LEGAL ISSUES CONFRONTING THE EXPLOITATION OF RENEWABLE SOURCES OF ENERGY FROM THE OCEANS*

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* *Editor's Note: Mr. Joseph was commissioned by the United Nations Conference on New & Renewable Sources of Energy (UNERG) to prepare this report. It is being used as an internal working paper in preparation for the UNERG Conference to be held in Nairobi, Kenya in August, 1981. It is based on the best available legal information as of June, 1980, however, by the date of the Nairobi Conference significant changes could occur. The JOURNAL feels that this report is an invaluable addition to the international legal literature examining the exploitation of renewable ocean energy sources. As such, we publish it in primarily the form in which it was submitted to the United Nations. As a result, it contains a minimal number of footnotes as there was a great need to make the report readable to the non-lawyer.*

With the shift in global energy resource usage from primarily oil to alternatives, some envisage the oceans as being a possible contributor. Apart from oil and natural gas, the thermal gradient, waves, currents, tides, salinity gradient, biomass, offshore winds and the geothermal resource can all be converted into useful forms of energy. Ocean Thermal Energy Conversion (OTEC)[1] appears to

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1. OTEC uses the temperature differential between warm surface waters and colder, deep waters of the ocean to produce electricity. Two simple OTEC processes exist to extract energy from the ocean. Both utilize solar energy that has been colected and stored as heat in the surface layer of the ocean. The first process is known as the "closed cycle." Here, a working fluid, such as ammonia, propane or a freon-type refrigerant is vaporized and recondensed continuously in a closed loop to drive a turbine. Warm sea water is drawn from the ocean surface and pumped through heat exchangers wherein the secondary working fluid is vaporized. The working fluid then expands and emerges as a high pressure vapor to drive the turbine. From the turbine exhaust vapor flows to a condenser where it returns to a liquid as it is cooled by cold sea water. The second method is known as the "open cycle." Warm surface water is evaporated under a partial vacuum. The steam thus produced passes through and propels a turbine, and is later cooled in a condenser using cold sea water pumped up from the depths.

OTEC electricity can be cabled to shore by transmission cable. Alternatively, OTEC plantships can traverse ("graze") the oceans in order to find the maximum thermal gradient differentials. In the latter mode of deployment, the energy produced could be used for energy-incensive manufacturing processes on board such as the production of ammonia or aluminum, or the processing of manganese nodules.

be the technology which will be the most significant[2] in this century. Research and development in France, Japan and the United States has advanced the technology to a stage which could see commercial OTECs deployed before 1990.

The industries developing OTEC face a number of legal, institutional and financial uncertainties. Despite the government's apparent emphasis on nuclear energy, coal and synthetic fuels, program managers in the United States are having to convince corporate management that commitment to OTEC research, development and demonstration programs should continue by demonstrating that these uncertainties are quickly being resolved. It cannot be overemphasized that in the United States at least, the early years of the 1980's are a critical period of decision for the OTEC community. There is little strong corporate commitment to OTEC,[3] and uncertainties make the cases of the OTEC program managers weaker. When a corporation decides to commit vast amounts of capital into capital intensive technologies like OTEC, it requires long lead-times for decision making. Uncertainties which now exist, affect the actualities of many years hence.[4]

The purpose of this paper is to address the major international law issues confronting the development of renewable ocean energy. National law studies require treatment in separate papers,[5] but should not be underestimated. In the United States there has been some difficulty convincing the Administration and Congress of the need for the enactment of a comprehensive legal regime and licens-

2. It will probably produce the most renewable ocean resource derived energy by the year 2000.

3. This is in large part based on U.S. industry's view that the Department of Energy's OTEC program is underambitious and overcautious. The general feeling is that the program is out of step with the advanced state of technology. This is felt to be more a problem of commitment than of disagreement. *See*, *Hearings Before the Subcommittee on Energy Development and Applications, US. House of Representatives Committee on Science and Technology*, 96th Cong., 2d Sess. — (June 5, 1980) (statements of Stephen L. Joseph).

4. *See* the testimony of the Ocean Energy Council before the National Ocean Policy Study Group, U.S. Senate Committee on Commerce, Science and Transportation, U.S. Congress, May 1, 1980 "[T]he justification of large, new investment requires considerable internal lead times to accomodate the corporate and financial decision-making process. The preparation of thoughtful long-range plans, the in-house promotion of new technology, the development of financing, and the resolution of institutional deficiencies all require extended periods of time. To prepare an internal schedule of technology introduction, many institutional and financial questions must be resolved well in advance of their actual materialization. Moreover, a decision to finance an OTEC plant must be made several years before the actual commitment of funds" (p.5).

5. However, a review of pending U.S. legislation is included in Appendix A.

ing legislation.[6] Such legislation is needed now, not in five or more years when it will be utilized. Industry needs advance information on what kind of legal regime will prevail. Without this guidance they may decide to commit capital to more certain investment climates.

The international law of the sea is going through a period of major change. The Geneva Conventions on the Law of the Sea, negotiated in 1958 at the United Nations Conference on the Law of the Sea (UNCLOS I), are now recognized as inadequate for the needs of the 1980s. The emergence in 1967 of the notion that the deep seabed should be vested in mankind as a whole,[7] the perception that the Geneva regime was not comprehensive enough, and the development of new offshore technologies resulted in preparations for a Third Conference.[8] However, thirteen years of planning and negotiation still have not produced a document for signature. Meanwhile, States have been developing the law by unilateral extensions of their jurisdictions. Presently, many of the rules of customary international law of the sea are uncertain and highly controversial. However, it is unlikely that there will be more than a handful of deployments of ocean energy devices beyond territorial waters in the next few years, so there is little utility in ascertaining the present customary position.

In this paper, for the sake of brevity and readable analysis, the references for determining the law of the sea are the four Geneva Conventions[9] and the latest draft negotiating text of the Third United Nations Conference on the Law of the Sea (UNCLOS III), the Informal Composite Negotiating Text Revision 2 (ICNT).[10] The Geneva Conventions bind less than a majority of States,[11] but as they generally codified existing customary principles, and in the case of some provisions may bind nonsignatories, they represent a

6. *See* note 4 *supra*. The rest of that testimony addressed this issue.

7. *See* G.A. Res. 2340 (XXII), Dec. 18, 1967; G.A. Res. 2467 (XXIII) Dec. 21, 1968; G.A. Res. 2574 (XXIV), Dec. 15, 1969; G.A. Res. 2749 (XXV), Dec. 17, 1970; G.A. Res. 2881 (XXVI), Dec. 21, 1971.

8. The Second Conference was held in 1960 to discuss the territorial sea limit, but produced no agreement. The inaugural session of the Third Conference convened in New York in 1973. The conference recently completed the first phase of its ninth session.

9. The citations for the three Conventions of relevance to this paper are contained in notes 16 and 19 *infra*.

10. Informal Composite Negotiating Text/Revision 2 (ICNT), U.N. Doc. A/CONF. 62/WP.10/Rev. 2 April 11, 1980 [hereinafter referred to as ICNT], *reprinted in* 18 INT'L LEGAL MATS. 686 (1979).

11. *See* notes 16 and 19 *infra*.

good starting point for a general analysis. The trends in State practice generally reflect ICNT provisions. The "common heritage of mankind" concept may already be part of international law.[12] Twelve-mile territorial seas and twenty-four mile continguous zones are also so prevalent in State practice that they are probably part of customary international law,[13] especially as they are consistent with the ICNT.[14] Resource zones of 200 miles almost certainly are now part of customary international law.[15]

To the maximum extent possible, this paper has been written in such a way as to make it comprehensible to nonlawyers. However, an introduction to some legal concepts is necessary to assist the layman. It is widely understood that each State has its own national legal system. However, on the international plane there exists a body of law called public international law. This sytem regulates State-to-State relations and rarely deals directly with non-State entities. Although it is binding, there is no comprehensive systematized enforcement scheme. The occasional violation does not refute the existence of this body of law. It is still observed most of the time, except in critical war and peace issues.

International law and the national legal systems exist side by side. In most cases, they are mutually exclusive, regulating different subject matters. Where they intersect and conflict, international legal doctrine maintains that international law prevails. However, in national courts judges follow the decisions of their governments embodied in a constitution or legislation, which may give primacy to national law. In the United States, for example, the two main sources of international legal rules, treaties (also called conventions) and binding customs have the status of Federal law. Subsequent national legislation has primacy over both sources and all national legislation has primacy over customery international law.

When a State is referred to as having authority or jurisdiction, it has authority to prescribe and enforce its laws over a particular subject matter, object or person. Unless international agreements or custom are contrary, this power is exclusively vested in one State

12. *See* G.A. Res. 2749 (XXV), Dec. 17, 1970. Resolutions of the United Nations General Assembly are not binding upon States. If the new deep seabed concepts are part of international law, it is because the history of State practice since 1967 or 1970 supports the conclusion that they are now customary principles. The United States maintains that they are not part of international law.

13. The United States has retained a three nautical mile limit.

14. ICNT, *supra* note 10, arts. 3 and 33(2).

15. States have established general resource zones of this breadth. *Cf.* note 69 *infra*.

under international law.[16].

The conclusion is written as a summary report for the United Nations Conference on New and Renewable Sources of Energy (UNERG). It is designed to summarize the points made in this report without extensive legal analysis.

I. SITING AND RESOURCE EXPLOITATION

The most basic concerns in the development of ocean energy devices is in which areas of ocean space and under what conditions may a device be sited and operated.

A. The Geneva Convention Concepts

UNCLOS I convened at Geneva in 1958 and produced four documents for signature and ratification. The three that are of relevant to this paper are the Convention on the Territorial Sea and the Contiguous Zone;[17] the Convention on the Continental Shelf;[18] and the Convention on the High Seas.[19]

1. *Internal Waters*. The Convention on the Territorial Sea and the Contiguous Zone provides that waters on the landward side of the baseline from which the territorial sea is measured together with their mouths, form part of the "internal waters" of a State.[20] They include ports, bays, lakes and rivers and sometimes other water areas closely adjacent to the land. A State has sovereignty over such waters extending to the air space over them, as well as to the bed and subsoil below.[21] Since this sovereignty is subject only to the duty not to hamper very limited rights of innocent passage, the customary law rules of entry in distress,[22] and

16. With respect to all the ocean zones mentioned in this paper, there are special rules for delimiting their boundaries between the neighboring or adjacent States. The following rules are general and are applicable to States with no adjacent or neighboring States. Often States are so positioned that they cannot extend their jurisdictions beyond a limited distance because of another State's jurisdiction or land territory. *See* Convention on the Territorial Sea and the Contiguous Zone, arts. 12 and 24(3) (hereinafter referred to as Territorial Sea Conv.) *done* Apr. 29, 1958, 516 U.N.T.S. 205, 15 U.S.T. 1606, art. 6; Convention on the Continental Shelf art. 6, (hereinafter referred to as CS Conv.) *done* April 29, 1958, 499 U.N.T.S. 311, 15 U.S.T. 471; ICNT, *supra* note 10, arts. 15, 74 and 83.

17. *Id.*

18. *Id.*,

19. Convention on the High Seas (hearinafter referred to as High Seas Conv.), *done* Apr. 29, 1958, 450 U.N.T.S. 82, 13 U.S.T. 2312.

20. Territorial Sea Conv., *supra* note 16, art. 5(1).

21. *Id.*, arts. 1 and 2.

22. *See* the *Hoff Case, United States v. Mexico*, U.N.R.I.A.A. 444; Convention on the

laws regulating the marine environment, a State has a high degree of authority to site ocean energy devices in these waters.[23] It can grant site exclusivity to OTEC and other ocean energy devices so that the thermal or other resource is utilized to the optimum.

There are no rights of passage for foreign ships in internal waters, except where the establishment of a straight baseline has the effect of enclosing, as internal waters, an area which previously had been considered territorial or high seas. In such waters, foreign vessels have a right of innocent passage, as they do in the territorial sea.[24] Where there is a right of innocent passage in internal waters, there is a duty not to hamper this navigation.[25]

The baseline for measuring the territorial sea is normally drawn at the low-water line along the coast.[26] However, special circumstances may permit the drawing of baselines in other ways resulting in significant variations. For example, where the coastline is "deeply indented and cut into," or where there is "a fringe of islands along the coast in its immediate vicinity," straight baselines may be drawn.[27] Such baselines must not depart to any appreciable extent from the general direction of the coast.[28] The sea areas lying within the lines must be sufficiently linked to the land domain to be subject to the regime of internal waters.[29] Additionally, in determining particular baselines account may be taken of "economic interests peculiar to the region concerned, the reality and importance of which are clearly evidenced by long usage."[30]

The Convention also permits the drawing of closing lines across or inside certain bays.[31] The waters on the landward side of these bays constitute internal waters. With respect to rivers flowing directly into the sea, the baseline may be a straight line across the mouth of the river between two points on the low-tide line of its

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Liability of Operators of Nuclear Ships, art. 17, *done* May 25, 1962, at Brussels; *as cited in* 1 S. ODA, INTERNATIONAL LAW OF THE OCEAN DEVELOPMENT 459 (1972).

23. *See* text accompanying notes 104-112 *infra*. The word "devices" refers to all manmade artificial islands and vessels or other manmade structures. In this article, biomass farms are included within this term.

24. Territorial Sea Conv., *supra* note 16, art. 5(2).

25. *Id.*, art. 15(1).

26. *Id.*, art. 3.

27. *Id.*. art. 4(1).

28. *Id.*, art. 4(2).

29. *Id.*

30. *Id.*, art. 4(4).

31. *Id.*, art. 7.

banks.[32] Other provisions of the Convention deal with ports,[33] roadsteads[34] and low-tide elevations,[35] but, for the purposes of this report, they do not warrant discussion.

The ICNT adds new circumstances under which straight baselines may be drawn. Where the coastline is highly unstable due to the presence of a delta and other natural conditions, the straight baseline may be drawn to points along the farthest seaward extent of the low-water line.[36] There would be no other significant changes to the regime of internal waters.[37]

2. The Territorial Sea. The Geneva Convention on the Territorial Sea and the Contiguous Zone states that the sovereignty of a State extends, beyond its land territory and internal waters, over a belt of sea adjacent to its coast called the territorial sea.[38] This provision codified long-standing customary international law. The sovereignty extends to the airspace over the territorial sea, as well as to its bed and subsoil.[39] Despite attempts to settle the issue at UNCLOS I and II, there is as yet no multilateral treaty delimiting the breadth of this belt of sea. The result of this is that many States have established twelve nautical mile limits, while some nations, such as the United States, still have three nautical mile limits, and others have extended to 200 nautical miles.

The "sovereignty" of a coastal State in its territorial sea is almost as extensive as its sovereignty over its land territory. It has complete virtual and exclusive authority over siting. This is subject to a duty not to hamper innocent passage of non-coastal State's ships and submarines via the blocking of established sealanes with ocean energy devices.[40]

Certain ocean energy devices would be "ships" for the purpose of the rules of innocent passage in the territorial sea. An OTEC plantship, for example, at least when not exploring or exploiting the thermal resource, would be a device falling into this category. The meaning of "passage" is defined by the Convention as "navigation

32. *Id.*, art. 13.
33. *Id.*, art. 8.
34. *Id.*, art. 9.
35. *Id.*, art. 11.
36. ICNT, *supra* note 10, art. 7(2).
37. *Cf. id.*, art. 6 on reefs.
38. Territorial Sea Conv., *supra* note 16, art. 1(1).
39. *Id.*, art. 2.
40. *See* note 25 *supra*.

through the territorial sea for the purpose either of traversing that sea without entering internal waters, proceeding to internal waters, or of making for the high seas from internal waters."[41]

If a device is a "ship," the question arises whether it would be navigating for the purpose of "traversing" the territorial sea while it simultaneously exploited the thermal or other energy resource. Under the provisions of the ICNT, as seen below, the picture is clearer, for activities not related to passage are clearly enjoined.[42] However, the Convention fails to distinguish clearly between primary and incidental purposes. The use of the definite article in "the purpose" implies that only traversing is permitted. This would exclude energy resource exploitation.

The ICNT envisages a mileage limit of twelve nautical miles for the territorial sea.[43] As mentioned above, many States have already extended their limits to this distance, while others have established greater or lesser breadths. The ICNT also provides that passage would not be innocent if the ship engages in "any . . . activity not having a direct bearing on passage."[44] This general statement would seem to clearly preclude energy resource exploitation by foreign "ships" exercising the right of innocent passage.

3. The Continental Shelf. Coastal States have resource jurisdiction over the continental shelf.[45] The shelf is defined by the Geneva Convention on the Continental Shelf as the seabed and subsoil of the submarine areas adjacent to the coast.[46] The continental shelf regime only prevails beyond territorial waters, because the coastal State has sovereignty in such waters. Where a general resource zone has been established, the shelf regime prevails beyond that, because the resource jurisdiction over the zone is inclusive of shelf jurisdiction and more extensive. No mileage limit is established for the continental shelf by the Convention. Instead, the limit is reached where the depth of the superjacent waters reaches 200 meters, or, beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of the shelf.[47]

41. Territorial Sea Conv., *supra* note 16, art. 14(2).
42. ICNT, *supra* note 10, art. 19(2)(1).
43. *Id.*, art. 3.
44. *See* note 42 *supra*.
45. Continental Shelf Conv., *supra* note 16, art. 2.
46. *Id.*, art. 1.
47. *Id.*

The Convention states that the coastal State exercises "sovereign rights" over the continental shelf, for the sole purpose of exploring or exploiting its natural resources.[48] These rights are exclusive and do not depend upon any coastal State assertion of jurisdiction over the shelf resources.[49] The term "natural resources" is defined as the mineral and other nonliving resources of the seabed and subsoil, and certain living organisms which live on the shelf.[50] The rights of the coastal State over the shelf do not affect the legal status of the superjacent waters as high seas, or that of the airspace above.[51] The provisions give the coastal State exclusive authority over the shelf only for the purpose of exploring or exploiting its resources. It can prevent other States from doing the same.[52]

The ocean geothermal resource falls within the definition of a continental shelf resource. The negotiating history of the Convention on the Continental Shelf indicates that the ocean biomass on the shelf seabed is probably also a shelf resource. The Convention defines shelf resources as follows:

> The natural resources referred to in these articles consist of the mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to sedentary species, that is to say, organisms which at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil.[53]

In its commentary to its draft articles prepared in 1956, the International Law Commission referred to marine flora in the following statement.

> At the eighth session it was proposed that the condition of permanent attachment to the seabed should be mentioned in the article itself. At the same time the opinion was expressed that the condition should be made less strict; it would be sufficient that the marine fauna and flora in question should live in constant physical biological relationship with the seabed and the continental shelf. . . .[54]

The International Law Commission's commentary is not in it-

48. *Id.*, art. 2(1).
49. *Id.*, art. 2(3).
50. *Id.*, art. 2(4).
51. *Id.*, art. 3.
52. *See* Commentary to Draft Article 68, 2 Y.B. INT'L. L. COMM'N 297, para. 2, U.N. Doc. A/CN.4/Ser.A/1956/Add.1.
53. *See* note 50 *supra*.
54. Commentary to Draft Article 68, *supra* note 52, para. 4.

self a statement of the law. However, the wording of Article 2(A) and the International Law Commission's commentary suggest that ocean biomass is included as "living organisms belonging to sedentary species" except floating biomass which is not attached to the seabed. Such floating biomass would be exploitable under the doctrine of the high seas.[55]

As will be seen later, under the doctrine of the freedom of the high seas, ocean energy resources can be exploited by any State, so long as reasonable regard is paid to the exercise of high seas freedoms by other States. The question which is of concern here is whether the high seas right to exploit an energy resource, such as the thermal gradient, permits a State to affix a device to a foreign continental shelf, particularly if the coastal State objects on the basis that it intends to exploit shelf resources on the same site.

The coastal State is not given "sovereignty" over the continental shelf, but only "sovereign rights." The reason for this was noted by the International Law Commission in its Commentary to its draft articles prepared for UNCLOS I.

> The Commission desired to avoid language lending itself to interpretations alien to an object which the Commission considers to be of decisive importance, namely, the safeguarding of the principle of the full freedom of the superjacent sea and the air space above it. Hence it was unwilling to accept the sovereignty of the coastal State over the seabed and subsoil of the continental shelf.[56]

The extent of the coastal State rights on and in the shelf itself, as opposed to rights in the superjacent waters and airspace, could therefore still correctly be described as sovereignty. The rationale for the use of the term "rights" was not intended as a limitation of the rights on the shelf itself, as it only referred to the rights in the waters and airspace above.

Article 5(1) of the Convention states that the exploitation of the natural resources of the shelf "must not result in any unjustifiable interference with navigation, fishing or the conservation of the living resources of the sea."[57] There is no corresponding provision in the Convention on the High Seas. However, the ICNT does make the freedom to construct artificial islands subject to the continental shelf regime.[58] In the absence of a similar provision in the

55. *See* text accompanying notes 63-64 *infra*.
56. *See* note 52, *supra*.
57. *See also* ICNT, *supra* note 10, art. 78(2).
58. *Id.*, art. 87(1)(d).

Convention, it is not clear whether priority is given to high seas freedoms or continental shelf rights, or whether there should be a balancing of the affected interests.

The ICNT contains provisions which would significantly affect the present legal position on the continental shelf with regard to ocean energy devices. UNCLOS III is currently working on a new formula for defining the breadth of the shelf.[59]

The ICNT states that Article 60 applies, *mutatis mutandis*, (*i.e.*, with all necessary modifications) to artificial islands, installations and structures on the continental shelf.[60] Article 60(1) states as follows:

> In the exclusive economic zone, the coastal State shall have the exclusive right to construct and to authorize and regulate the construction, operation and use of:
>
> (a) Artificial islands;
>
> (b) Installations and structures for the purposes provided for in article 56 and other economic purposes;
>
> (c) Installations and structures which may interfere with the exercise of the rights of the coastal State in the zone.

Application of this Article, without any modification, would effectively abolish the right of non-coastal States to emplace or affix ocean energy devices on the continental shelf in order to exercise their right to exploit the high seas energy resources.[61] Although the words *mutatis mutandis* mean that Article 60 as a whole is to be modified as necessary, the extent of the modification is not made clear.

In 1969, the International Court of Justice broadened the continental shelf concept by defining it as a prolongation or continuation of the land territory.[62] If the ICNT is read in the light of that case, it might well be interpreted in favor of greater coastal State rights. If Article 80 is interpreted in this way, and the broadness of Article 81 would support such an interpretation, Article 60 could be applied so as to exclude ocean energy devices affixed to the continental shelf absent control State consent.

Article 81 states that the coastal State shall have "the exclusive

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59. *See*, *Id.*, art. 76.

60. *Id.*, art. 80.

61. This interpretation is supported by ICNT *supra* note 10, art. 87(1)(d), making the high seas freedom to construct artificial islands subject to the continental regime.

62. *North Sea Continental Shelf Case*, Judgment of Feb. 20, 1969 (Federal Republic of Germany/Denmark, Federal Republic of Germany/Netherlands) [1969] I.C.J. Rep. 3, digested and excerpted in 63 A.J.I.L. 591 (1961); *reprinted in* 8 I.L.M. 340 (1969).

right to authorize and regulate drilling on the continental shelf for all purposes." The word "drilling" could be interpreted either to include or exclude drilling for the purpose of placing the foundations of a structure not exploring or exploiting the resources of the shelf. The use of the words "for all purposes" implies that non-shelf resource related drilling would be subject to coastal State jurisdiction, thereby supporting an interpretation of Article 80 of the ICNT in favor of greater coastal State rights.

The ICNT would establish a system of payments and contributions to the International Sea-bed Authority, with respect to the exploitation of the continental shelf beyond 200 miles.[63]

4. The High Seas. The concept of the high seas has been present in State practice for hundreds of years. The term "high seas" is defined as all parts of the sea that are not included in the territorial sea or in the internal waters of a State.[64] This is an international area, open to certain specified freedoms and reasonable use by all nations. The Geneva Convention on the High Seas codified the applicable principles. The critical Article as far as the siting and operation of ocean energy facilities on the high seas is Article 2, which reads as follows:

> The high seas being open to all nations, no State may validly purport to subject any part of them to its sovereignty. Freedom of the high seas is exercised under the conditions laid down by these articles and by the other rules of international law. It comprises, *inter alia*, both for coastal and non-coastal States:
>
> 1. Freedom on navigation;
> 2. Freedom of fishing;
> 3. Freedom to lay submarine cables and pipelines;
> 4. Freedom to fly over the high seas.
>
> These freedoms, and others which are recognized by the general principles of international law, shall be exercised by all States with reasonable regard to the interests of other States in their exercise of the freedom of the high seas.

The inclusion of the words *inter alia* was intended to establish that the list of enumerated freedoms is not exhaustive. The final sentence of the article expressly recognizes the possibility of other legitimate uses.

It should be noted that this right to use the high seas is expressed as a "freedom." The right to fish on the high seas is de-

63. ICNT, Art. 82,

64. High Seas Conv., *supra* note 19, art. 1.

scribed by Article 2 as a "freedom" to fish. There is no reference to a property right in the fish themselves. Once the freedom to fish has been exercised and the fish are caught and appropriated, property rights do arise in them, *i.e.*, the fish are *res nullius*. An analogy might be drawn with high seas energy resources. There would initially be a freedom to exploit them, not a property right in them. There would be no question of property rights in them until appropriation has occurred.

Whether the deployment of an ocean energy device would be a high seas freedom would be dependent on a balancing of the affected interests in each case. Fixed ocean energy devices would by their very presence exclude other high seas freedoms in the space they occupy. Navigation and fishing might be affected for example. However, other States must also take into account the interests of the State in exploiting the energy resource. As the oceans are so vast, the deployment of almost all ocean energy devices on the high seas should be regarded as reasonable. It could also be argued that a State has authority to grant site exclusivity on the high seas as a freedom and because it would be generally unreasonable for another State to hamper any other State's exercise of the freedom to exploit the energy resources.

The ICNT counterpart to Article 2 of the Convention on the High Seas reads as follows:

> Freedom of the high seas
>
> 1. The high seas are open to all States, whether coastal or landlocked. Freedom of the high seas is exercised under the conditions laid down by this Convention and by other rules of international law. It comprises, *inter alia*, both for coastal and landlocked States:
>
> (a) Freedom of navigation;
>
> (b) Freedom of overflight;
>
> (c) Freedom to lay submarine cables and pipelines subject to Part VI;
>
> (d) Freedom to construct artificial islands and other installations permitted under international law, subject to Part VI;
>
> (e) Freedom of fishing, subject to the conditions laid down in Section 2;
>
> (f) Freedom of scientific research, subject to Parts VI and XIII.
>
> 2. These freedoms shall be exercised by all States, with due consideration for the interests of other States in their exercise of

the freedom of the high seas, and also with due consideration for the rights under this Convention with respect to activities in the Area.[65]

There are textual differences from Article 2 which should be noted. First, the words "and others [*i.e.*, freedoms] which are recognized by the general principles of international law" are omitted. The words were perhaps omitted because they were superfluous. Whatever the reason, this omission in itself is inconsequential, because the words *inter alia* are retained.

Secondly, the ICNT uses the words "due consideration" instead of the words "reasonable regard." This is probably meant to symbolize that the balancing of high seas freedoms against the common heritage rights is somehow jurisprudentially different than the balancing of two claims to high seas freedoms. This change should not affect the practical application of the high seas freedom doctrine with respect to ocean energy devices.

B. New Concepts and the Third United Nations Conference on the Law of the Sea

The inaugural session of the Third United Nations Conference on the Law of the Sea convened in 1973. At the time of writing the Conference had completed the first phase of its ninth session and was due to hold the second phase in late 1980. No provisions had been formally voted upon by the Conference for inclusion in the Law of the Sea treaty. However, the practice of States and the consensus of many of the Conference participants suggested that some new concepts, which will affect ocean energy, had either become or might subsequently enter international law. These concepts include archipelagic waters, exclusive economic zones, the "common heritage of mankind," and the creation of an International Sea-bed Authority to manage common heritage seabed and subsoil activities and resources.

1. Archipelagic Waters. Although the question of a special regime for archipelagoes was raised at UNCLOS I, no such regime was adopted in the Geneva Conventions. However, some archipelagic States subsequently drew their baselines to join the outermost points of their outermost islands, thereby enclosing large bodies of water where no international regime had been agreed upon. The ICNT states that straight baselines may be drawn joining the outer-

65. ICNT, *supra* note 10, art. 87.

most islands and drying reefs of an archipelagic State,[66] within certain limitations.[67] Foreign vessels would have rights of archipelagic sealanes passage or innocent passage in the enclosed waters.[68] An ocean energy device would have to be placed so as not to hamper the exercise of these rights of navigation.

2. The Exclusive Economic Zone. Many States have established general or specific resource zones of varying breadths, sometimes described as "exclusive economic zones." Most of these extend to 200 nautical miles. In such zones, the coastal State exercises exclusive jurisdiction over some or all natural resources.[69] This concept has been adopted in the ICNT. In a zone which may extend to 200 nautical miles, the coastal State would have

> [s]overeign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the seabed and subsoil and superjacent waters, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds.[70]

Article 60(1) provides that the coastal State in its exclusive economic zone has the "exclusive right to construct and to authorize and regulate the construction, operation and use" of artificial islands, installations and structures for the purpose of exploiting the natural resources over which it has jurisdiciton.

It is clear, therefore, that with respect to the siting and operation of ocean energy devices, the coastal State would have complete and exclusive authority over siting and operations.[71]

3. The "Common Heritage of Mankind." In 1970, the General Assembly of the United Nations adopted a resolution, which included the following paragraphs.

> 1. The sea-bed and ocean floor, and the subsoil thereof, beyond the limits of national jurisdiction (hereinafter referred to as the area), as well as the resources of the area, are the common heritage of mankind.
> 2. The area shall not be subject to appropriation by any means

66. Examples of archipelagic States are Indonesia, Fiji, Phillipines and Mauritius.

67. ICNT, *supra* note 10, art. 47(1).

68. *Id.*, Arts. 52-54.

69. *E.g.*, the U.S. Fishery and Conservation Management Act of 1976 establishes a 200 nautical mile fishery zone with the exception of tuna.

70. ICNT, *supra* note 10, art. 65(1)(a).

71. *Id.*, art. 56(1)(b) grants jurisdiction over the use of installations.

> by States or persons, natural or juridical, and no State shall claim or exercise sovereignty or sovereign rights over any part thereof.[72]

The ICNT also embodies the "common heritage" concept. To what extent it is part of customary international law is a matter of dispute between industrialized nations, who have the technological capability to exploit seabed resources such as manganese nodules, and the "group of seventy-seven." The ICNT provisions dealing with the "Area" must be reviewed in order to assess whether there would be any effect on ocean energy device deployment if they become binding. They will become binding on some or all States, by virtue of the ratification of a law of the sea treaty, or possibly in the case of the more generalized provisions, if they become effectively recognized in State practice.

The "common heritage of mankind" concept extends to the "Area" and its resources. The "Area" is defined as "the seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction."[73] In the context of the ICNT as a whole, this is intended to mean beyond the exclusive economic zone and continental shelf. The status of the waters, including the thermal gradient above the Area, are not affected by the common heritage concept.

The International Sea-bed Authority would be the organization through which the States Parties would organize and control "activities in the Area."[74] This latter term, which is a shorthand description of the jurisdiction of the authority, is defined as "all activities of exploration for, and exploration of, the resources of the Area."[75] Two questions with respect to the impending regime affect the siting of ocean energy devices. First, which ocean energy resources are also common heritage resources? Secondly, how would ocean energy activities not exploiting "Area" resources be affected by the new regime?

With respect to the first question, the status of the superjacent waters and airspace above the seabed would remain high seas.[76] Only the seabed and subsoil are included in the common heritage concept, so the thermal gradient resource would not be part of it. Consequently, the only energy resources which could conceivably be part of the area are the geothermal and biomass resources. The

72. G.A. Res. 2749 (XXV) Dec. 17, 1970, paras. 1 & 2.
73. ICNT, *supra* note 10. art. 1(1).
74. *Id.*, art. 157(1).
75. *Id.*, art. 1(3).
76. *Id.*, art. 135.

ICNT defines "resources" to mean mineral resources *in situ*.[77] Minerals would include the following categories.

> (i) Liquid or gaseous substances at or beneath the surface such as petroleum, gas, condensate, helium, and also sulphur and salts extracted in liquid form.
>
> (ii) Solid substances occurring on the surface or at depths of less than the three metres below the surface, including polymetallic nodules.
>
> (iii) Solid substances at depths of more than three metres below the surface.
>
> (iv) Metal-bearing brine at or beneath the surface.[78]

This definition would not include geothermal or biomass resources. In Article 133 of the ICNT revision 1, the words "water, steam and hot water" were included. These words have now been deleted and the geothermal resource is thereby excluded. Biomass is not a mineral and therefore does not fall within the definition.

Regarding the second question, how would ocean energy activities not exploiting "Area" resources be affected by the new regime, a fixed support or a mooring device would be using the "Area" without constituting an "activity" therein. Could the International Sea-bed Authority validly object to such a use of the seabed? The ICNT states:

> No State shall claim or exercise sovereignty or sovereign rights over any part of the Area or its resources, nor shall any State or natural or juridical person appropriate any part thereof. No such claim or exercise of sovereignty or sovereign rights, nor such appropriation shall be recognized.[79]

The question is whether the use of the seabed in the way we are concerned with would constitute an attempt to claim "sovereignty" or "sovereign rights," or would be an illegal "appropriation." It may be contended that this provision could be interpreted in such a way as to prohibit the fixing, or even mooring of facilities on the seabed. However, this would be a great hindrance to the exercise of a valid high seas freedom, a result which UNCLOS III would probably not sanction. The ICNT clearly envisages the use of high seas freedoms on the seabed. It refers to the high seas freedoms to construct artificial islands and other installations.[80] Morever, this free-

77. *Id.*, art. 133(b). The meaning of the Latin "*in situ*" in this context must refer to the seabed and subsoil.

78. *Id.*, art 133 (c).

79. *Id.*, art. 137(1).

80. ICNT, *supra* note 10, art. 87(d).

dom is expressly subject to the continental shelf regime while not being subject to the "common heritage" regime. This implies that the "common heritage" regime does not prohibit the emplacement of ocean energy devices on the seabed.

II. JURISDICTION OVER OCEAN ENERGY DEVICES AND PERSONS ON BOARD.

Here we are concerned with determining which State has competence in international law to prescribe and enforce its laws over an ocean energy device, and the persons on board.

A. High Seas

The Convention on the High Seas of 1958 states as follows:

> Each State shall fix the conditions for the grant of its nationality to ships, for registration of ships in its territory, and for the right to fly its flag. Ships have the nationality of the State whose flag they are entitled to fly. There must exist a genuine link between the State and the ship; in particular, the State must effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag.[81]

The Convention further states that ships may sail under the flag of only one State.[82]

Ships are assimilated to territory for the purpose of jurisdiction, because when considered from the standpoint of public order, a single municipal legal system is necessary to regulate people on board. It would not be practical to repeatedly change legal systems as the ship passes through foreign waters. The need for certainty resulted in the choice of flag State jurisdiction, and rejection of other theories of jurisdiction including the State of the owner's nationality, or the State with the closest relationship.

OTEC plantships and some other moving ocean energy devices would be "ships" for the purposes of jurisdiction. However, fixed ocean energy devices do not have the voyaging characteristic.[83] With respect to such devices and other structures on the high seas, which are not "ships," the law is not settled. There is no recognition of this gap in the Convention. In customary international

81. High Seas Conv., *supra* note 19, art. 5(1).

82. *Id.*, art. 6(1).

83. Moored devices, such as the moored "Mini-OTEC" facility off Hawaii, or the converted Navy tanker which will also be moored and will primarily test heat exchangers, known as "OTEC-1", do not have the voyaging characteristics. Nothing in the law says that they must, but in the writer's view they should be assimilated to fixed structures nonetheless.

law, however, States may prescribe and enforce laws for its nationals anywhere. State practice also recognizes the existence of limited passive nationality or "protective" jurisdiction. That is to say, the competence to prescribe and enforce laws against non-nationals to protect State interests or nationals.

Jurisdiction based on nationality is unsatisfactory as a basis for regulating activities on board, or for regulating the device itself. This is due to the likelihood of a multiplicity of nationalities being involved, each with conflicting rules. As with ships, there is a need for a rule which would make a single legal system applicable to "non-ship-like" devices. There is no basis in international law for determining which State should have such jurisdiction.

The most certainty would be provided by selecting a "flag" state and applying its law. In the absence of the selection of a flag State, or where there were two or more appropriate flags, the device would be treated as Stateless and subject to the principles of customary international law of nationality jurisdiction. The best solution to the problem is therefore to attribute nationality to such devices.

Flags of convenience should be treated in the same way as ships. Although Article 5 speaks of a "genuine link," which is said to mean that the State must regulate the daily lives of those on board,[84] many ships sail under the flags of nations with which there is no genuine link.[85] In practice, the flag is respected as valid and such ships are not treated as Stateless resulting in the law of the flag prevailing. It is, however, posssible that there will be some future enforcement of the genuine link rule, but that question and its implications are beyond the scope of this paper.

It should be noted that fixing an ocean energy device to the seabed to exploit a non-common heritage resource would not invoke the jurisdiction of the International Sea-bed Authority for all purposes. Its authority extends only to activities for the exploration or exploitation of the seabed and not to the regulation of the people on-board the device.[86]

B. The Exclusive Economic Zone

The ICNT would grant exclusive jurisdiction over fixed struc-

84. This element has been omitted from the ICNT, *supra* note 10, art. 91(1).

85. *E.g.*, Liberia, Panama. *See* ICNT, *supra* note 10, art. 94(1). The ICNT does not provide for sanctions where there is no "genuine link."

86. *See* ICNT, *supra* note 10, art. 157(1).

tures exploiting energy resources in the Exclusive Economic Zone to the coastal State.[87] The terms used to define fixed structures are "artificial islands, installations and structures."[88] Whether this includes ships, such as foreign OTEC plantships exploiting the zone resources, could be reduced to an issue of little practical importance if when the coastal State grants permission to foreign ships to exploit the resources, it makes bilateral arrangements regarding jurisdiction. If no bilateral arrangements are made, jurisdiction should probably be presumed to be in the flag State, due to the policy arguments against repeatedly changing the legal system on board when entering different jurisdictions.

C. The Continental Shelf

The Convention on the Continental Shelf provides that the coastal State has jurisdiction over all facilities exploring or exploiting resources of the shelf.[89] The ICNT states that Article 60 would apply *mutatis mutandis* (*i.e.*, with all necessary modifications) to artificial islands, installations and structures on the continental shelf.[90] There is no express qualification that such structures must be exploring or exploiting shelf resources. Article 60(2) reads:

> The coastal State shall have exclusive jurisdiction over . . . artificial islands, installations and structures [covered by Article 60(1)], including jurisdiction with regard to customs, fiscal, health, safety and immigration regulations.

It has been noted that the continental shelf concept seems to have become enlarged by a decision of the International Court of Justice.[91] Moreover, Article 81, which would grant the coastal State the exclusive right to authorize and regulate drilling on the shelf "for all purposes," is consistent with the trend toward greater rights for the coastal State with respect to the shelf.

There is no legal basis for granting the coastal State jurisdiction over devices exploiting water or airspace resources, just because the shelf is being used for support. Such devices should be regarded as on the high seas and subject to the principles applicable therein. Consequently, the flexibility in interpretation permitted by the use of the words *mutatis mutandis* should preclude coastal State

87. *Id.*, art. 60(2).

88. *Id.*

89. Continental Shelf Conv., *supra* note 16, art. 5(4).

90. ICNT, *supra* note 10, art. 80.

91. *See* note 62 *supra*.

jurisdiction over shelf supported structures that are not exploiting shelf resources.

D. The Contiguous Zone

The Geneva Convention on the Territorial Sea and the Contiguous Zone provides that in a zone of the high seas contiguous to the territorial sea, the coastal State may exercise the necessary control to prevent and punish infringement within its territorial sea of customs, fiscal, immigration or sanitary regulations.[92] The breadth of this zone may not exceed twelve nautical miles from the territorial sea baseline.[93] The ICNT would extend the permissible breadth of the zone to 24 nautical miles.[94]

E. Territorial, Archipelagic and Internal Waters

The coastal State has territorial jurisdiction over all facilities in territorial, archipelagic, or internal waters. This means that these areas are treated as if they were dryland for the purpose of prescribing and enforcing law. This even extends to ships exercising the right of innocent passage. However, it is subject to the provisions in the Convention on the Territorial Sea and the Contiguous Zone and their counterparts in the ICNT, which state that territorial jurisdiction *should not* be exercised on board ships passing through the territorial sea.[95] The coastal State's jurisdiction over ships traversing territorial waters does not exclude flag State jurisdiction. However, the coastal State generally refrains from exercising jurisdiction, except where it regards its peace and order as disturbed.[96] The ICNT does not provide for any change in the regime of territorial jurisdiction over territorial seas, internal and archipelagic waters.

F. Jurisdiction over Submarine Cables

The coastal State has jurisdiction over cables in its territorial sea by virtue of its territorial jurisdiction therein. Jurisdiction could effectively be obtained over foreign ocean energy devices connected to shore by electrical transmission cable, even though coastal State jurisdiction would not normally pertain to the facility itself. The context in which this method of acquiring jurisdiction is

92. Territorial Sea Conv., *supra* note 16, art. 24(1).

93. *Id.*, art. 24(2).

94. *Id.*, art. 33(2).

95. *Id.*, arts. 19 & 20.

96. This is based on comity rather than customary international law. *See Wildenhus's Case*, 120 U.S. 1, 7 S. Ct. 385.

needed is where no general resource zone is established. Since most States have, and eventually all coastal States which can will probably establish such zones, the validity of this jurisdictional basis will be of little practical importance. It is really based on the need for a coastal State to consent to laying submarine cables in territorial waters. It is merely another way of saying that such consent can be conditioned upon a grant of jurisdiction to the coastal State, regardless of which State would otherwise have jurisdiction in international law. This is a perfectly valid condition to make and is relied upon in pending U.S. legislation.[97]

III. SUBMARINE CABLES AND PIPELINES

Many ocean energy devices will be connected to shore by electrical transmission cables or pipelines. The question of where these can be laid is dealt with in the Geneva Conventions and the ICNT.

There is no provision in the Convention on the Territorial Sea and the Contiguous Zone permitting non-coastal States to place submarine cables in territorial waters. The coastal State, by virtue of its sovereignty therein, can prohibit them. It has jurisdiction over all cables and pipelines within its territorial waters. The Convention on the Continental Shelf provides that, subject to its right to take "reasonable measures" for the exploration and exploitation of the natural resources of the continental shelf, the coastal State may not impede the laying or maintenance of submarine cables or pipelines on the shelf.[98] The Convention on the High Seas also specifically refers to the high seas freedom to lay submarine cables and pipelines.[99]

The ICNT permits the laying of submarine cables and pipelines in the exclusive economic zone[100] and on the continental shelf.[101] The international seabed area is also open to the laying of submarine cables, as an enumerated high seas freedom.[102]

The Convention for the Protection of Submarine Cables of 1884,[103] to which the United States and over 30 other countries are parties, deals with submarine cables beyond territorial waters. Ar-

97. *See* Report on Legislative Action in the United States Congress to Establish a Legal Regime for OTEC, Appendix A *infra*. On the question of who has jurisdiction to protect cables beyond the territorial sea, *see* text accompanying notes 98-104 *infra*.

98. Continental Shelf Conv., *supra* note 16, art. 4.

99. High Seas Conv., *supra* note 19, art. 2(3).

100. ICNT, *supra* note 10, art. 58(1).

101. *Id.*, art. 79(1).

102. *Id.*, art. 87(1)(c).

103. USTS 380

ticle II provides that the breaking or injury of a submarine cable, done willfully or through culpable negligence, shall be a punishable offense. The punishment inflicted would not be a bar to a civil action for damages. The U.S. Congress is considering bills which would include provisions for the protection of submarine cables, establishing penalties and leaving open the option of a civil suit.[104]

IV. OCEAN ENERGY RELATED MARINE SCIENTIFIC RESEARCH

No rational deployment of an ocean energy device would be conceivable without prior on-site research into the resource and the prevailing conditions for exploiting it. In the case of OTEC, for example, extensive research into the temperature differential, currents, climate and living resources would be essential. In the territorial sea, the coastal State can exercise its sovereignty to prohibit scientific research. This situation is unchanged in the ICNT.[105]

The Convention on the Continental Shelf states as follows:

> The consent of the coastal State shall be obtained in respect of any research concerning the continental shelf and undertaken there. Nevertheless, the coastal State shall not normally withhold its consent if the request is submitted by a qualified institution with a view to purely scientific research into the physical or biological characteristics of the continental shelf, subject to the proviso that the coastal State shall have the right if it so desires, to participate or to be represented in the research, and that in any event the results shall be published.[106]

In practice, consent is often not given for research on the continental shelf. This would be an obstacle to ocean energy development, for example, core samples always need to be taken before building a platform.

The ICNT Articles dealing with scientific research represent very serious problems for ocean energy device deployment. The coastal state has a veto over research activities by foreigners in its exclusive economic zone and on its continental shelf.[107] The ICNT's only qualification on its unbalanced compromise between coastal State control and the needs of mankind is a great deal of non-right conferring language.[108] It would therefore be impossible for a coastal State that wished to deploy an ocean energy device in

104. S. 2492 & H.R. 6154, *see* Appendix A for a discussion of this legislation.
105. ICNT, *supra* note 10, art. 245.
106. Continental Shelf Conv., *supra* note 16, art. 5(8). *Cf.* art. 5(1).
107. ICNT, *supra* note 10, art. 246(1).
108. *Id.*, arts. 246 & 252.

its own exclusive economic zone to conduct research into the environmental conditions in its neighboring State's zone without that State's consent.

Although scientific research is not one of the enumerated freedoms in the Convention on the High Seas, it has always been regarded as such in State practice. Article 87 of the ICNT does mention it as a high seas freedom. The ICNT, in article 143(3), also provides that State Parties may carry out marine scientific research in the International Seabed Area.[109]

V. THE ENVIRONMENT

There are presently three sources of marine environmental law. First, there is a general principle of international law that a State owes a duty to protect other States against injurious acts caused by it or its individuals, emanating from activities or areas over which it has jurisdiction.[110] Second, there are national laws regulating particular areas, activities, structures or persons. The United States Congress is currently considering bills which would establish an environmental regime for OTEC, as part of a comprehensive licensing scheme.[111] Third, numerous conventions have been concluded under the auspices of the Intergovernmental Maritime Consultative Organization (IMCO). Although there are as yet no conventions specifically regulating ocean energy devices, many existing conventions would affect both moving vessels and fixed or floating platforms.[112]

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109. *Id.*, art. 143(3).

110. The *Trail Smelter Case*, III U.N.R.I.A.A. 1905 (1949).

111. See Report on Legislative Action in the United States Congress to Establish a Legal Regime for OTEC, Appendix A *infra.*

112. For example, the Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft, signed at Oslo, February 15, 1972; as cited in 1 S. ODA, INTERNATIONAL LAW OF THE OCEAN DEVELOPMENT 505 (1972), states in art. 1 as follows:

> The contracting Parties pledge themselves to take all possible steps to prevent the pollution of the sea by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.

The Convention controls the dumping of materials and might apply to OTEC plantships but not fixed or moored facilities because the term "ships" is defined as seagoing vessels of any type whatsoever, excluding fixed or floating platforms.

The Convention for the Prevention of Marine Pollution by Dumpting of Wastes and Other Matter, done Dec. 29, 1972, 26 U.S.T. 2403, T.I.A.S. No. 8165; conveniently found in 11 INT'L LEGAL MATS. 1291 (1972), regulates with the dumping of "waste and other matter that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea." "Dumping" is defined as any deliberate disposal at sea from vessels, platforms or other man-made structures,

UNCLOS III has approached the law of marine environment by laying down general principles and rules, rather than attempting to formulate details. The ICNT contains a broad legal framework which would be superimposed on the numerous multilateral treaties and national laws. Where States are not already bound by particular treaties, the intention is to bind them to general rules beyond the very limited obligation of customary international law referred to above. The relationship between the ICNT Articles and existing or future conventions is explained in Article 237.

> 1. The provisions of this Part [*i.e.*, Part XII, dealing with the protection and preservation of the marine environment] are without prejudice to the specific obligations assumed by States under special conventions and agreements concluded previously which relate to the protection and preservation of the marine environment and to agreements which may be concluded in furtherance of the general principles set forth in this Convention.
>
> 2. Specific obligations assumed by States under special conventions, with respect to the protection and preservation of the marine environment, should be carried out in a manner consistent with the general principles and objectives of this Convention.[113]

Article 192 of the ICNT provides that States have the obligation to protect and preserve the environment. The remaining environmental provisions in the ICNT complement this theme with

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and a vessel is defined as any waterborne craft of any type whatsoever. This formulation would seem to include both fixed and moored OTEC facilities and plantships.

The International Convention for the Prevention of Pollution from Ships, done November 2, 1973, I.M.C.O. Doc. MP/Conf. W.P.35 (1973), applies to "ships" which term is defined as a vessel of any type whatsoever operating in the marine environment, and includes fixed or floating platforms. Annex II contains regulations for the control of pollution by noxious liquid substances in bulk, a term not defined by fixed quantity and which might include OTEC's working fluid or products produced on board plantships. Annex IV regulates the prevention of pollution by sewage from ships and Annex V regulates the prevention of pollution by garbage from ships.

The Protocol Relating to Intervention on the High Seas in Cases of Marine Pollution by Substances Other than Oil, I.M.C.O. Doc. MP/Conf./W.P.35 (November 2, 1973); conveniently found in 68 AM. J. INT'L L. 577 (1974) and 13 INT'L LEGAL MATS. 605 (1974), grants Contracting States the right to "interfere" following a marine casualty or acts which may reasonably be expected to result in major harmful effects. In such circumstances, States may take such measures on the high seas as may be necessary to prevent, mitigate or eliminate grave and imminent danger to their coastline or related interests from pollutioin or threat of pollutioin by substances other than oil. A "substance other than oil" includes those contained in a protocol to the Convention "and those other substances which are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea."

113. ICNT, *supra* note 10, art. 237.

general obligations and a system of enforcement.[114]

Serious consideration might be given to the possibility of international conventions designed to deal with some of the special problems that ocean energy device deployment would entail. For example, the cooling of areas of water, or the use of biocides, are environmental impacts that only OTEC produces. These effects can be regulated in the design and construction stage. International standards could be established for designing out a potential problem where possible. The previous Conventions, and the ICNT which contains general obligations are inadequate. Both merely regulate ocean energy devices in a general fashion and do not set down precise criteria or standards. Thus, they are open to subjective interpretation.

VI. TECHNOLOGY TRANSFER

The ICNT contains a section designed to promote the transference of marine technology to developing States. Article 266(1) provides that "[s]tates, directly or through competent international organizations, shall cooperate within their capabilities to promote actively the development and transfer of marine science and marine technology on fair and reasonable terms and conditions."[115] Article 267 of the ICNT also provides that States, in promoting such cooperation, shall have "proper regard for all legitimate interests, including, *inter alia*, the rights and duties of holders, suppliers and recipients of marine technology." The rest of the provisions are framed in aspirational terms, with no specific legal directives.[116]

If the aspirations which underlie these provisions were to become reality, major industrial actors in ocean energy development might reconsider their involvement. However, these provisions are framed in ambitious terms and should not be regarded as legally binding. Moreover, Article 267 provides a good basis to prevent the transfer of proprietary information. So, too, does the qualification that States need only cooperate to the extent of their "capabilities." Furthermore, what are to be considered fair and reasonable terms and conditions is left to the subjective determination of the States concerned.

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114. *Id.*, arts. 193-236.

115. *Id.*, art. 266(1).

116. *Id.*, arts. 268-278.

VII. SAFETY AND REGULATIONS

The only reference to safety zones in the four Geneva Conventions is in the Convention on the Continental Shelf. A coastal State may establish safety zones with a radial of 500 meters around its installations exploring and exploiting shelf resources.[117] The ICNT confers on coastal State the same right in the exclusive economic zone.[118] Article 80 of the ICNT applies the same to the continental shelf.

A State can establish safety zones in its territorial sea,[119] provided they do not hamper innocent passage. Indeed, these zones can be greater than 500 meters. On the high seas, the pertinent question is whether the establishment of a safety zone would be a reasonable use. It probably would be provided if it was not unreasonably large and it served a legitimate purpose.

Article 5 of the Convention on the Continental Shelf states that the coastal state may take "measures necessary" for the protection of its devices in the safety zone. It states that ships must "respect" these safety zones.[120] Article 60 of the ICNT, which applies to the exclusive economic zone and the continental shelf, allows the taking of "appropriate measures" within the safety zone, to ensure the safety of navigation and of the protected structure.[121]

There can be no doubt that these safety zones extend to the airspace above the surface, and to the waters below. Although this is not expressed in the Geneva Conventions or the ICNT, safety zones with only one dimension would be useless, as they would not keep aircraft and submarines clear of the danger area.

The regulatory regime at sea consists of rules relating to such matters as design and construction standards, safety of life at sea, navigational equipment requirements, communications and seaworthiness certification. There are two sources of these types of rules; treaties and national legislation. The present rules are too detailed to explore here, but they should be studied and taken into account by designers and engineers.[122]

It is quite likely that the Maritime Safety Committee of the

117. Continental Shelf Conv., *supra* note 16, art. 5(2).

118. ICNT, *supra* note 10, art. 60(4).

119. By virtue of its sovereignty therein.

120. Continental Shelf Conv., *supra* note 16, art. 5(3).

121. ICNT, *supra* note 10, art. 60(4).

122. *E.g.*, The Safety of Life at Sea Conventions of 1960 and 1974, *done* June 16, 1960, 16 U.S.T. 185, T.I.A.S. No. 5780, 536 U.N.T.S. 27, *amended* November 1, 1974.

Intergovernmental Maritime Consultative Organization (IMCO), will gradually begin to take into account the need to regulate some features of ocean energy devices. So far, they have dealt mainly with ships, but in recent years there has been a trend to regulate fixed and floating installations. Planning would certainly be enhanced if these rules could be anticipated well in advance.

VIII. LIMITATION OF LIABILITY

In the absence of an international scheme, national courts will determine their own jurisdictional competence, in accordance with domestic maritime or admiralty law, to hold a shipowner or a member of the crew liable for damage. National law may limit the extent of the available sanctions.

On the international plane, there are few agreements limiting liability. These are all schemes applicable only to particular problems.[123] There is at present no international scheme which would limit liability for damage caused by fixed ocean energy devices. Development of an international scheme for damage caused by OTEC plants may be desirable.

IX. CONCLUSION

The international law of the sea is presently in a state of flux. The Third United Nations Conference on the Law of the Sea has not yet concluded its work. However, it has produced a series of

123. The TOVALOP and CRISTAL schemes limiting liability for damage caused by oil tankers are specific examples which can be cited.

TOVALOP is the acronym for the Tanker Owners Voluntary Agreement Concerning Liability for Oil Pollution of 1969. Under TOVALOP, approximately 95 percent of the owners of the world's tanker tonnage agreed to provide a fund for reimbursing national cleanup costs in the event of oil spills. Liability is limited to situations where the owner has been unable to provide absence of fault and is limited to the lesser of $100 per gross registered ton or $10 million.

CRISTAL stands for Contract Regarding an Interim Supplement to Tanker Liability for Oil Pollution of 1979. Under CRISTAL, this amount of private coverage was supplemented by world oil owners who shipped crude oil on TOVALOP tankers. It covers more contingencies than TOVALOP and gives coverage up to $30 million under a strict liability standard.

The concept of these arrangements had been extended by an agreement among operators of North Sea exploration and production facilities effective during 1974 called OPOL (Offshore Pollution Liability Agreement) prior to the North Sea Civil Liability Convention coming into effect. *See* Faron, *International Regulatory Aspects of OTEC Development and Operation, as found in* AMERICAN SOCIETY OF INTERNATIONAL LAW, DRAFT FINAL REPORT 110 (July 26, 1978) [submitted to the Department of Energy under ERDA Contract No. EG-77-C-01-4118].

draft texts. Therefore, whether or not a new law of the sea treaty results from the Conference, it is possible for international lawyers to project, with a relatively high degree of certainty, what kind of legal regime will prevail when ocean energy devices, apart from oil and natural gas facilities, are deployed in the future.

The most important international law issues are, 1) who has authority over the siting of ocean energy structures and vessels, and, 2) who has the right to exploit energy resources in particular areas of ocean space. A number of general propositions can be made. It must be emphasized that these propositions are extremely general and will often be subject to exceptions.

1. From the land territory to the territorial sea limit, the coastal State will have exclusive authority over siting. It owns the energy resources in these waters, the airspace above them, and the shelf or seabed below. It can be assumed that territorial seas will generally extend to 12 nautical miles by the time OTEC and other ocean energy devices are deployed.

2. Beyond the territorial sea limit, the coastal State will have exclusive authority over the siting of devices which explore and exploit the geothermal and biomass resources which it owns in its continental shelf. This does not mean that there are any rights vested in the coastal State over the waters or airspace above the shelf.

3. The resources of the shelf or seabed, waters and airspace beyond the territorial sea, up to a limit of 200 nautical miles from the coast, are becoming part of general national resource zones, as more States establish them. The prospective Law of the Sea treaty will embody a comprehensive regime for such zones. Coastal States will have exclusive authority over the siting of all ocean energy structures and vessels exploiting the resources of the zone. They have exclusive ownership of all the resources therein.

4. Beyond territorial waters where no general resource zones are established, or beyond such zones if they are, the waters and airspace, but not the seabed, are governed by the regime of the high seas. There is a freedom to exploit the natural resources therein. There would be no high seas freedom to unreasonably hinder the exercise of this freedom to exploit these energy resources.

5. The prospective international seabed regime would vest the resources of the deep seabed in mankind as a whole, to be managed by an International Sea-bed Authority. It would not affect the geothermal, biomass or any other renewable energy resources. As

the waters above the airspace are unaffected by the regime, no mode of OTEC deployment would be affected.

6. Jurisdiction over ocean energy devices, that is, the competence to prescribe and enforce national laws to regulate or protect a structure or moving device, will usually vest in the coastal State in the case of fixed structures, and flag States in the case of moving ones. Where a fixed structure is beyond 200 miles and a resource zone of that breadth is established, or without an established zone of 200 miles, beyond the territorial sea, where the fixed structure is or, where the structure is on the continental shelf and shelf resources are not being exploited, the jurisdictional situation is uncertain.

7. The present and proposed marine scientific research regimes vest almost total discretion in the coastal State, failing to reflect a balance between coastal State needs and the needs of mankind to exploit available energy resources.

A review of all the international issues in these and other areas leads to the conclusion that the international legal situation on the whole is very favorable for projected ocean energy exploitation scenarios. National laws may, however, present problems which need to be resolved.

Appendix A

REPORT ON LEGISLATIVE ACTION IN THE UNITED STATES CONGRESS TO ESTABLISH A LEGAL REGIME FOR OTEC

At the time of writing, four bills respecting OTEC were pending before the 96th U.S. Congress. S. 1830[124] and H.R. 5796[125] would accelerate the Department of Energy OTEC program to achieve early commercialization. S. 2492[126] and H.R. 6154[127] would establish a licensing regime and provide capital construction fund treatment and loan guarantees. The Crude Oil Windfall Profit Tax Act of 1980[128] signed into law on April 2, 1980, provides tax credits for OTEC. The Congress has yet to vote on the Fiscal Year 1981 authorizations and appropriations for the Department of Energy OTEC program.

S. 2492 and H.R. 6154 have been reported by the Senate Commerce Science and Transportation Committee and the House Merchant Marine and Fisheries Committee respectively. The "Declaration of Policy" section of these two bills states in part:

> (a) It is declared to be the purposes of the Congress in this Act to—
>
> (1) authorize and regulate the construction, location, ownership, and operation of ocean thermal energy conversion facilities located in the territorial sea of the United States or connected to the United States by pipeline or cable, consistent with the Convention on the High Seas and general principles of international law;
>
> (2) authorize and regulate the construction, location, ownership and operation of ocean thermal energy conversion plantships documented under the laws of the United States, consistent with the Convention on the High Seas and general principles of international law;
>
> (3) authorize and regulate the construction, location, ownership and operation of ocean thermal energy conversion plantships by United States citizens, consistent with the Convention on the High Seas and general principles of international law.[129]

Section 3(11) defines an OTEC "facility" as any facility which is

124. Sponsored by Senator Matsunaga (D-Hawaii). Introduced on Sept. 27, 1979.

125. Sponsored by Representative Fuqua (D-Florida). Introduced on Nov. 2, 1979.

126. Sponsored by Senator Inouye (D-Hawaii). Introduced on March 27, 1980.

127. Sponsored by Representative Studds (D-Massachusetts). Introduced on Dec. 14, 1979.

128. Pub. L. No. 96-223.

129. S. 2492 and H.R. 6154, § 2.

standing or moored in or beyond the territorial sea of the United States.

Section 101(a) of both [S.2492 and H.R. 6154] provide as follows:

> (a) No person may engage in the ownership, construction, or operation of an ocean thermal energy conversion facility which is documented under the laws of the United States by pipeline or cable, except in accordance with a license issued under this Act. No United States citizen may engage in the ownership, construction, or operation of an ocean thermal energy conversion plantship except in accordance with a license issued under this Act or in accordance with a license issued by a foreign nation whose licenses are found by the Administrator [of the National Oceanic and Atmospheric Administration (NOAA)] after consultation with the Secretary of State, to be compatible with licenses issued under this Act.

No license can be granted by the Administrator of NOAA unless the OTEC facility or plantship will be documented under the laws of the United States.[130]

A different version of H.R. 6154 was before the House Merchant Marine and Fisheries Subcommittees on Oceanography and Merchant Marine. It would have based jurisdiction over facilities standing on or moored to the continental shelf of the United States on the Convention on the Continental Shelf, without regard to the pipeline or cable. The following testimonies of the Department of State were critical of this jurisdictional basis.

Statement by Morris D. Busby
Acting Deputy Assistant Secretary of State
for Oceans and Fisheries Affairs
before the Subcommittee on Oceanography and the
Subcommittee on Merchant Marine of the House Committee
on Merchant Marine and Fisheries
Wednesday, February 27, 1980

It is a pleasure to appear before you today to testify in regard to the Ocean Thermal Energy Conversion Act of 1980. In general, Mr. Chairman, the Department of State has no objection to the development of ocean thermal energy conversion (OTEC). Indeed, OTEC development is consistent with our foreign policy objectives of reducing our dependence upon foreign sources of energy, and

130. S. 2492 and H.R. 6154, § 101(c)(7).

promoting new energy technologies in an increasingly energy-short world. However, my testimony today will be limited to a discussion of certain aspects of the bill of particular concern to the Department of State. I defer to the Department of Energy in regard to the Administration's position on the overall appropriateness and desirability of this particular bill at this particular time.

Mr. Chairman, Article 56 of the Informal Composite Negotiating Text (Rev. 1) under consideration in the Third United Nations Conference on the Law of the Sea would establish the right of the coastal nation to control the production of energy from the water, currents and wind within a 200 nautical mile exclusive economic zone off its coast, and would include jurisdiction over all OTEC facilities and plantships within that zone. Under this text, the operation of OTEC facilities and plantships seaward of the 200-nautical mile exclusive economic zone remains a freedom of the high seas to be exercised with due consideration to the interests of other nations. The United States has supported these provisions of the Informal Composite Negotiating Text and looks forward to their inclusion in an otherwise acceptable Law of the Sea Convention.

Although the LOS text would grant to coastal nations jurisdiction over OTEC facilities within a 200-nautical mile exclusive economic zone, under existing international law a coastal nation may only exercise jurisdiction over OTEC facilities and plantships documented under its laws, and over all OTEC facilities and plantships of any registry operating in its territorial sea.

Accordingly, at the present time there is no basis in international law to support the jurisdictional basis set forth in Section 2(a)(1) and subsequent sections of the bill. These sections would provide that all OTEC facilities standing on or moored to the U.S. continental shelf are subject to U.S. jurisdiction. However, Article 2 of the 1958 Convention on the Continental Shelf provides that the coastal nation exercises over the continental shelf sovereign rights only for the purposes of exploring it and exploiting its natural resources, which are defined as the mineral and other nonliving resources of the seabed and subsoil together with living organisms belonging to sedentary species. This Convention and the other 1958 Law of the Sea Conventions are silent with regard to the exploitation of the non-living resources of the water column superjacent to the continental shelf. Therefore, the mere fact that an OTEC facility operating under the flag of another nation is standing on or moored to our continental shelf is not in itself sufficient to

establish United States jurisdiction under international law over that facility. The United States firmly maintains that such activities are a high seas freedom not subject to coastal state consent or jurisdiction.

However, under present international law the United States may exercise jurisdiction over a cable or pipeline with the U.S. territorial sea used to convey electricity or products from an OTEC facility operating seaward of the territorial sea. In this manner, jurisdiction could effectively be obtained over non-U.S.-registered OTEC facilities operating seaward of the territorial sea even though U.S. jurisdiction would not normally pertain to the OTEC facility itself. In this context, I would note that it is unlikely that a foreign-flag OTEC facility not designed to convey its products to shore by means of a cable or pipeline would be constructed on or moored to our continental shelf. It would generally be more advantageous for the operator of such a facility to locate it in an area where the thermal resource is more favorable than adjacent to the United States.

Sections 108(d)(1) and 108(d)(2) authorize the Secretary of the department in which the Coast Guard is operating to designate safety zones around OTEC facilities or plantships "[s]ubject to recognized principles of international law." The right of a coastal nation to designate safety zones around certain offshore installations is granted in Article 5 of the Convention on the Continental Shelf, but that right is clearly linked in the Convention to the coastal nation's right to explore the continental shelf and exploit its natural resources. Because an OTEC facility or plantship would exploit the thermal resource of the water column above the shelf rather than the resources of the seabed or subsoil of the shelf, the status of a safety zone about such a facility is therefore uncertain under international law.

It is worth noting how the drafters of the Deepwater Port Act of 1974 handled the uncertain status under international law of safety zones around a deepwater port. Section 19(c) of that act provides that "(e)xcept in a situation involving force majeure, a licensee of a deepwater port shall not permit a vessel, registered in or flying the flag of a foreign state, to call at, or otherwise utilize a deepwater port licensed under this Act unless (1) the foreign state involved, by specific agreement with the United States, has agreed to recognize the jurisdiction of the United States over the vessel and its personnel, in accordance with the provisions of this Act, while

the vessel is located within the safety zone . . ." Similar language could be used to obtain jurisdiction over vessels calling at OTEC facilities or plantships during their construction or to remove or deliver products, but not jurisdiction could be obtained over vessels not making such calls, just as under the Deepwater Port Act jurisdiction could not be obtained over vessels not calling at the deepwater port.

[Paragraph Omitted]

Section 101(c)(8) of the bill would require an applicant for a license to agree that no vessel will be used for the transportation to the United States of things produced, processed, refined or manufactured at the OTEC facility or plantship unless such vessel is documented under the laws of the United States. We believe this provision would hinder the ability of the United States to participate in the possible worldwide deployment of OTEC plantships. For economic reasons it appears quite possible that OTEC plantships may be owned and operated by international consortia. The provisions of this paragraph would lessen the attractiveness to international consortia of operating an OTEC plantship under U.S. registry, and thereby potentially restrict entry of the U.S. OTEC industry into aspects of the plantship market.

Similar discriminatory documentation requirements have appeared in legislation concerned with deep seabed hard mineral mining. The Administration was strongly opposed to those discriminatory provisions, and I wish to emphasize the Administration's strong opposition to similar provisions in OTEC legislation.

In closing, I wish to note that the bill as presently drafted is silent with regard to ocean thermal energy conversion facilities within the United States territorial sea. Section 3(10) limits its definition of an ocean thermal energy conversion facility to any facility which is "standing on or moored to the Continental Shelf of the United States beyond its territorial sea . . ." This has the effect of excluding U.S.-registered OTEC facilities located within the U.S. territorial sea from the regulatory and financial aspects of Titles I and II of the bill. The siting of an OTEC facility within our territorial sea is a possibility within some of our possessions and territories due to the proximity of the thermal resource to the shore. Any non-U.S.-registered OTEC facility within our territorial sea would, of course, be subject to U.S. jurisdiction.

[Paragraph Omitted].

Statement by J. Brian Atwood
Assistant Secretary for Congressional Relations
Department of State
before the Subcommittee on Oceanography and
the Subcommittee on Merchant Marine of the House Committee
on Merchant Marine and Fisheries
Wednesday, February 27, 1980

Dear Mr. Chairman:

The Secretary has asked me to reply to your letter of December 21, 1979, requesting our views on H.R. 6154, a bill to regulate and promote ocean thermal energy conversion (OTEC) facilitates and plantships.

We anticipate providing the Committee with a more detailed explanation of our views under separate cover in the near future. In the meantime, I would like to briefly summarize our most important points.

It is the opinion of the Department of State that there is no basis in international law for the assertion by the United States of regulatory jurisdiction over OTEC activities conducted by persons not otherwise subject to United States jurisdiction. Section 2(a)(1) refers to OTEC facilities standing on or moored to the continental shelf of the United States. The mere fact that an OTEC facility is standing on or moored to our continental shelf is not sufficient to establish United States jurisdiction to regulate that OTEC facility. An OTEC facility standing on or moored to the continental shelf is not engaged in an activity exploiting the resources of the continental shelf, but is instead engaged in extracting energy from the water column superjacent to the seabed of the continental shelf. As set forth in the 1958 Convention on the Continental Shelf, the coastal state exercises over the continental shelf sovereign rights for the purposes of exploring it and exploiting its natural resources. The natural resources of the continental shelf consist of the mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to sedentary species.

Consistent with existing international law, the United States may exercise jurisdiction over all OTEC facilities and plantships documented under U.S. law, and over all OTEC facilities and plantships of any registry operating in the U.S. territorial sea. In addition, the United States may exercise jurisdiction over a cable or pipeline within the U.S. territorial sea used to convey electricity or product from an OTEC facility operating seaward of the territorial

sea. In this manner, regulation could effectively be obtained over non-U.S.-registered OTEC facilities operating seaward of the territorial sea even though U.S. jurisdiction would not pertain to the OTEC facility itself. In this context it may be noted that it appears unlikely that an OTEC facility, not subject to our jurisdiction, designed to manufacture a product that would be conveyed to the United States by means other than cable or pipeline would be constructed on or moored to our continental shelf. It would generally be more advantageous for the operator of such a facility to locate it elsewhere where the thermal resource is more favorable than that adjacent to the United States.

We note that the Informal Composite Negotiating Text (Rev. 1) under consideration in the Third United Nations Conference on the Law of the Sea would grant to the coastal state sovereign rights within a 200 nautical mile exclusive economic zone for the production of energy from the water, currents and wind. Under a treaty concluded along the lines of that text, the coastal state would have jurisdiction over all OTEC facilities and plantships within its exclusive economic zone. Under this text, the operation of OTEC facilities and plantships within its exclusive economic zone. Under this text, the operation of OTEC facilities and plantships seaward of the exclusive economic zone is a freedom of the high seas, and with due consideration for the rights under the (future) Law of the Sea Convention concerning the exploration and exploitation of the mineral resources of the seabed and subsoil beyond the limits of the continental shelf.

In addition, we note that the bill as presently drafted is silent with regard to ocean thermal energy conversion facilities within the United States territorial sea. Section 3(10) limits its definition of an ocean thermal energy conversion facility to any facility which is "standing on or moored to the Continental Shelf of the United States beyond its territorial sea . . . ." This has the effect of excluding U.S.-registered OTEC facilities located within the U.S. territorial sea from the regulatory and financial aspects of Titles I and II of the bill. The siting of an OTEC facility within some of our possessions and territories due to the proximity of the thermal resource to the shore. Any non-U.S.-registered OTEC facility within our territorial sea would, of course, be subject to U.S. jurisdiction.

We are concerned that the detail of the provisions of Title I of the Act may be premature. Section 402 states that Title I will not apply to OTEC facilities or plantships which the Secretary of En-

ergy has designated as a demonstration facility. A demonstration OTEC facility or plantship is still several years away, and the first few OTEC's to be built will most likely be for demonstration purposes. We are therefore concerned that the passage at this time of detailed regulatory legislation may hinder the development of the emerging OTEC technology, and may not be adequately predictive of the true regulatory needs a few years hence.

[Remaining paragraphs omitted.]