

On July 15, 1977, following two more months of extensive negotiations, the sixth session of the Third United Nations Conference on the Law of the Sea was concluded with the elusive international treaty in sight but not yet in hand. After years of open negotiations, subtle diplomacy and flamboyant rhetoric, many difficult issues once thought to be intractable have now been amicably resolved.

Several key issues, however, still stand between the existing state of anarchy and a comprehensive law of the sea treaty. One of the most crucial of these issues is agreement on the nature of an international regime for the seabeds.¹ This article proposes the establishment of some form of proprietary protection for new deepsea mining technology as one possible vehicle for reconciling the conflicting interests of the developed and less-developed countries in the seabeds issue.

Part I presents an overview of the clashing developed and less-developed country positions on the seabeds and sketches briefly how linking proprietary protection to technology transfer might be able to bridge the gap between them.

Part II examines the present and evolving international law regarding delimitation of the ocean floor and considers to what extent national patent rights might be able to protect new ocean mining technology even in the absence of an international agreement.

Part III examines the location, distribution and potential value of seabed mineral resources based on recent geophysical studies and projections and considers whether the resources which will be subject to an international seabed

Proprietary Protection for Deepsea Mining Technology in Return for Technology Transfer: New Approach to the Seabeds Controversy

DAVID SILVERSTEIN*

*Member of the Massachusetts, Federal and Patent Bars. J. D. with Specialization in International Affairs 1973, Cornell Law School. The author is working towards a Ph.D., The Fletcher School of Law and Diplomacy, Tufts University. The author is indebted to Dr. Dan S. Ciobanu of The Fletcher School of Law and Diplomacy and Dr. David A. Ross of the Woods Hole Oceanographic Institution for their insights and encouragement.

1. See generally Oxman, "The Third United Nations Conference on the Law of the Sea: The 1976 New York Sessions," 71 *Am. J. Int'l L.* 247, 250 (1977).

regime are of sufficient worth to merit the establishment of the proposed proprietary rights - technology transfer mechanism.

Finally, part IV proposes a mechanism for linking proprietary rights and technology transfer under an international seabed regime which might reconcile the developed and less-developed country interests.

THE NATURE OF THE SEABEDS CONTROVERSY

The Principle of a "Common Heritage of Mankind"

When the United Nations "Declaration of Principles Governing the Sea-bed and the Ocean Floor and the Subsoil Thereof Beyond the Limits of National Jurisdiction"² was adopted in 1970 proclaiming that beyond the limits of national jurisdiction the seabed and its resources are the "common heritage of mankind", such a concept was little more than wishful thinking for the less-developed countries. For nearly four centuries based on legal foundations laid by Grotius³ and political foundations laid by the emerging sea powers, the principle of "freedom on the high seas" had prevailed. This legal principle taken in conjunction with the Lockean social philosophy that the "goods of nature" are owned in common and that common goods are appropriated by "mixing them" with one's labor⁴ was ample support for a first-come, first-served approach to the living and mineral resources of the oceans. Under this anarchical approach it seems fairly certain that the oceans' resources would have been greedily divided among the few developed countries having the necessary technology, capital and markets to exploit the oceans with few if any benefits accruing to the less-developed countries.

The Clashing Developed and Less-Developed Country Positions

It is a tribute to the success of modern multilateral negotiations that we have come as far as we have toward recognizing a "common heritage of mankind" in the oceans in so few years. No longer is there any real question that a final Law of the Sea treaty will provide for the establishment of an International Seabed Authority and that there will be some provision for the sharing of

2. United Nations, Res. 2749 (1970).

3. Dutch-jurist Hugo Grotius advocated freedom of the high seas in his 1609 doctrine *Mare Liberum*.

4. John Locke, *Two Treatises of Government* (Cambridge Univ. Press 1960) 329. With regard to the oceans, Locke says:

and by virtue thereof, what Fish any one catches in the Ocean, that great and still remaining Common of Mankind; or what Ambergris any one takes up here, is by the *Labour* that removes it out of that common state Nature left it in, *made* his *Property* who takes that pains about it. *Id.* at 331.

revenues derived from seabed exploitation with the less-developed countries.⁵ The focus of the still-outstanding disputes is on how much control the Authority should wield and how the wealth of the seabeds should be apportioned.

Delegates from the industrialized countries which are eager to develop new and diversified sources of scarce and strategic raw materials and which also possess or are close to developing the technology to commence ocean mining have argued for an Authority of limited, largely ministerial functions.⁶ Ocean mining licenses would be granted to nationals (individuals or corporations) on a first-come basis. Preferably there would be a flat-rate license fee per site or per square mile of area or, alternatively and at most, a per-ton or per-barrel royalty for mineral ores and petroleum. The only functions exercised by the Authority would be in such areas as pollution control, resolution of conflicting territorial claims, and accounting for revenues.

By contrast, delegates for the less-developed countries demand an Authority of broad discretionary powers exercising virtually sovereign control over the ocean floor.⁷ Such an authority could decide which mining sites should be awarded, and to whom, and could impose quotas on the amounts of resources taken. Royalties would be based on a percentage of the market value of the resources mined or, in one extreme proposal, on the profits earned.⁸ By virtue of their majority presence in the Assembly,⁹ the principal governing body of

5. See generally *Informal Composite Negotiating Text*, U.N. Doc. A/CONF. 62/WP.10 (July 15, 1977) (hereinafter cited as *Informal Composite Negotiating Text*) Part XI, Articles 133-192.

6. See R. E. Osgood, et al., *Toward a National Ocean Policy: 1976 and Beyond* (NSF Ocean Policy Project 1976) [hereinafter cited as *National Ocean Policy*] 168-170.

7. *Id.*

8. The reason this issue is of such importance is that the value of the mineral resources prior to processing represents only perhaps 6-10% of the ultimate value. See Report to the Secretary General, *Economic Implications of Sea-bed Mineral Development in the International Area*, U.N. Doc. A/CONF. 62/25 (1974).

9. Article 157 (1) of the new composite negotiating text provides: "The Assembly shall consist of all the members of the Authority." Article 157 (9) provides that: "A majority of the members of the Assembly shall constitute a quorum." Finally, Article 157 (6) provides that: "All decisions on questions of substance shall be taken by a two-thirds majority of the members present and voting" These provisions closely correspond to the voting provisions in the United Nations General Assembly. See *United Nations Charter*, Article 18. If it is assumed that all of the present General Assembly members will become signatories to the Law of the Sea treaty, those countries recognized as less-developed or part of the so-called Group of 77 (now numbering more than 100 countries) would constitute or come very close to constituting the requisite two-thirds majority on the Seabed Authority. The power of the LDC's in the U.N. General Assembly, however, is tempered by Article 12 of the Charter which requires the General Assembly to abstain from acting on matters which are under consideration by the Security Council. In the Security Council, the United States, United Kingdom, France, the Soviet Union, and China sit as "permanent" members, see Article 23 (1), and exercise "veto" power over matters which are other than "procedural", see Article 27. But see "The Uniting for Peace Resolution," Res. 377A (1950). The proposed Law of the Sea

the Authority,¹⁰ the LDC's would thus be assured of favorable policies for the exploitation of the seabed.

Spokesmen for the developed country industries interested in seabed mining have been openly critical and deeply suspicious of the type of Authority urged by the LDC's. Richard Greenwald, special counsel to Deepsea Ventures, Inc., has wryly observed that under such an Authority:¹¹

a contractor or venturer provides all the funds, all of the talent, all of the know-how, and all of the equipment. He takes all of the responsibility, and all of the risks, even the losses and damages arising as a result of instructions from the authority that has total control over him. This is not realistic. No corporation would sign such a contract.

The Economic Issues at Stake

Behind the nationalistic rhetoric and political puffing to which at least a part of the LDC intransigence on the seabed issue might be attributable lie some genuine economic concerns. The LDC's now realize that monetary payments alone can never adequately reimburse them for the exploitation of their non-renewable natural resources.¹² Even with their vast oil revenues, for example, many Arab states are finding the skyrocketing costs of imported manufactured goods constraining their ambitious development plans.

With such costly experience under their belts, the LDC's are justifiably wary of any regime for the seabed which would give a free-hand to developed-country enterprises to mine the ocean floor in return for simple monetary payments while at the same time effectively excluding genuine participation by countries without the necessary technology. Accordingly, a major element of

treaty does not even contain this nominal safeguard against the possibility of a "tyranny by the majority".

10. Article 158 (1) of the new composite negotiating text provides: "The Assembly is the supreme organ of the Authority, and as such shall have the power to establish the general policies . . . to be pursued by the Authority. . . ."

11. Quoted in an article entitled "This Could Mean War", 5 *Juris Doctor* 25 (May 1975).

12. An old Chinese proverb says: "If you give a man a fish, you feed him for one day; if you teach him how to fish, you feed him for many days." Quoted from Dedijer, "Underdeveloped Science in Underdeveloped Countries", appearing in E. Shils (ed.), *Criteria for Scientific Development: Public Policy and National Goals* (M.I.T. Press, Cambridge, Mass., 1968) at 143. In the past, there has been considerable debate over the role of international trade in the economic growth of less-developed countries. See generally J. D. Theberge (ed.), *Economics of Trade and Development* (John Wiley & Sons, Inc. New York 1968). It is now generally acknowledged even among ardent free-trade advocates, however, that without the accompanying diffusion of technology to the LDC's, they must face deteriorating terms of trade and growing balance of payments deficits. See, e.g., H.G. Johnson, *Technology and Economic Interdependence* (St. Martin's Press New York 1975) [hereinafter cited as *Technology and Economic Interdependence*].

the LDC position on the Law of the Sea treaty is their insistence on provisions for technology transfer.¹³ If the necessary technology were made available to them, the LDC's could participate directly in seabed mining or indirectly through the Enterprise, a production arm of the proposed Seabed Authority.¹⁴

Capital for such participation might come from the World Bank as well as from the revenues generated by licensing developed-country mining industries. Initially there would also be a need for developed-country technical assistance and personnel, another form of technology transfer, to conduct research and operate the hardware.¹⁵ Experienced developed-country personnel, however, could be hired, at least at the outset, to run the machinery and train LDC personnel. Large numbers of American petro-chemical and other engineers have, for example, been lured in recent years to the oil producing countries by attractive salary offers.

The post-World War II experiences of Japan and, more recently, Hong Kong and Taiwan, have proven that if the necessary capital, technology and training become available, less-developed countries with lower labor costs and fewer governmental constraints can compete favorably with developed-country industries.¹⁶ At the same time, the LDC's would be acquiring valuable marketing experience and making important international business contracts which could facilitate industrialization in other economic sectors.

The principle of "comparative economic advantage" tells us that not all LDC's would find it equally profitable to participate in all forms of deepsea mining even if the capital and technology were available.¹⁷ Based on geographical and other relevant criteria, some LDC's would find they enjoyed a

13. A thorough review of the problems facing LDC's in the Law of the Sea negotiations and the important role of technology transfer in solving these problems appears in Pinto, "Problems of Developing States and Their Effects on Decisions on Law of the Sea", *Proceedings of the Seventh Annual Law of the Sea Institute Conference (1972)* [hereinafter cited as *Seventh Annual Law of the Sea Conference*] 3-13.

14. See *Informal Composite Negotiating Text*, *supra* n. 5, Article 169.

15. See Ross and Smith, "Training and Technical Assistance in Marine Science - A Viable Transfer Product," 2 *Ocean Devel. & Int'l L. J.* 219 (1974).

16. See *Technology and Economic Interdependence*, *supra* n. 12, Chap. 3, 30-45. The fact that much of the success in Japan, Hong Kong and Taiwan was in labor-intensive industries does not necessarily weaken this argument. Although seabed mining may involve very sophisticated technology, it will also require a large input of man-hours. For example, because of the high capital costs, it will probably be desirable to run ocean mining platforms on a twenty-four hour a day basis. There have also been suggestions for carrying out at least the preliminary refining steps at the ocean mining sites to minimize land-based pollution and unnecessary transport costs. These refining steps would impose further labor requirements on the ocean mining operations. Finally, by making the necessary starting capital available to LDC-enterprises at preferential interest rates, any advantage developed-country enterprises might initially enjoy by virtue of large capital investment needs could be equalized.

17. *Id.*

“comparative advantage” in a certain type of deepsea mining. Because of their previous experience in mining, refining, and marketing primary mineral commodities, one group of LDC’s which might, at least initially, enjoy a comparative advantage in deepsea mining is the group of present land-based producers of these raw materials.¹⁸ These countries have constituted the most outspoken group of LDC’s on the seabed issue because of fears that ocean production will undermine their domestic operations.¹⁹ If the necessary capital and ocean mining technology were available, however, these countries might actually find it profitable to engage in their own seabed operations.

Thus some of the principal concerns which have impelled the LDC’s to stand firm on the issue of a strong Seabed Authority with discretionary control over mining sites, production quotas, and licensing fees could be allayed by effective provisions for technology transfer.

The Inadequacy of the Present Technology Transfer Provisions

Technology transfer to less-developed countries has received considerable attention in recent years in the Law of the Sea conferences as well as in other international forums. Large portions of the most recent Informal Composite Negotiating Text are devoted to technology transfer.²⁰ These provisions, however, are merely advisory, not compulsory. Typical of these provisions is the opening paragraph of Article 144 which reads: “The Authority and States Parties shall co-operate in promoting the transfer of technology and scientific knowledge relating to activities in the Area so that the Enterprise and all States benefit therefrom.”²¹ Thus, these provisions establish a standard of conduct but not an obligation.

Even if the treaty attempted to impose such an obligation on the developed countries, it would be an obligation difficult or impossible to fulfill. The technology, present and future, for deepsea mining is not likely to be found in engineering textbooks, doctoral dissertations, and Government Printing Office monographs.

18. This argument is subject to many qualifications. Much of the production and marketing expertise may reside in multinational enterprises operating within the primary mineral-producing countries rather than in local LDC mining industries. Many of the relevant minerals are presently produced concurrently in developed countries so that the production and marketing expertise may be too diffused to give LDC producers a comparative advantage on this basis. Even among the different LDC’s, geography and other factors might outweigh the comparative advantage which the present land-based producers would otherwise enjoy. The important point, however, is that given access to capital and technology, it is by no means as clear that the present land-based producers would be damaged by seabed mining operations as they have insisted.

19. See *National Ocean Policy*, *supra* n. 6, at 164-168.

20. *Informal Composite Negotiating Text*, *supra* n. 5, Articles 144 and 267-278.

21. *Id.*, Article 144.

On the contrary, deepsea mining technology is at the frontier of modern science and engineering. For the most part these activities are being conducted by private enterprises at tremendous expense. Even in instances involving federal subsidies to private industry, under emerging United States research and development policies the Government, in general, retains only a non-exclusive, non-transferable, royalty-free license in the resulting technology.²² Thus, if the United States were obligated by treaty to transfer this technology to the LDC's or the Seabed Authority, it could do so only by paying private industry a "just compensation" at a cost of millions of dollars to American taxpayers.²³ The principal defect, therefore, in the technology transfer provisions of the proposed Law of the Sea treaty is their failure to realistically address the fact that the latest and most important ocean mining technology is in private hands and is likely to remain there in the foreseeable future.

Assessment of Some Approaches to the Technological Gap

One approach is for the LDC's to realize that despite the idealistic technology transfer provisions in the proposed treaty, it will be many years before they begin to enjoy a technological parity with the developed countries. In the meantime, their best interests may be served by insisting, as they have, on an omnipotent Seabed Authority in which they would exercise majority voting control. Thus, the LDC's would be in a position to restrict the ocean mining activities of the developed countries until they are able to exploit the seabed on an equal footing.²⁴

There are numerous objections to this policy, however. First, even assuming the developed countries were to sign and ratify a treaty which vested sovereign powers in the Seabed Authority, which now seems highly unlikely, it is inconceivable that these countries would patiently abide by its terms while the LDC's attempted to restrict ocean mining. Second, even if this tactic were successful, the LDC's would be depriving themselves of the much-needed revenues to develop their own ocean mining technology.

Another approach to this problem is for the LDC's to acquire the necessary technology from the developed-country private industries. Assuming there were prices at which these industries could be persuaded to sell or license their technology, it seems unlikely that the LDC's could afford it.

22. *Compare* Uniform Federal Research and Development Utilization Act of 1977, H.R. 6249 (95th Cong., 1st Sess.) with U.S. Dept. of Commerce Policies, Procedures and Clauses Regarding Inventions, 42 Fed. Reg. 35669 (July 11, 1977).

23. *United States Constitution*, 5th Amendment.

24. The decreasing technological lead of developed-country industries is a source of genuine concern and one reason these industries have pressed for quick unilateral action. See *National Ocean Policy*, *supra* n. 6, at 173.

Still another possibility is to tie access to ocean mining sites to the transfer of technology.²⁵ There are also several objections to this course of action, however. First, this would still require a Law of the Sea treaty in which the Seabed Authority exercised substantial control over the award of mining sites; and, this could hinder the signing and ratification of the treaty by the developed countries. Second, there is no effective way of policing the technology which is transferred to insure that it is complete and in fact represents the best and the latest available. This system would encourage a developed-country industry to hedge as much as possible in disclosing its technology and to offer no more than necessary in order to secure the desired mining license. Relatively small, often hard-to-detect changes in complex technology can often mean the difference between success and failure. Alternatively, after securing a given mining license the industry could innovate improvements in the technology which would give it a decided edge over an LDC company or the Enterprise which was still utilizing the original technology. The Seabed Authority would require large numbers of trained personnel and, probably, an unacceptable degree of surveillance power to ensure complete technological disclosure under this scheme.

Finally, most developed, country commercial interests as well as a growing faction of U.S. legislators already think of ocean mining as a "right" which vests in the first claimant to a given area rather than as a "privilege" to be rationed out by some international body.²⁶ Therefore, this is not a formula likely to induce substantial support for the Law of the Sea treaty from an already recalcitrant private industry sector.²⁷ Thus, tying technology transfer to

25. As noted, *supra* n. 20 and accompanying text, the proposed treaty establishes a standard of conduct for developed countries to "co-operate" in technology transfer. Refusal by an ocean mining company to share its technology could be construed as a breach of this standard of conduct on the part of the company's home state and, on this basis, licenses might be denied to *all* nationals of that state. Furthermore, since the sixth session of the Third Law of the Sea Conference adjourned, the LDC's have proposed revisions in the Informal Composite Negotiating Text which would affirmatively link access to mining sites with technology transfer. See *The Washington Post* (August 14, 1977) at A-1.

26. See, e.g., The Deep Seabed Hard Minerals Act, S. 713 (94th Cong., 1st Sess. 1975). This bill and others like it, drafted by the industry lobby, the American Mining Congress, and introduced each year by Montana Senator Lee Metcalf, would allow companies to mine anywhere on the ocean floor with State Department protection after securing a U.S. license and paying U.S. taxes. In 1974 one company, Deepsea Ventures, Inc., filed a deepsea mining claim with the State Department asserting exclusive mining rights to an area of 60,000 square kilometers in the Pacific. See Remarks by Richard Greenwald, Special Counsel, Deepsea Ventures, Inc. before the Ninth Annual Law of the Sea Institute Conference, January 1975, *Law of the Sea: Caracas and Beyond* (Ballinger Pub. Co. Cambridge, Mass. 1975) [hereinafter cited as *Law of the Sea: Caracas and Beyond*] 159-163. See also Dubs, "Law of the Sea From the Perspective of the Hard Rock Mining Industry", 11 *Marine Tech. Soc. J.* 8 (1977).

27. In response to an early proposal by the LDC's for the identification of ten economically

ocean mining licenses also does not appear to be a satisfactory way to reconcile the developed and less-developed country interests.

Proprietary Protection as a Mechanism for Inducing Technology Transfer

What is needed to coax developed-country industries into actively supporting a Law of the Sea treaty is a suitable *quid pro quo*, something desirable to which they are clearly *not* already entitled. One thing to which multinational enterprises are clearly *not* entitled under the existing rules of international law is proprietary protection for new ocean mining technology. Patent rights are national in scope and do not extend beyond the territorial limits of the country granting the patent.²⁸ Only by international agreement adopting a new rule of international law can proprietary protection be afforded to new deepsea mining technology.²⁹

The foundation of national patent laws is that, in return for a grant of exclusive rights for a limited period of time, the inventor discloses his invention to the public.³⁰ With certain modifications, this proven formula could become the basis for the sharing of new ocean mining technology. In particular, the Seabed Authority would have the power to grant some form of proprietary protection for new ocean mining technology in return for complete disclosure of the technology and underlying know-how.

Such a system would have to be carefully designed to afford access to the technology at reasonable royalty rates by the Enterprise and the LDC's while, at the same time, insuring adequate protection against infringement by

attractive mining sites for exploration by private or state companies in joint venture with the Seabed Authority, Marne A. Dubs, Kennecott's Ocean Mining Director, observed:

[T]he [Group of] 77 are trying to buy the developed countries off by offering ten sites under a 'joint venture' scheme to get things started. After that, they would presumably have acquired funds, technology and management from us so that we could be quickly and quietly removed from further seabed activity in the future. One hardly need do more to show the unacceptability of this negotiated text!

See *National Ocean Policy*, *supra* n. 6, at 171.

28. In the leading case of *Deepsouth Packing Co. v. Laitram Corp.*, 406 U.S. 518 (1972), the United States Supreme Court held that a United States patent on a shrimp-cleaning device was not infringed by a U.S. company which manufactured kits containing all of the necessary component parts designed for sale and assembly abroad.

29. See part II *infra*.

30. In *National Carbon Co. v. Western Shade Cloth Co.*, 93 F. 2d 94, 96 (7th Cir. 1938), the Court said:

Specifications of the patent, including the description and the claims, constitute a contract between the public and the patentee, under which the public, through the government, agrees that, in consideration of the inventor's disclosure of his teaching and his grant of the right to use the same after his monopoly expires, he shall be protected in his exclusive use during the life of the patent. *The object is to place the patent fully within the knowledge of the public . . .* (Emphasis added.)

developed-country industries. There would be special problems of disclosure, standards for protection, and detecting and enforcing possible infringements different from those encountered in a domestic patent system. These problems are examined more carefully and possible solutions proposed in part IV. On the other hand, this system would be self-monitoring in the sense that private industry would be induced to disclose its latest ocean mining technology in order to secure proprietary protection.

The potential value of such protection to private industry should not be underestimated. The emerging deepsea mining technology is based on costly research and development efforts. Latecomers would have a great incentive to try to capitalize on the expenditures of the pioneer industries if, once pirated, the technology could be openly used without fear of legal sanctions. In fact, the availability of international proprietary protection for ocean mining technology might very well serve as an added incentive to marine research and development activities.³¹

DELIMITATION OF NATIONAL JURISDICTION OVER THE SEABED

In the preceding section, the nature of the seabed controversy was examined and the establishment of an international system of proprietary protection for new ocean mining technology was proposed as a vehicle for facilitating technology transfer and reconciling the conflicting developed and less-developed country interests. This section and part III explore whether an international system for protecting ocean mining technology is really required or whether, perhaps, the developed countries could provide adequate protection through unilateral action.

Under present as well as proposed law, developed country coastal states exercise at least some degree of control over substantial portions of the ocean floor.³² Furthermore, in the absence of technology transfer, ocean mining will be conducted almost exclusively by developed-country nationals. Thus, developed coastal states could exercise legislative jurisdiction over a large share of ocean mining activities premised on a combination of the "territoriality" and "nationality" principles traditionally recognized in international law.³³ Developed countries might, therefore, be able to afford substantial protection

31. Abraham Lincoln has been quoted as saying: "The Patent System added the fuel of interest to the fire of genius." See *Deller's Walker on Patents* (2nd ed. 1964) 61..

32. See, e.g., Finlay, "The Position of the American Petroleum Institute on the Revised Single Negotiating Text," 11 *Marine Tech. Soc. J.* 12 (1977).

33. As contrasted with "adjudicatory jurisdiction", "legislative jurisdiction" delimits the extent to which municipal law can be held to govern the acts of an individual. The five recognized bases for exercising "legislative jurisdiction" in international law are: (1) the territoriality principle; (2) the nationality principle; (3) the protective principle; (4) the universality principle; and (5) the passive personality principle. See *Harvard Research on International Law*, "Jurisdiction With

to ocean mining technology by domestic legislation covering seabed areas deemed to be part of the coastal state's "territory" and in other seabed areas by jointly regulating the conduct of their nationals.

Such measures, if effective, would obviously undercut the incentives for developed-country industry to share its technology with the LDC's in return for more comprehensive proprietary protection. A careful examination of the pertinent legal issues and geophysical factors indicates, however, that unilateral and multilateral actions among the developed countries would be only partially successful in protecting the valuable ocean mining technology. Moreover, such steps could raise international legal and diplomatic problems extending well beyond the sphere of the Law of the Sea negotiations.

Maritime Application of the Patent Laws

In general, a patent confers only national rights and has no extraterritorial application³⁴. On several occasions, however, United States courts have considered the maritime application of the U.S. patent laws. A study of the problems encountered by the United States courts in deciding such cases suggests the nature and extent of the problems that the U.S. and other developed countries might experience in attempting to unilaterally protect new ocean mining technology.

The first type of cases involves United States flagships. In the early case of *Gardiner v. Howe*,³⁵ a lower federal court held that a United States patent could be infringed by use on board a United States merchant vessel on the high seas on the ground that the patent laws extended to any place under United States jurisdiction. The rationale of *Gardiner* was subsequently adopted by the Supreme Court in *Marconi Wireless Tel. Co. v. United States*.³⁶

On the other hand, the Supreme Court has also ruled that the "fiction" that a United States flagship is United States "territory" does not extend so far as to make general United States laws applicable to flagships in the absence of some expression of Congressional intent.³⁷ For example, in deciding the recent case

Respect to Crime". 29 *Am. J. Int'l L.* 435, 445 (Supp. II 1935) Of these, the "territoriality" and "nationality" principles have the broadest application and acceptance.

34. See *Deepsouth Packing Co. v. Lairam Corp.*, *supra* n. 28. See also Stauder, "Patent Protection in Extraterritorial Areas (Continental Shelf, High Seas, Air Space and Outer Space)," 7 *Int'l Rev. Industrial Prop. & Copy. L.* 470 (1977); and, Saragovitz, "The Law of Intellectual Property in Outer Space," 16 *Idea* 86 (1976).

35. 9 Fed. Cas, 1157 (1865).

36. 320 U.S. 1 (1943). The Court held that the Marconi patents were infringed by a group of radio receivers made and used at the United States Naval Radio Station at the American Legation in Peking, China.

37. See, e.g., *United States ex rel. Claussen v. Day*, 279 U.S. 398 (1929); *Cunard S.S. Co. v. Mellon*, 262 U.S. 100 (1923); and, *Scharrenberg v. Dollar S.S. Co.*, 245 U.S. 122 (1917).

of *Decca Limited v. United States*³⁸ involving the alleged infringement at sea by the U.S. government of a patented navigational system, the U.S. Court of Claims, although ultimately concluding that U.S. patent laws did apply, gave special attention to the limited application accorded by the Supreme Court to the "flagship fiction".³⁹ Thus, it is not even certain that present U.S. patent laws protect against infringements committed by American nationals aboard U.S. flagships.⁴⁰

A second category of cases are those involving so-called "flag of convenience" ships which fly foreign flags but are beneficially owned by Americans. The Supreme Court has been even less consistent in deciding these cases.⁴¹ If U.S. patent laws do not extend to United States flagships, however, they certainly do not extend to "flag of convenience" ships either.

In the third type of case involving a genuinely foreign-owned flagship, the Supreme Court has clearly refused to subject the ship to general United States laws merely because of the ship's temporary presence in U.S. waters or ports. For example, in *Brown v. Duchesne*,⁴² the Supreme Court held that a United States patent was not infringed by a device carried as a part of the equipment of a French flag vessel to a United States port.⁴³

The preceding three sets of cases are, respectively, analogous to the following types of ocean mining activities:

- (1) ocean mining by an American national in an area subject to United States control;

38. 544 F. 2d 1070 (U.S. Ct. Clms. 1976).

39. *Id.* at 1073-1074. The Court of Claims also noted that the 1952 codification of the patent laws added, for the first time, an express definition of the term "United States" to mean "the United States of America, its territories and possessions", 35 U.S.C. §100(c), and that in the leading post-1952 case of *DeepSouth Packing Co. v. Laitram Corp.*, *supra* n. 28, the Court strictly construed the territorial limits of U.S. patent laws. On this basis, the Court of Claims questioned the continued viability of the earlier *Gardiner* and *Marconi* decisions. *Id.*

40. *But see*, *Ocean Science and Engineering, Inc. v. United States*, 194 U.S.P.Q. 380 (U.S.Ct.Clms. 1977). This case involved allegations of patent infringement and breach of trade secret rights arising from the Government's use of the research vessel, The Glomar Explorer, as a "cover" for intelligence-gathering operations. In what the Court acknowledges is only *obiter dictum*, it concludes that U.S. patent laws would have applied if the patent had been infringed.

41. *See, e.g.*, *Hellenic Lines Ltd. v. Rhoditis*, 398 U.S. 306 (1970); *McCulloch v. Sociedad Nacional*, 372 U.S. 10 (1963); and, *Lauritzen v. Larsen*, 345 U.S. 571 (1953).

42. 60 U.S. (19 How.) 183 (1857).

43. The reasoning behind this decision was that Congress could not by its general language have intended to empower U.S. patentees to harass and obstruct foreign flagships in our ports trading pursuant to treaties guaranteeing them equal access. *See also Benz v. Compania Naviera Hidalgo, S.A.*, 353 U.S. 138 (1957). In this case relying on *Brown v. Duchesne, supra*, the Supreme Court held that United States labor laws do not apply to labor disputes on board foreign flag vessels during their temporary stays in United States ports.

- (2) ocean mining by the foreign subsidiary of an American parent corporation; and,
- (3) ocean mining by a foreign national.

So far there have been no cases construing the limits of United States legislative jurisdiction in an ocean mining context.⁴⁴ Based on the analogous flagship cases, however, it appears that only in the first case - an American national mining in an area subject to United States control - might there be liability for patent infringement. Even under these limited circumstances there would be no liability unless the area were deemed to be a part of the "territory" of the United States and jurisdiction could be based on the "territoriality" principle or else if Congress specifically extended the patent laws to Americans operating in such areas based on the "nationality" principle.

Important diplomatic and legal barriers, however, are likely to prevent Congress from giving extraterritorial application to U.S. patent laws. Such legislation might contravene the Paris Convention on Industrial Property⁴⁵ to which the United States and most other developed countries are parties. Such action might also establish a dangerous precedent for other countries and in areas other than patents. Even modest extraterritorial applications of U.S.

44. The only relevant cases which have arisen concern the relationship between federal and state jurisdiction over the seabed. By the Submerged Lands Act of 1953, 43 U.S.C. §§1301 et seq., Congress granted to coastal states dominion over offshore seabed for a distance of up to three geographical miles from the coastline. Congress expressly reserved the rights of the United States in the portion of the continental shelf beyond the three-mile limit. *Id.* §1302. This reservation of rights was subsequently confirmed by the Outer Continental Shelf Lands Act of 1953, 43 U.S.C. §§1331 et seq. Section 3 of the Act:

declared [it] to be the policy of the United States that the subsoil and seabed of the Outer Continental Shelf appertain to the United States and are subject to its jurisdiction, control, and power of disposition as provided in this subchapter.

The Act then proceeds to set out detailed provisions for the exercise of exclusive jurisdiction in the area and for the leasing and development of the resources of the seabed.

Prior to the Submerged Lands Act, *supra*, the United States Supreme Court had squarely held that the federal government exercised jurisdiction even over the portion of the seabed lying within the three-mile belt. See *United States v. Louisiana*, 339 U.S. 699 (1950); *United States v. Texas*, 339 U.S. 707 (1950); and *United States v. California*, 332 U.S. 19 (1947). The Submerged Lands Act was contested and held to be constitutional in *Alabama v. Texas*, 347 U.S. 272 (1954). This question was again recently reexamined in *United States v. Maine*, 43 L.Ed.2d 363 (1975). There the Supreme Court reaffirmed the sovereign rights of the United States in the seabed beyond the three-mile limit.

These cases, however, deal only with the respective rights of the federal government and the coastal states in the continental shelf based entirely on municipal law. Whether the continental shelf is considered "territory" of the United States for purposes of exercising legislative jurisdiction is a question of international law.

45. See The Convention of Paris for the Protection of Industrial Property, July 14, 1967, 2 U.S.T. 1583, T.I.A.S. No. 6923, Article 5 ter. This multilateral treaty has undergone six revisions since the original agreement in 1883.

antitrust, security and exchange, and export control laws have met with storms of protest from many foreign countries and have jeopardized the warm welcome previously accorded to U.S. foreign direct investments. For all of these reasons, Congress may well be wary about extending the scope of U.S. patent laws even if the objective is simply to prevent Americans from taking advantage of fellow Americans.⁴⁶

Accordingly, it seems likely that U.S. nationals will be protected under United States patent laws only if their patented ocean mining technology is being used in an area of the seabed which is deemed to be a part of the "territory" of the United States. The next section considers to what extent different portions of the seabed might be deemed a part of the "territory" of the United States under present and emerging law for purposes of the application of U.S. patent laws.

Coastal State Jurisdiction Over the Seabed

Delimitation of national jurisdiction over the seabed has become a complex question of international law and geophysical facts. Each of several different areas or "zones" in the oceans is subject to special rules, and the coastal state enjoys a different scope of control in each of these zones.⁴⁷ Consequently, each zone must be analyzed individually to determine the extent of coastal state jurisdiction over that zone.

1. Territorial Sea

There is no substantial disagreement at the Law of the Sea negotiations that coastal states are entitled to sovereign control over the water, airspace and seabed of their "territorial sea",⁴⁸ a twelve-mile zone immediately adjacent to

46. For example, despite intense lobbying by the U.S. mining industry, Congress and the State Department have been hesitant to recognize the deepsea mining claims of companies like Deepsea Ventures, Inc. See Remarks of Thomas Clingan, State Department representative before the Ninth Annual Law of the Sea Institute Conference, January 1975, *Law of the Sea: Caracas and Beyond*, supra n. 26, at 175.

47. See generally Remarks of Robert D. Hodgson, State Department representative before the Ninth Annual Law of the Sea Institute Conference, January 1975, *id.*, at 183-197.

48. Article 2 of the 1958 Geneva Convention on the Territorial Sea and the Contiguous Zone, U.N. Doc. A/Conf. 13/L.52 (adopted April 27, 1958), provides as follows:

The Sovereignty of a coastal State extends to the air space over the territorial sea as well as to its bed and subsoil.

This formulation remains virtually unchanged in the proposed Law of the Sea treaty. See *Informal Composite Negotiating Text*, supra n. 5, Article 2 (2). The only foreseeable change in this absolute standard is that the coastal state may be required under the new treaty to exercise some restraint with regard to marine pollution which cannot be contained within the territorial sea. *Id.* Article 193.

their coastlines.⁴⁹ Therefore, within a coastal state's territorial sea, patented ocean mining technology would be protected under coastal state laws. This is not unimportant in view of the fact that a substantial proportion of proven seabed petroleum deposits lie within a twelve-mile territorial sea.

2. *Contiguous Zone*

Moving seaward from the outer boundary of the territorial sea, there is an area called the "contiguous zone".⁵⁰ Within its contiguous zone, the coastal state has only the limited authority to "prevent infringement of its customs, fiscal, immigration or sanitary regulations within its territory or territorial sea."⁵¹

Because the maximum outer boundary for the contiguous zone under present law is a distance of twelve miles measured from the same baseline as the territorial sea,⁵² today the contiguous zones of many coastal states have been "swallowed-up" by expanded territorial seas. The emerging Law of the Sea treaty, however, would expand the contiguous zone to a breadth of twenty-four nautical miles.⁵³ It becomes important, therefore, to consider whether a state's authority to "[p]revent infringement of its customs, fiscal, immigration or sanitary regulations"⁵⁴ would encompass patent infringement.

A good argument can be made for enforcing United States patent laws in its contiguous zone based on Sections 337 and 337a of the Tariff Act of 1930.⁵⁵ These "customs regulations" are clearly designed to prevent patent infringement by barring the importation of infringing products.⁵⁶ Furthermore,

49. Traditionally the territorial sea has been a band three-miles wide starting from a coastal "baseline". Important questions of international law having far-reaching political and economic ramifications have turned on the proper location of the baselines for purposes of delimiting the territorial sea. See, e.g., *Norwegian Fisheries Case*, 1951 I.C.J. Rep. 116. Recently states throughout the world have moved toward expanding the width of their territorial sea. A zone of twelve miles seems to be the emerging standard. See *Informal Composite Negotiating Text*, *supra* n. 5, Article 3. The International Court of Justice, however, recently recognized that special circumstances (e.g., geological, historic, or economic) might justify a state's claims to an even broader territorial sea. See *Icelandic Fisheries Case*, 1974 I.C.J. Rep. 16.

50. 1958 Geneva Convention on the Territorial Sea and the Contiguous Zone, *supra* n. 48.

51. *Id.* Article 24(1).

52. *Id.* Article 24(2).

53. See *Informal Composite Negotiating Text*, *supra* n. 5, Article 33.

54. *Id.* Because Article 24 of the Geneva Convention and Article 33 of the proposed treaty limit coastal state action in the contiguous zone to preventing and punishing infringements of the four enumerated types "within its territory or territorial sea", a preliminary question would be whether the seabed underlying the contiguous zone but beyond the territorial sea is "within its territory". This question is considered in parts II(B) (3) and (4), *infra*.

55. 19 U.S.C. §§1337 and 1337(a).

56. In particular, these provisions bar the importation "for use, sale, or exchange of a product made, produced, processed, or mined under or by means of a process covered by the claims of any

the recent case of *United States v. FIV Taiyo Maru, Number 28, SOI 600*,⁵⁷ suggests the liberal scope U.S. courts may be willing to accord to United States legislative authority in the contiguous zone.

Thus there appears to be a strong likelihood that coastal state patent laws would be enforced within the 24-mile contiguous zone.

3. Exclusive Economic Zone

The idea of an exclusive "economic zone" for coastal states under the proposed treaty is based on the principle that for a limited distance beyond its territorial sea a coastal state should have exclusive rights to the natural resources of the oceans both living and mineral.⁵⁸ The proposed treaty further provides that states which may be using another state's economic zone "shall comply with the laws and regulations established by the coastal State in accordance with (the) rules of international law. . . ."⁵⁹

The sovereign rights enjoyed by the coastal state in this zone, however, are limited. Patent rights are only tangentially related to "the purpose of exploring and exploiting, conserving and managing the natural resources. . . of the seabed and subsoil. . . ."⁶⁰ It is therefore doubtful that the present patent

unexpired valid United States letters patent," as well as "the importation of any product or article covered by the claims of any unexpired valid United States letters patent." *Id.*

57. 395 F. Supp. 413 (D. Me. 1975). In this case involving the condemnation and forfeiture of a Japanese fishing vessel captured on the high seas after continuous "hot pursuit" by the Coast Guard for fishing inside the 12 mile contiguous zone, District Judge Gignoux interpreted Article 24 of the Convention in this way:

Although Article 24 only affirmatively recognizes the right of a coastal State to create a contiguous zone for one of the four enumerated purposes, nothing in the Article precludes the establishment of such a zone for other purposes, including the enforcement of domestic fisheries law. *Id.* at 419.

For a thorough discussion of the legal issues involved in this important case, see Fidell, "Hot Pursuit From a Fisheries Zone," 70 *Am. J. Int'l L.* 95 (1976), the reply by Dan Ciobanu, *id.* at 549, and the rejoinder by Eugene Fidell, *id.* at 554.

58. Article 56 (1) of the *Informal Composite Negotiating Text*, *supra* n. 5, establishes an exclusive economic zone in which the coastal state shall have:

sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the sea-bed and subsoil and the 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;

(b) jurisdiction as provided for in the relevant provisions of the present Convention with regard to:

- (i) the establishment and use of artificial islands, installations and structure;
- (ii) marine scientific research;
- (iii) the preservation of the marine environment

59. *Id.*, Article 58.

60. *Id.*, Articles 56 (1) and 73.

laws would be construed to extend to the exclusive economic zone, or that a coastal state's patent laws could be extended to cover its exclusive economic zone even if it so desired.⁶¹

4. *Continental Shelf*

Finally, the limits of national jurisdiction in the continental shelf must be considered. A problem in studying this part of the ocean is that legal and geophysical uses of the term "continental shelf" have not always been consistent.⁶² In geophysical terms, the continental shelf is one part of a larger area of the ocean floor collectively called the "continental margin".⁶³ Legal use of the term "continental shelf", however, has sometimes included all of the continental margin or some portion thereof not necessarily coinciding with the geophysical definition.⁶⁴

The first substantial claim by a coastal state to rights in its continental shelf was the famous Truman Proclamation of 1945.⁶⁵ A state's rights in its continental shelf were crystallized into international law with the 1958 Geneva Convention on the Continental Shelf⁶⁶ which defines the continental shelf so that the legal size increases as technological advances permit exploitation at ever greater depths.⁶⁷ Within the continental shelf region, the coastal state "exercises over the continental shelf sovereign rights for the purpose of exploring it and exploiting its natural resources."⁶⁸

The proposed Law of the Sea treaty expressly establishes the outer edge of the continental margin as the boundary for the "continental shelf" based on the

61. Coastal state laws are enforceable in its exclusive economic zone only to the extent that they accord with the Law of the Sea treaty and "other rules of international law". *Id.*, Articles 58 (3) and 296(2) (b).

62. See, e.g., *National Ocean Policy*, *supra* n. 6, Appendix at 197.

63. The continental margin is, in general, comprised of three parts: the continental shelf, a gently-sloping part of the seabed directly adjacent to the land mass; the continental slope, a more steeply-sloping portion of the seabed adjoining the continental shelf; and the continental rise, another gently-sloping part of the ocean floor which extends from the continental slope out to the abyssal plain. See D.A. Ross, *Introduction to Oceanography* (2nd ed. Prentice-Hall, Inc. 1977) [hereinafter cited as *Introduction to Oceanography*], Fig. 10-2 at 354.

64. See, e.g., *North Sea Continental Shelf Cases*, 1969 I.C.J. Rep. 30.

65. 59 Stat. 884, 10 Fed. Reg. 12303 (1945).

66. U.N. Doc. A/Conf. 13/L.55 (adopted April 26, 1958).

67. Article 1(a) defines the "continental shelf" as follows:

the seabed and subsoil of the submarine areas adjacent to the coast but outside the area of the territorial sea, to a depth of 200 metres, or, beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said areas

68. *Id.* Article 2(1).

principle that this is merely the "natural prolongation" of the land mass.⁶⁹ In cases where the continental margin extends less than 200 nautical miles from the territorial sea baselines, the coastal state may claim part of the abyssal plain out to the 200 nautical mile mark as its "continental shelf."⁷⁰ Within this region, the coastal state enjoys the identical rights as under the 1958 Geneva Convention, namely "sovereign rights for the purpose of exploring it and exploiting its natural resources."⁷¹

This formulation of coastal state rights is strikingly similar to the rights of the coastal state in its exclusive economic zone.⁷² For similar reasons, it seems doubtful that present patent laws would be construed to extend to the continental shelf.⁷³

In summary, by analogy to U.S. maritime patent cases involving flagships of different nationalities and ownerships, it appears that present national patent laws would probably not extend to ocean mining technology used outside the coastal state's territorial sea and contiguous zone. It seems doubtful whether, in accordance with international law, coastal states could extend their patent laws to either their exclusive economic zones or their continental shelves beyond the 24-mile limit based on the "territoriality" principle because coastal state rights in these areas are limited to "exploring" and "exploiting". Furthermore, although coastal states might extend their patent laws to cover their own nationals operating anywhere on the seabed based on the "nationality" principle, it is unlikely that they will accord even limited extraterritorial ap-

69. Article 76 of the *Informal Composite Negotiating Text*, *supra* n. 5, reads as follows:

Definition of the continental shelf

The continental shelf of a coastal State comprises the sea-bed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance.

70. *Id.*

71. *Id.* Article 77(1). Alternatively, in cases where the continental margin extends more than 200 nautical miles, the coastal state's sovereign rights to explore and exploit the natural resources in the area beyond the 200-mile mark are qualified by its obligation to make royalty payments to the Seabed Authority for sharing with the LDC's. *Id.* Article 82. This provision is analogous to proposals by the United States in the early 1970's for a "trusteeship zone" covering the portion of the continental margin beyond the 200-meter isobath. See *National Ocean Policy*, *supra* n.6, at 151.

72. See n. 58 *supra* and accompanying text.

73. Although the continental shelf provisions of the proposed treaty do not contain an express provision requiring that coastal state laws regarding the shelf be consistent with international law, this would seem to be an implicit, overriding principle of construction for the entire treaty. See *Informal Composite Negotiating Text*, *supra*, Article 296 (2) (b). Again similar to the exclusive economic zone, it seems doubtful that a coastal state could, in accordance with international law, extend its patent laws to this region.

plication to their patent laws because of potential legal and diplomatic ramifications.

NATURE AND VALUE OF SEABED RESOURCES

The preceding section considered to what extent the developed countries could take effective steps to protect the ocean mining technology by their industries without LDC cooperation. The conclusion was that such protection would probably be ineffective because of the limited coastal state jurisdiction over the exclusive economic zone and continental shelf.

Even assuming that developed-country coastal states were both willing and able to extend their patent laws to cover their exclusive economic zones, their continental shelves, and their nationals anywhere in the world, the LDC's (and perhaps LDC-organized subsidiaries of developed-country parent companies)⁷⁴ would *still* be able to use "pirated" ocean mining technology on a large portion of the seabed. This area includes the abyssal plain of the ocean floor beyond coastal state economic zones and extended continental shelves, the oceanic rise, and the oceanic ridge.⁷⁵ In fact, much of the important technology would not have to be "pirated" in the ordinary sense of the word because it would already be publicly available in the developed-country patent literature.⁷⁶ How valuable, then, are the seabed mineral resources which lie clearly outside of any conceivable coastal state jurisdiction?

There are three general types of mineral resources of potential commercial importance on and under the seabed - the so-called "manganese nodules", petroleum and natural gas, and the metalliferous muds.

The most highly-publicized of these are the "manganese nodules".⁷⁷ Although they are common to all of the oceans, especially high, commercially-exploitable concentrations have been found in parts of the Pacific,⁷⁸ and the most promising mining areas are located on the abyssal plain outside of coastal state exclusive economic zones and continental shelves.⁷⁹ Thus, by virtue of their

74. See nn. 41-44, *supra*, and accompanying text.

75. See *Introduction to Oceanography*, *supra* n. 63, Fig. 10-2 at 354.

76. Issued patents in all countries are public documents. The basic foundation of patent law is public disclosure of new inventions in return for patent protection. See n. 30, *supra*.

77. See *Introduction to Oceanography*, *supra*, at 371-377. These deposits derive their name from the fact that the deposits often occur as round or oblong bodies ranging from about 1 to 20 cm. in diameter. *Id.* at 371-372. Manganese nodules contain high concentrations of manganese, iron, nickel, copper and cobalt. *Id.*

78. *Id.* In one estimate over 25% of the sea floor is said to be covered by nodules, and there are over 1.5 trillion tons in the Pacific alone. *Id.*

79. See D.R. Horn et al., *Ferromanganese Deposits Off the North Pacific*, Technical Paper No. 1 (NSF 1972). One reason for this is thought to be that because their geological development requires millions of years, manganese nodules located closer to shore where heavier sedimentation occurs would soon be buried. See *Introduction to Oceanography*, *supra*, at 371-377.

distribution, manganese nodules are one seabed mineral mining resource over which the Seabed Authority will exercise almost complete control.

There have been widely varying estimates concerning the commercial value of the manganese nodules, especially in view of the heavy capital investments required for mining and the lack of experience in processing the ores.⁸⁰ But the potential profits have already lured several financially-astute multinationals to develop technology, conduct explorations, and launch pilot operations while urging their governments to recognize and enforce their mining claims.⁸¹ Presumably these companies are at least as interested in protecting their technology as their mining sites.

Probably the most important seabed mineral resource at the present time is petroleum. As mentioned before, most of the proven seabed petroleum deposits are located in the geological continental shelf region, often within a coastal state's twelve-mile territorial sea.⁸² In this area, coastal states would almost certainly be able to protect new ocean mining technology under national patent laws.

Fewer explorations for petroleum have been conducted along the continental slope and continental rise portions of the seabed, largely because the technology for these deeper-water regions has only recently been developed. Geophysical studies of sedimentation and rock formations, however, indicate that potentially large petroleum deposits should be found in the continental rise area and the adjacent part of the abyssal plain.⁸³

Although the present formulation of the proposed Law of the Sea treaty would vest sovereign rights in the coastal states for exploring and exploiting the entire continental margin as a part of the coastal state's "continental shelf",⁸⁴ this may still be changed before a final treaty emerges. The land-locked and so-called "shelf-locked" states as well as those considered to be generally "geographically-disadvantaged"⁸⁵ have urged a narrower treaty definition of the "continental shelf" which would exclude the continental rise and continental slope from exclusive coastal state jurisdiction, at least in cases where these portions of the continental margin extend beyond the state's exclusive economic zone.⁸⁶ Thus, a larger portion of the seabed's resources would inure

80. *Id.* at 374-377. For an interesting theoretical framework and economic analysis of mining manganese nodules, see Herfindahl, "Some Problems in the Exploitation of Manganese Nodules", *Seventh Annual Law of the Sea Conference*, *supra* n. 13, at 28-39.

81. *See Introduction to Oceanography*, *supra*, at 374-377.

82. *Id.* at 362-367.

83. *Id.*

84. *See* nn. 69 and 70, *supra*, and accompanying text.

85. *See generally* Alexander, "Geographical Factors and the Patterns of Alignment," *Perspectives on Ocean Policy* (NSF Ocean Policy Project 1974) 317-330. For a detailed analysis and listing of "geographically-disadvantaged" states, see the remarks of Francis X. Njenga, *id.* at 87-105.

86. *See* n. 71, *supra*.

to the benefit of the "common heritage of mankind". In a compromise proposal, the continental slope and continental rise would not be deemed a part of the "continental shelf" and the coastal states would exercise only "preferential" not "exclusive" exploitation rights in these areas.⁸⁷

Accordingly, it is likely that substantial seabed petroleum resources will be found beyond the outer jurisdictional limits of coastal states; and the protection of new deepsea drilling technology in these areas would require international agreement.

A third type of seabed mineral resource are the deepsea muds. A common type of such deposits called "brown clay" is widely spread along the ocean floor in layers up to 300 m. or more and total volumes estimated at about 30 million cubic kilometers.⁸⁸ These brown clays have been found to contain as much as 9% aluminum and 6% iron plus lesser amounts of copper, nickel, cobalt and titanium.⁸⁹ Like the manganese nodules, the most commercially-attractive deposits of brown clays are in areas outside of coastal state exclusive economic zones and national jurisdiction.

Even more promising, however, are the "Red Sea" muds associated with hot brine concentrations accidentally discovered in the Red Sea in 1948.⁹⁰ Little notice of this discovery was taken at the time. Confirmation discoveries during the last fifteen years, however, combined with new geophysical theories linking underwater seismic activity to sea-floor spreading, have led to speculation of enormous potential significance.⁹¹ The Red Sea muds contain precious metals, particularly gold, silver and copper, in concentrations far in excess of presently-mined land deposits. One estimate of the gross value of the metals in only the upper ten meters of sediments at one of the Red Sea hot-brine "deeps" was over two billion 1967-dollars.⁹²

The significance of this discovery is that according to the latest geophysical theories about the formation of oceans, current seismic activity in the Red Sea is associated with sea-floor spreading and the early geological stages of a new ocean and oceanic ridge. If this theory has merit, it suggests that in the mature oceans the slopes of the oceanic ridges may contain extensive, highly-concentrated ore deposits similar to the Red Sea muds formed during an earlier geological period. The oceanic ridges are located in mid-ocean far from coastal state exclusive economic zones⁹³ and, therefore, would clearly be subject to the

87. Compare Finley, "Rights of Coastal Nations to the Continental Margins," 4 *National Res. Lawyer* 668 (1974) with Henkin, "A Reply to Mr. Finley," 64 *Am. J. Int'l L.* 62 (1970). See also Goldie, "Where is the Continental Shelf's Outer Boundary," *J. Mari. L. & Comm.* 461 (1970).

88. See *Introduction to Oceanography*, *supra* at 368-369.

89. *Id.*

90. *Id.* at 369-370.

91. *Id.*

92. *Id.*

93. *Id.*, Fig. 10-2 at 354.

jurisdiction of the Seabed Authority. The technology for mining these potentially valuable deposits could be protected only through an international agreement.

In summary, a careful study of the relevant legal and geophysical issues indicates that mineral resources of substantial commercial value may be found on or under the seabed in areas which will lie clearly outside the reach of national jurisdiction. Accordingly, the next section proposes establishment of an international system for proprietary protection and technology transfer to facilitate cooperation among the developed and less-developed countries in exploiting the international seabed area.

PROPRIETARY PROTECTION FOR OCEAN MINING TECHNOLOGY

The Theoretical Foundations of Proprietary Protection

The fundamental principle behind a system of proprietary rights is that in return for publicly disclosing a new invention the inventor is assured of a limited scope of protection against others copying or using the invention.⁹⁴ During the life of a patent, the inventor may either exploit the invention himself, or he may license others to use it upon payment of a royalty.⁹⁵

In return, the public receives access to the new technological knowledge, which they may freely use once the relevant patents expire. Even before the patents expire, the public may build on the newly-available technical knowledge to realize still better inventions. Also, the very existence of a patent may be an incentive to others to "invent around" the patent.

Proprietary Protection in Practice

In practice, the system of proprietary protection found in the Western, industrialized countries has suffered from many structural defects which have been especially objectionable to the LDC's.⁹⁶ Although the disclosure requirements for obtaining patents are seemingly stringent,⁹⁷ in reality a patent

94. See n. 30, *supra*.

95. See generally Silverstein, "The Value of Patents in the United States and Abroad: Guidelines for the General Practitioner," 8 *Cornell Int'l L. J.* 135 (1975).

96. See generally Addresses by Dr. Bartholomew J. Kish and Neal Willis before the American Patent Law Association, *APLA Bull.* (June 1975) 330-342; and Address by Homer Blair before the American Patent Law Association, *APLA Bull.* (Oct.-Nov. 1975) 660-672. See also Kunz-Hallstein, "Patent Protection, Transfer of Technology and Developing Countries - A Survey of the Present Situation," 6 *Int'l Rev. Industrial Prop. & Copy. L.* 427 (1976).

97. For example, 35 U.S.C. §112, the disclosure provision of the United States patent code, reads as follows:

The specification shall contain a written description of the invention, and of the manner

often discloses only the "bare-bones" of an invention and cannot be commercially practiced without highly-trained personnel and the accompanying "know-how". LDC's have also complained that patent terms are too long and that, in the meantime, the new technology is either not "worked" in the LDC's or is licensed only at exorbitant royalty rates.

Accordingly, for several years now the "Group of 77" countries have pressed for important changes in the domestic and international systems for protecting industrial property.⁹⁸ Their demands have included, among others, more complete disclosure requirements, shorter patent terms, more rigorous standards of novelty, and the availability of compulsory licenses under the patents at "reasonable" royalty rates.

Designing a Proprietary Protection System for Ocean Mining Technology

It seems clear that the LDC's would not accept a system of proprietary protection for new ocean mining technology which embodied the same features they have found objectionable in the developed-country patent systems. To be acceptable to the countries which hold a controlling vote in the Law of the Sea Conference, a proprietary protection system would have to insure a meaningful level of technology transfer to the LDC's.

First, such a system would have to embody much more detailed disclosure requirements, including underlying know-how and trade secrets, than do the present developed-country patent laws. It might even be necessary to require a limited degree of training of LDC technical personnel to insure that they could practice the protected technology.

Second, it would be necessary to subject the protected technology to some form of compulsory licensing by the Seabed Authority and by LDC's⁹⁹ for a "reasonable" royalty rate. For example, protected technology could be made

and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

98. See *The Role of the Patent System in the Transfer of Technology to Developing Countries*, U.N. Doc. TD/B/AC-11/19 (April 23, 1975).

99. One preliminary problem is defining exactly what constitutes a "less-developed" country. At the Seventh Annual Law of the Sea Institute Conference, Emmanuel Bello, a Nigerian from the Columbia Law School, proposed that technology itself be the yardstick for distinguishing the developed from the less-developed countries. See *Seventh Annual Law of the Sea Conference*, *supra* n. 13, at 23. Based on this criterion:

within Europe itself you see Portugal, Spain, and many other countries, such as Yugoslavia, which may be regarded as developed countries, but technologically they are also incapacitated by their own economic standards. They cannot really, on their own, undertake any exploration or exploitation of the deep ocean floor or the coastal areas within their continental shelves. So they would be regarded as developing nations within the context of the international law of the sea, as we see it today. *Id.*

subject to compulsory licensing to a bona fide LDC enterprise¹⁰⁰ after a period of two years. The technology would be protected against use by a developed-country enterprise on the other hand for, say, ten years.

Developed-country private enterprise has vigorously opposed additional disclosure requirements and compulsory licensing provisions.¹⁰¹ One reason private enterprise has been relatively successful in opposing such measures is the availability of trade secret protection as an alternative to patents.¹⁰² The argument runs that if patents become subject to excessive regulations, industry will turn instead to trade secrets and thus deprive the public of the disclosure of the new knowledge. This is possible domestically because of the legal enforcement of trade secrets and the fact that domestically-operating companies need no prior permission from the government in order to use a new technology.

The Seabed Authority, on the other hand, could deny any protection whatsoever to technology or know-how which was not protected under the system established by the Authority. Furthermore, by maintaining some control over the award of mining sites to prospective private industries, the Authority could oversee the technologies used to mine the seabed. Under this scheme, mining sites would be awarded only after a company submitted the details of the proposed technology to a Technology Review arm of the Authority. If the proposed technology were deemed to be conventional and not protected under the Authority system, the mining site would be routinely granted. If the proposed technology were considered new and important, the mining site would be awarded only after the company agreed to submit the technology for protection under the Authority's system and to be subject to the concomitant disclosure and compulsory licensing requirements. Finally, if the proposed technology were deemed to "infringe" technology already subject to

Such a criterion, however, would obviously create difficulties if applied to the technology transfer-proprietary protection scheme proposed in this paper. The important question in this context is whether a country has achieved such a level of general economic and technological development that it would be reasonably capable of developing its own ocean mining technology if it chose to do so.

100. A second preliminary problem would be in defining what constituted a "bona fide LDC enterprise". For example, should an LDC enterprise be disqualified if 51% of its stock is owned by developed-country nationals but not if the proportion is only 49%? What about the many indirect methods by which a multinational enterprise might control an LDC-based subsidiary in which it did not own a controlling interest?

101. For example, on January 12, 1977, the Energy Research and Development Administration (ERDA) held a "Public Colloquium on Mandatory Patent Licensing". Only one of six speakers, an economist, spoke in favor of compulsory licensing. The business community was uniformly opposed. See 316 *Pat., Trade., and Copy J. A-2* (1977).

102. In the recent and controversial case of *Kewanee Oil Co. v. Bicron Corporation*, 416 U.S. 470 (1974), the United States Supreme Court held that the area of trade secrets was not "preempted" by federal patent law and, accordingly, states could enforce trade secrets through the doctrines of contract and misappropriation.

protection under the Authority's system, the Authority would deny the mining license if the applicant were a developed-country enterprise or, alternatively, grant the license subject to payment of a "reasonable" royalty to the owner of the technology if the applicant were a bona fide LDC enterprise¹⁰³ and the initial two-year exclusivity period had expired.

Advantages of the Proposed System

On its face, it might appear that such a proposal would be acceptable to neither the developed countries nor the LDC's. There are, however, numerous advantages for both sides which could flow from the adoption of this scheme.

First and most important, the LDC's would no longer be obliged to insist on an Authority with sovereign control over the deepsea mining sites. Mining sites could be awarded on a first-come basis to any state or private enterprise which demonstrated the necessary technology. Because under the new treaty LDC's would share equal access with developed-country enterprise to all scientific information about the seabed resources¹⁰⁴ and, under this proposal, would also enjoy access to the same technology after a short exclusivity period, the LDC's would no longer need to fear exclusion from ocean mining activities. With lower labor costs and access to capital¹⁰⁵ and to the latest scientific information and technology at reasonable royalty rates but without the background research and development costs, many LDC enterprises should be able to compete favorably with the developed-country mining interests. As previously discussed, present LDC land-based mineral producers might well find they enjoyed a comparative economic advantage in seabed mining which might more than compensate them for any fall in mineral prices.¹⁰⁶

The LDC's would also be assured of access to the latest seabed mining technology under this scheme because new technology which was not promptly disclosed and protected under the Authority system would be subject to appropriation by others.

Developed-country enterprises, on the other hand, would receive protection for their new and valuable ocean mining technology which is not presently available. In return for making a significant new contribution to ocean mining technology, they would enjoy a short period of exclusivity. Moreover, the system would be essentially self-monitoring against infringements because each

103. See nn. 99 and 100, *supra*.

104. See *Informal Composite Negotiating Text, supra* n. 5, Article 143 and Part XIII, Articles 239-266.

105. As previously noted, the capital might come in part from the World Bank and other existing international organizations with the remainder coming from the revenues generated by the Seabed Authority in licensing developed-country mining industries.

106. See n. 18, *supra*, and accompanying text.

prospective mining enterprise would have to submit its proposed technology to the Authority in advance of any mining operations. Thus, a developed-country industry which duly registered its new ocean mining technology with the Authority would be absolutely protected against direct competition from another developed-country enterprise during the lifetime of the Authority protection. It would also be assured of royalty payments from LDC enterprises which elected to use its technology following the abbreviated exclusivity period.

Last but not least, under this system developed-country industries would enjoy assured access to ocean mining sites, provided they had the necessary technology, and would not be subject to production controls and similar restrictions designed to safeguard LDC interests. Familiar and reliable economic principles would govern their investment decisions rather than unknown and ever-changing political dogmas to which the presently-proposed treaty would subject them. These considerations might well be sufficient to win their support in spite of disclosure and compulsory licensing requirements not to their liking.

CONCLUSION

The present stalemate in the Law of the Sea negotiations over the seabed issue is largely a product of the inadequate technology transfer provisions. The less-developed countries would not feel obliged to insist on a sovereign Seabed Authority with absolute control over seabed mining were it not for their fears of being exploited by the developed countries which possess the necessary ocean mining technology.

A familiar formula for inducing technology transfer is to link it to a system of proprietary protection. Under the present domestic and international laws, only a limited degree of proprietary protection is afforded to seabed mining technology. An international agreement with LDC cooperation would be required to establish more comprehensive proprietary protection.

Although a system of proprietary protection for seabed mining technology could be patterned along the familiar lines of developed-country patent systems, special provisions regarding disclosure requirements, compulsory licensing, and the term and scope of protection would be necessary to accommodate LDC interests and insure a meaningful level of technology transfer. The substantial benefits and advantages which both developed and less-developed countries would realize from such a scheme, however, should outweigh the drawbacks and encourage support from both quarters.

Accordingly, the establishment of a system of proprietary protection for new ocean mining technology could become a vehicle for technology transfer and a solution to the seabed controversy.