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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 I)

1. The Economic and Technical Sub-Committee, established by the Committee on the Peaceful Uses of the Sea-Bed and Ocean Floor Beyond the Limits of National Jurisdiction, was entrusted with the consideration of the following topics:

- (i) Economic and technical requirements which such a régime as is referred to in operative paragraph 2 (a) of resolution 2467 A (XXIII) should satisfy in order to meet the interest of humanity as a whole.
- (ii) Operative paragraph 2 (b) of resolution 2467 A (XXIII) - to study the ways and means of promoting the exploitation and use of the resources of this area, and of international co-operation to that end, taking into account the foreseeable development of technology and the economic implications of such exploitation and bearing in mind the fact that such exploitation should benefit mankind as a whole.
- (iii) Economic and technical implications of -
 - (a) all other questions mentioned in the terms of reference of the Committee as contained in resolution 2467 A (XXIII); and
 - (b) the reports submitted by the Secretary-General pursuant to resolutions 2467 B, C and D (XXIII) and 2414 (XXIII).

It was furthermore requested to prepare and adopt its report, containing its recommendations, for submission to the Main Committee.

2. The bureau of the Economic and Technical Sub-Committee was composed of the following members:

Chairman: Mr. Roger Denorme (Belgium)
Vice-Chairman: Mr. Ramesh Arora (India)
Rapporteur: Mr. Anton Prohaska (Austria)

3. The Economic and Technical Sub-Committee held its meetings in New York from 11 to March 1969. The meetings were attended by the representatives of the forty-two Member Countries of the Committee. Also present were the observers of the following countries: Barbados, Burma, Denmark, Jamaica, Netherlands, New Zealand, Nicaragua, Portugal, South Africa, Spain, Sweden, Turkey, Ukrainian S.S.R., Venezuela; and the representatives of UNESCO-IOC, WMO, IMCO and FAO.

4. At the end of its meeting held on the Sub-Committee adopted unanimously its report to the Committee.

5. As a background for discussion, the Economic and Technical Sub-Committee had at its disposal the report of the Economic and Technical Working Group of the Ad Hoc Committee to Study the Peaceful Uses of the Sea-Bed and Ocean Floor Beyond the Limits of National Jurisdiction, and the preliminary note by the Secretariat entitled "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). The introductory remarks made by the Chairman on 11 March were also circulated as an official document (A/AC.138/SC.2/3).

6. In accordance with its programme of work (A/AC.138/SC.2/2) the Economic and Technical Sub-Committee gave consideration to the following items:

- (i) Consideration of progress achieved in the exploration and exploitation of the resources of the sea-bed and the ocean floor, and the subsoil thereof, beyond the limits of national jurisdiction and in the techniques used for their development.
- (a) Hydrocarbons and soluble minerals; drilling;
- (b) Surficial deposits and deposits within bedrock; dredging and mineral extraction.

(ii) Preliminary study of the ways and means of promoting the exploitation and use of the resources of this area, and of international co-operation to that end, bearing in mind the fact that such exploitation should benefit mankind as a whole.

- (a) General considerations;
- (b) Establishment of basic documents;
- (c) Exploration of mineral concentrations;
- (d) Evaluation of mineral concentrations or deposits which have been ascertained: technical feasibility and economic exploitability;
- (e) Exploitation of mineral deposits.

Consideration of progress achieved in the exploration and exploitation of marine hydrocarbons and in the techniques used for their development

7. During its meetings of 12 and 13 March 1969, the Economic and Technical Sub-Committee gave consideration to this item. It based its deliberations on national experiences in this field and on various sources of relevant information, and had particular regard to the technical and economic facts of work at sea and on the ocean floor. Taking into account the conclusions reached in paragraphs 11-29 of the Economic and Technical Working Group's report, it reviewed the advances of the past year in the exploration and exploitation of sub-sea petroleum resources.

8. The study and analysis of activities presently carried out in off-shore areas was considered particularly useful with respect to projections and forecasts regarding the eventual development of marine mineral resources beyond the limits of national jurisdiction.

9. The limited extent of our knowledge in the field of exploration and exploitation of marine mineral resources was again emphasized. Even though considerable progress has been achieved - the Glomar Challenger was able to core samples at depths of 5,000 metres below sea level - most of the geological and morphological structure of the sea-bed and ocean floor beyond national jurisdiction is still unknown in sufficient detail to permit full appraisal of its resource potential. For example, although it appears that sediments thick enough to contain large quantities of petroleum are mainly confined to the continental terrace and rise and the small ocean basins, the occurrence of thick layers of sediment containing appreciable accumulations of petroleum in some parts of the abyssal plain cannot be excluded.

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10. In connexion with the task undertaken by the Glomar Challenger, it was noted with appreciation that the results of this programme are being made available to the world scientific community.
11. Progress achieved in petroleum exploration and exploitation has been significant during the last year in almost every respect: in the development of exploration methods, in extending the capability for drilling to greater depths, in adding new producing areas, in increasing production and in improving facilities for storage and transfer of petroleum at sea and on shore.
12. Drilling activities carried out on land present extreme hazards requiring strict and adequate safety measures. This is all the more true for all phases of marine petroleum development, due to the hostile environment in which it takes place: one single blow-out may pollute vast expanses of the ocean, significantly upset the ecological balance and damage the traditional maritime activities. Since only a few countries have so far adopted national safety codes for oil drilling within their continental shelf area, the necessity of adopting such appropriate legislation in the interest of the world community was urgently stressed.
13. Although technological advances were regarded satisfactory and justifying the conclusion of the Ad Hoc Committee "that a cautious optimism is appropriate as to the technical achievements that may be expected" reference was made to serious accidents which occurred in the process of offshore drilling.

In this context two points were being stressed: (a) that improvements and refinements to present technology are still needed; (b) that a high degree of technical competence is required not only by the offshore operator but also by the responsible authority.
14. Interest in the essential services and equipment which are necessary to increase the scale and extent of offshore exploration and production has considerably increased during the last year. Such equipment includes underwater navigation equipment, acoustic and seismic penetration survey devices, measuring and recording devices for use under water, acoustic telemetry, command and release systems, diving and underwater living equipment, submersibles, underwater cameras and television, etc. Developments during the past year in reflection seismic devices using non-explosive energy sources and in continuous recording and

computerized analysis of the data have been of an incremental rather than a revolutionary nature. Several new submersibles were completed during the last year, while the technology for undersea habitats and work units has been advanced.

15. Hydrocarbons may be the most valuable economic resources of the subsoil of the ocean. Many of the most promising regions for oil and gas are related to offshore zones of the continental terrace and rise, and small ocean basins adjoining to oil or gas bearing regions on the continent.

16. New ground for offshore oil production has been gained both in new areas of the shelves now shown to be productive or promising and in deeper waters made accessible by advancing technology.

17. At present, exploitation of hydrocarbons in water depths up to 300-400 metres is economically feasible in a few areas. Technology needed to explore hydrocarbons at greater depths is at present partly developed; although the engineering for exploratory drilling at greater depths has not been designed in detail, there seem to be no insuperable obstacles provided the expected oil fields appear large enough to warrant the expense.

18. During the last twenty years world consumption of energy in all its forms has doubled. It was estimated that in the next fifteen years world energy consumption will double again. Nevertheless, the vastness of the continental, shelf areas, which for their greatest part have not yet been explored, suggest that for the next decade or so world supply of petroleum may be sufficient even if for economic and technical reasons exploration and exploitation of hydrocarbons remain confined to these areas.

19. How much of the anticipated increase in world demand for hydrocarbons will be met in the future by offshore petroleum sources will depend inter alia:

(i) On the availability and cost of synthetic fuels.

Synthetic hydrocarbons (derived from tar sands, oil shales and coal) are not expected to have a significant influence on the market for petroleum during the next decade; the costs of extracting hydrocarbons from these sources are not much above those of natural petroleum, which on the one hand means that there is some incentive for the research and development that may make them competitive in the future and on the other means that they provide a ceiling on petroleum prices, which would prevent them from rising to the high level that might be required at first to support petroleum production from the deep ocean floor.

- (ii) On future discoveries of oil on land.

Offshore costs are higher than onshore costs under comparable conditions of drilling depth and field size. Virgin offshore ground offers however a better opportunity to find giant fields producible at costs low enough to offset the difference in development expenses, but large onshore discoveries such as those recently made in Alaska could retard growth in offshore production.

- (iii) On policies affecting the supply of energy.

Since economic policies on a national and international level are subject to change they also appear likely to affect the competitive position of various sources of energy.

Recognizing that such uncertainties may invalidate any forecasts made now, present trends suggest (1) that offshore production might supply approximately 30-35 per cent of the world market by 1980 as compared to 16 per cent at the present time; (2) that, until such time, offshore production will not exceed depths of 600 metres below sea level (a) because it will take time to develop appropriate deep sea drilling systems and (b) because less expensive onshore and shallower offshore sources appear ample enough to meet the demand until 1980 and somewhat beyond.

20. Expenditure related to oceanography has sizably increased in many countries in recent years, in particular in some highly developed countries. Ten years ago only five countries carried out offshore exploration programmes, but at present these activities are in progress in more than sixty-six countries. Every year increasingly large sums are spent by Governments and private companies for research projects in this field. This trend and its beneficial effects on marine petroleum development may decrease if future regulations of oil exploitation in deeper water do not take into account the appropriate requirements.

21. The following observations concluded the consideration on this item:

(a) To a large extent the geological structure of the sea-bed, prerequisite to further exploration and exploitation, remains unknown. Accordingly, at the present moment, the existence of thick sediments even at very great depths which would contain accumulations of petroleum and gas cannot be excluded.

(b) The great technical progress achieved during the past months does not to any appreciable extent change the conclusions of the report of the Ad Hoc Committee but has justified the prospects which were envisaged and the cautious optimism voiced in this report. The present available data generally confirm the figures put forward last year.

(c) Significant new technical improvements are expected. They should be coupled with greater efforts to prevent accidents such as those which have recently occurred. Such accidents illustrate the difficulties inherent in offshore development and the necessity of a very high degree of scientific and technical competence of those concerned with such operations.

(d) Several factors have a bearing on the further development of offshore drilling and related research, inter alia: the over-all demand for hydrocarbons; the possibility of new oil discoveries on land; the possibility of developing synthetic hydrocarbons; the possibility of harnessing other sources of energy competing with hydrocarbons, the hazards connected with under-sea exploitation; finally, economic policies which may have a delaying effect.

(e) Large investments in oceanographic research programmes are being made in several countries, mostly highly developed. This fact might warrant continued efforts to expand the international co-operation in this field.

(f) Hydrocarbons appear to constitute the most promising resources of the ocean floor. It would not be surprising, therefore, if their exploitation would be the first successful mining operation at great depths.

(g) While from a technical standpoint, exploration and exploitation of petroleum and gas may soon be possible, at great depths such operations may not be economical for some time. Regulations in this field should be realistic so as not to hinder continued investment and progress.

(h) It is extremely important to establish appropriate safety measures in view of the various hazards which exist when producing petroleum and gas from the sea-bed, including blow-outs and leaks, ill-effects of the use of explosives in seismic research, and pollution of the sea, its ecological consequences, and interference with navigation.

Consideration of progress achieved in the exploration and exploitation of marine surficial and sub-surface deposits and in the techniques used for their development

22. During its meetings of 13 and 14 March 1969, the Economic and Technical Sub-Committee gave consideration to this item. It took into account the conclusions reached in paragraphs 11-29 of the report of the Ad Hoc Committee's Economic and Technical Working Group as well as the most recent developments in the exploration and exploitation of surficial and sub-surface hardmineral deposits of the ocean floor.

23. At present, offshore mining operations are carried out in water depths of less than sixty metres by many countries. The exploratory activities now underway may eventually lead to the development of offshore mining in new areas. None of the recent developments however point to breakthroughs that may substantially enlarge the scope of marine mining in the near future.

24. Advances in offshore mining of hard minerals have not been as rapid as those relating to petroleum. However, in line with the increasing emphasis being placed on offshore mining by both Government and industry throughout the world, the present limited stage of development of offshore mining technology may be expected to change in the years to come.

25. The development of hard minerals in deeper water appears to advance on a slow pace. This might be explained inter alia by the following:

(a) knowledge of the regional geology necessary to guide prospecting is still fragmentary;

(b) ore-finding technology, particularly for sub-surface bedrock minerals, is poorly developed, even on land;

(c) evaluation technology for most of the minerals considered is both weak and expensive;

(d) low-cost mining systems at greater depths have not yet been developed;

(e) the development of surficial deposits is delayed by the absence of adequate economic extraction and beneficiation processes;

(f) finally, low-cost onshore sources of most sea-bed minerals are ample for the foreseeable future.

26. Nevertheless, there is much interest in economic recovery and production of manganese nodules, particularly for their content of nickel and copper, and a

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recent announcement of progress in this field suggests that production of metals from them may begin by the early 1970's.

27. Industry is beginning to look at the ocean floor as a major source of a variety of minerals not only because of the enormous quantities expected to be found but also because in the long run the sea might prove to be a less expensive source of several of them than are the continents.

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

(a) Progress has been made in the field of dredging and mining of surficial and sub-surface hard minerals. However, no breakthroughs have occurred which would change the conclusions reached by the Ad Hoc Committee last year.

(b) This somewhat slow development is mainly due to the technical problems involved in the prospection and recovery under water of sub-surface deposits and to the economic inadequacy of the processes for upgrading surficial deposits.

(c) At this stage industry is becoming increasingly aware of the vast mineral reserves contained in the ocean floor which could in the not too distant future become technically recoverable and economically exploitable.
