. Estradé (Spain), whereas Prof. Gorove submitted a very interesting paper on the international legal implications of solar energy.

Mr. Stoebner stressed that because of the complexity of the technical, economic and political points, it was very difficult to find solutions in the legal field and that because of the very fast technical development lawyers did not have much time to adapt themselves as yet. He hoped that the technical considerations would be not too overwhelming for us. Mr. Stoebner also stressed that cooperation would be very helpful in regard to the financial problems. As the subject has not been exhausted, the Board of Directors decided to put it on the agenda for another time.

During the remainder of time, Dr. Kaltenecker spoke about the future systems of the satellites in Europe. A vivid discussion with Mr. Majorski followed in which it became clear that Mr. Majorski had other ideas about Intelsat.

During the second session on geostationary orbit, Dr. van Kries had written a very profound introductory report which he summarized. On this topic Dr. Busak gave also a very interesting report. The subject gave rise to a rather technical discussion in which Mr. Pouliquen also gave his expert opinion. The discussion will be detailed in the Proceedings of the Colloquium.

Also in the second session, the legal aspects of space international cooperation were treated. Here the introductory report was written by Prof. Christol. Other reports on this

subject were by Dr. Bourély on the legal framework of European cooperation in the execution of space application program and by Mr. Myers on political considerations on some aspects of the law of outer space. The reports were followed by a discussion on the term "common heritage of mankind". Mr. Majorski was of the opinion that common heritage of mankind is not a rule, as he interpreted Prof. Christol's view, but just a statement of intentions.

The third session was devoted to various subjects. Among them was discussed an Italian proposal regarding the delimitation of airspace from outer space (Prof. Magno). Miss Reijnen defended the conception of a third zone, the mesospace. This idea was attacked by several persons, including Hervy, Fasan and Magno, who were of the opinion that a two-zone-delineation, as presently is common, was sufficient.

During the same session, a guest speaker, Miss Gloria Heath, reported on the Survey of Recovery Capabilities. She spoke for the Space Rescue Symposium, but her subject had so many legal implications that it appeared worthwhile to discuss this topic in the Colloquium. Miss Heath thought that perhaps the rules in space law (Rescue Agreement) and in air law (Chicago Convention of 1944 and Annex 12) could create problems inasmuch as it was not sure which rule would apply in a certain case and if people thought that others were competent nobody would give the needed assistance. Also there would be gaps as in a situation where craft or persons land in the territory of a *non*-contracting party.

What is assistance by the launching nation—can they send their personnel to the site—is it assured that such items as medical advice will be sought from the launching power before being administered by the contracting party (assuming communications have been established), etc.

A vivid discussion followed in which Mrs. Diederiks proposed to add a technical annex to the Rescue Agreement as had been done in the Chicago Convention to assure a good implementation of the Agreement. This idea was backed by some of the participants. The Colloquium at Anaheim later this year is expected to consider this complicated subject more thoroughly.

Additional subjects considered were the papers of Mr. Dausés on the relative autonomy of space law, Mr. Hervy on "Le concept juridique de souveraineté et le droit spatial," and the paper of Mrs. Nauges on "Les problèmes juridiques et institutionnels de l'exploitation opérationnelle du satellite Meteosat."

During the fourth session Mrs. Diederiks-Verschoor mentioned in her paper the Space Shuttle Project and the problem that this Shuttle will be launched as a space vehicle through the atmosphere by a rocket and will return into the earth's atmosphere as an aircraft which will have difficult implications.

Mr. Haakma, in his paper about some legal aspects of "Space Lab", made some remarks about the registration and the liability for damage concerning "Space Lab".

Some discussion arose on the subject of the military aspects of the use of "Space Lab", because the paper speaks about peaceful purposes. Kaltenecker defended this idea of peaceful purposes contrary to Mr. Majorski and Mr. Haakma who stressed that every activity in space has possible military connotations. In the discussion it was, however, pointed out that military and nonmilitary uses are extraordinarily interdependent.

Additional papers were presented by: Professor Gorove on "Direct Television Broadcast by Satellite: a Proposal for Cooperation"; Magno and Verdacchi on "Règles de droit sur le plus léger que l'air"; Reijnen on "Extra Terrestrial Intelligence and Earthian Law"; Robinson on "Earth Exposure to Martian Matter: Back Contamination Procedures and International Quarantine Regulations"; and Smirnoff on "The New Tasks of Space Law". This was followed by a discussion on extra-terrestrial intelligence between Dr. Fasan, who has written a book on this subject, and Miss Reynen.

Altogether the Colloquium had a rather intimate character because of the small number of participants each speaking his opinion freely. This was the great value of this meeting.

In conclusion, a word of thanks and great appreciation should be noted for the infatigable care of the Chairman of the Organizing Committee Prof. Varela Cid, whose enthusiasm and diligence overcame the difficult circumstances and helped a great deal to make the Congress and Colloquium a success.

Dr. I.H.Ph. Diederiks-Verschoor
President, International Institute
of Space Law

2. *Institute for Air and Space Law of the University of Cologne.*

The Institute was founded in 1950 by Professor Alex Meyer, the nestor of German air law as a research center within the University. This center was intended as a continuation of the work of the former Institute for Air Law that had existed since 1925 at the University of Königsberg and had moved to Berlin in 1940. Its last director Dr. Rüdiger Schleicher was imprisoned in 1944 and later shot because of an involvement in the events of the 20th of July.

The research center quickly gained in importance. As early as 1952 it was able to publish its own Journal of Air Law under the editorship of Dr. Meyer and with the help of the Transport Ministry of the Federal Republic. In 1955 the center was granted the status of a University Institute. In 1960 with the emergence of space travel this became the Institute for Air Law and Questions of Space Law. The title of the Journal was consequently altered.

Under the leadership of Prof. Meyer the Institute became the hub of German air and space law research. It possesses an important specialist library with more than 5000

volumes. Its object is to edit the Journal plus a series of commentaries on international agreements concerning air and space law, to render assistance to the users of the Library, to provide information to authorities, courts of law and private persons, to draw up judgments and provide details concerning the administration of various committees.

On September 30, 1974 Prof. Meyer retired both as director of the Institute and as editor of the Journal. From its very beginning he followed closely the legal implications of air travel. His first considerable publication "Die Erschliessung des Luftraums in ihren rechtlichen Folgen" (The utilization of airspace in its legal implications) appeared in 1908. From this time on he continued to promote and influence in a decisive way the national and international science of air law. The founding of the Institute and its Journal are marks of this unusually fruitful activity throughout seven decades.

Prof. Meyer carried out pioneer work when technical developments reached far beyond the limits of air space. He was among the founders of world space law and was, in this field, responsible for innumerable fruitful innovations. In the course of time he received several national and international distinctions, such as the "Andrew-Haley Gold Medal" of the IISL and the "Edward Warner Gold Medal" of ICAO. His students are now installed and work in almost every reputable institute of air and space travel. He was also successful in his efforts to secure the continuation of his work in the Institute.

In 1975 North-Rhine-Westphalia founded a chair of air and space law. The holder of this chair and the successor of Prof. Meyer as director of the Institute is Prof. Karl-Heinz Bockstiegel who was appointed on May 15, 1975. Together with friends, colleagues and students the latter expects to publish a "Festschrift" in honor of Prof. Meyer. Now that space travel has developed from the stages of scientific research to the phase of practical application, space law has also changed accordingly. For this reason the Institute has now received its final title of Institute for Air and Space Law.

Winfried Heymer
Assistant of the Institute for Air
and Space Law
University of Cologne

3. *The Institute of Air and Space Law, McGill University.*

In November 1976, the Institute of Air and Space Law, McGill University, Montreal, Canada, will celebrate its twenty-fifth anniversary. This rather unique Institute was founded in 1951, and until 1955 directed, by the late Professor John Cobb Cooper—a citizen of the United States and an internationally recognized aerospace lawyer. During his long professional career, Professor Cooper occupied many outstanding positions in the aviation world. From 1934 till 1945, he was Vice-President (Legal) of Pan American World Airways; at the International Civil Aviation Conference in Chicago in 1944, he acted as legal adviser to the United States' delegation; from 1945 till 1964, Professor Cooper held the position of Legal Adviser to the International Air Transport Association

(IATA)—to mention but a few of his many roles. A number of Professor Cooper's aerospace publications were collected and edited by Professor Ivan A. Vlasic in 1968 under the title *Exploration in Aerospace Law*.

From its foundation in 1951 until the present the Institute of Air and Space Law has functioned as a major international center for aerospace teaching and research. Each academic year the Institute brings together some twenty highly qualified postgraduate law students from all over the world. Its study program leads to the Master of Laws (LL.M.) degree. The first year program comprises a series of lectures, seminars and the writing of term papers. The second year program is devoted to the writing of LL.M. theses. Theses may, if permission is granted to a student, be written *in absentia*. A limited number of exceptionally qualified students are accepted by the Institute as Doctor of Civil Law (D.C.L.) candidates.

Over the years the Institute has assembled a large collection of air and space law documentation. Indeed, its library may be considered as one of the most complete aerospace libraries in North America. The collection of aerospace LL.M. and D.C.L. theses, written by Institute students, is unique in its kind. As far as the availability of air law documentation is concerned, the Institute has always benefited from the fact that the two major international aviation organizations, the International Civil Aviation Organization (ICAO) and the International Air Transportation Association (IATA), are both located in Montreal. Close cooperation and interchange of ideas exists between the Institute on the one hand and ICAO and IATA on the other. Institute graduates remain in contact with each other through the Institute of Air and Space Law Association. Its successful functioning is assured through the Honorary Secretary, Miss Sheila F. Macbrayne, herself an Institute graduate and former Secretary of the Institute.

From 1955 until 1975, the following aerospace and international law experts have served as Directors of the Institute: Professors Eugène Pépin, Alfred Rosevear, Maxwell Cohen, Sir Francis Vallat, Edward McWhinney and Ivan Vlasic. The Institute's present Director is Dr. Nicolas M. Matte. Dr. Matte assumed office on June 1, 1975. Dr. Matte is a Doctor of Laws of the Universities of Bucharest and Paris, and graduate of the *Institut des hautes études internationales* of the Université de Paris. As early as 1951, and until 1968, Professor Matte directed a chair in air and space law at the Université de Montreal. Dr. Matte's two major aerospace publications are: *Droit Aérien-Aéronautique* (1st edition, 1954; 2nd edition, 1964) and *Aerospace Law/Droit Aérospatial* (1st edition, 1969; 2nd edition in preparation).

Under the guidance of Dr. Matte, and with Professors Ivan A. Vlasic and Martin A. Bradley as full-time faculty, the Institute will continue the teaching and research program as already mentioned. In addition, the Institute is preparing the following projects: the establishment of a special air and space law research center within the Institute; the organizing of several symposia; and the creation of a bilingual publication, the *Annals of Air and Space Law/Les Annales de droit aérien et spatial*.

Through the establishment of a special research center, the Institute hopes to engender new enthusiasm for profound academic research in the field of aerospace law. The symposia organized by the Institute have brought together many air and space law scholars from all parts of the world. The symposium held in October, 1975, dealt with the legal implications of remote sensing of the earth and its environment from outer space. A former Associate Director of the Institute, Professor Hamilton DeSaussure, currently Professor of International Law at the School of Law, the University of Akron (Ohio), was in charge of the organization of this symposium. An air law symposium will be held on the occasion of the Institute's twenty-fifth anniversary in the fall of 1976. The precise subject for this forthcoming symposium has still to be determined. The *Annals of Air and Space Law/Les Annales de droit aérien et spatial* will constitute a periodical Institute publication containing aerospace law contributions both by outside scholars in the field and by Institute faculty and graduates. It is expected that the first issue of the *Annals/Les Annales* will appear in 1976. In many ways they can be regarded as the revival of an earlier Institute publication, the *Yearbook of Air and Space Law/Annuaire de droit aérien et spatial*, which appeared from 1965-67, the editor-in-chief being Professor René H. Mankiewicz.

Peter P. C. Hagnappel
Teaching Fellow
Faculty of Law
McGill University, Montreal

4. *Other Events.*

The Space Law Committee of the Inter-American Bar Association met during the XIXth Conference of the Association in Cartagena, Colombia, September 27-October 4, 1975. The meeting was chaired by Judge Harold Berger and reports were presented by Matthew Corrigan, Professor Stephen Gorove, Katherine Drew Hallgarten and Brig. Gen. Martin Menter (ret.). The discussions dealt with problems of air law, solar energy and space law, telecommunications law and the stratospheric ozone problem.

An Aerospace Student Forum on "Aeronautical and Space Applications: Promise, Problems and Policies" sponsored by the Federation of Americans Supporting Science and Technology (FASST) and chaired by Leonard David, Director of the Aerospace Student Council of FASST, was held on October 8, 1975 at NASA's Goddard Space Flight Center in Greenbelt, Maryland. Topics of presentations included: "Monitoring Earth Resources from Space with Landsat" by Dr. Nicholas M. Short, "ATS-6 Health/Education Telecommunications Experiment in the U.S.A. and India" by Albert A. Whalen; "The Impact of Space Technology on Society—Problem, Policies and Promise for the Future" by Eilene Galloway; "Aerospace Technology Applications to Transportation" by Robert L. Maxwell; "Impact of ERDA's Research Programs on the Nation's Energy Supply" by Dr. Chalmer G. Kirkbride; and "Biomedical Applications of Aerospace Technology" by Richard Farrell.

At the Seventh World Peace Through Law Conference held in Washington, D.C. on October 12-17, 1975 a report was presented on the "Environmental Effect of Stratospheric Pollution" by Brig. Gen. Martin Menter (ret.).

Legal Implications of Remote Sensing from Outer Space were the subject matter of a Symposium held at the Institute of Air and Space Law of McGill University, Montreal, October 16-17, 1975. The discussion, moderated by Professor Hamilton DeSaussure and Dr. Nicolas M. Matte, Director of the Institute, extended to the technical applications of remote sensing and its impact on economic development, the world-wide utilization and dissemination of data, the possible integration of North-American Landsat Program and the role of the United Nations. Program participants included a number of nationally and internationally known experts and specialists. Among the panelists were: Dr. M. C. Bourély, Legal Adviser, European Space Agency; Prof. Carl Q. Christol, Univ. of Southern California; Dr. Isabella Diederiks-Verschuur, President, International Institute of Space Law; Stephen E. Doyle, Deputy Assistant Administrator for International Affairs, NASA; Eilene Galloway, Senior Specialist, Library of Congress; Professor Stephen Gorove, Univ. of Mississippi Law Center; Neil Hosenball, General Counsel, NASA; Monroe Leigh, Legal Adviser, U.S. Dept. of State; David Leive, Senior Legal Adviser, INTELSAT; L. W. Morley, Director, Program Planning and Evaluation, Canada Centre for Remote Sensing; Brig. Gen. Martin Menter (ret.); Dr. G. C. M. Reijnen, Astronomical Institute, Utrecht; Dr. George S. Robinson, Legal Adviser, Smithsonian Institution; Marvin Robinson, Acting Chief, Outer Space Affairs Division, United Nations; J. Schram, Directorate of Legal Operations, Dept. of External Affairs; Dr. Gennady P. Zhukov, U.S.S.R. Academy of Sciences, and others.

The XXVIIIth International Astronautical Congress of the International Astronautical Federation will be held at Anaheim, California, October 10-16, 1976. The Congress will focus on the theme "The New Era of Space Transportation".

The 19th Colloquium on the Law of Outer Space is being organized by Professor Carl Q. Christol of the University of Southern California. Four sessions are scheduled on the following subjects: 1. The Future of Space Law; 2. Space Law and Energy; 3. The Relationship of Air Law and Space Law; 4. Various Subjects.

5. *Brief News.*

The United States launched its second Project Viking spacecraft designed to conduct surface explorations on Mars. The vehicle is scheduled to reach Mars on August 7, 1976.

Government of India announced plans for its second satellite to be launched by the Soviet Union in 1977 or 1978.

Japan plans to launch a broadcasting satellite in early 1978 for the purpose of studying the seasonal aspects of radio wave propagation.

The Sixth EUROSPACE, U.S.-European Conference on Partnership for Space Applications was held October 13 to 19, 1975, in Monte Carlo. While delegations of both sides renewed pledges of cooperation, concern was expressed over problems in management and work duplication in future joint ventures.

Soviet Union made its sixth and seventh unmanned landings on the surface of Venus on October 22 and 25, 1975. Each vehicle was able to return a panoramic photograph of the surface of Venus before overheating and ceasing to transmit. Soviet officials said the photograph revealed a "young, still living planet," but no evidence of physical life was mentioned.

The People's Republic of China launched its Fourth satellite on November 26, 1975. The satellite was believed to have been designed for photo-reconnaissance and to have film ejection capacity. A fifth satellite was launched into a similar orbital trajectory on December 16, 1975.

Soviet Union filed advanced notification with the International Frequency Registration Board of the International Telecommunications Union of a plan to launch a network of seven geostationary spacecraft, positioned over the Indian, Pacific and Atlantic Oceans. This network of satellites will work with four other proposed satellites (notification of which had already been made) to form a new global communications system, to be fully functional by 1980.

World Meteorological Organization announced early in January that its studies indicate that the projected number of supersonic transports to be put into service by Britain, France, and the Soviet Union will have no substantial effect on the ozone level in the upper atmosphere.

National Aeronautics and Space Administration in early January announced a schedule of twenty-one space launches in 1976. Of these, eighteen are to be made on a reimbursement basis for separate governmental departments, private industry, or foreign governments. Two are of satellites sponsored by NATO, and another is of a satellite built and designed by Indonesia.

Japan has announced plans for two spacecraft launches in 1976. The launches are being made with the cooperation and sponsorship of the University of Tokyo.

BOOK REVIEWS

The Political Economy of the Space Program, by Mary A. Holman, Pacific Books (Palo Alto, California, 1974, \$24.95).

In his foreword, George Mueller, a former Associate Administrator for manned space flight, N.A.S.A., states as self-evident that, "... a vigorous program of directed research and development is essential to the continuation of the growth of our industrial economy. . . [T]he affluence we have achieved is the result of the increased productivity of our industrial establishment. . . ." (P.V). The case in point is the United States Space Program, and in particular the Apollo Program. Current benefits of space research and development would have to include, among other things, communications satellites, meteorological satellites, and microelectric circuitry. For the future, he anticipates radically different transportation systems based on the space shuttle which would provide one-hour service from London to Los Angeles, and people living in space in the 1980's. Exciting possibilities? Certainly! But, are these ideas the imagination of a member of the team that put a man on the moon in the 1960's, or are they the probabilities of the 1970's and 1980's?

Dr. Holman examines the future possibilities of the United States Space Program in the 1970's and beyond through the eyes of an economist. The basis of such examination is the National Aeronautics and Space Administration (NASA) Space Program during the 1960's, and its economic, political, and social development and implications, as well as the attendant decision-making processes. Dr. Holman also attempts to measure the impact of the program upon: the United States, the communities in which major facilities are located, the prime contractors and sub-contractors; and finally, the space program's relation to economic stability and growth.

A basic premise is that all public policy is based on the value judgments of millions of people through the complex interaction of the political and legal systems and the market place. Within public policy are traditional objectives of defense policy, foreign policy, economic policy, and social policy. The most significant and far-reaching decisions affecting the United States economy have been brought about by other than economic goals, an example being the Space Program. The Space Program has been affected by each of the four policy objectives, but the effect of the Space Program has made it among the foremost economic issues at the present time, and therefore, as stated by Dr. Holman, "a study of space programs by an economist is a study of economic policy formulation and implementation." (p. 2)

These economic analyses provide strong support for the Space Program, not only as a stabilizing force in the American economy in the 1960's, but also as future contributions to the economy based on technological development that will be used in the Space Program as well as in other areas of the economy. A serious problem is that the true contribution to economic growth cannot be statistically shown because scientific activities are intellectual in nature and many of the results in research and development

processes do not take the form of physical values that are capable of measurement. In addition, some of the greatest contributions to economic growth and economic welfare may not be realized for decades or even generations. The author identifies contributions that are not capable of measurement: acceleration in the development of the fuel cell; instruments for cardio-vascular monitoring; devices and techniques for cryogenic surgery; improved television, telephone and telegraph via communications satellites; new weather forecasting techniques via meteorological satellites; microminiaturization of electronic components; increased reliability and speed of computers; earth resources information provided by orbital satellites; and, a space shuttle transportation system (p. 333).

Dr. Holman determines that the success of NASA in the 1960's was based on (a) goal orientation with President Kennedy's 1961 speech getting the goal of NASA as a manned landing on the moon before the end of the decade, and (b) a clearly defined method of achievement, that is, a determination within a year of Kennedy's speech of the specific method by which the goal would be achieved. According to the author, prior to the President's speech in 1961, and subsequent to the culmination of the manned lunar landing program, the Space Program lacked goal orientation and a clearly defined course of action for the future. As such, the image of NASA is comparable to any other public agency or department.

Dr. Holman concludes that because of the difficulty of measuring the economic gain from the research and development of the Space Program, though such a clearly a major element, and with no goal orientation for the future program to spark the public imagination, it is likely that resources devoted to the exploration of space may be diverted to "more important" social problems existing on the Earth, and that resource allocation to the Space Program will be limited to pre-1961 levels. Even discounting the difficulty or impossibility of resource transfer, such a result is deplored as counter-productive. Some social programs make no contribution to economic development, while the higher levels of national income resulting from the productivity gains in the Space Program could be supportive of such social programs.

Dr. Holman's research is a strong endorsement of the contribution of the Space Program of the 1960's to the economic well-being of the United States. Her prognosis for the 1970's and beyond, however, should serve as a clear warning to all concerned, of the dangers to the future development of the Space Program.

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Studies in Aerospace Law: From Competition to Cooperation, by S. Bhatt, Sterling Publishers (New Delhi, 1974, pp. 208, Rs.35).

The author is a former Fulbright scholar at Southern Methodist University, visiting lecturer at the University of Delhi Faculty of Law, and civil servant in the Legal Directorate of the Director General of Civil Aviation in India.

The author's purpose, in his own words, was "to study the developments in the earthspace arena which were responsible for the establishment of public law and order in the region" and "to analyze the events and factors which became responsible for the changing of international society . . . from a climate of confrontation and competition of the first decade of space exploration to peaceful international cooperation during the second decade."

In attempting to achieve this broad purpose, the author covers virtually the complete field of space law, and in certain instances, even beyond that field. Among other things, the author concerns himself with: International Society: A perspective for law of space (Chapter 2); Intellectual Tradition in Relation to Law Science and Policy in Space Age (Chapter 3); Current Developments in Outer Space: Perspectives on Law, Freedom, and Responsibility after lunar landings (Chapter 8); and, Legal Aspects of International Cooperation in Outer Space (Chapter 10).

This very broad scope may have led to a certain lack of depth and clarity. An interesting, though in our opinion a dangerous philosophy, is dealt with under the sub-heading, Attributes of Intellectuals at page 28. Overall, the book is rich in content, and as such may be recommended to the advanced scholar in space law.

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A. Book

D. Harvey and L. Cirroritti, *U.S.-Soviet Co-operation In Space* (U. of Miami, Center for Advanced Int. Affairs, Miami, 1974).

B. Articles

Brewn, *Direct Broadcast Satellites and Freedom of Speech*, 4 Calif. W. Int. L. J. 374 (1974).

Bueckling, *Bemerkungen zum Weltraumregisterabkommen (Entwurf)*, 24 Zeitschrift für Luftrecht und Weltraumrechtsfragen 4 (1975).

Bueckling, *Bemerkungen zur organisationsrechtlichen Struktur der Europäischen Weltraumorganisation (ESA)*, 24 Zeitschrift für Luftrecht und Weltraumrechtsfragen 106 (1975).

Bueckling, *Weltraumrecht in der Krise*, Film und Recht 72 (No. 2, 1975).

Charyk, *INTELSAT: Its Accomplishments and Potential in Global Communications*, 3 Intermedia (Brit.) 2 (1975).

Christol, *Space Joint Ventures: The United States and Developing Nations*, 8 Akron L. Rev. 398 (1975).

Dauses, *Direct Television Broadcasting by Satellites and Freedom of Information*, 3 J. Space L. 59 (1975).

Falk, *Global Environment and International Law: Challenge and Response*, 23 Kan. L. Rev. 385 (1975).

Frutkin, *Direct/Community Broadcast Projects Using Space Satellites*, 3 J. Space L. 17 (1975).

Galloway, *Direct Broadcast Satellites and Space Law*, 3 J. Space L. 3 (1975).

Gehrig, *Broadcast Satellites—Prospects and Problems*, 3 J. Space L. 25 (1975).

Goedhuis, *The Present State of Space Law*, in M. Bos (ed.), *The Present State of International Law and Other Essays* 201 (I.L.A., 1973).

Gorove, Direct Television Broadcasting by Satellite: Some Alternatives in Case of an Impasse, 3 J. Space L. 55 (1975).

Kaltenecker, Zur Gründung des Europäischen Weltraumorganisation, 23 Zeitschrift für Luftrecht und Weltraumrechtsfragen 244 (1974).

La Fleur, Current Literature on Aerospace Law, 4 J. Air L. 165 (1975).

Meyer, Rückschau auf Luftrecht und Weltraumrecht, 23 Zeitschrift für Luftrecht und Weltraumrechtsfragen 228 (1974).

Moore, Earth Resource Satellites, a Puzzle for the United Nations, 16 Harv. Int'l. L. J. 648 (1975).

Patermann, Applicable Law in Cases of Tort Damages Caused by Direct Broadcast Satellites, 3 J. Space L. 47 (1975).

Pikus, Legal Implications of Direct Broadcast Technology, 3 J. Space L. 39 (1975).

Preston, The Common Heritage of Mankind as a Legal Concept, 9 Int'l. Lawyer 157 (1975).

Straschnov, Convention Relating to the Distribution of Programme Carrying Signals Transmitted by Satellite, 21 Bull. Copyright Soc. 369 (1974).

Notes/Comments

Direct Satellite Broadcasting and the First Amendment, 16 Harv. Int'l. L. J. 514 (1975).

Liability for Damage by Space Objects, 7 Texas Int'l. L. Rev. 523 (1975).

Outer Space, 69 Am. J. Int'l. 645 (1975).

Recent Federal Actions Affecting Long Distance Telecommunications: A Survey of Issues Concerning the Microwave Specialized Common Carrier Industry, 43 Geo. Wash. L. Rev. 878 (1975).

C. Official Publications

United Nations

U.N. Comm. on Peaceful Uses of Outer Space, Space Activities and Resources, Doc. A/AC. 105/100 (1975).

- U.N. Comm. on Peaceful Uses of Outer Space, Report of the United Nations/FAO Regional Seminar on Remote Sensing of Resources and Environment, Doc. A/AC. 105/136 (1975).
- U.N. Comm. on Peaceful Uses of Outer Space, Report by the Secretariat, Implementation Requirements for an International Center for Storage and Dissemination of Earth Resources Satellite and Related Data, Doc. A/AC. 105/140 (1975).
- U.N. Comm. on Peaceful Uses of Outer Space, Report of the United Nations Interregional Seminar on the Applications of Geodetic and Remote Sensing Data from Satellites for Cartography (Survey and Mapping), Doc. A/AC. 105/141 (1975).
- U.N. Comm. on Peaceful Uses of Outer Space, Report on the Needs of Developing Countries for Assistance in the Practical Applications of Space Technology, Doc. A/AC. 105/143 (1975).
- U.N. Comm. on Peaceful Uses of Outer Space, Presentation of Information by the Inter-Governmental Maritime Consultative Organization (IMCO) on the Establishment of a Maritime Satellite System, Doc. A/AC. 105/151 (1975).

United States Congress

- U.S. House Comm. on Science and Astronautics, Hearings before Subcommittee on Aeronautics and Space Technology: Review of Tracking and Data Acquisition Program, 93d Cong., 1-2 Sess. (Comm. Print. 1974).
- U.S. Senate Comm. on Aeronautical and Space Sciences, Hearings on Meeting with Assembly of Western European Union, Committee on Scientific, Technological, and Aerospace Questions, 94th Cong., 1st Sess. (Comm. Print. 1975).
- U.S. Senate Comm. on Aeronautical and Space Sciences, Hearings on S. 573, NASA Authorization for Fiscal Year 1976 and the Transition Period, 94th Cong., 1st Sess. (Comm. Print. 1975).
- U.S. Senate Comm. on Aeronautical and Space Sciences, The International Legal Aspects of the Stratosphere Ozone Problem, 94th Cong., 1st Sess. (Comm. Print. 1975).

United States Department of State

- Statement of W. Tapley Bennett, Jr., U.S. Deputy Representative to the United Nations on the Issue of Remote Sensing, 71 Dept. St. Bull. 1835 (1974).
- U.N. Outer Space Committee Meets at New York (Statement of Ronald F. Stowe), 73 Dept. St. Bull. 140 (1975).

U.S. Discusses Issues in Direct Television Broadcasting and Remote Sensing by Satellites (Statement of W. Tapley Bennett, Jr.), 73 Dept. St. Bull. 673 (1975).

U.S. Gives Views on Draft Convention on Registration of Objects Launched into Outer Space (Statement of Herbert Reis), 71 Dept. St. Bull. 68 (1974).

U.S. Presents Guidelines for Remote Sensing of the Natural Environment From Outer Space (Statement of Ronald F. Stowe), 72 Dept. St. Bull. 419 (1975).

D. Miscellaneous

Agreement on the Exchange of Information on Weather Modification Activities, 14 Int'l. Legal Mat. 589 (1975).