



Miscellaneous No. 7 (1979)

The Antarctic Treaty

Report of the
First Special Consultative Meeting
held at London 25, 27 and 29 July 1977

and

Recommendations of the
Ninth Consultative Meeting
held at London 19 September—7 October 1977

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by the Secretary of State for Foreign and Commonwealth Affairs
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THE ANTARCTIC TREATY

REPORT OF THE FIRST SPECIAL CONSULTATIVE MEETING HELD AT LONDON 25, 27 AND 29 JULY 1977

Early in 1977 the Polish People's Republic notified the Antarctic Treaty Consultative Parties of the establishment of a permanent scientific station in the Antarctic Treaty area. In consequence, at a Special Consultative Meeting held in London on 25, 27 and 29 July 1977, the Representatives of the Consultative Parties recorded their acknowledgement that the Polish People's Republic had fulfilled the requirements established in Article IX paragraph 2 of the Antarctic Treaty and, as a consequence, had the right to appoint representatives to Consultative Meetings. The report of the Special Consultative Meeting is reproduced below.

FINAL REPORT OF THE FIRST SPECIAL ANTARCTIC TREATY CONSULTATIVE MEETING

1. The Representatives of the Consultative Parties (Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, the Republic of South Africa, the Union of Soviet Socialist Republics, the United Kingdom of Great Britain and Northern Ireland and the United States of America) met in London on 25, 27 and 29 July 1977.
2. Mr. G. E. Hall, Representative of the United Kingdom, was elected Chairman. Mr. J. Smallwood, of the United Kingdom Foreign and Commonwealth Office, was appointed Secretary-General.
3. The Meeting considered in Plenary Session the question of procedures to be adopted to give effect to Article IX, paragraph 2, of the Antarctic Treaty and the notifications received from the Government of the Polish People's Republic about its activities in the Antarctic and decided as follows:

I

The Representatives of the Consultative Parties,

Recognising the need for a procedure of consultation to be adopted between them in the event that another state, having acceded to the Antarctic Treaty, should notify the Depositary Government that it considers it is entitled to appoint Representatives to participate in Antarctic Treaty Consultative Meetings;

Recalling that Recommendations which became effective in accordance with Article IX of the Treaty are, in terms of that Article

“measures in furtherance of the principles and objectives of the Treaty”;

Recalling their obligation under Article X of the Antarctic Treaty to exert appropriate efforts, consistent with the Charter of the United Nations, to the end that no one engages in an activity in Antarctica contrary to the principles or purposes of the Treaty;

Recognising that the entitlement of an acceding state to appoint Representatives to participate in Antarctic Treaty Consultative Meetings under Article IX, paragraph 2, of the Treaty depends on such a state demonstrating its interest in Antarctica by conducting substantial scientific research activities there, such as the establishment of a scientific station or the despatch of a scientific expedition;

Unanimously decide:

1. An acceding state which considers itself entitled to appoint Representatives in accordance with Article IX, paragraph 2, shall notify the Depositary Government for the Antarctic Treaty of this view and shall provide information concerning its activities in the Antarctic, in particular the content and objectives of its scientific programme. The Depositary Government shall forthwith communicate for evaluation the foregoing notification and information to all other Consultative Parties.

2. Consultative Parties, in exercising the obligation placed on them by Article X of the Treaty, shall examine the information about its activities supplied by such an acceding state, may conduct any appropriate enquiries (including the exercising of their right of inspection in accordance with Article VII of the Treaty) and may, through the Depositary Government, urge such a state to make a declaration of intent to approve the Recommendations adopted at Consultative Meetings in pursuance of the Treaty and subsequently approved by all the Contracting Parties whose Representatives were entitled to participate in those meetings. Consultative Parties may, through the Depositary Government, invite the acceding state to consider approval of the other Recommendations.

3. As soon as possible, but in any case within 12 months of the date of the Communication by the Depositary Government to the other Consultative Parties referred to in paragraph 1 above, the Government which is to host the next Consultative Meeting shall convene a Special Consultative Meeting in order that it may determine, on the basis of all information available to it, whether to acknowledge that the acceding state in question has met the requirements of Article IX, paragraph 2 of the Antarctic Treaty. The adequate preparation of the Special Consultative Meeting shall be undertaken through diplomatic channels.

4. With the agreement of the Representatives of all the Consultative Parties, the Special Consultative Meeting shall record this acknowledgment in its report. The acceding state shall be so notified by the host Government of the Special Consultative Meeting.

5. The procedure hereby established may be modified only by a unanimous decision of Consultative Parties.

II

The Representatives of the Consultative Parties,

Recalling that the Polish People's Republic acceded to the Antarctic Treaty on the 8th of June 1961 in accordance with Article XIII;

Noting that the Polish People's Republic established a permanent scientific station named "Henryk Arctowski Antarctic Station", Lat. 62°09'S, Long. 58°29'W, in the Antarctic Treaty Area on the 26th of February 1977 and that the Polish People's Republic thereby demonstrates its interest in Antarctica in accordance with Article IX, paragraph 2 of the Treaty;

Recalling that the Polish People's Republic has made known its approval of all the Recommendations adopted at the first eight Antarctic Treaty Consultative Meetings;

Having ascertained in accordance with Article X of the Treaty, on the basis of information provided about scientific investigations being undertaken at the station and of an inspection carried out under Article VII of the Treaty, that the activities of the Polish People's Republic in the Antarctic are in accordance with the principles and purposes of the Treaty;

Record their acknowledgment that the Polish People's Republic has fulfilled the requirements established in Article IX, paragraph 2 of the Antarctic Treaty and that, as a consequence, has the right to appoint representatives in order to participate in the Consultative Meetings provided for in Article IX, paragraph 1 of the Treaty; and hereby warmly welcome the Polish People's Republic as a participant in such meetings.

**RECOMMENDATIONS
OF THE
NINTH CONSULTATIVE
MEETING HELD AT LONDON
19 SEPTEMBER-7 OCTOBER 1977**

The Recommendations of the Ninth Consultative Meeting are reproduced in this paper⁽²⁾.

In accordance with Article IX, paragraph 4, of the Antarctic Treaty the Recommendations of Consultative Meetings become effective upon approval by all parties whose representatives were entitled to participate in the meeting at which they were adopted. A table prepared by the United States Government as Depositary Government for the Antarctic Treaty, showing which Recommendations of the first seven Consultative Meetings have become effective and which States have approved the Recommendations of the Eighth Meeting, is reproduced at Annex I on page 37.

⁽²⁾ The texts of the Antarctic Treaty together with the texts of the Recommendations of the first three Consultative Meetings (Canberra 1961, Buenos Aires 1962 and Brussels 1964) have been published in Miscellaneous No. 23 (1965), Cmnd. 2822. The Recommendations of the Fourth to Eighth Consultative Meetings have been published as follows:

| | |
|----------------------------|---|
| Fourth (Santiago, 1966) | Miscellaneous No. 14 (1967), Cmnd. 3404 |
| Fifth (Paris, 1968) | Miscellaneous No. 12 (1969), Cmnd. 3993 |
| Sixth (Tokyo, 1970) | Miscellaneous No. 12 (1971), Cmnd. 4698 |
| Seventh (Wellington, 1973) | Miscellaneous No. 41 (1973), Cmnd. 5502 |
| Eighth (Oslo, 1975) | Miscellaneous No. 6 (1977), Cmnd. 6796. |

Ninth (London 1977)

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**RECOMMENDATIONS
ADOPTED AT THE
NINTH ANTARCTIC TREATY
CONSULTATIVE MEETING**

IX-1

Antarctic Mineral Resources

The Representatives,

Recalling the provisions of the Antarctic Treaty, which establishes a regime for international co-operation in Antarctica, with the objective of ensuring that Antarctica should continue forever to be used exclusively for peaceful purposes and should not become the scene or object of international discord;

Bearing in mind the provisions of Article IV of the Treaty;

Convinced that the framework established by the Antarctic Treaty has proved effective in promoting international harmony in furtherance of the purposes and principles of the United Nations Charter, in ensuring the protection of the Antarctic environment, and on promoting freedom of scientific research in Antarctica;

Noting with thanks the Report of the Scientific Committee on Antarctic Research (SCAR) Group of Specialists entitled Preliminary Assessment of the Environmental Impact of Mineral Exploration/Exploitation in Antarctica (EAMREA);

Recognizing nevertheless that adequate scientific data concerning the harmful environmental effects of activities related to the exploration and exploitation of Antarctic mineral resources, should they occur, are not yet available;

Concerned that unregulated activities related to exploration and exploitation of mineral resources could adversely affect the unique environment of the Antarctic and other ecosystems dependent on the Antarctic environment,

Conscious that the Consultative Parties to the Antarctic Treaty in carrying out scientific research in the area have accumulated valuable experience and can substantially contribute to the protection of the environment and the rational use of Antarctic mineral resources, should exploration or exploitation thereof occur;

Aware of the special responsibilities of Consultative Parties to ensure that any activities in Antarctica, including commercial exploration and exploitation in the future, should they occur, should not become the cause of international discord, of danger to the unique Antarctic environment, of disruption to scientific investigation, or be otherwise contrary to the principles or purposes of the Antarctic Treaty;

Recommend to their Governments that :

1. They reaffirm the basic principles set forth in Recommendation VIII-14 of the Eighth Antarctic Treaty Consultative Meeting;
2. They take note with appreciation of the Report of the Group of Experts on Mineral Exploration and Exploitation annexed to the Report of the Ninth Consultative Meeting and make the best possible use of its conclusions and guidelines;
3. They continue to study the environmental implications of mineral resource activities in the Antarctic Treaty Area and hold at a time and place to be arranged through diplomatic channels a meeting of ecological, technological and other related experts, in accordance with Recommendation IV-24, with a view to developing scientific programmes aimed at:
 - (i) improving predictions of the impact of possible technologies for mineral exploration and exploitation in the Antarctic, as outlined in Section IIB of the Report of the Group of Experts, and in Section 5 of the SCAR/EAMREA Group Report;
 - (ii) developing measures for the prevention of damage to the environment or for its rehabilitation, in accordance with Section IIC of the Report of the Group of Experts;
4. They endorse the following principles elaborated at the Special Preparatory Meeting held in Paris from 28 June to 10 July 1976:—
 - (i) the Consultative Parties will continue to play an active and responsible role in dealing with the question of the mineral resources of Antarctica;
 - (ii) the Antarctic Treaty must be maintained in its entirety;
 - (iii) protection of the unique Antarctic environment and of its dependent ecosystems should be a basic consideration;
 - (iv) the Consultative Parties, in dealing with the question of mineral resources in Antarctica, should not prejudice the interests of all mankind in Antarctica;
5. They note that the provisions of Article IV of the Antarctic Treaty shall not be affected by the regime. It should ensure that the principles embodied in Article IV of the Antarctic Treaty are safeguarded in application to the area covered by the Antarctic Treaty;
6. They study the content of a future regime based on the principles contained in paragraphs 4 and 5 and on such further principles, rules and arrangements as may be agreed, taking full account of all proposals submitted to the IXth Consultative Meeting;
7. The subject "Antarctic Resources—The Question of Mineral Exploration and Exploitation" be the subject of intensified consultation among them and they urge the host Government of the Tenth Consultative Meeting to convene a meeting to consider legal and political aspects of mineral resource issues; this meeting to report to the Tenth Consultative Meeting on the results of its work;

8. They urge their nationals and other States to refrain from all exploration and exploitation of Antarctic mineral resources while making progress towards the timely adoption of an agreed regime concerning Antarctic mineral resource activities. They will thus endeavour to ensure that, pending the timely adoption of agreed solutions pertaining to exploration and exploitation of mineral resources, no activity shall be conducted to explore or exploit such resources. They will keep these matters under continuing examination;

9. The subject "Antarctic Resources - The Question of Mineral Exploration and Exploitation" be placed on the Agenda of the Tenth Antarctic Treaty Consultative Meeting.

IX-2

Antarctic Marine Living Resources

The Representatives,

Recalling the special responsibilities conferred upon the Consultative Parties in respect of the preservation and conservation of living resources in the Antarctic by virtue of Article IX paragraph 1(f) of the Antarctic Treaty;

Recalling further the history of action taken by Consultative Parties concerning conservation and protection of the Antarctic ecosystem including, in particular, Recommendations III-VIII, VIII-10, VIII-13 and IX-5;

Noting that concentrations of marine living resources are found in the Antarctic Treaty area and adjacent waters;

Aware of the need to compile more information with a view to developing a good scientific foundation for appropriate conservation measures and rational management policies for all Antarctic marine living resources;

Recognising the urgency of ensuring that these resources are protected by the establishment of sound conservation measures which will prevent overfishing and protect the integrity of the Antarctic ecosystem;

Concerned that interim guidelines for the protection and conservation of Antarctic marine living resources are desirable until such time as a definitive regime enters into force;

Convinced that provision for effective measures to conserve Antarctic marine living resources as well as for collection and analysis of the data necessary to develop such measures will require the early conclusion of a definitive conservation regime;

Recommend to their Governments that:

I

Scientific Research

1. To the greatest extent feasible, they cooperate broadly and comprehensively in scientific investigations, and in the exchange of information thereon, relating to the Antarctic marine environment and that they intensify as far as possible scientific research related to Antarctic marine living resources;
2. In planning their marine activities in the Antarctic, they have regard to the advantages that will accrue from coordination by them of their scientific investigations contributing to the BIOMASS programme;
3. They give sympathetic consideration to the provision of practical measures (such as ships, ship time, personnel and finance) in support of the implementation of the BIOMASS programme or other similar programmes;
4. They examine the possibility of integrating, in so far as is practicable, research vessel programmes with the activities of other vessels, and make available on vessels operating in the Antarctic, other than research vessels contributing directly to the BIOMASS programme, time and facilities for routine observations aimed at extending the data base for the programme.

II

Interim Guidelines for the Conservation of Antarctic Marine Living Resources

1. They observe the following interim guidelines pending entry into force of the definitive regime for Antarctic Marine Living Resources:
 - (a) they cooperate as broadly and comprehensively as possible in the mutual exchange of statistics relating to catch of Antarctic Marine Living Resources;
 - (b) they should show the greatest possible concern and care in the harvesting of Antarctic Marine Living Resources so that it does not result in the depletion of stocks of Antarctic marine species or jeopardizing the Antarctic marine ecosystem as a whole;
 - (c) they urge those Governments which are not parties to the Antarctic Treaty and which engage in activities involving the use of the marine living resources of Antarctica to take account of these guidelines;
2. They review these interim guidelines as and when necessary and in any event following the conclusion of the definitive regime with a view to their future elaboration in the light of the provisions of the definitive regime.

III

Establishment of a Definitive Conservation Regime

1. A definitive regime for the Conservation of Antarctic Marine Living Resources should be concluded before the end of 1978.

2. A Special Consultative Meeting be convened in order to elaborate a draft definitive regime, and in particular:

- (a) to determine the form of the definitive regime, including the question as to whether an international instrument such as a convention is necessary;
- (b) to prepare, if necessary, draft rules of procedure for a subsequent decisive meeting for the establishment of the definitive regime;
- (c) to decide on participation in such a meeting by States other than Consultative Parties which are actively engaged in research and exploitation of Antarctic Marine Living Resources and the participation, on an observer basis, of appropriate international organisations;
- (d) to finalise the date and place of the decisive meeting;
- (e) to take any other steps in order to facilitate the work of the decisive meeting referred to above.

3. The Special Consultative Meeting shall base its work on this recommendation and take account of the discussions at the Ninth Consultative Meeting, its report and the documents presented to it, and, in the elaboration of a draft definitive regime, shall take into account *inter alia* the following elements:

- (a) the regime should explicitly recognise the prime responsibilities of the Consultative Parties in relation to the protection and conservation of the environment in the Antarctic Treaty area and the importance of the measures recommended by the Consultative Parties to this end;
- (b) The provisions of Article IV of the Antarctic Treaty shall not be affected by the regime. It should ensure that the principles embodied in Article IV are safeguarded in application to the marine areas south of 60° South latitude;
- (c) the regime should provide for the effective conservation of the marine living resources of the Antarctic ecosystem as a whole;
- (d) the regime should cover the area of specific competence of the Antarctic Treaty;
- (e) the regime should, however, extend north of 60° South latitude where that is necessary for the effective conservation of species of the Antarctic ecosystem, without prejudice to coastal state jurisdiction in that area;
- (f) the regime should not apply to species already regulated pursuant to existing international agreements but should take into account the relationship of such species to those species covered by the regime.

IX-3

Improvement of Telecommunications in the Antarctic

The Representatives,

Considering that requirements in the field of telecommunications as regards collection and dissemination of meteorological data, and the need for scientific, administrative and operational traffic have developed substantially since the second telecommunications meeting of experts of the Consultative Parties held in Buenos Aires in 1969;

Considering that the implementation of Recommendation VI-1 and VII-7, and participation in the programmes of the World Meteorological Organisation, particularly the World Weather Watch, require a thorough review and improvement of the network operating in the Antarctic;

Recommend to their Governments that they:

1. Compile comprehensive data, each for its own part, on the types of traffic, modes of transmission, timing, frequencies of their telecommunications schedules and current equipment of their telecommunications programmes in the Antarctic, as well as on projects in the process of implementation and proposed improvements, in particular by designating, where appropriate, stations capable of replacing others in the event of breakdown;
2. Forward all such data to each of the other Consultative Parties via diplomatic channels on the one hand and on the other by direct despatch to the departments concerned;
3. Arrange for a meeting of telecommunications experts to be held, on the initiative of the Government of the host country, before the Tenth Consultative Meeting, to analyse the data thus compiled, suggest desirable measures of harmonisation and put forward recommendations on improvements to be made in the operation of the telecommunications network in the Antarctic;
4. Request SCAR through their National Antarctic Committees to undertake, at the earliest opportunity, a study of the most recent applications of science and technology to the specific problems of the Antarctic in the field of propagation of radio waves, and to pass on its conclusions to the Consultative Parties prior to their Tenth Meeting or if necessary to the next Consultative Meetings.

IX-4

Co-operation in Transport

The Representatives,

Recalling the appropriate provisions of the Treaty as well as Recommendation VIII-7;

Acknowledging the comprehensive report on transport resources and potential requirements delivered to the Fourteenth Meeting of the Scientific Committee on Antarctic Research (SCAR);

Concurring that the most effective use of aviation assets will be in co-ordinated air support projects (as circumstances permit) without major additional construction or investment;

Noting that new types of aircraft, equipment, and facilities are either being developed or likely to be introduced, and the continuing need for standardization of facilities and procedures to ensure effective co-ordination;

Recommend to their Governments that:

1. They request SCAR, through their National Antarctic Committees, to continue the work of the Sub-committee on Co-operative Air Transport System for Antarctica (CATSA) of the Working Group on Logistics;
2. They request their offices responsible for the administration of Antarctic expeditions to adopt, to the extent practicable, such measures for improved compatibility of facilities and procedures as SCAR might be able to suggest.

IX-5

Man's Impact on the Antarctic Environment

The Representatives,

Recommend to their Governments that they approve the following declaration on the Protection of the Antarctic Environment:

The Governments participating in the Ninth Antarctic Treaty Consultative Meeting,

Deeply aware that the Antarctic environment is unique and vulnerable to contamination and disturbance;

Determined to protect the Antarctic environment from harmful interference;

Having particular regard to the conservation principles developed by the Scientific Committee on Antarctic Research (SCAR) of the International Council of Scientific Unions;

Recalling their obligation to exert appropriate efforts, consistent with the Charter of the United Nations, to the end that no one engages in any activity in Antarctica contrary to the principles or purposes of the Antarctic Treaty;

Declare as follows:

1. The Consultative Parties recognise their prime responsibility for the protection of the Antarctic environment from all forms of harmful human interference;

2. They will ensure in planning future activities that the question of environmental effects and of the possible impact of such activities on the relevant ecosystems are duly considered;
3. They will refrain from activities having an inherent tendency to modify the Antarctic environment unless appropriate steps have been taken to foresee the probable modifications and to exercise appropriate controls with respect to harmful environmental effects;
4. They will continue to monitor the Antarctic environment and to exercise their responsibility for informing the world community of any significant changes in the Antarctic Treaty Area caused by man's activities.

IX-6

Oil Contamination of the Antarctic Marine Environment

The Representatives,

Recommend to their Governments that :

1. They consider the possibility of preparing reports concerning the pathways by which oil may reach the Antarctic marine environment as a result of man's maritime activities in the Antarctic;
2. They include in these reports proposals relating to practicable means, if any, by which such oil contamination might be reduced;
3. They consider the possibility of instituting, in association with appropriate organisations, a programme for the determination of baseline levels of contamination of the Antarctic marine environment by oil;
4. They provide such reports as they may have prepared to, and further consider this matter at, the Meeting of Experts recommended in paragraph 3 of Recommendation IX-1, with a view to making proposals concerning these matters for consideration at the next Consultative Meeting.

EXTRACTS FROM THE FINAL REPORT OF THE MEETING

Mr. George Hall was elected Chairman, Mr. John Smallwood of the Foreign and Commonwealth Office was appointed Secretary-General and Mr. Ian Duncan of the Foreign and Commonwealth Office was appointed Assistant Secretary-General.

Mineral resources

The Working Group of Experts on Exploration and Exploitation of Antarctic Minerals met from 20 September until 29 September and had before it the report of the Scientific Committee on Antarctic Research (SCAR) Group of Specialists entitled "A Preliminary Assessment of the Environmental Impact of Mineral Exploration/Exploitation in Antarctica (EAMRA)." Its Report was submitted to Plenary by Dr. Holdgate on 29 September. The Report was welcomed by Representatives who decided that it should be annexed to the Final Report of this Meeting. [Reproduced at page 20].

The Working Group on the Legal and Political Aspects of Mineral Resources, and its Working Committee, met from 29 September - 6 October. Its Report, which included a draft Recommendation, was submitted to Plenary on 7 October.

Living resources

The Working Group on Marine Living Resources, and its Working Committee, met from 21 September - 6 October. Its Report, which included a draft Recommendation, was submitted to Plenary on 7 October.

The Working Group agreed to include in its Report the understanding of the Group that the word "conservation" as used in the draft Recommendation includes rational use, in the sense that harvesting would not be prohibited, but the regime would exclude catch allocation and other economic regulation of harvesting. It was similarly the understanding of the Group that the word "resources" was not limited to commercially exploitable species.

In connection with the Special Consultative Meeting referred to in paragraph 2, Part III of Recommendation IX-2, the Representatives welcomed the invitation issued by the Government of Australia to hold the meeting in Canberra from 27 February to 16 March 1978.

Telecommunications

The Working Group met on 30 September and 4 October. Its Report, which included a draft Recommendation, was submitted to Plenary on 6 October.

Tourism

A draft statement of accepted practices and the relevant provisions of the Antarctic Treaty, together with a draft containing practical guidance for visitors to the Antarctic, was considered for inclusion in Annex A of

Recommendation VIII-9 but, owing to lack of time for full discussion, the matter was referred to the Tenth Consultative Meeting.

No action was taken to list or define areas of Special Tourist Interest for inclusion in Annex B of Recommendation VIII-9.

Man's impact on the Antarctic environment

With the items on the agenda concerning Antarctic resources particularly in mind, the Representatives discussed the question of man's impact on the Antarctic environment. They recalled the numerous steps already taken by Consultative Parties designed to protect the Antarctic environment from unnecessary interference, including:

- (i) The designation by the Consultative Parties of the Treaty Area as a Special Conservation Area and the adoption of the "Agreed Measures for the Conservation of the Antarctic Fauna and Flora";
- (ii) The designation of "Specially Protected Areas" to preserve their unique ecological system and "Sites of Special Scientific Interest" to enable scientific investigations to be carried out at those sites without interference;
- (iii) The negotiation of the Convention for the Conservation of Antarctic Seals (London 1972);
- (iv) The adoption of measures to preserve and protect from damage historic monuments situated in the Antarctic Treaty Area;
- (v) The adoption of a Code of Conduct to be observed at their stations and by their expeditions within the Antarctic Treaty Area.

They also recalled that in close co-operation with the Scientific Committee on Antarctic Research (SCAR) of the International Council of Scientific Unions, and through SCAR with other appropriate international organizations concerned, they have developed plans for the comprehensive study of the Antarctic marine ecosystem considered as an integral part of the Antarctic environment and have sought to:

- (a) identify the types and assess the extent of human interference which has occurred in the Treaty Area as a result of man's activities;
- (b) assess the possible impact on the environment of the Treaty Area and other dependent ecosystems if mineral exploration and/or exploitation were to occur there.

The Representatives, while considering the next steps to be taken with regard to questions concerning Antarctic resources, decided to recommend that their Governments should reaffirm their commitment to environmental protection. Accordingly the Representatives drew up the statement contained in Recommendation IX-5.

Activities in the Antarctic of other States

This question was widely discussed.

In connection with possible substantial or continuing activities in the Antarctic Treaty Area by States that are not Contracting Parties of the Treaty, the Representatives recalled their agreed view expressed in

the Final Report of the Seventh Antarctic Treaty Consultative Meeting that it would be advisable for Governments to consult together as provided for by the Treaty and be ready to urge or invite as appropriate the State or States concerned to accede to the Treaty, pointing out the rights and benefits they would receive and also the responsibilities and obligations of Contracting Parties.

Information and documents of Consultative Meetings

The question of availability of information and documents to the public was discussed and it was generally agreed that there should be increased efforts to make both more available to the public.

Review of Conservation Measures and Sites of Special Scientific Interest

The Meeting considered the question of the designation of Marine Sites of Special Scientific Interest and the opinion was expressed that SCAR should be invited to examine this matter. In this connection, Representatives noted that the Government of Chile intended to propose to SCAR, following agreed procedures, two Marine Sites of Special Scientific Interest.

The United States Delegation submitted the following information on its experience in Sites of Special Scientific Interest:

Management plans for seven Sites of Special Scientific Interest (SSSI) were accepted as interim guidelines by Recommendation VIII-4 in 1975. The 1976-77 austral summer provided the first opportunity to incorporate these guidelines into Antarctic operating procedures.

The existing seven SSSI expire on June 30, 1981, which date is likely to occur before the eleventh Consultative Meeting.

The US Antarctic Program controls visits to SSSI by a permit system and has found this to be an effective means of reducing harmful interference at SSSI 1, 2, 3 and 4 during the 1976-1977 operating season. The posting of information signs around SSSI has been a deterrent to unintended interference by tourists. During this initial year of operations, the US issued one permit for access to SSSI. One request for access to SSSI 3 was denied on grounds that the proposed purpose was in conflict with the Management Plan as set forth in Recommendation VIII-4.

Tenth Consultative Meeting

Representatives accepted with pleasure the invitation of the Representative of the United States to hold the Tenth Consultative Meeting in Washington, DC, in 1979.

Other business

The Consultative Parties were agreed that in view of the number of important matters requiring continuing consideration it was desirable to meet on a more frequent basis than in the past. It was noted that the holding of Special Consultative Meetings for *ad hoc* purposes would be a response to this need; and it was agreed that the question of periodicity and nature of meetings within the Treaty framework should be included as an item on the agenda of the Xth Consultative Meeting.

REPORT OF THE GROUP OF EXPERTS ON MINERAL EXPLORATION AND EXPLOITATION

1. The Group of Experts was established in accordance with Recommendation VIII-14, operative paragraph 4, and the Report of the Special Preparatory Meeting held in Paris in June 1976. The Group met between 20 and 29 September 1977.
2. The Group conducted its business according to the terms of reference established at the Special Preparatory Meeting and guidelines submitted to the Plenary.
3. At its first session the Group elected Dr. M. W. Holdgate (United Kingdom) as its Chairman.
4. The Group adopted the following agenda:
 - I. To review the present state of technology for exploration and exploitation of minerals in the Antarctic—
 - (a) geophysical and other exploratory techniques
 - (b) construction techniques for onshore or offshore installations
 - (c) drilling and other extraction techniques
 - (d) processing and storage techniques
 - (e) transport techniques.
 - II. To review the probable impact of such exploration and exploitation on the environment.
 - III. To review measures for the prevention or restoration of damage to the environment—
 - (a) techniques for the prevention of pollution
 - (b) remedial and restorative techniques
 - (c) techniques for monitoring
 - (d) techniques for the assessment (prediction) of environmental impact.
 - IV. To suggest preliminary guidelines on appropriate methods for exploration and exploitation and on preventive, corrective and restorative measures for the protection of the environment.
5. The attached record of the discussions and conclusions of the Group of Experts is presented in the following order:
 - I. Guidelines on appropriate methods for mineral exploration and exploitation in the Antarctic, and for the protection of the environment.
 - II. A record of the Group's discussion, arranged in accordance with Items I-III of its agenda.
6. In presenting their Report to Plenary the Group noted that the implementation of all the guidelines, including the proposals for scientific

research, set out in the Report would demand substantial effort before exploratory drilling or the extraction of hydrocarbons or other minerals began (if this in fact were to occur) in the Antarctic.

7. The Group also stressed that these guidelines would need regular review as technology and scientific understanding advanced. The standards, pollution levels, environmental impact and other parameters referred to in the Guidelines and Report would also need careful quantification.

I

GUIDELINES ON APPROPRIATE METHODS FOR MINERAL EXPLORATION AND EXPLOITATION IN THE ANTARCTIC, AND FOR THE PROTECTION OF THE ENVIRONMENT

Introduction

8. The Group of Experts consider that were it thought possible to commence mineral exploration or exploitation in the Antarctic, guidelines would need to be developed and agreed covering scientific baseline studies, site studies, environmental impact assessment and many technical details of the actual operation of activities related to minerals.

9. Not only should existing international agreements such as those on safety at sea, pollution from shipping, dumping at sea and other marine environmental matters be upheld, but consideration should be given to the development (in pursuance of Recommendation VIII-11) of special rules related to the exacting climatic conditions of the Antarctic, and the importance of safeguarding its unique environment and ecosystems.

10. Programmes of scientific research, monitoring and information exchange should be set in hand, according to procedures established by Consultative Meetings under the Antarctic Treaty, so as to provide as complete a foundation as possible before exploration or exploitation is likely to be considered.

Geological and Geophysical Investigations Prior to Exploratory Drilling for Hydrocarbons

11. Areas which may contain hydrocarbons are likely to be identified only after extensive, basic geophysical and geological surveys. Before any exploratory drilling was undertaken there would be a need for further detailed geological and geophysical studies and the investigation of environment factors that determine the feasibility of safe drilling operations. This second category of information should include sea state data; weather trends during different seasons; currents; pack ice distribution, types and pressures; iceberg size, frequency, drift rate and direction; and location of contemporary iceberg scour. Information is also needed about the composition, stability and strength of sea bed sediments and strata on which installations might be based.

12. Most established geological and geophysical techniques, including geological and geochemical surveys and magnetic, gravimetric and seismic profiling systems, can be used safely and successfully for exploration for mineral resources in the Antarctic at appropriate seasons. Their initial environmental impact is likely to be no greater than that of present research activities, and can probably be controlled in the way that research is controlled (for example under the Agreed Measures for the Protection of Antarctic Fauna and Flora), but revised standards may be required should there be a marked increase in the scale of these activities.

13. Seismic techniques using high explosives as an energy source are required for geophysical research on deep crustal structures, and may be used occasionally in hydrocarbon exploration at sea, to confirm the findings of other methods. However, the detonation of explosives can have severe local impact on the biota and their use should be kept to a minimum. They should not be used on land (or in fresh waters) of biological or geomorphological interest.

Exploratory drilling for hydrocarbons at sea

14. Before any exploratory drilling is undertaken, there should be foundation investigations using methods such as high-resolution seismic and a range of physical studies of sea bed conditions at the proposed drill site.

15. Because of the special environmental conditions and environmental sensitivity, any exploratory drilling in the Antarctic should be arranged with particularly thorough attention to safety precautions, both in the design of the equipment and installations and in its operation.

16. Floating structures used for exploratory drilling in the Antarctic should conduct their operations so as to be able to stop drilling rapidly and move away when threatened by icebergs, and subsequently recover their boreholes, without risk of pollution. Because it is most efficient to undertake such disconnection in an orderly way, early warning of approaching icebergs and storms that might also require movement off station is essential.

17. There is a divergence of expert opinion on how far technological developments might permit exploratory drilling from installations on the sea bed within the mid-term (10-25 years). Such developments would allow operations in areas inaccessible at present (although not below ice shelves). It would be essential for such installations (and similar sea bed installations used in exploitation) to be located in areas not liable to iceberg scour.

18. Platforms and other installations for use for oil exploration or exploitation in the Antarctic should, wherever possible, be constructed outside the region and towed to their location. On-shore bases for the support of exploratory and exploitative activities should be kept as few and as small as possible and sited with great care so that the least possible environmental damage results. Installations for oil exploitation in the Antarctic should be as self-contained as possible.

19. Under the exacting conditions of the Antarctic, and because of its environmental sensitivity, special attention should be given to the thorough training of technical personnel and to the elaboration and enforcement of strict codes of conduct governing drilling operations.

Design of installations for the exploitation of hydrocarbons at sea

20. There is no technology presently suited to year-round oil production in the Antarctic. The concepts behind such potential technology are being developed actively, and may lead in the direction of self-contained, unmanned installations on the sea bed. It is important that guidelines are agreed to ensure that design, installation and maintenance are to the highest standard so as to prevent pollution, waste of energy and other resources, and hazard to human life. These guidelines will need continual review as the technology is developed.

21. Risk analyses should be performed to identify possible modes of failure of installations under the extreme environmental conditions of the Antarctic (which would need careful definition to this end), or through accident, and provision should be made for redundant paths or systems to insure against serious failure.

22. High standards should be set for the processing of hydrocarbons exploited in the Antarctic. As a general rule, gas should not be flared but used to provide energy for local needs, re-injected, or exported from the Antarctic. Water emerging with the oil should be re-injected.

23. Storage systems should be designed so as to ensure that hydrocarbons are separated from displaced seawater in accordance with agreed standards.

24. Further studies are needed in order to develop suitable vessels for use in the transportation of hydrocarbons from the Antarctic. These vessels should conform to advanced design standards and include systems for the prevention of the discharge of oily ballast water or polluted seawater south of 60° South.

Mineral Exploration and Exploitation on Land

25. Exploratory drilling is unlikely to be undertaken widely on land in the Antarctic, but should be carefully localised and controlled so as to minimise the disturbance of vulnerable Antarctic soils and the importation of chemical and microbial contamination.

26. Although the mining of minerals on land in the Antarctic is not likely in the foreseeable future, were it to occur severe local impact could be caused. This could also result from quarrying of aggregate and rocks for use in construction. Processing of ores would demand substantial energy and water, and generate large volumes of wastes. Sites and associated transport routes for any such mining or quarrying need a thorough environmental evaluation, and its operation would need careful monitoring to minimise damage.

Environmental Impact Assessment and Environmental Protection or Rehabilitation

27. Methods for environmental impact assessment in the Antarctic should be developed in accordance with recent developments in the concept. Such

assessments should involve the close association of environmental scientists, specialists in the technology of mineral exploration and exploitation, and others concerned with the regulation of such activities. Impact assessment should be so conducted as to aid the adjustment of proposed developments so as to reduce their environmental effects, and should lead on to continuing monitoring.

28. Methods for the containment, recovery or safe dispersion of oil spilled at sea in the Antarctic in all but ideal conditions do not exist at present, and need urgent development. Research on this topic (or on that described in the following paragraph) should not, however, involve the deliberate release of oil into the sea in the Antarctic.

29. Knowledge is insufficient at present to allow reliable estimation of the impact of possible oil spills on Antarctic ecosystems, and it is vital that research on this subject be expanded.

30. There are no effective methods for the full restoration of sites on land, on ice, or at sea in the Antarctic disturbed by mineral exploration or exploitation. Artificial re-vegetation of land areas, as practised in the Arctic, does not appear appropriate in the Antarctic because of differing habitat conditions and a lack of suitable indigenous plant species. The most that can be done is to grade land surfaces and remove all possible extraneous material.

II

RECORD OF THE DISCUSSION OF THE GROUP OF EXPERTS

A. Review of the present state of technology for Exploration and Exploitation of Minerals in the Antarctic

(i) General Considerations

31. In discussing mineral exploration and exploitation techniques it is desirable to discriminate between the position on land (and there between ice-free and ice-covered terrain) and at sea. Marine situations should be examined in three categories: areas of sea bed situated beneath floating ice shelves several hundred metres thick, areas beneath pack ice that persists for nine or more months in the year, and areas beneath seas open for at least three summer months.

32. It is also useful to distinguish three successive stages in the process commencing with exploration and ending in the exploitation of minerals.

These stages are:

- (i) basic exploration, which involves many activities inseparable from those in normal scientific geological and geophysical research and seeks to define the structures of the strata most promising for detailed examination;
- (ii) exploratory drilling in restricted areas chosen as a result of such preliminary investigations;
- (iii) full-scale exploitation.

33. Although there is a wide range of opinions concerning the likely location and extent of hydrocarbon and other mineral deposits in the Antarctic, at present there is no proof that significant deposits exist south of latitude 60° South. However, the Group agrees with a number of previous national and international evaluations, including those by SCAR, that exploration for hydrocarbons on the continental margins around Antarctica is foreseeable, and commercial exploitation is a possibility in the longer term. The exploitation of metallic minerals and fossil fuels on land appears much less probable in the foreseeable future, while there are more accessible deposits in other regions, but it would be unwise to exclude it completely. Should offshore oil or gas reserves be exploited, moreover, there could be onshore mining of rocks and quarrying of aggregates for use in construction. While the technology for exploration for, and exploitation of, hydrocarbons has received most urgent attention therefore, some attention has been given to that employed for other minerals.

34. The Antarctic remains one of the world's least known regions. Much of its land surface is mantled in ice, and its shallow seas obscured by ice shelves and pack. The development and application of geophysical methods, especially those employing remote sensing, are vital to its exploration for science, irrespective of possible mineral exploitation. Only approximately 1 per cent of other geologically comparable areas contain hydrocarbon resources, so that most of this exploration is unlikely to lead to possible commercial development.

35. Exploration or exploitation of hydrocarbons seems likely to be technically feasible at some time, but estimates of the likely time scale vary and there was a wide divergence of views in the Group. No delegation believed that exploratory drilling in the Antarctic would begin in less than five years, and most of the experts considered that it was unlikely in less than ten years. The time scale for possible exploitation is even more uncertain, but in the much less exacting conditions of the North Sea ten years elapsed between exploratory drilling and the commencement of exploitation.

36. It is important that a sufficient environmental data base to allow wise decisions about the conduct of exploratory drilling is obtained. Information is needed about sea states and depths; the persistence of storms and of spells of good weather; currents; pack ice (including pressures in pack); iceberg size, depths, frequency and rate of movement; and the depths of iceberg scour in areas that might be explored for hydrocarbons. In such areas information is also needed on the composition and stability of sea bed sediments and rocks to which structures might be moored or on which they could be based. Areas of faulting and slumping, which could threaten the integrity of structures, need to be defined. Techniques to determine all these features are available (including side scan sonar and high-resolution seismic studies of the sea bed) but this programme of data gathering could well take ten years.

37. The design of structures for drilling, production, oil collection, processing, storage and transportation of the final products from the Antarctic must be based on recommended practices. Guidelines will need to be laid down to ensure that structures are designed, installed and maintained in a manner that provides safeguards against pollution, the waste of resources, or risks to life.

(ii) *Geophysical and other exploratory techniques*

38. Geophysical exploration needs to be combined with other techniques. On land the continued mapping of ice thickness and sub-ice relief and the extension of geological investigations are needed as well as gravimetric, magnetic or seismic investigations if crustal structures are to be defined. At sea bathymetric surveys and geological sampling of the sea bed are important, alongside more specialised geophysical techniques.

39. Aeromagnetic techniques using a fairly widely spaced network of traverse lines are particularly appropriate to the search for basins containing substantial thicknesses of sediment. At sea, methods involving the sampling of water just above the sea bed in the search for traces of hydrocarbon seepage is another possible environmentally safe technology, as a supplement to the seismic studies that are likely to be instituted on an increasing scale.

40. Seismic surveys undertaken at sea involve two kinds of technique. Reflection methods, now widely used by the petroleum industry, involve long multi-channel arrays and energy sources which include non-explosive systems (such as "air guns"). Despite the problems posed by sea ice, these systems can be used in many parts of the Antarctic at certain seasons. They can give penetration of the sea bed for up to 10-15 km, which is sufficient for exploration for hydrocarbon minerals and they have no damaging impact on the marine flora and fauna. However, additional velocity information may be required, and therefore many commercial operations also use refraction methods to a limited degree. These methods involve "air guns", or occasionally high explosives. Use of explosives is not considered essential in exploring for hydrocarbons, and it has been prohibited in some regions (such as the Norwegian continental shelf) because of the severe local damage it can cause to the marine biota.

41. Refraction seismic studies using explosives, on the other hand, are unavoidable at present in certain fundamental fields of crustal geophysics where the aim is to study deep structure (to 30-40 km) as when examining the relationship between the Antarctic and other continents.

42. While satisfactory geophysical methods appear to be available for scientific exploration and the search for minerals in Antarctica, there are dangers in over-generalisation. One thing is, however, clear. The present ignorance of the structure of much of the Antarctic land and continental margin*, coupled with the hostile environment and the extent of ice cover, means that the exploratory phase is likely to be prolonged in most areas, before exploratory drilling could be considered.

* In this report the term "continental margin" is used to include the continental shelf, continental slope and continental rise.

(iii) *Drilling and other extraction techniques*

43. Considerable experience of drilling has been gained on land in the joint Japanese-New Zealand-United States Dry Valley Drilling Project. Technology developed in the Arctic could be used under certain conditions to explore for and exploit hydrocarbons on land in the Antarctic. Conversely no technology exists for drilling through moving ice-sheets on land and it is unlikely that there will be much incentive to develop it.

44. In considering off-shore drilling technology it is useful to discriminate between strictly technological aspects (for example relating to platforms, drilling systems or prevention of blow-outs) and environmental factors determining the period for which drilling is feasible and the special hazards to be guarded against.

45. It is important to discriminate between drilling to only shallow depths to obtain geological samples of sea bed strata for scientific purposes and exploratory drilling for hydrocarbons. The latter requires blow-out preventers and other safety devices while the former may not. Generally shallow drilling to confirm sea bed geology should precede deep drilling for hydrocarbons.

46. Technology already exists for drilling from dynamically positioned mobile structures in depths below 1,000m. It appears theoretically possible in the Antarctic in areas free of ice and where massive icebergs are infrequent for at least three months in summer. Such areas are rare and of very limited extent. Thorough studies of environmental conditions in such areas would be required before operations could be conducted without risk.

47. The Group was informed by several delegations of the development of technology (such as large floating caisson structures) in their countries that would allow drilling in deeper waters and in areas covered with Arctic pack ice throughout the year. Such technology would need very careful evaluation before its use was considered in the Antarctic, but it might allow the exploration of larger areas on the Antarctic margin (but not the regions below thick ice shelves).

48. Experience off Labrador has come from the use of a Pelican-type dynamically-positioned ship. Such a vessel may not be ideal for exploratory drilling in the Antarctic and a floating dynamically-positioned structure may be preferable.

49. Ice conditions in the Antarctic, which differ in many ways from those in the Arctic, pose certain special problems. There is an annual discharge to the oceans around Antarctica of about 4,000 km³ of icebergs, many of which persist for several years. Antarctic icebergs are much larger, and many could not readily be towed away from a drilling platform. A platform would therefore need to be able to cease work and move away if threatened. Experience off Labrador confirms that towing can change the direction of drift of the smaller icebergs sufficiently to approximately halve the number of times the drilling vessel needs to disconnect from the borehole, but in the Antarctic the benefit might be

considerably less. Towing is at present impracticable with icebergs exceeding two million tonnes weight, and when the sea is rough, or the berg inconveniently shaped or unstable.

50. Technology exists for shutting down and disconnecting from wells, and re-entering them afterwards without risk of pollution, but it is desirable to conduct the shut-down process in an orderly fashion because this facilitates re-entry, and hence an effective "early warning" system of approaching icebergs would be needed. Forecasts of the frequency of such encounters are also required since drilling would be unacceptably protracted if it had to stop very often. Such operations would also demand reliable meteorological information in advance of developing storms. Environmental studies designed to ensure the safety of exploratory drilling activities appear to need urgent development.

51. Exploratory drilling is not an end in itself. It costs large sums, and is undertaken in the hope that it will lead on to exploitation. Hence the technology for exploration and exploitation needs to be considered together, but there is the important difference that while the former can be done satisfactorily in areas of sea open for three months in summer the latter demands operations for a much longer period, for which there is no technology appropriate to the Antarctic at present.

52. It is important to discriminate between the process of drilling (whether for exploration or production wells) and the control of production. Drilling is always done at present from ships or platforms at the sea surface, but there are several systems allowing control of production wells by structures on the sea bed. At present all of these are in shallow water and many are controlled from a surface vessel to which oil is piped.

53. Existing technology does not appear suitable for exploratory drilling in those parts of the Antarctic seas covered almost throughout the year by pack and fast ice of many years' accumulation or by floating ice shelves and glaciers. For these reasons most of the seas on the Antarctic margin are inaccessible for exploratory drilling at present, and fixed or floating platforms of the kind used in oil exploitation today seem equally unsuited to these areas. Technology permitting drilling from installations on the sea bed in other regions is being developed and may help to overcome this obstacle except in those areas where icebergs ground on the sea bed. Advances are also being made in the design of systems both for drilling and operating production wells on or below the sea bed in deep waters. The water depth presents no inherent problem because such systems would be unmanned and their maintenance would be likely to be undertaken by submarines rather than divers. Such systems have not yet been developed for the conditions prevailing in the Antarctic.

(iv) *Construction techniques for on-shore and off-shore installations*

54. At present several kinds of platform are used in oil exploitation at sea. Fixed structures of concrete or steel are being used today in depths of water down to 130 and 300 m respectively, and have been developed for safe operation even in seismic zones. One floating platform, linked by risers to production wells, is in use in the North Sea. About 100 underwater well head systems are in use, mainly in shallow water and none

below 300 m. Despite considerable advances in the design of platforms, risers (the link between ocean floor and surface platform) and safety devices, none of these platform systems is suitable in their present form for installation in the Antarctic. While considerable progress has been made in developing surface platforms to withstand storms, and pack ice, none is proof against icebergs on an Antarctic scale. At the present, the design of equipment for use in oil exploitation in the Antarctic remains in the conceptual stage.

55. The first action in evaluating a newly discovered oilfield is to determine its size, and where the technology for exploitation is very expensive, a field needs to be very large if it is to be worth exploiting. In the Antarctic a further constraint would be imposed by limited access. It is difficult to envisage any Antarctic oilfield being exploited if it were only accessible to transport removing the production for three months of the year even though this period would suffice for the actual drilling of wells.

56. In the North Sea, using today's technology (but with year-round access), before an oilfield is exploited the potential recoverable reserves need to be of the order over 100–200 million barrels. In the Antarctic it is likely that only very large fields would be attractive for exploitation. The limit will however depend on world energy costs and on the available technology in the future. Should oilfields be found and technology allow their exploitation, it would be unwise to assume that they might not become economically attractive in the future.

57. Any structures used for oil exploitation in the Antarctic would almost certainly be constructed in a region of warmer waters outside the region and towed to the point of installation. There are no technological problems in this process, but seas in the area of installation would need to be ice-free at least for the period of 1–3 days needed for correct positioning.

58. The logistic support of exploitation activities will also need careful planning. It could involve the construction of supply bases on land in the Antarctic if there were suitable sites nearby, or outside the region (the latter being the more likely). Structures used in the Antarctic are likely to be more self-contained than those used elsewhere, in less exacting climates. These features are likely to reduce the extent of major construction activities on land with their associated environmental impact.

59. Should mineral exploration or exploitation occur on-shore the associated construction of bases for support personnel, processing plant, or other installations would be possible adapting technology already developed in Arctic regions and in the building of the larger Antarctic stations.

(v) *Processing and storage operations: hydrocarbon minerals at sea*

60. All oil emerging from a well is a mixture of liquid hydrocarbons, gas and (especially as the exploitation of a field continues) water. The gas needs to be separated from the oil before the latter can be transported (since transport of oil in tankers takes place at atmospheric pressure). The hydrocarbon gases produced are generally either flared (burned) or re-injected thereby maintaining pressure and helping continued exploitation.

The water is separated from the oil and can also be injected back into the oil reservoir or into some other strata.

61. Existing technology for this separation and reinjection could be employed in any fixed or floating surface production platforms used in the Antarctic (it would be more difficult to liquefy the separated gas and remove it for marketing). Some gas could be used as a fuel, for power drilling and other operations: The Group advises that gas should not generally be flared in the Antarctic (Guidelines paragraph 15). Appropriate technology which has also been developed and tested in production wellhead structures on the sea bed, operated by remote control from the surface, could be developed as an integral part of the perfection of such submerged structures for use in the Antarctic.

62. Substantial storage capacity might be required at installations at sea from which separated oil was loaded directly into ships, because of the inevitable interruption of surface shipping operations by storms, and occasionally by heavy pack or icebergs. Even sub-sea installations loading into submarine tankers might require considerable capacity.

(vi) *Processing and storage operations : minerals on land*

63. If minerals were exploited on-shore in the Antarctic, it is likely that they would also (as elsewhere in the world) need to be enriched before transport away from the mining area. This processing would demand substantial installations, although the technology would be likely to be the same as was applied elsewhere, for example in the Arctic. Large amounts of fuel would be required since the processing of such ores is an energy-intensive process. Large volumes of water would also be needed – again demanding energy, in most parts of the Antarctic, to melt ice. Substantial volumes of wastes would be produced.

(vii) *Transport techniques*

64. Transport would be required for two purposes should mineral exploration or exploitation occur in the Antarctic. It would be needed to support personnel and installations and to remove the products of their activities. Present technology, as used to supply Antarctic bases, would be adequate for the support role although the volume of equipment and numbers of people moved might be much greater (in exploratory drilling two or three service ships might be needed to support the 100 or so men on a rig and the tugs employed in iceberg towing). Small storage bases might be needed on shore should this be possible near enough to areas being explored. However, exploitation of hydrocarbons would require a considerable increase in the number of personnel at drilling installations, with the possible resulting need to build land bases with the least possible damage to the environment.

65. It seems likely that separated oil would be loaded directly into ships at installations at sea for removal from the Antarctic. Either specially designed surface vessels or submarines could be used to remove oil. Information obtained during the voyage of the "Manhattan" may allow the design of tankers that could operate commercially through Arctic pack

ice. The attraction of submarines lies in their greater certainty of year-round access. The concepts behind the design of both types of vessel are being explored actively, and it is likely that technology would be available by the time Antarctic oil exploitation became possible on other grounds. Pipelines, however, provide a third option. Their use is unlikely in many parts of the Antarctic, especially because of iceberg scour but also because there is little attraction in removing oil from the open sea to coastal areas which might be no more easily accessible by tankers; modern techniques of tunnelling in the sea floor at depths of up to 300 m could possibly be developed to the point where pipelines could be adequately protected.

B. Environmental impact of mineral Exploration and Exploitation

66. The Group of Experts could not undertake a thorough study of the impact of mineral exploration and exploitation on the Antarctic environment. However, the discussion of the technical aspects of mineral exploration and exploitation in the Antarctic showed that the question of the impact of these activities on the environment has been studied very inadequately and that there is an urgent need for a further examination of this problem. The Group considers that measures for the protection of the Antarctic environment need to be worked out prior to any commercial exploration for, or exploitation of mineral resources in Antarctica, should such activities occur there.

67. The Group had before it the Report of the SCAR Group of Specialists on the Environmental Impact Assessment of Mineral Exploration/Exploitation in Antarctica (EAMREA) prepared at the request of the Eighth Consultative Meeting and the Special Preparatory Meeting in Paris in June 1976. Attention was also drawn to a number of other papers, including those presented to the Special Preparatory Meeting in Paris by the Soviet Delegation and by the Australian Delegation, and the summary of the Report on Environmental Impact Assessment by Dr. D. H. Elliot. The Group of Experts considered that the EAMREA Report, taken in conjunction with the other papers, provided a useful starting point for the assessment of the likely impact on the Antarctic environment of various possible technological developments and for the development of a programme to provide more precise assessments.

68. The Group advised the Consultative Meeting that technological and ecological experts need to work together in the further evaluation of these questions. Only through a direct interaction of this kind will it be possible to define the ways in which new technological advances may alter physical and chemical properties of the Antarctic as a habitat and apply the most recent advances in scientific understanding of Antarctic environments and ecosystems so as to predict the ecological changes that are likely to result. A series of carefully prepared expert seminars or workshops bringing together appropriate specialists may well provide the most effective forum for this dialogue.

69. More research will unquestionably be required before satisfactory predictions can be made of the nature and scale of the impact of possible

alternative mineral exploration and exploitation technologies in the Antarctic. Opinions expressed in the Report (e.g. in paragraphs 12, 13 and 26 of the Guidelines and paragraphs 39, 40 and 50 of the Record of the Group's discussions should be regarded as provisional, pending such research). The Group did not attempt to specify all the subjects needing attention, but did identify the following areas:

- (i) basic bathymetric, geological, geophysical and geochemical studies leading to a more realistic definition of those areas in the Antarctic where exploration for minerals may be considered, and where surveys consequently need to be undertaken to define environmental and ecological features;
- (ii) research leading to improved weather forecasting, and data on current directions and velocities and on the distribution and frequency of occurrence of various sea states, ice conditions and icebergs of various dimensions;
- (iii) definition of the fundamental structure and functioning of those types of Antarctic ecosystem most likely to be affected by mineral exploration and exploitation, including the flow of nutrients and energy through the system and primary and secondary biological production (and the factors influencing them). Simulation modelling of the essential processes within these ecosystems could assist the prediction of how they are likely to respond to various impacts;
- (iv) surveys to determine baseline levels in the environment (including ice caps) and in plants and animals of hydrocarbons and other substances whose environmental concentrations may be raised as a consequence of mineral exploration and exploitation;
- (v) research to establish quantitatively the effect on Antarctic organisms which are particularly important ecologically or economically (e.g. krill) of a range of concentrations of hydrocarbons and other possible pollutants;
- (vi) research on the mechanism and rate of biodegradation of oils of various kinds under Antarctic conditions (it being emphasised that this research should not involve the deliberate liberation of oil in the Antarctic).

Ecologists who were members of the Group stressed the need for selection, based on a critical analysis of existing knowledge, in the development of this research programme. It would be quite impossible to measure all environmental variables, or describe all Antarctic ecosystems in detail. The dialogue between technological and ecological experts described in paragraph 68 should have as a major objective the selection of key factors and organisms for detailed study.

70. The first of these areas of research is equally important if the potential of the Antarctic as a source of minerals is to be evaluated. The Group recorded its view that the estimate* published in the Oil and Gas Journal

* The Group of Experts was informed that this figure originated from an unpublished, highly provisional calculation, using methodology which has since been revised, in an internal document within the United States Geological Survey.

for November 1976 and quoted in the Report of the SCAR EAMREA Group that 45 billion barrels of oil and 115 trillion cubic feet of gas "may" occur on parts of the Antarctic continental margin, even with the qualifications attached to it by the EAMREA Group, was only a speculation and should not be cited unless supported by much firmer evidence.

71. There are other fields of research which the Group noted as essential if exploration for minerals in the Antarctic was to be properly directed, and its impact predicted and controlled. The studies mentioned in paragraph 69 (ii) above, fall into this category and form part of the data base that the Group considered was essential before exploration for hydrocarbons could safely begin on the Antarctic margin. The following other topics were mentioned:

- (i) detailed site investigations in areas that might possibly be considered for exploration;
- (ii) research on methods for the containment, recovery or safe dispersal of spilled oil (the Group emphasised that this was a topic of the highest priority);
- (iii) studies on the likely physical condition of oil spilled on the cold Antarctic seas, and on mathematical models for the prediction of the movements of oil slicks under Antarctic conditions (there are numerous existing models, developed in other regions, which could provide a starting point);
- (iv) techniques for the safe disposal of wastes arising from mineral exploration and exploitation in the Antarctic.

72. If mineral exploration or exploitation were to occur in the Antarctic it would be essential to monitor both the operations themselves and consequential changes in the environment. There would need to be a system providing immediate warning of an accident leading to significant pollution and monitoring of the dispersion and effects of the pollutants released, and of the effectiveness of any measures for containment or recovery. This would be particularly difficult under Antarctic conditions.

C. Measures for the Prevention or Restoration of Damage to the Environment

(i) Prevention of Pollution by Oil

73. Problems of oil pollution can arise during drilling (whether for exploration or production), extraction, processing, storage or transportation under both normal operations and in the event of accident. Some delegations considered that these problems may be especially acute in the very cold Antarctic seas where the natural degradation of oil is likely to be extremely slow.

74. Thorough surveys in advance of drilling are essential for the prevention of pollution. High resolution seismic studies can detect layers where gas pockets may be encountered near the surface. Pressure measurement is

also desirable during drilling. In a permafrost environment frozen hydrates (or hydrates and oil) may sometimes be encountered and present an added hazard.

75. At any time during drilling, fluid under pressure (gas, oil or water) may be encountered. It is therefore important to maintain at all times all the equipment and materials necessary to control unexpected pressure. This equipment includes blow-out preventers, communications and remote control equipment, reserves of mud, and additives and degasification equipment. It should be noted that these muds may contain special additives to make them suitable for use in the Antarctic and these have a potential to cause some local pollution if released in the environment. When the well has reached a certain depth casing is carried out. Casing of a well is a very important safety factor, and it will be necessary to determine the length of each casing appropriate to the nature of the rock formation and the pressures that may be encountered. Cementing practices must be good enough to ensure that oil cannot escape laterally through the casing into flanking rocks and ultimately to the surface. Over-design is essential in exploration wells in new areas.

76. Additional pollution prevention measures should include proper procedures for well work-over (including the cleaning of operating systems, and replacement of components). These are naturally vulnerable operations because some control equipment is often itself taken out of use, and precautions must be especially strict in extreme environments.

77. Accidents on oil rigs, leading to environmental hazard, commonly involve human error and no technology can eliminate this, but it can reduce its probability and the scale of the consequences. Generally speaking human errors are commonest in routine operations involving less qualified personnel. In opening up a new region, in an exploratory phase, highly skilled staff are likely to be employed and the risk of error reduced. Because the Antarctic is a peculiarly hostile environment, more than normal care is likely to be taken during the early stages. The risks from human error are likely to increase once there is a transition from exploration to exploitation, with a strong element of routine. But there is no reason to predict a higher likelihood of human error in the Antarctic than elsewhere (the reverse is more likely) because operating conditions are never likely to be easy. Therefore, the training of personnel is an essential element in these safety precautions, and this must include "refresher" courses bringing staff up to date with new methods.

78. On drilling platforms at sea the prevention of pollution is of the first importance because opportunities for rehabilitation if spillage occurs are few or non-existent under the exacting conditions of the Antarctic. It is essential to undertake exploration cautiously, to prevent blow-outs. It is essential to be able to stop and re-start drilling, and to abandon and re-enter wells without risk of pollution: wherever possible equipment should be recovered before the link with a well is severed but in emergency a platform can move off station in under a minute without risk of pollution. With sound technology, training and vigilance the risk of blow-outs would be very small.

79. The maintenance and repair of Antarctic installations and anti-corrosion measures (for example the use of sacrificial anodes) may also have some environmental impact.

80. Where drilling takes place on land it is important that minimal damage is done to permafrost soils (wells being sealed as to avoid this), that reservoirs of fuel used to power drilling are located on an insulated bed, that all fuel tanks are surrounded by bunds to contain spillage, that care is taken to minimise contamination with oil, muds, chemicals and micro-organisms, that all debris is incinerated or removed, and that the land area is afterwards rehabilitated as far as possible. It is particularly important to ensure that water does not penetrate and freeze between the casing strings of wells, since the resulting expansion could cause bursting and pollution.

81. The techniques of risk analysis, covering fire as well as the other hazards identified above should be applied in the design of all equipment for use in oil exploration or exploitation in the Antarctic, and a substantial safety margin provided. Fire is equally a hazard on land, where its threat is increased by the generally unavailability of liquid water for fire-fighting except in limited areas near freshwater lakes and the sea.

82. Oil storage below the sea depends on the displacement of sea water from the tanks. The interface is always kept within the tank, and there are reliable ways of preventing hydrocarbons being discharged, but when water is drawn off it is necessary to separate the oil. Special techniques and standards will need to be drawn up for seabed storage systems in the Antarctic.

83. A major risk of oil spillage probably lies in the transfer from production wells to storage and thence to tankers. If seabed pipelines are used, it will be because technology allows their burial below the depth of iceberg scour, in stable areas not liable to substantial movements.

84. Tankers to be used in the Antarctic will almost certainly be specially built. In addition to being ice strengthened and having greater power such tankers will presumably operate within the guidelines of the safety and marine pollution prevention conventions to which the Antarctic Treaty nations are signatory. The ship design, construction and equipment features may include segregated ballast, double hulls or double bottoms, crude washing, inert gas systems, and discharge monitoring and control devices or some combination of these. The adoption of such features would prevent pollution through the discharge of oily ballast water, which remains a significant source of marine pollution in other areas. It is anticipated that Treaty Countries would operate their ships in an environmentally safe manner with special regard for the fragile nature of the Antarctic environment.

85. There are few suitable sites for tanker terminals on land in the Antarctic. If oil were brought ashore and then exported in tankers, bilge and ballast handling and treatment facilities might be needed (depending on ship design, discussed in paragraph 84), and the scale and nature of these must be geared to local needs. A standard for the permissible

maximum oil concentration in process water discharged to the sea should be set, together with standards for volatile hydrocarbons released to air: both must depend on assessments of the environmental quality to be sustained. It is important to note that if tankers arrived in the Antarctic in ballast, from ports elsewhere, the ballast water could contain a range of dissolved industrial effluents, and these could bring low concentrations of new contaminants to the Antarctic even if oil levels in the emissions were satisfactorily controlled.

(ii) *Prevention of pollution from mining and processing of minerals on land*

86. Major local pollution could be caused by mining, quarrying and processing of coal or hard rock mineral resources on land in the Antarctic, especially for elements like iron, where large volumes of spoil would be produced. Such mining or the quarrying of construction materials on land could release large amounts of dust, contaminate drainage with metal salts, and produce tailings or waste heaps with high concentrations of toxic metals. Not only could these have a deleterious effect on land, freshwater and inshore marine biota in the vicinity, but they could also be a hazard to human health, especially if water supplies were contaminated.

(iii) *Rehabilitation*

87. Areas of Antarctic land damaged by mineral exploration and exploitation cannot be rehabilitated in the fashion adopted in the Arctic, involving the fertilisation of the soil and the sowing of the seeds of vascular plants. The two vascular plant species native to the region are unlikely to be suited to cultivation in this way, the introduction of alien species would contravene conservation agreements (and be unlikely to succeed) and the bryophyte vegetation of coastal areas in the Maritime Antarctic is equally unsuited to propagation. It seems likely therefore that the most that could be done to restore land sites disturbed by man would be to remove all equipment and imported debris and shape any disturbed land so as to favour the slow process of natural colonisation. The rehabilitation of disturbed ice sites on land, or of areas of sea bed, (other than a clean-up procedure to remove extraneous debris) does not appear feasible except by slow natural processes.

88. Should oil be spilled at sea in the Antarctic, especially in periods of high wind and waves or among ice, its recovery or even containment does not appear possible using present technology. It is essential to take every precaution to prevent the spillage of oil in the Antarctic because of the risk of unacceptable impact on the environment, but in case such spillages occur, research into means of containment and recovery of oil, and perhaps the further development of non-toxic biodegradable dispersants should be pursued.

Annex I

APPROVAL OF RECOMMENDATIONS OF PREVIOUS CONSULTATIVE MEETINGS

| | 16 Recommendations adopted at First Meeting | 10 Recommendations adopted at Second Meeting | 11 Recommendations adopted at Third Meeting | 28 Recommendations adopted at Fourth Meeting |
|--------------|---|--|---|--|
| | Approved | Approved | Approved | Approved |
| Argentina | All | All | All | All |
| Australia | All | All | All except VIII | All except 1-19 |
| Belgium | All | All | All except VIII | All except 1-19 |
| Chile | All | All | All | All |
| France | All | All | All | All |
| Japan | All | All | All except VIII | All except 1-19 |
| New Zealand | All | All | All | All |
| Norway | All | All | All | All |
| Poland | All | All | All | All |
| South Africa | All | All | All | All |
| U.S.S.R. | All | All | All | All |
| U.K. | All | All | All | All except 12 |
| U.S.A. | All | All | All except VII & VIII | All except 1-19 |

| | 9 Recommendations adopted at Fifth Meeting | 15 Recommendations adopted at Sixth Meeting | 9 Recommendations adopted at Seventh Meeting | 14 Recommendations adopted at Eighth Meeting |
|--------------|--|---|--|--|
| | Approved | Approved | Approved | Approved |
| Argentina | All | All | All | All |
| Australia | All except 5 & 6 | All except 8, 9, 10 | All | All except 1-5 ⁽¹⁾ |
| Belgium | All except 5 & 6 | All except 8 & 10 | All except 5 | All except 1, 2, 4 & 5 |
| Chile | All | All | All except 4 & 9 | All |
| France | All | All | All | All |
| Japan | All except 5 & 6 | All except 8, 9, 10 | All except 5 | |
| New Zealand | All | All | All | All |
| Norway | All | All | All | All |
| Poland | All | All | All | All |
| South Africa | All | All | All | All |
| U.S.S.R. | All | All | All | All |
| U.K. | All | All except 8 & 10 ⁽²⁾ | All except 5 ⁽⁴⁾ | All |
| U.S.A. | All except 5 & 6 ⁽³⁾ | All except 10 ⁽³⁾ | All except 5 ⁽⁴⁾ | All except 1, 2 & 5 ⁽⁵⁾ |

(1) 5 and 6 accepted as interim guidelines.

(2) 8 and 10 accepted as interim guidelines.

(3) 10 accepted as interim guideline.

(4) 5 accepted as interim guideline.

(5) 1, 2 and 5 accepted as interim guidelines.

(6) 1-5 accepted as interim guidelines.

With the exceptions noted above, the Recommendations of the first seven Consultative Meetings became effective on the following dates:

| | | | | | |
|------------------------------|-----|-----|-----|-----|------------------|
| First Consultative Meeting | ... | ... | ... | ... | 30 April 1962 |
| Second Consultative Meeting | ... | ... | ... | ... | 11 January 1963 |
| Third Consultative Meeting | ... | ... | .. | ... | 6 September 1966 |
| Fourth Consultative Meeting | ... | ... | ... | ... | 30 October 1968 |
| Fifth Consultative Meeting | ... | ... | ... | ... | 14 October 1970 |
| Sixth Consultative Meeting | ... | ... | ... | ... | 29 October 1973 |
| Seventh Consultative Meeting | ... | ... | ... | ... | 29 May 1975. |

The Recommendations of the Eighth and Ninth Meetings have not yet been approved by all the Consultative Parties.

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