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COMMITTEE ON THE PEACEFUL USES OF THE
SEA-BED AND OCEAN FLOOR BEYOND THE
LIMITS OF NATIONAL JURISDICTION

Economic and Technical Sub-Committee

DRAFT PROGRESS REPORT OF THE ECONOMIC AND TECHNICAL SUB-COMMITTEE
(PART II)

General considerations with respect to the ways and means of promoting the
exploitation and use of sea-bed resources

29. During its meetings of 17, 18 and 21 March 1969, the Economic and Technical Sub-Committee gave consideration to this item. It had before it the report of the Ad Hoc Committee's Economic and Technical Working Group (paragraphs 18-29 and 39-61), and the preliminary note prepared by the Secretariat "Economic Considerations Conducive to Promoting the Development of the Resources of the Sea-Bed and Ocean Floor Beyond the Limits of National Jurisdiction in the Interests of Mankind" (document A/AC.138/6 and Corr.1). It based its deliberations, inter alia, on national experiences as reported by various delegations.

30. The report of the Ad Hoc Committee's Economic and Technical Working Group (paragraphs 49-61) has established that the conditions which should be met by any regime of sea-bed resources management can be studied without prejudging the subsequent legal considerations. Drawing upon the experience of the Ad Hoc Committee, the Economic and Technical Sub-Committee based its deliberations solely on economic and technical requirements.

31. In the past ten years man's knowledge of the sea-bed and its environment has considerably increased, but must still be considered inadequate and of an approximate nature. Basic data or documents relating to much of the ocean floor are practically non-existent. Hence, substantial improvement of our knowledge of the sea-bed and ocean floor is an urgent necessity. In this

context, reference was made to the usefulness of the long-term programme of oceanographic research which is to be based on national programmes prepared by Governments and co-ordinated by the IOC of UNESCO.

32. The importance of scientific co-operation on a regional and international level was stressed. An important element of such co-operation would consist in training national experts, in particular of developing countries, and in providing them with basic equipment to carry out research and investigation in this field. Such measures would lay the ground for the future direct participation of the countries concerned in the exploration and exploitation of the sea-bed and ocean floor.

33. For the development of the resources of the ocean floor, new forms of international co-operation should be devised which should avoid being a mere reflection of present relations between States. They should provide not only equality of opportunity but rather equality in the enjoyment of benefits derived from the exploitation of the resources of the ocean floor. Their primary goal should be the research of maximum benefit for mankind as a whole.

34. Benefits derived from any such co-operation should, furthermore, contribute to closing the existing gap between developing and developed countries. In this regard it was pointed out that special consideration should be given to a system of rational exploitation. It was observed that many ways were possible to realize the common endeavour of exploitation for the benefit of all mankind and that all avenues which might lead to that end should be carefully explored.

35. Any study of ways and means which are to secure that the resources of the sea-bed beyond national jurisdiction be developed in an orderly manner and in a way not interfering unjustifiably with the other uses of the sea must take into account that eventual arrangements would be applicable to a vast area, encompassing the larger part of the world's surface.

36. Unless the resources of the ocean floor are extracted and brought to the market places of the world on a basis competitive with minerals from land, there is no prospect of any tangible benefit to mankind as a whole.

37. There is no difference in principle between the factors which determine the economic viability of mineral exploitation on land or beneath the sea. Therefore, experience gained on land is generally relevant and should be studied.

38. Agreement on arrangements which meet the criteria of effectiveness, credibility and impartiality is one of the first vital steps in creating an economic environment conducive to encourage and promote the use of the sea-bed resources. They must instill confidence in the minds of potential operators that rights granted will be, and can be, upheld. They must command the support and respect of all the nations of the world who create them - developing and developed, socialist and capitalist, large and small, coastal and landlocked.

39. The arrangements should also be effective. The economics of an operation can be drastically changed, or even destroyed, if there are delays in taking decisions which result in excessive dead time for an operating rig. On the other hand, risks of blow-outs, pollution and waste or destruction of resources exist if the wrong decisions are taken.

Thus the skills of many experts (geologists, geo-physicists, geo-chemists, petroleum engineers, mining engineers, safety experts, marine biologists, lawyers, administrators, etc.) will be needed if exploration and exploitation of ocean floor resources are to be both encouraged and effectively controlled. Any regulatory authority must therefore have, within itself, or have access to, through some agency arrangement, a high degree of technical and professional competence. Only then, it will possess the necessary flexibility to cope with new and complex situations, and the sensitivity to react quickly and decisively.

40. The provision of adequate and reasonable economic incentives should be possible. At the same time the interests of the world community must be safeguarded.

41. The highest priority should go to the stability of the ground rules. To weigh up the economics of a project the potential operator has to be assured that the conditions under which he will work are clearly set out, and that they will not change during the life of his title.

42. The ways in which national Governments impose a levy on mineral exploration and production are many and varied, the most common being, (a) fees or rentals on the acreage, or square mileage held, (b) a royalty (or percentage of value) on production and (c) company tax on profits. In addition, some countries have a system of competitive bonus bids for cash for the right to a concession.

It would be advisable to keep fees and other payments required from operators at a modest, or low level at the exploration stage, and then looking to mankind as a whole, provide for a sharing in the benefits through appropriate royalty or taxation provisions at the time of production. In any event, due allowance should be made in devising any scheme to take into account the difficulties and therefore the high costs and risks inherent in the marine environment.

43. Adequately sized exclusive areas are also important. From the point of view of operators, the size of the areas should allow for efficient or economic exploration. Equally, from the point of view of Governments, and in our case in this Committee from the point of view of all the Governments representing mankind as a whole, it is important that areas, once granted, be effectively and energetically worked and not allowed to lie fallow. This objective can be achieved by a sliding scale of fees which increase over time, by requiring the surrender of portions of the area after stipulated periods, or by stipulating that a concession will lapse if the mineral is not exploited within a defined period, or by a combination of all three. An opportunity for competition between operators in adjoining areas should be provided for.

44. Sub-sea mineral exploitation may create hazards to other uses of the sea. Mineral exploration and extraction may interfere with fishing, while the use of dynamite in seismic exploration may kill fish locally. Although the establishment of sea lanes and use of modern aids to navigation have largely eliminated interference with navigation, the increase in the number of fixed or stationary installations multiplies the number of obstacles shipping must face and calls for specific measures to solve conflicts arising from different uses of the sea.

45. Pollution stemming from sub-sea mineral exploitation is essentially of two types, namely (a) oil, gas, brines or fluids released directly from the well, from production or storage facilities and from pipelines and (b) particulate matter stirred up from the sea bottom in mining or discharged as waste in the course of on-site beneficiation. The potential ill effects of mineral exploitation in waters beyond the limits of national jurisdiction are little understood at this stage, and will require both further study and caution.

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They might well be less significant in deep water far from land than they are near shore.

46. With regard to the problem of safety of personnel, sub-sea mineral development combines the hazards related to shipping and fishing and those associated with onshore drilling or dredging. Even though experience seems to be sufficient to form the basis for adequate safety regulations and practices, this aspect deserves continued reviews and improvement.

47. In the foreseeable future only a few countries will be in a position to actively participate in the exploration of the sea-bed and ocean floor. This should, however, not preclude the others from benefitting from this development. In view of this consideration and pending the establishment of appropriate international arrangements it was considered timely and appropriate to focus on interim steps: these should be simple and pragmatic in nature and not prejudice the eventual regimes which may be established. They might include the registry of activities carried out beyond the limits of national jurisdiction, as well as scientific technical co-operation, training of personnel, safety measures, etc.

48. The importance of international co-operation with regard to submarine archaeology dealing with sunken cities and wrecks on the bottom of the sea was also mentioned. Apart from increasing historical knowledge, progress in that field will also provide appreciable information on sea-level changes having occurred thousands of years ago, thus establishing a link between archaeological and geological evidence.

49. The following observation concluded the consideration of this item:

(a) Once again, it was emphasized, that our knowledge of the ocean is still fragmentary and perhaps too scant to provide as yet a basis for economic exploitation of the sea-bed and its resources.

(b) New forms of international co-operation should be considered to ensure the rational and equitable exploitation of the resources of the sea-bed.

(c) The fact that the exploitation of marine mineral resources is only in its very early stage provides a good opportunity to draw up, in good time, international arrangements for operations on and under the sea-bed.

(d) The main objective of international arrangements in this respect should be that all countries, whether coastal or landlocked, benefit from such a development and that the special interests and needs of developing countries be taken into account.

(e) Such arrangements should be effective, equitable and trustworthy. They should provide economic incentives for exploitation of marine mineral resources, particularly at the exploratory phase.

(f) Operations should be conducted in such a way as to reduce to a minimum the danger to human life, pollution and interference with navigation and fishing.

Particular problems related to the economics involved in the first phase of marine mineral resources development: the establishment of basic documents

50. During its meeting of 19 March 1969, the Economic and Technical Sub-Committee gave consideration to this item. It had before it the preliminary note by the Secretariat on "Economic considerations conducive to promoting the development of resources of the sea-bed and ocean floor beyond the limits of national jurisdiction in the interests of mankind". It based its deliberations also on the letter dated 27 February 1969 addressed by the Chairman of the IOC to the Secretary-General (A/AC.138/10).

51. In the Report of the Ad Hoc Committee's Economic and Technical Working Group (paragraph 19) four phases were distinguished in the process of mineral development, the first of which deals with the acquisition of the basic knowledge through systematic area surveys and research, necessary to understand the character, distribution and variation of the mineral resources.

52. Basic documents, especially bathymetric, geophysical and geologic maps are needed to help identify areas favourable for the occurrence of various minerals and to appraise their potential resources, and as such are a prerequisite for the development of marine mineral resources. Such data also help to define properties of the sea bottom that need to be known to predict the hazards to mining operations and the effects of mining on other uses. Due to the vastness of the area - approximately 360 million square kilometres are covered by water - the systematic mapping and charting of the ocean floor is a long-term and costly endeavour. Although much is known about the geology of the ocean floor from widely spaced geophysical and sampling traverses and from special purpose mapping, systematic mapping of the oceanic basins has not yet begun.

53. Practical considerations suggest that parts of this enormous task lying ahead be tackled by means of co-operative planning. Such a procedure would avoid overlapping and duplication of national efforts, lead to results in the shortest possible time and allow for a national pooling of facilities and qualified personnel.

54. In order to achieve effective and rational co-operation there must be agreement on co-ordinated planning of scientific research, on standardized measuring techniques and data processing as well as common understanding on the areas which would deserve priority investigation.

55. In the context of co-operative planning the co-ordinating role played by the IOC of UNESCO in the past was mentioned and the hope was expressed that it will continue and strengthen its activity in this field.

56. The need to standardize and calibrate instruments used at sea and in the laboratory was especially stressed; repeated slight errors in millions of measurements could give rise to large-scale erroneous conclusions and seriously hamper progress.

57. In the field of international co-operation, reference was also made to the regional economic commissions of the United Nations and the valuable assistance they could provide in particular with regard to the selection of appropriate areas for the purpose of such oceanographic expeditions.

58. At the scientific level of investigation where research consists of an enquiry by scientists into the basic nature of the sea and the sea floor with no immediate economic goal in mind, there should be the least restriction on the movement of oceanographic vessels, and no unnecessary hindrance placed in their way. If coastal States limit excessively the freedom of research they may undermine the scientific basis upon which future progress will depend for all countries.

59. The question was raised of how the basic documents resulting from expeditions at sea were to be made accessible to the world community. There is general agreement that results of governmental and academic research in the area of the sea-bed beyond national jurisdiction should be freely accessible to all.

It appears feasible to reconcile this principle with the proposition that operators be given exclusive rights to explore an area for a specified period.

In return for granting exclusive exploration rights, operators might be requested to make the basic data (seismic records, portions of cores, cuttings and samples) obtained in the course of the operation freely available after the lapse of a suitable period of time. This could be considered in the framework of the arrangements to be agreed upon for granting of exploration rights.

60. Existing information and data services are restricted to scientific or academic data. There is a need for a service processing applied, technological, and commercial data. A fundamental problem with such information is the task of interpreting and processing the data for publication and retrieval. Standardizing the methods of storing oceanographic data so that they are permanently and swiftly available to scientists everywhere is of primary importance. It was mentioned in this context that World Oceanographic Data Centres operate in Moscow and Washington. It was further suggested that a register of existing publications, maps and relevant documents be established and that new publications be registered.

61. Systematic mapping as indicated before will eventually provide the broad base of understanding needed for full use of the ocean floor and efficient development of its resources. It is however expected that the prospector and developer will precede the topographer and geologist at sea as they have on land, once suitable deposits are identified in certain areas. The development of ocean floor mineral deposits will therefore not have to await completion of the enormous and comprehensive task of basic survey.

62. The question arises whether priority could or should be given to certain areas for which the establishment of basic documents might be promoted. In this respect, the policy should be to concentrate on the systematic gathering of basic knowledge of areas which show signs of potential mineralization in preference to areas where preliminary surveys offer no encouragement.

63. Similarly, technical possibilities and economic prospects of such undertakings should be kept in mind: it would seem appropriate to proceed progressively oceanwards from the shelf towards greater water depths. Other criteria might be, inter alia, the availability of markets for given minerals and prevailing weather conditions. The importance of certain areas or resources for developing countries should also be taken into account.

64. The scientific results of co-operative programmes prepared and co-ordinated by the IOC of UNESCO might prove to be a useful guideline for the determination of such priorities.

65. In order to associate developing countries more fully and without delay in this new venture, it is of primary importance to make the Governments and people of those countries aware of the possibilities inherent in the development of the ocean floor and to provide for the training of national experts.

66. The following observations concluded the consideration of this item:

(a) Before us is the task of conducting a systematic geological survey of the sea-bed and the ocean floor. It is an enormous task, very expensive and will involve many years of work.

(b) The object of such a survey is not confined to the search for economically valuable mineral deposits, but is broader in scope. It encompasses all aspects of the marine environment.

(c) It requires international co-operation in the planning of research programmes, in the standardization of the methods used for survey and analysis, etc. The active participation of all countries should be sought in bringing about such co-operation.

(d) It should be governed by the principle of freedom of scientific research, and the results obtained should be circulated as broadly as possible.

(e) It seems, however, that the beginning of development of the mineral resources of the ocean does not have to await complete oceanographic knowledge of the ocean floor.

(f) The question arises whether or not certain priorities could be devised in the selection of areas for which the establishment of basic documents would be promoted. In this regard attention should be focused on areas which seem to offer an economic potential for exploitation and where development techniques would be available in the near future.

(g) In the interests of effective dissemination of all available information, operators who are granted exclusive exploration rights should also be requested to make available freely, after the lapse of a suitable period, the basic data they have gathered.

Particular problems related to the economics involved in the second and third phase of marine mineral resources development: the exploration of mineralization zones and the evaluation of their exploitability

67. During its meeting of 20 March 1969, the Economic and Technical Sub-Committee considered jointly the second and third phase of marine mineral resources development: the exploration of mineralization zones and the determination of the economic value of the mineral concentrations or deposits which have been ascertained. It had before it the preliminary note by the Secretariat on "Economic Considerations Conducive to Promoting the Development of the Resources of the Sea-Bed and Ocean Floor Beyond the Limits of National Jurisdiction in the Interests of Mankind" (document A/AC.138/6).
68. Experience gained in various countries in relation to the development of mineral resources under national jurisdiction should be taken into account when considering the measures which may be conducive to promoting the development of the resources of the ocean floor beyond the limits of national jurisdiction. An appropriate adaptation of the existing practices might be envisaged with a view to ensuring the optimum efficiency of the arrangements. Common denominators amongst these practices should be identified in order to facilitate their acceptance by the international community.
69. According to one of the systems which might be envisaged for promoting the development of marine mineral resources beyond the limits of national jurisdiction the operator would be called upon to make a declaration of intent to undertake exploration in a certain area. The registration of such a declaration would be made subject to certain conditions such as respect of international law, reasonable regard for the marine environment, etc. No exclusive exploratory rights would, however, be granted.
70. A more formal system would entail the issuance of an exploration permit. Such a permit would be granted for a given area and for a relatively short period of time. It would give no exclusivity to the operator nor rights to further exploitation. The operator would, however, enjoy preferential treatment when applying for a subsequent exploitation permit and would receive an indemnity if his application is rejected.
71. Under a third system, an exclusive prospecting license would be granted for a more limited area and a longer period of time. Such a license would entail

exclusivity in the search for specified minerals and would carry the right to future exploitation of the deposits discovered. The more extensive rights given to the operator would correspond to his submission of a definite programme, his financial commitment and his technical capabilities.

72. In order to avoid the problems which might arise if leases were granted directly to individual companies, it may seem advisable to involve their respective Governments: they would, for instance, be in a better position to judge the suitability of a potential operator applying for a permit.

73. Any such lease-system would also have to contain provisions which would ensure that the interests of all countries are equitably respected.

74. Reference was made to the importance of preventing marine pollution caused by blowouts which might occur at all stages of marine mineral development carried out by means of drilling.

Although out of 7,642 wells drilled for oil and gas on the outer continental shelf of the United States until the beginning of 1969, only twenty-three resulted in blowouts; the study of the origin, effects and means of prevention and control of such accidents deserves high priority due to their potential danger to human life and the marine environment. It was recognized, however, that a complete elimination of these accidents could not be anticipated due to human error and/or equipment failure.

75. Without prejudice to the setting up of international arrangements for the exploitation of the sea-bed resources, measures which would further international co-operation, in the interests of mankind, as a whole might be strengthened. Such measures would include technical assistance to developing countries comprising the training of qualified personnel, the establishment of reference services which could give these countries easier access to basic data, the provision of capital needed to undertake sea-bed resources development operations, etc.

76. Further description of the different structural units underlying the seas and oceans was advocated, inter alia, the continental shelf, the continental slope, the abyssal plain and other important features. The characteristic differences between the oceans and the internal and marginal seas might also be studied in this context.

77. The following observations concluded the consideration of this item:

(a) It would seem appropriate to adapt procedures and practices at present used on a national level and apply them to concessions granted beyond the limits of national jurisdiction.

(b) Various types of arrangements are feasible under which the burdens assumed by the operator would be matched by corresponding rewards.

(c) Such arrangements are meant to serve the interests of mankind as a whole, and should take into account the special interests and needs of developing countries.

(d) Although accidents in offshore drilling could never be completely eliminated, their number should be reduced as much as possible by means of improved safety measures.

Particular problems related to the economics involved in the fourth phase of marine resources development: the exploitation of mineral deposits

78. During its meetings of 21 and 24 March 1969, the Economic and Technical Sub-Committee considered this item. It based its deliberations on the report of the Ad Hoc Committee's Economic and Technical Working Group (paragraphs 30-38), on the preliminary note by the Secretariat "Economic Considerations Conducive to Promoting the Development of the Resources of the Sea-Bed and Ocean Floor Beyond the Limits of National Jurisdiction in the Interests of Mankind" (document A/AC.138/6 and Corr.1) and on pertinent information on methods applied by various Governments at the national level.

Methods applied under national resources management systems

79. The Economic and Technical Sub-Committee considered a series of methods applied nationally to regulate mineral exploration and exploitation with a view to examining whether common denominators could be arrived at which were to serve as examples for similar regulations within the envisaged international arrangements.

80. Two methods were considered by which a regulatory authority might proceed in granting production permits:

(a) The system of freedom of general exploration granted to all interested parties - within a given area - on the understanding that exclusive production titles will be allotted over sections of the area for such periods and on such conditions as appear appropriate to the regulatory authority. The salient point of this system would lay in its incentives for increased exploration activities.

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(b) The system of allocating exclusive exploration rights to a potential operator with a guarantee that he will be granted a production title in the event of discovery. Such a system would build on the premise that the area of the sea-bed beyond national jurisdiction is enormous, that its potential is little known, and that any exploration is carried out with the expectation of ultimate commercial production.

81. Any exclusive rights that may be granted should be over areas large enough and for periods long enough to enable the operator to carry out exploration and exploitation with the benefit of economies deriving from the scale of activities.

At the same time, these rights should only be given over such an area and for such a period as will ensure that the area is effectively and energetically worked during the life of the title.

82. Both exploration and production titles should specify the minerals which they cover: as a general rule, all-embracing titles should not be contemplated.

Subdivision into hydro-carbons and other minerals was regarded necessary.

Furthermore, it was considered that hydro-carbon titles should be liable to be extended so as to cover other substances which may be recovered by drilling, e.g., sulphur in some forms of its occurrence. Hard minerals might also be grouped in ways corresponding to the mode of occurrence: e.g., it is impossible in the case of lead and zinc to extract the one without the other.

83. The need for stability in the ground rules does not imply that conditions should be immutable. Production rights should be granted for an adequate specified period of time, at the end of which the title holder should have the opportunity to renew his title, subject however to the right of the granting authority to review the conditions for the renewed title. Such a way of proceeding would allow for long-term planning on the part of the operator and induce him to apply sound exploitation methods: sea-bed resources being one-time wasting resources, responsible development is imperative. On the other hand it would permit on the part of the regulatory authority of a review of the portion of the benefit from production which should accrue to mankind as a whole - that is to say, the renewed title could carry a higher rate of royalty or tax.

Economic and technical requirements for an international resources management system

84. Promotion and success of international co-operation in the development of marine mineral resources will be dependent on the resource management system which eventually will be devised: arrangements will have to create an enlightened administrative climate and provide for some form of control by an appropriate regulatory authority.

85. Any regulatory authority that may be established must, inter alia, have the mandate and competence to ensure, either directly or by the use of agents, that production of ocean floor resources is carried out (a) in a way which conforms with good mining practices and which maximizes the benefits obtained, (b) without unjustifiable interference with other activities on the sea-bed or on the superjacent high seas, (c) with constant vigilance to guard against marine pollution and the disturbance of the ecological balance.

Moreover, ways will have to be devised by which the regulatory authority may verify the quantities of minerals mined or extracted and assess their value in order that mankind as a whole may receive its just and equitable due.

It will be essential, as well, to balance carefully the requirement of competence of the administration with the need to keep any type of authority which may eventually be agreed within manageable proportions of numbers of personnel: it is not difficult to conceive of the creation of an international bureaucracy swallowing up the direct financial benefits which might accrue from ocean floor production.

86. Any regulatory authority should further be empowered to require operators to:

- (i) submit advance notices of proposed programmes;
- (ii) provide information and appropriate materials on a current basis as well as to furnish comprehensive technical reports;
- (iii) assist in the carrying out of inspections by authorized officials.

87. With particular regard to the technical aspects, the resource management system should be designed so as to adequately reflect such requirements and factors arising from the exploratory techniques necessary to find the various types of deposits, the evaluation procedures required to justify their development and the equipment and methods for their extraction.

88. With particular regard to the economic aspects any such system will have to make allowance for the economic realities and provide adequate economic incentives to attract the necessary investment capital, protecting at the same time the interests of the international community as a whole. Rights should be granted in a manner devoid of political or other discrimination, for specified periods of time and oblige the holder either to pursue actively resource development or reconstitute the rights granted.

Ensuring the interests of mankind as a whole with regard to the special needs of the developing countries

89. Mankind as a whole stands to benefit from the production of sea-bed resources: once discovered and produced they will add to the existing inventory of minerals which are a wasting and non-replaceable asset as distinct from other natural resources available for use by mankind.

Furthermore, the international community will benefit from sharing financially with the operator, be it a private company or a State-owned enterprise, in the proceeds from the sale of his product.

The special interests and needs of developing countries would thereby have to be taken into account.

90. The royalties imposed should not be so high as to discourage exploitation or to promote irresponsible methods of exploitation. They should be modest at the initial stages of exploitation, since the returns will then also be small, and they could vary with the difficulties and costs of the exploitation.

91. Any international resource management in granting exploitation rights for special minerals must take into account the position of the corresponding land minerals in the world markets.

The promotion of an exploitation of specific sea-bed minerals which would entail a drop in price of corresponding land minerals on the export of which some or many developing countries may rely should be carefully considered by producer countries and countries dependent on the import of these raw materials within the framework of the existing international arrangements for raw products.

92. Reference was made to marine mineral deposits in particular hydro-carbons, located partly within the zone of national jurisdiction and partly outside this area. Two ways were suggested which seem likely to reconcile the interests of the coastal State and the interests of the world community in exploiting these deposits:

- (i) to establish an intermediate buffer zone contiguous to the outer limits of national jurisdiction where the coastal State would enjoy priority of rights or exclusive rights of exploitation, depending on the extent of the overlapping of the deposit;
- (ii) to consider a joint exploitation of such resources by the coastal State and the entrepreneur operating within the envisaged international arrangement.

93. International co-operation in the field of sea-bed resources development requires the participation of all States, developed as well as developing. One form of promoting the participation of developing countries which lack the necessary capital and technological skill would be in the training of their nationals. It was therefore advocated that the existing training programmes in this area be enlarged, more widely publicized, and that new programmes be created at the national, regional and international levels, so as to attract and encourage the potential scientists and research students from developing countries.

94. In this context, it was furthermore proposed that operators should agree to include among their personnel, trainees from developing countries in order to assist them in the training of national experts. Nationals of countries, where similar types of deposits as are looked for by the operator are identified, should thereby enjoy priority.

Other measures related to the exploitation of sea-bed resources

95. At the national level measures are taken for the protection of installations used for exploration and exploitation on the continental shelf, as well as measures to avoid that such installations constitute a danger to the environment or an impediment to other activities.

These measures should be carried over into an international agreement which, inter alia, might provide for the establishment of "safety zones" around such installations, where navigation and overflight would be subject to certain restrictions without giving the installations the status of islands.

96. Personnel engaged in off-shore operations should be given guarantees commensurate with the risks they take. In addition, safety codes should be adopted to ensure best possible protection of this personnel.

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97. Safeguards against potential hazards inherent in exploitation activities and provisions for the prevention of marine pollution should also be considered in this context.

98. The activities of the Inter-Governmental Maritime Consultative Organization were mentioned. It was proposed that the International Conventions concluded under its auspices, i.e., the International Convention for the Prevention of Pollution of the Sea by Oil (1954) as amended and the International Convention for the Safety of Life at Sea (1960) might be complemented so as to take into account problems relating to:

- (i) the safety of construction, equipment and operation of drilling rigs, production platforms, submersibles, and other devices used for the exploitation and transportation of sea-bed resources;
- (ii) the safety of the people working on them;
- (iii) the danger arising from ships navigating in the area where underwater operations take place;
- (iv) the spillage of oil and other noxious or hazardous substances into the sea due to the exploitation of sea-bed resources.

99. Any international arrangement for the exploitation of marine mineral resources would also have to include provisions relating to the liability for accidents occurring during the operation of off-shore ventures. In particular the necessity of considering a régime of compensation for damages to third parties was stressed.

100. The following observations concluded the consideration of this item:

(a) In order to promote the exploitation of the resources of the sea-bed beyond the limits of national jurisdiction, it will be necessary to organize an international resource management system conducive to encourage the necessary capital investment and liable to further and protect the interests of the international community.

(b) To be efficient in the accomplishment of its task, the responsible authority must be endowed with the necessary scientific, technical and economic expertise.

(c) It will, however, be necessary to make sure that the provisions for technical competence and expert knowledge do not lead to the creation of an international bureaucracy likely to absorb the financial benefits expected from the exploitation of marine mineral resources.

(d) Various formulas regarding the granting of exploitation titles on a national level have been discussed. It was considered necessary to determine the common denominators of these national formulas, and to examine their respective advantages and drawbacks.

(e) Mankind as a whole stands to benefit from the development of sea-bed resources in two ways: from the increase of world inventory of mineral resources; and by financial sharing in the benefits resulting from their exploitation.

(f) There was common understanding that the developing countries for some time to come will not be able to participate in the exploration and exploitation of the resources of the ocean floor.

(g) It was therefore considered important (i) to promote international co-operation providing for the training of their nationals with a view to enabling developing countries to participate directly in such undertakings and (ii) to provide for an international resource management arrangement which, by means of sharing the financial advantages expected to be forthcoming from such exploitation, will take into account the special needs and interests of developing countries.

(h) Since the economy of certain developing countries is very much dependent upon the export of certain primary commodities it will be necessary to study in detail the economic impact of exploitation of mineral resources on the world market.
