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**Conciliation Commission on the Continental Shelf area between Iceland and Jan
Mayen: Report and recommendations to the governments of Iceland and
Norway, decision of June 1981**

June 1981

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PART I

**Conciliation Commission on the Continental
Shelf area between Iceland and Jan Mayen:
Report and recommendations to the
governments of Iceland and Norway**

Decision of June 1981

**Commission de conciliation sur le plateau
continental entre l'Islande et Jan Mayen: Rapport
et recommandations aux gouvernements
de l'Islande et de la Norvège**

Décision de juin 1981

CONCILIATION COMMISSION ON THE CONTINENTAL SHELF AREA
BETWEEN ICELAND AND JAN MAYEN: REPORT AND
RECOMMENDATIONS TO THE GOVERNMENTS OF ICELAND AND
NORWAY, DECISION OF JUNE 1981

COMMISSION DE CONCILIATION SUR LE PLATEAU CONTINENTAL
ENTRE L'ISLANDE ET JAN MAYEN: RAPPORT ET RECOMMAN-
DATIONS AUX GOUVERNEMENTS DE L'ISLANDE ET DE LA
NORVÈGE, DÉCISION DE JUIN 1981

Mandate of the Commission—article 9 of the Agreement between Iceland and Norway of May 28, 1980, concerning fishery and continental shelf questions—to make recommendations with regard to the dividing line for the continental shelf area—claim by one Party to a continental shelf area extending beyond the 200-mile economic zone—to take into account the Party's strong economic interests in these sea areas, the existing geographical and geological factors and other special circumstances—recommendations must be unanimous and are not binding on the Parties—reasonable regard to be paid by the Parties to recommendations as a useful basis for the resolution of the outstanding issues during the negotiation following the conciliation.

Rules of procedure—Commission adopts its own rules of procedure—unanimous non-binding recommendations to be presented to the Parties within five months of the appointment of the Commission—request of written and/or oral pleadings from the two Parties in case of unanimous recommendations by the Commission would not serve a useful purpose since the two national members of the Commission had participated in all previous negotiations.

Applicable law—Commission shall not act as a court of law—examination by the Commission of State practice and court decisions so as to ascertain possible guidelines for the practicable and equitable solution of the questions concerned—taking into account the provisions of the draft Convention on the Law of the Sea—draft texts influenced by the decisions of the International Court of Justice (ICJ) in the *North Sea Continental Shelf* cases.

Status of Islands—reference to the draft Convention on the Law of the Sea—article 121 of the draft Convention reflecting the present status of international law on the subject in the opinion of the Commission—Island entitled to a territorial sea, an economic zone and a continental shelf—applicability of the provisions of the draft Convention concerning delimitation of the exclusive economic zone (article 74) and of the continental shelf (article 83) between States with opposite or adjacent coasts.

Delimitation—to be effected by agreement between the Parties in conformity with international law: in accordance with equitable principles, employing the median or equidistance line, where appropriate, and taking account of all circumstances prevailing in the area concerned—agreement of May 28, 1980, implicitly recognizing that Iceland shall have a full economic zone of 200 nautical miles in areas where the distance between Iceland and Jan Mayen is less than 400 miles.

Methods of delimitation of the dividing line for the shelf area—vary in accordance with the circumstances of the case—inapplicability of the natural prolongation concept to the present case—determination of a certain proportionality by dividing the area concerned between the Parties on the basis of distance and other relevant factors—wide variety of

solutions used in State practice in regard to drawing boundary lines—frequent use of median line as an equitable solution—account to be taken of special circumstances in order to accommodate the relevant factors of each case—possibility of a “trade-off” by ignoring the islands on both sides when both coastal States have islands along their coasts—application of the “enclave principle” to islands situated within the 200-mile economic zone of another State in order to give them territorial seas—use of agreements for joint development and cooperation in overlapping areas of continental shelves between neighboring countries.

Special circumstances—dependency of the Party on imports of hydrocarbon products—shelf surrounding the Party having very low hydrocarbon potential—existence of a high geological risk in the relevant area—difficulties for exploration and commercial use.

Approach to be used by the Commission in formulating relevant recommendations—promotion of cooperation and friendly relations between the Parties—taking into account both the fact that the bilateral agreement on the Party’s 200-mile economic zone has already given the Party a considerable area beyond the median line and the fact that the uncertainties with respect to the resource potential of the area create a need for further research and exploration—proposition of the adoption of a joint development agreement covering substantially all of the area defined by the Commission and offering any significant prospect of hydrocarbon production, based on the principles recommended by the Commission.

Mandat de la Commission—article 9 de l’Accord du 28 mai 1980 entre l’Islande et la Norvège relatif à la controverse sur la pêche et le plateau continental—faire des recommandations à propos de la ligne de division de la zone du plateau continental—réclamation par l’une des Parties d’un plateau continental s’étendant au-delà de la zone économique de 200 miles nautiques—prise en compte des intérêts économiques importants de l’une des Parties dans ces zones maritimes, des facteurs géographiques et géologiques ainsi que des autres circonstances spéciales—recommandations devant être prises à l’unanimité mais non contraignantes pour les Parties—Parties devant raisonnablement tenir compte de ces recommandations comme base utile à la résolution des problèmes en suspens lors de la négociation ayant lieu après la conciliation.

Règles de procédure—la Commission adopte ses propres règles de procédure—des recommandations non contraignantes prises à l’unanimité doivent être présentées aux Parties dans les cinq mois suivant l’établissement de la Commission—inutilité de demander des plaidoiries écrites et/ou orales aux deux Parties en cas de recommandations unanimes de la part de la Commission, du fait de la participation des membres nationaux de la Commission à toutes les négociations antérieures.

Droit applicable—la Commission ne doit pas agir comme une cour de justice—examen par la Commission de la pratique étatique et des décisions judiciaires afin de déterminer les grandes lignes d’une solution pratique et équitable aux problèmes en question—prise en compte du projet de Convention sur le droit de la mer—projet de texte influencé par les décisions de la Cour internationale de Justice (CIJ) dans les affaires relatives au *Plateau continental de la Mer du Nord*.

Statut des îles—référence au projet de Convention sur le droit de la mer—article 121 du projet de Convention reflétant le statut contemporain du droit international sur le sujet, selon la Commission—îles ayant droit à une mer territoriale, une zone économique et un plateau continental—applicabilité des dispositions du projet de Convention relatives à la délimitation de la zone économique exclusive (article 74) et du plateau continental (article 83) entre les États ayant des côtes opposées ou adjacentes.

Délimitation—devant être effectuée par accord entre les Parties conformément au droit international : selon des principes équitables, en employant la ligne médiane ou équidistante, lorsqu'approprié, et prenant en compte toutes les circonstances prévalant dans la zone concernée—accord du 28 mai 1980 reconnaissant implicitement que l'Islande devrait avoir une zone économique intégrale de 200 miles nautiques dans les régions où la distance entre l'Islande et Jan Mayen est inférieure à 400 miles nautiques.

Méthodes de délimitation de la ligne de démarcation du plateau continental—variation selon les circonstances de l'espèce—inapplicabilité du concept de prolongement naturel dans le cas présent—détermination d'une certaine proportionnalité en divisant la zone concernée entre les Parties sur la base de la distance et d'autres facteurs pertinents—grande variété de solutions utilisées dans la pratique des États pour tracer les lignes frontières—recours fréquent à la ligne médiane comme solution équitable—prise en compte des circonstances spéciales afin de s'accommoder des facteurs pertinents à chaque cas—possibilité de compromis en ignorant les îles de chaque côté lorsque les deux États côtiers disposent d'îles le long de leurs côtes respectives—application du principe d'enclavement pour les îles situées dans les 200 miles de la zone économique exclusive d'un autre État afin de leur accorder une mer territoriale—recours à des accords pour la coopération et le développement conjoint dans les zones de chevauchement du plateau continental entre États voisins.

Circonstances spéciales—dépendance de l'une des Parties aux importations de produits hydrocarbures—plateau entourant l'une des Parties ayant très peu de potentiel en hydrocarbures—existence d'un très haut risque géologique dans la zone en question—difficultés d'exploration et d'utilisation commerciale.

Approche devant être employée par la Commission pour formuler les recommandations pertinentes—promotion de la coopération et des relations amicales entre les Parties—prise en compte du fait que l'accord bilatéral sur la zone économique de 200 miles de l'une des Parties a déjà accordé à cette Partie une zone considérable allant au-delà de la ligne médiane, ainsi que du fait que les incertitudes relatives au potentiel de ressources hydrocarbures de la zone entraînent un besoin pour des recherches et des explorations supplémentaires—proposition d'adopter un accord de développement conjoint couvrant substantiellement l'intégralité de la zone définie par la Commission et offrant quelque perspective significative de production hydrocarbure, et fondé sur les principes recommandés par la Commission.

* * * * *

**REPORT AND RECOMMENDATIONS TO THE GOVERNMENTS
OF ICELAND AND NORWAY OF THE CONCILIATION
COMMISSION ON THE CONTINENTAL SHELF AREA
BETWEEN ICELAND AND JAN MAYEN***

Commission

The Honorable Elliot L. Richardson, Chairman

H.E. Hans G. Andersen, Conciliator for Iceland

H.E. Jens Evensen, Conciliator for Norway

Washington, D.C

1981

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* Secretariat note: This text incorporates minor, non-substantive corrections in the text of the Report.

** Secretariat note: see Figure 1 in the front pocket of this volume.

*** Secretariat note: see Figure 2 in the front pocket of this volume.

**** Secretariat note: see Figure 3 in the front pocket of this volume.

Section I

BRIEF EXAMINATION OF THE AGREEMENT BETWEEN ICELAND AND NORWAY OF MAY 28, 1980.

On May 28, 1980 the Governments of Iceland and Norway concluded an Agreement concerning fishery and continental shelf questions. Articles 1-8 of this Agreement deal with fishery questions.

In the preamble of the Agreement it was recognized that Iceland should have an economic zone of 200 miles pursuant to the Icelandic Law on Territorial Sea, Continental Shelf and Economic Zone of June 1, 1979. The shortest distance between Iceland and Jan Mayen is about 290 nautical miles. During the negotiations of the aforementioned agreement the Icelandic Government advanced the view that Iceland was entitled to a continental shelf area extending beyond the 200-mile economic zone. Since no agreement was reached on this question during the negotiations, the parties agreed to refer it to a Conciliation Commission to be established in accordance with Article 9 of the agreement.

Article 9 reads:

“The question of the dividing line for the shelf in the area between Iceland and Jan Mayen shall be the subject of continued negotiations.

For this purpose the Parties agree to appoint at the earliest opportunity a Conciliation Commission composed of three members, of which each Party appoints one national member. The Chairman of the Commission shall be appointed by the Parties jointly.

The Commission shall have as its mandate the submission of recommendations with regard to the dividing line for the shelf area between Iceland and Jan Mayen. In preparing such recommendations the Commission shall take into account Iceland’s strong economic interests in these sea areas, the existing geographical and geological factors and other special circumstances.

The Commission shall adopt its own rules of procedure. The unanimous recommendations of the Commission shall be submitted to the two Governments at the earliest opportunity. The parties envisage the presentation of the recommendations within five months of the appointment of the Commission.

These recommendations of the Commission are not binding on the Parties; but during their further negotiations the Parties will pay reasonable regard to them.”

Section II

ESTABLISHMENT AND WORK OF THE CONCILIATION COMMISSION

In accordance with Article 9 of the Agreement the Government of Iceland appointed Ambassador Hans G. Andersen, Chairman of the Delegation of Iceland to the Third United Nations Conference of the Law of the Sea, as its national member. The Government of Norway appointed Ambassador Jens Evensen, Chairman of the Delegation of Norway to the Conference.

The parties agreed jointly to appoint Ambassador Elliot Richardson, then Chairman of the Delegation of the United States of America to the Conference on the Law of the Sea, as Chairman of the Icelandic-Norwegian Conciliation Commission.

The Commission was duly established on August 16, 1980.

The mandate of the Commission, according to Article 9, paragraph 3, is to make recommendations with regard to the dividing line for the shelf area between Iceland and Jan Mayen. In preparing such recommendations the Commission shall take into account Iceland's strong economic interests in these sea areas, the existing geographical and geological factors and other special circumstances.

It follows from Article 9 that the recommendations of the Commission to be submitted to the two Governments must be unanimous. The recommendations of the Commission are not binding on the Parties. But the Agreement stipulates that during the negotiation following such recommendations the Parties "will pay reasonable regard to them." During its work the Conciliation Commission has discussed the various aspects of the problems involved. It is hoped that the recommendations submitted will serve as a useful basis for the solution of the outstanding questions.

The Conciliation Commission held a first informal meeting to plan its work in Geneva in the period August 19-27, 1980. The first formal meeting was convened in Washington in the period 27-29 October, 1980. In order to obtain the available information concerning the geology of the continental shelf areas in question, including the probability of mineral resources in the seabed, a meeting was convened at the Lamont-Doherty Geological Observatory of Columbia University, New York, in the period 8-10 December, 1980. Present at the meeting were international geologists and geophysicists who had conducted research in the area. The Commission held additional meetings in Washington, D.C. during 11-12 December, 1980.

The two national members of the Commission, Ambassadors Andersen and Evensen, met in Geneva in the period 8-15 February, 1981. Thereafter,

the Conciliation Commission had a meeting in London in the period 16-17 February, 1981.

Further meetings were held in the period: March 3-4, 1981 in New York.

At its first formal meeting in Washington in the period 27-29 October, 1980 the Commission decided that since the purpose of the Conciliation Commission was to submit unanimous recommendations and since the two national members had participated in all previous diplomatic negotiations, it would not serve a useful purpose to request written and/or oral pleadings from the two parties.

Section III

JAN MAYEN: GEOGRAPHY AND GEOLOGY

Jan Mayen is an island situated at the Northern end of the Jan Mayen Ridge between:

70° 49' N
71° 10' N
7° 53' W
9° 05' W

The island is elongated along a NE-SW axis. It is about 53 km long and has a maximum width in the Northern part of 15-20 km. Its area is 373 km² which is about the same size as Streymoy, the largest of the Faroe Islands.

Distances to other geographic locations are as follows:

Tromsø	1018 km	(550 n.m.)
Iceland	540 "	(292 ")
Greenland	455 "	(246 ")
Longyearbyen on Svalbard	966 "	(522 ")

The island is characterized by large mountains. The northern part includes the volcano Beerensburg, 2277 m, the highest mountain on the island. The central part is relatively flat with low elevations. The southern part is dominated by a mountain plateau with maximum elevation of 769 m (Rudolftoppen). The coast is rather steep, although there are areas of extensive flat shorelines with sand and gravel.

Jan Mayen is an entirely volcanic island. It was formed during the last 10-12 million years. The rocks are lava (alkalibasalt) and other volcanic material. The island is volcanically active today, with frequent earthquakes. The most recent volcanic eruption was in 1970, when lava, ash, smoke and steam flowed out through a 6 km long fracture on the northeastern side of

Beerensburg. The lava flowed to the coast where a coastal terrace of 4 km² was built. Volcanic eruptions have also been reported by whalers in 1732 and 1818.

The Norwegian Meteorological Institute established a meteorological station on Jan Mayen in 1912. The station has been permanently staffed since that time except for one year when the Second World War broke out. Several other permanent stations have been added since that time for LORAN A and C, CONSOL, Coast-radio, etc. Most of these stations are under the administration of the Ministry of Defense. Between thirty and forty people live throughout the winter on the eastern coast in the central part of the island. This is also where the stations and the airport are located. Roads connect the installations and living quarters.

Section IV

STATUS OF ISLANDS

Article 121 of the Draft Convention on the Law of the Sea (Informal Text) of August 27, 1980 reads as follows:

Article 121

Regime of Islands

1. An island is a naturally formed area of land surrounded by water, which is above water at high tide.
2. Except as provided in paragraph 3, the territorial sea, the contiguous zone, the exclusive economic zone and the continental shelf of an island are determined in accordance with the provisions of this Convention applicable to other land territory.
3. Rocks which cannot sustain human habitation or economic life of their own, shall have no exclusive economic zone or continental shelf.

In the opinion of the Conciliation Commission this article reflects the present status of international law on this subject. It follows from the brief description of Jan Mayen in Section III of this report that Jan Mayen must be considered as an island. Paragraphs 1 and 2 of Article 121 are thus applicable to it.

Therefore, Jan Mayen is entitled to a territorial sea, an economic zone and a continental shelf. On the other hand, it must be kept in mind that Articles 74 and 83 concerning delimitation are also applicable. The first paragraphs of these articles read as follows:

*Article 74**Delimitation of the exclusive economic zone between
States with opposite or adjacent coasts*

1. The delimitation of the exclusive economic zone between States with opposite or adjacent coasts shall be effected by agreement in conformity with international law. Such an agreement shall be in accordance with equitable principles, employing the median or equidistance line, where appropriate, and taking account of all circumstances prevailing in the area concerned.

*Article 83**Delimitation of the continental shelf between
States with opposite or adjacent coasts*

1. The delimitation of the continental shelf between States with opposite or adjacent coasts shall be effected by agreement in conformity with international law. Such an agreement shall be in accordance with equitable principles, employing the median or equidistance line, where appropriate, and taking account of all circumstances prevailing in the area concerned.

According to these provisions such delimitation shall be effected *by agreement* between the parties in conformity with international law. The parties have concluded such agreement on May 28, 1980 implicitly recognizing that Iceland shall have a full economic zone of 200 nautical miles in areas where the distance between Iceland and Jan Mayen is less than 400 miles. The agreement also provides that Norway will establish a fishing zone around Jan Mayen. Such a zone of 200 nautical miles was established around Jan Mayen by Norwegian Royal Decree of May 23, 1980, with effect from May 29, 1980. The Royal Decree provides that the boundaries with neighboring countries shall be effected by agreement.

The Conciliation Commission will consider the continental shelf problems involved in the remaining sections of this report.

Section V**REPORT OF GEOLOGISTS OF 16 DECEMBER, 1980**

As mentioned in Section II, the Conciliation Commission made arrangements to obtain a geological report regarding the continental shelf area between Jan Mayen and Iceland.

The Conciliation Commission considers it appropriate to reproduce the report in its entirety together with the maps prepared by the geological experts. The report follows.

**THE AREA BETWEEN JAN MAYEN AND
EASTERN ICELAND – A GEOLOGICAL REPORT**

Prepared at a workshop held at Lamont-Doherty Geological Observatory, Palisades, New York, USA, December 8 to 10, 1980.

Workshop participants:

Dr. Manik Talwani (Lamont-Doherty Geological Observatory of Columbia University, USA)

Dr. Karl Hinz (Bundesanstalt für Geowissenschaften und Rohstoffe, Federal Republic of Germany)

Dr. Lucien Montadert (Institut Francais du Pétrole)

Dr. Olav Eldholm (University of Oslo, Norway)

Mr. E. Bergsager (Norwegian Petroleum Directorate)

Dr. Gudmundur Palmason (National Energy Authority, Iceland)

Dr. Lewis Alexander (Geographer of the United States) Dr. N. Terence Edgar (United States Geological Survey)

Mr. John Mutter, Rapporteur (Lamont-Doherty Geological Observatory of Columbia University, USA)

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**THE AREA BETWEEN JAN MAYEN AND
EASTERN ICELAND – A GEOLOGICAL REPORT**

Abstract

This report has two principal purposes:

- (1) to examine how the Jan Mayen Ridge, which is the most prominent feature in this region containing sedimentary rocks, is related morphologically and geologically to the island of Jan Mayen and to Iceland.
- (2) to examine existing geological and geophysical data with a view toward obtaining the distribution of possible prospective areas for hydrocarbons in the region lying between Jan Mayen and eastern Iceland.

The Jan Mayen Ridge is a roughly north-south trending feature with water depths between 200 m and 1600 m (Figure 1). It is subdivided by a depression, situated between latitudes 68° and 69°N into a northern plateau-like area and a southern zone. Although the ridge is not continuous through the entire area lying between Jan Mayen and eastern Iceland, the region is referred to as the “Jan Mayen Ridge Area” in this report.

The concept of natural prolongation can be considered in two different senses, morphological and geological. Morphologically the northern part of Jan Mayen Ridge can be considered a southward extension from the shelf¹ of Jan Mayen. On the other hand, Jan Mayen Ridge cannot morphologically be considered an extension from the Icelandic shelf.

However, geologically Jan Mayen Ridge is a microcontinent that predates both Jan Mayen and Iceland which are composed of younger volcanics; therefore the ridge is not considered a natural geological prolongation of either Jan Mayen or Iceland.

The hydrocarbon potential of the northern part of the Jan Mayen Ridge, situated north of the oblique depression (see Figure 1), is regarded as more favorable mainly because it has a larger areal extent than the southern part. It should be stated that the southern part is less understood and appears to be more complex than the northern part. However, considered in comparison with known oil-producing areas worldwide, the overall potential cannot be considered good, based on the existing fragmentary data. We emphasize that detailed further exploration could change this assessment.

¹ Shelf here defined in its usual scientific sense.

THE AREA BETWEEN JAN MAYEN AND EASTERN ICELAND—A GEOLOGICAL REPORT

Scope and Purpose of Report

This report has two principal purposes:

- (1) to examine how the Jan Mayen Ridge, which is the most prominent feature in this region containing sedimentary rocks, is related morphologically and geologically to the island of Jan Mayen and Iceland.
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Nomenclature Regarding Jan Mayen Ridge

The Jan Mayen Ridge is a roughly north-south trending feature with water depths between 200 m and 1600 m (Figure 1). It is subdivided by a depression, situated between latitudes 68° and 69°N into a northern plateau-like area and a southern zone. Although the ridge is not continuous through the entire area lying between Jan Mayen and eastern Iceland, the region is referred to as the “Jan Mayen Ridge Area” in this report.

Evolution and Subsurface Geology of the Jan Mayen Ridge Area

It is generally agreed that the Jan Mayen Ridge Area has, geologically speaking, evolved in a unique way. Both the island of Jan Mayen, which lies north of the Jan Mayen Ridge, and Iceland, which lies to the southwest, are composed of relatively young rocks of volcanic origin. Even though both are islands, thus lying above sea level, they came into existence during the opening of the Norwegian Sea and are considered oceanic structures. The Jan Mayen Ridge, on the other hand, lies below sea level but is considered largely a continental sliver and is believed to contain rocks whose age predates the opening of the Norwegian Sea.

Two important geological events are responsible for the present location and configuration of the Jan Mayen Ridge. The first was the opening of the Norway Basin (to the east of Jan Mayen Ridge) which represents the first stage in the opening of the Norwegian Sea by the splitting apart of Greenland and Norway. The split started in Early Eocene (about 55 m.y. before present) and continued until the Lower Oligocene (27 m.y. before present) and culminated in the opening of the Norway Basin. About 27 m.y. ago the axial ridge at which the opening was actively taking place became extinct and the axis of opening “jumped” westwards. The opening at the new ridge axis was effective in separating a thin, long sliver which was previously a part of Greenland away from it. This long sliver is the Jan Mayen Ridge. For reasons

that are not understood, this piece of continent did not stay above sea level. (It is in fact quite likely that for most of its history it was below sea level. In Mesozoic times it was part of a shallow sedimentary basin and later in the Early Tertiary a part of Greenland's continental margin.) At any rate, after being split away from Greenland it subsided and did so in somewhat irregular fashion. The northern part subsided less and stayed relatively shallow; it also remained a single block-like feature while the deeper southern part broke into several fragments that subsided more deeply.

Sedimentary patterns changed after each episode of opening giving rise to "break up unconformities" which can be detected by seismic reflection profiling. Two important unconformities are readily seen in the seismic records. The lower one, termed "O", is believed to be associated with the first episode of opening (that started 55 m.y., ago). It has not been reached by drilling, and the estimate of its age is based in part on the velocities of seismic waves in the underlying rocks and partly on its juxtaposition with basalt outpourings associated with early opening. The second unconformity termed "A" is believed to be associated with the second episode of opening (that started about 27 m.y. ago). It has been reached by drilling. Rocks above the unconformity are Miocene and younger (less than 15 m.y.) in age and below it are Oligocene-Eocene (35 to 50 m. yrs.) in age.

The rocks below "O" are "pre-opening" in age and for this reason have been used to characterize and define the continental character of the Jan Mayen Ridge. We note, however, that these rocks are unsampled and so there is no direct evidence of continental rocks. Horizon "O" can, however, be identified on seismic reflection profiles. In Figure 2 areas where horizon "O" forms a ridge are colored yellow, and where they form a depression or a ridge which does not rise above the seafloor are shown in orange.

The process of initial openings (first phase as well as the second phase) was associated with the extrusion of large amounts of lava. The lava flows covered the newly created ocean floor, but in some cases they may also have covered the foundered continental fragments. Thus there is some uncertainty in the areas covered by lava flows (which solidify to form basaltic rocks) whether the underlying rocks are oceanic or continental. Where independent evidence from lineated magnetic anomalies² assures us that the areas are oceanic, the map has been colored red; the areas where there is uncertainty about the underlying rocks have been colored blue or purple. The purple areas represent lava flows associated with the first phase of opening. The surface of these flows is relatively rugged, and they lie deeper than the lava flows emplaced during the second stage of opening which generally have a smoother surface, and the corresponding areas of the map have been colored blue. Lava flows in both areas (where the underlying rocks are uncertain in character) as well as in the region of demonstrated oceanic crust appear as a

² Such anomalies are known to be created during the active seafloor spreading phase of an ocean basin.

near ubiquitous seismically “opaque” layer. This layer is found everywhere except in the area where the continental fragments clearly interrupt this layer. (That the seismically “opaque” layer in this area is indeed basalt has been unequivocally demonstrated by the recovering of core samples by drilling.)

It is particularly difficult to define the total sediment thickness in the Jan Mayen Ridge Area. There are two main reasons for the difficulty. One is that sediments might exist below the extensive basalt flows in the area – seismic methods used to date have not penetrated below the basalt (as stated earlier basalt flows might in places cover sedimentary rocks near the edges of the continental blocks). Secondly, the base of the sedimentary column has not been reached by seismic reflection work even in areas not covered by basalt. The uncertainties in sediment thickness, therefore, mainly pertain below horizon “O” and the basalts. Only in a small area beneath the eastern flank of the Jan Mayen Ridge has a mappable stratified sequence been recognized below “O” on seismic profiles. The thickness of sediment lying above “O” and the basalts is on the other hand relatively well mapped. Although the thickness of post-“O” and post-basalt sediment generally does not exceed about 2.5 km (Figure 2), in some areas, particularly on the east flank of the Jan Mayen Ridge, the thickness might be as much as 4 km.

In summary, the Jan Mayen Ridge Area is geologically complex, consisting of (Figure 2):

Areas underlain by crust that is demonstrably oceanic (red),

Areas that contain, at depth, rocks believed to be continental in origin (yellow and orange), and

Areas where the lava flows obscure the nature of the underlying rocks (blue and purple).

Areas where seismic data are very sparse or for other reasons do not provide information to place them in one of the above groups are left white.

While the above description of the Jan Mayen Ridge Area is agreed to represent the consensus of geologic opinion, we note that some scientists who have made surveys in the region consider that a much greater area of the seafloor in the region is of continental origin.

Jan Mayen Ridge as a “Natural Prolongation” of Jan Mayen or Iceland

The concept of natural prolongation can be considered in two different senses, morphological and geological. Morphologically the northern part of Jan Mayen Ridge can be considered a southward extension from the shelf³ of Jan Mayen. On the other hand, Jan Mayen Ridge cannot morphologically be considered an extension from the Icelandic shelf.

³ Shelf here defined in its usual scientific sense.

However, geologically Jan Mayen Ridge is a microcontinent that predates both Jan Mayen and Iceland which are composed of younger volcanics; therefore the ridge is not considered a natural geological prolongation of either Jan Mayen or Iceland.

Resource Potential of the Jan Mayen Ridge Area

We take into consideration here only the possible potential for hydrocarbons. The present knowledge does not indicate other resources. No indication for the generation of metalliferous deposits or manganese nodules has been reported yet from the active or extinct oceanic ridges or fracture zones (Figure 1), but we will not completely rule out the possibility of the generation of such deposits in the above-mentioned areas.

In the Jan Mayen Ridge Area the geophysical surveys have only been of a reconnaissance nature—they have not been of the detailed nature carried out for pinpointing structures for the purpose of drilling for oil or gas. Furthermore, drilling in this area has been carried out only for scientific purposes. The number of drill holes is very few, and they have not been extended to depths where oil-bearing horizons might possibly exist.

JOIDES/DSDP scientific drilling has been carried out at four sites – 346, 347, 349, and 350 in the Jan Mayen Ridge Area. At sites 346, 347, and 349 the drill penetrated through the horizon A (which is the upper one of the two major unconformities in the Jan Mayen Ridge Area). The sediments lying above “A” are Miocene or younger in age, and are believed to have been deposited after the initiation of the second stage of opening. The sediments below “A” are Oligocene or older; they are believed to have been deposited when Jan Mayen Ridge was still attached to Greenland and formed part of its eastern margin. The sediments have a larger terrigenous component than the post-“A” sediments, but none of the sediments reached in these holes indicated the presence of hydrocarbons. Horizon “O” and the rocks below it lie far below the depth reached by the drill.

Hole 350 was drilled to the seismically opaque layer which was determined to be basalt of Eocene (?)^{*} age. It is uncertain what lies below the basalt layer – Jan Mayen Ridge type continental crust or oceanic crust.

Holes 348 and 337 in areas of lineated magnetic anomalies respectively west and east of the Jan Mayen Ridge reached basalt of appropriate age and confirmed the oceanic nature of these areas.

Thus, our deductions about the hydrocarbon potential are based on fragmentary data. At the present state of knowledge they allow us to deduce areas that almost certainly can be excluded as prospective areas for hydrocarbon exploration. Whether the remaining areas which could contain hydrocarbons actually do so can be determined only after much more detailed

^{*} Secretariat note: [sic]

geophysical work and intensive exploratory drilling carried down to great depths.

The area of demonstrably oceanic crust colored red in Figure 2 can almost certainly be excluded as a prospective region for hydrocarbon exploration mainly for the following reasons: insufficient thickness of sediments overlying oceanic crust, poor likelihood of high content of organic material within these sediments, unfavorable structural and trapping conditions. Similar remarks apply to the oceanic area west of the Jan Mayen Ridge. For these reasons the oceanic areas can almost certainly be excluded from considerations of prospecting for hydrocarbons. This also applies to the area adjacent to the north of Jan Mayen.

The areas which have been shaded blue and purple on the map are also considered very unlikely prospects for petroleum exploration, although less so than the oceanic areas shaded in red. Sediments above the basalt generally are quite thin, and their petroleum potential is considered very low for the same reasons described above for the oceanic areas. An area containing a very thick (greater than 2.5 km) section of post-"O" and post-basalt sediments on the eastern flank of the Jan Mayen Ridge is indicated in Figure 2. This area extends on either side of the boundary between the yellow and the purple areas. Because of the large thickness this section could by itself provide the source and reservoirs for hydrocarbon accumulation. This part of the purple area is an exception to the general statement of low prospectivity. The presence of sediment below the basalt cannot be excluded in this area as it is in the oceanic areas, but the lack of direct evidence of such presents a problem in the evaluation of the petroleum potential. If substantial thicknesses of sediment lie below the basalt, they could constitute an important hydrocarbon prospect.

The boundary between the blue/purple region and the yellow/orange region is uncertain and discussion of the yellow/orange region may, in general, apply to the sediments that may lie below the basalt as described above. The yellow/orange area is characterized by two major rock units of hydrocarbon potential separated by a prominent seismic reflector "O". This reflector may represent the top of a basalt layer, but it is generally considered to be an unconformity or a surface that characterizes a gap in the sedimentation process caused by the separation of Greenland from Norway 55 million years ago. The presence of sedimentary rocks below reflector "O" can be documented by seismic surveys in only very limited areas. Rocks of equivalent age on Greenland and Norway include source and reservoir rocks, two fundamental elements required for petroleum generation and accumulation. Petroleum has been discovered from rocks of equivalent age in Norway demonstrating that the other requirements for petroleum generation, maturation, migration, and accumulation have been met in that region, but because of the unique subsequent geologic history of the ridge, it is not possible at this time to make such a statement for the Jan Mayen Ridge Area.

Under the assumption that the older rocks of Jan Mayen Ridge are similar to the favorable rocks of the Norwegian and Greenland sequences they may contain accumulations of hydrocarbons or serve as source rocks. The sediments lying above reflector "O" are sufficiently thick in some areas to generate oil if source rocks are contained within them, independent of the older rocks below reflector "O".

The hydrocarbon potential of the northern part of the Jan Mayen Ridge, situated north of the oblique depression (see Figure 1), is regarded as more favorable mainly because it has a larger areal extent than the southern part. It should be stated that the southern part is less understood and appears to be more complex than the northern part.

A site survey carried out by Soviet scientists on the southern part of the Jan Mayen Ridge Area for the location of scientific drill holes, carried out sediment sampling operations. They reported the discovery of sediments with traces of petroleum gases in an area near 9°W 67°N. Because of the inconclusive nature of this data we have not attached much weight to the reported discovery.

In the above discussion we have emphasized the relative potential for hydrocarbons of different zones within the Jan Mayen Ridge Area. However, considered in comparison with known oil-producing areas worldwide, the overall potential cannot be considered good, based on the existing fragmentary data. We emphasize that detailed further exploration could change this assessment.

References

- Belousov, V.V., Milanovskii, E.E. (eds.), 1979. *Islandiya i sredinnokeanicheski chrebet*, Geomorfologiya, Tecktonika M. Nauka.
- Dittmer, F., Fine, S., Rasmusen, M., Bailey, J.C., and Campsie, J., 1975. Dredged basalts from the Mid-Atlantic Ridge north of Iceland, *Nature*, 254:298-301.
- Eldholm, O., and Windisch, C., 1974. Sediment distribution in the Norwegian-Greenland Sea. *Geol. Soc. Amer. Bull.*, 85:1661-1676.
- Gairaud, H., Jacquart, G., Aubertin, F., and Beuzart, P., 1978. The Jan Mayen Ridge synthesis of geological knowledge and new data. *Oceanol. Acta*, 1:335-358.
- Garde, S.S., 1978. Zur geologischen Entwicklung des Jan Mayen Ruckens nach geophysikalischen Daten. Doctor Thesis, Fak Natur Geisteswissen. Tech. Univ. Clausthal, 74 pp.

- Grønlie, G., and Talwani, M., 1978. Geophysical Atlas of the Norwegian Greenland Sea. VEMA Research Series IV, Lamont-Doherty Geological Observatory, Palisades, NY.
- Grønlie, G., Chapman, M., and Talwani, M., 1979. Jan Mayen Ridge and Iceland Plateau: Origin and evolution. *Norsk Polarinst Skrifter*, 170:25-47.
- Henderson, G., 1976. Petroleum Geology. *in* *Geology of Greenland*, Escher, A., and Watt, W.S. (eds.), 488-505.
- Hinz, K., 1972. Der Krustenaufbau des Norwegischen Kontinental-randes (Vøring Plateau) und der Norwegischen Tiefsee zwischen 66° und 68° N nach seismischen Untersuchungen. *Meteor, Forschungs-Ergebnisse, Reihe, C*, 10:7-16.
- Hinz, K., 1975. Results of geophysical surveys in the area of the Aegir Ridge, the Iceland Plateau, and the Kolbeinsey Ridge. *Norges geol. unders.* 316:201-203.
- Hinz, K., and Schlüter, H.-U., 1978. Der Nordatlantik-Ergebnisse geophysikalischer Untersuchungen der Bundesanstalt für Geowissenschaften und Rohstoffe an Nordatlantischen Kontinentalrändern. *Erdeol-Erdgas-Zeitschrift*, 94:217-280.
- Hinz, K., and Schlüter, H.-U., 1980. Continental margin off East Greenland. *Proceedings of the Tenth World Petroleum Congress, Bucharest, Vol. 2, Exploration Supply and Demand*, Heyden and Son Ltd., London, 405-418.
- Johnson, G.L., and Heezen, B.C., 1967. Morphology and evolution in the Norwegian-Greenland Sea. *Deep-Sea Res.*, 14:755-771.
- Sundvor, E., Gidskehaug, A., Myhre, A., Eldholm, O., 1979. Marine geophysical survey on the northern Jan Mayen Ridge. The Norwegian Petroleum Directorate's geol./geophys. investigation sci. Rep. No. 6, Jordsjelvstasjon: Bergen, Norway.
- Talwani, M., and Udinstev, G., et al., 1976. Survey at Sites 346, 347, 348, 349, and 350. The area of the Jan Mayen Ridge and the Iceland Plateau. Initial Reports of the Deep Sea Drilling Project, Vol. 38, U.S. Government Printing Office, Washington, DC, 1256 pp.
- Talwani, M., and Udinstev, U., 1976. Tectonic synthesis, in Talwani, M., Udinstev, G., et al. (eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 38, U.S. Government Printing Office, Washington, DC, 1256 pp.
- Talwani, M., and Eldholm, O., 1977. Evolution of the Norwegian-Greenland Sea. *Geol. Soc. Amer. Bull.*, 88:969-999.
- Udinstev, G.B., and Kosminskaya, I.P., in press. Heezen's ideas about the tectonic heterogeneity of the ocean floor and their application to the new data obtained in the North Atlantic Ocean. Heezen Memorial Volume.

Sources of Data

LAMONT-DOHERTY GEOLOGICAL SURVEY (LDGO on Figure 2):

Approximately 2000 km MCS lines from 1978 cruise RC21-14. Single-channel seismics, gravity, and magnetics from several research cruises of the R/V VEMA collected over a period of more than ten years. Sonobuoy reflection/refraction data from both MCS and single-channel seismic investigations. Two-ship MCS Expanded Spread and Constant Offset Profiles collected in collaboration with Universities of Bergen and Oslo, Norway, in 1978.

BGR, FEDERAL REPUBLIC OF GERMANY (BGR - 75 & 76 on Figure 2):

1969: Refraction seismic station line III, PLANET cruise 1969

1972: METEOR cruise no. 28, single-channel reflection seismic profiling

1975: 48 multichannel reflection seismics, 635 km, BGR-North Atlantic cruise 1975

1976: 48 multichannel reflection seismics, 694 km, BGR-North Atlantic cruise 1976

CNEXO/IFP, France (CNEXO - 75 on Figure 2):

1975: CEPAN 1 survey, 24 multichannel reflection seismics, 2500 km

UNIVERSITY OF BERGEN, NORWAY (Norway (University of Bergen) on Figure 2):

1978: MCS 400 km 20-channel; sonobuoy refraction

NORWEGIAN PETROLEUM DIRECTORATE (Oljedirektorate - 79 on Figure 2):

1979: 950 km, multichannel seismic reflection profiling, sonobuoy stations

As their report makes clear, the experts have carefully considered the petroleum potential of the areas concerned. In their opinion this potential is not encouraging. The areas shown in red on the map reproduced in Figure 2 “can almost certainly be excluded as a prospective region for hydrocarbon exploration.” The areas which have been shaded blue and purple on the map “are also considered very unlikely prospects for petroleum exploration although less so than the oceanic areas shaded in red.”

This leaves – in the experts’ opinion – the Jan Mayen ridge as the area where oil potential may exist. These areas are shaded yellow and orange on the Figure 2 map. In addition, the experts described an area on the Eastern flank of the Jan Mayen Ridge which “extends on either side of the boundary between the yellow and the purple areas. Because of the large thickness this section could by itself provide the source and reservoir for hydrocarbon accumulation.” This area is shaded dark purple on the map.

The experts further conclude that “the hydrocarbon potential of the Northern part of the Jan Mayen Ridge, situated north of the oblique depression, is regarded as more favorable mainly because it has a larger extent than the Southern part. It should be stated that the Southern part is less understood and appears to be more complex than the Northern part.”

However, the conclusions of the experts are the following:

“In the above discussion we have emphasized the relative potential for hydrocarbons of different zones within the Jan Mayen Ridge Area. However, considered in comparison with known oil-producing areas world-wide, the overall potential cannot be considered good, based on the existing fragmentary data. We emphasize that detailed further exploration could change this assessment.”

Section VI

POSSIBLE METHODS AND APPROACHES

As stated by the geological experts in their report:

“The concept of natural prolongation can be considered in two different senses, morphological and geological. Morphologically the Northern part of the Jan Mayen Ridge can be considered a southward extension from the shelf of Jan Mayen. On the other hand, Jan Mayen Ridge cannot morphologically be considered an extension from the Icelandic shelf.”

Geologically, the experts consider that the Jan Mayen Ridge is neither a prolongation of Jan Mayen nor of Iceland. They express this opinion as follows:

“However, geologically Jan Mayen Ridge is a microcontinent that predates both Jan Mayen and Iceland which are composed of younger volcanics; therefore the ridge is not considered a natural geological prolongation of either Jan Mayen or Iceland.”

In the light of these findings, the Conciliation Commission is of the opinion that the concept of natural prolongation would not form a suitable basis for the solution of the outstanding issues.

In this context the Commission reverts to the wording of its mandate: “In preparing recommendations with regard to the dividing line for the shelf

area between Iceland and Jan Mayen, the Commission shall take into account Iceland's strong economic interests in these sea areas, the existing geographical and geological factors and other special circumstances." In order to submit recommendations to the two governments, such recommendations must be unanimously agreed upon by the Conciliation Commission. It follows from the mandate that the Conciliation Commission shall not act as a court of law. Its function is to make recommendations to the two governments which in the unanimous opinion of the Commission will lead to acceptable and equitable solutions of the problems involved.

Although not a court of law, the Commission has thoroughly examined state practice and court decisions in order to ascertain possible guidelines for the practicable and equitable solution of the questions concerned.

Although, the Commission deems it inappropriate to deal at any length with such state practice and court decisions, account should, however, be taken *inter alia* of the provisions on delimitation of continental shelves contained in Article 83 of the Draft Convention on the Law of the Sea. (see page 9 above.)* It seems that these draft texts have at least to some extent been influenced by the decisions rendered on February 20, 1969 by the International Court of Justice in the North Sea Continental Shelf Cases.

State practice has many examples of dividing lines which vary in accordance with the circumstances of the case.

One approach is to consider whether the natural prolongation concept is applicable. In the light of the geological report, the Commission felt, as noted above, that the natural prolongation concept would not be helpful in finding an acceptable solution to the problems.

Other approaches seek to determine a certain proportionality by dividing the area concerned between the parties on the basis of distance and other relevant factors. As mentioned in Section IV, Jan Mayen, as an island, is in principle entitled to its own territorial sea, contiguous zone, exclusive economic zone and continental shelf (Article 121 of the Draft Convention). On the other hand, where boundary questions arise with neighboring states, the principles pertaining to delimitation are applicable to Jan Mayen (Articles 15, 74, and 83 of the Draft Convention).

In state practice a wide variety of solutions have been used in regard to drawing boundary lines. Frequently the median line has been chosen as providing an equitable solution. In other cases account has been taken of special circumstances leading to a great diversity of solutions in order to accommodate the relevant factors of each case.

Islands belonging to a state and lying in the vicinity of its coasts are ordinarily, given full weight for delimitation purposes. Where both coastal

* Secretariat note: Page 11 in the present volume.

states have islands along their coasts, examples are found where a “trade-off” takes place by ignoring the islands on both sides when drawing the boundary line. Where islands are situated within the 200-mile economic zone of another state, the “enclave principle” has sometimes been utilized to give them territorial seas. There are other examples in which islands have been given limited weight, particularly in straits and other narrow areas.

Finally, there are examples of agreements for joint development and cooperation in overlapping areas of continental shelves between neighboring countries.

In its judgment of February 20, 1969 in the North Sea Continental Shelf Case, the International Court of Justice emphasized the wide variety of situations as follows:

“93. In fact there is no legal limit to the considerations which States may take account of for the purpose of making sure that they apply equitable procedures, and more often than not it is the balancing-up of all such considerations that will produce this result rather than one to the exclusion of all others. The problem of the relative weight to be accorded to different considerations naturally varies with the circumstances of the case.” (I.C.J. Reports 1969 p.51.)

Having in view the broad scope of the considerations that may appropriately be recognized in formulating its recommendations, the Commission concluded that an approach should be used which takes into account both the fact that agreement by Iceland and Norway on Iceland’s 200-mile economic zone has already given Iceland a considerable area beyond the median line and the fact that the uncertainties with respect to the resource potential of the area create a need for further research and exploration. Rather, therefore, than propose a demarcation line for the continental shelf different from the economic zone line, the Commission recommends adoption of a joint development agreement covering substantially all of the area offering any significant prospect of hydrocarbon production. The Commission’s reasons for this recommendation include the desire to further promote cooperation and friendly relations between Iceland and Norway. Special consideration has also been given, to the following factors:

- (a) Iceland is totally dependent on imports of hydrocarbon products.
- (b) The shelf surrounding Iceland is considered by scientists to have very low hydrocarbon potential.
- (c) The Jan Mayen Ridge between Jan Mayen and the 200-mile economic zone of Iceland is the only area which is considered to have the possibility of finding hydrocarbons. The experts consider, however, the whole area to be a high geological risk.
- (d) The water depths overlying the Jan Mayen Ridge are too great to permit exploration using present technology. The distances from the natural markets for hydrocarbons – especially gas – are great.

Consequently, very large hydrocarbon discoveries would seem necessary in order to make such finds commercial.

The recommended joint development agreement should be based on the following main principles:

First, given the opinion of the geological experts that the area of interest for potential hydrocarbon deposits is the Jan Mayen Ridge extending southward from Jan Mayen towards Iceland, the Commission proposes that the area subject to joint development be defined by the following coordinates:

- 70^{35°} N. Lat.
- 68° N. Lat.
- 10^{30°} Long.
- 6^{30°} Long.⁴

This area comprises some 45,475 km². It includes the major part of the Jan Mayen Ridge and refers to the areas which the scientists who met at Lamont-Doherty Observatory on December 8-10, 1980 consider to have some hydrocarbon potential. The area south of the 200-mile economic zone of Iceland comprises some 12,725 km². The area lying north of the 200-mile zone of Iceland comprises some 32,750 km².

The activities in the area may be divided into three stages:

- (a) Pre-drilling stage,
- (b) Drilling stage,
- (c) Development stage.

These will be described in turn.

PRE-DRILLING STAGE

This marks the early stage of systematic geological mapping. The prime tools of this stage are seismic surveys, although magnetic surveys may also be used.

The pre-drilling stage is normally preceded by earlier “academic” investigations which define the more basic geological elements. The results of these “academic” activities are often published in scientific publications. The area under consideration here has been the subject of considerable academic interest. The report of the geological experts is based on such investigations. The more systematic petroleum-oriented mapping of the area has not, however, been started.

⁴ See Figure 3 [...] [in the front pocket of this volume]

The pre-drilling stage may in practice be subdivided into two phases, the first of which aims at defining the main geological elements, while the second aims at defining the geological elements in further detail and at establishing drilling locations.

Both phases are based mainly on the seismic profiles obtained from the seismic surveys. The main difference between the two phases is that during the first phase the grid distance between the seismic profiles averages 4-6 km or more. In the second phase the seismic survey is considerably more detailed, and the grid distance is about 1 km or, in some cases, even less.

On the Norwegian Continental Shelf the Norwegian Petroleum Directorate (PD) carries out the first phase with funds appropriated from the State Budget on a yearly basis. On the basis of these surveys, areas of the Norwegian Continental Shelf may be opened for further surveys by petroleum companies on the basis of "exploration" licenses. The relevant data thus obtained are available to interested companies at a reasonable price. The companies then undertake their own detailed surveys. Each company does its own interpretation and has the capacity to acquire detailed seismic data in a manner reflecting its own school of geological thought. The companies often differ substantially as to the prospectivity of different structures. This is particularly true in the case of "new" areas like the Jan Mayen Ridge.

The Commission believes that it would be important to assess the possible hydrocarbon potential of the area concerned at an early date. The Commission accordingly suggests that the first-phase seismic surveys should be undertaken as a joint venture between the Norwegian Petroleum Directorate and an equivalent or similar government organization of Iceland. These surveys should to a reasonable extent cover the specified area both north and south of the 200-mile boundary of Iceland's economic zone as it is desirable that a scientific hydrocarbon-oriented assessment of the area be based on an adequate knowledge of the Ridge as a whole.

In preparing such a survey, the two governments should cooperate and coordinate their efforts to draw up a general plan for the seismic exploration work. It is, however, apparent that the costs of such seismic surveys would be high – certainly on the order of millions of dollars – and that the conclusions to be anticipated therefrom are conjectural. The execution of such surveys also requires considerable expertise and experience. For these and other reasons the Commission proposes that the recommended seismic surveys should be undertaken by the Norwegian Petroleum Directorate in accordance with plans elaborated by the two governments jointly. The costs of such surveys should be borne by Norway unless otherwise agreed by the parties.

Icelandic and Norwegian scientists and experts should have the opportunity to participate in the seismic surveys on an equal footing. If the survey data are promising, the seismic surveys could be made available for sale to oil companies at adequate prices. In that case the cost of the surveys

could be recovered from the proceeds of such sales. The Commission proposes that any net profit after the recovery of costs should be shared between the two countries on a basis to be negotiated by them.

The second phase of the pre-drilling stage would entail the opening up of areas for general exploration permits to petroleum companies, if the conclusions to be drawn from the first seismic phase were sufficiently positive.

The time required for the pre-drilling stage is likely to be 5-9 years in all: 3-5 years for the first phase and 2-4 years for the second phase.

DRILLING STAGE

If the conclusions drawn from the pre-drilling stages so warrant, the next stage will be the drilling stage. This stage begins after negotiations – often protracted and difficult – between the companies and the government concerned. After the successful conclusion of such negotiations, exploitation licenses will be issued by the authorities concerned giving the licensee the rights in a specified area to carry out further exploration and to drill for hydrocarbons.

Under Norwegian petroleum legislation the drilling stage can also be subdivided into two phases. The first is a 6-year period in which the licensee must comply with a strict work program imposing an obligation to drill a certain number of wells. If within the stipulated 6-year period the licensee has fulfilled his work obligations and other obligations such as the observance of safety and environmental regulations, the exploitation license will be extended for a period of 30 years. However, after the expiry of the 6-year period half of the license area must be relinquished, and during the remaining period the area-fees increase substantially and progressively with time.

DEVELOPMENT STAGE

The initiation of this stage will depend on positive drilling results. The development stage will ordinarily be the most expensive, but also the most rewarding because it is based on an assessment that the hydrocarbon finds are commercial; the investments in this stage are consequently the least risky.

As is apparent from the foregoing discussion, the investments and economic risks differ substantially between the three stages. This has to be taken into consideration when agreements concerning joint cooperation are being worked out.

Forms of Joint Cooperation Agreements: Funding and Risk Capital

There are several possible types of joint cooperation agreements, giving various alternatives with regard to performance and control, ownership of the hydrocarbons found, and approaches to funding and risk capital. At least the following four main categories of joint cooperation agreements are commonly used today.

(a) Concession contracts with joint-venture arrangements

The contents of such contracts vary widely. Recent versions provide for a specified percentage of state-participation, ordinarily between 50-75 percent. Such recent state-participation arrangements ordinarily contain provisions for "carried interest." Under a "carried interest" contract the expenses for the government's share of exploration and drilling activities is borne by the private company or companies concerned up to the time when a commercial find has been made. If the results are negative, the companies absorb the entire cost, including the state's percentage in the joint venture. The usual carried-interest contract also provides that if a commercial find is made the companies will be reimbursed over a period of time for the state's share of the costs of exploration and drilling from the proceeds of production.

In the Commission's opinion, a joint-venture arrangement of this type with participation by Norway, Iceland and chosen oil companies may offer a viable solution to hydrocarbon activities in the area concerned.

(b-d) Service contracts, Production-sharing contracts and entrepreneur contracts are other examples of joint-cooperation arrangements between a state and private oil companies. *Service contracts* and *production sharing contracts* have many common features. The main such feature is that the state concerned formally retains its ownership of the area as well as of any hydrocarbon finds made. The private oil company (companies) carries all financial risk at least up to the time when a commercial find has been made. The company thereafter has the right to buy a certain percentage of the oil or gas produced at agreed prices (service contracts) or to obtain a certain percentage of the oil or gas produced in kind over a period of years (production-sharing contracts). Whether and to what extent the company will be reimbursed for its expenses after a commercial find has been made varies from contract to contract. These two types of contracts may also be categorized as "risk contracts."

Entrepreneur contracts in the strict sense of the term imply that a contractor undertakes to perform certain tasks in relation to petroleum activities and is paid for his services according to the terms of the contract. This type of contract is not a risk contract in the ordinary sense.

As previously stated, the Commission regards joint-venture agreements as the most viable solution to the cooperation between the two parties foreseen in the specified area.

Various methods of obtaining the funding and risk capital necessary for such joint ventures could be used.

Under one method the two countries could at the drilling stage appropriate the necessary capital in their state budgets or otherwise in proportion to each country's share of the joint venture. A state company (or state companies) would then carry out all drilling-stage activities. The Commission cannot, however, recommend this type of financing. Hydrocarbon exploration and exploitation are in general financially high risk activities, especially in unknown areas. In the specified area the geological risks, the great water depths and other environmental circumstances combine to make the financial risks very large. Consequently, and particularly at the outset, it seems advisable for economic as well as for technological reasons to bring into the joint venture (ventures) oil companies with deep-water experience.

Thus the Commission recommends that in a first period during which the area concerned is unknown as far as hydrocarbon potential and geological and technological features and obstacles are concerned, the necessary risk capital should – to the extent possible – be invested by oil companies as participants in the joint venture. The oil companies must be willing – again to the extent possible – to carry both the Norwegian and the Icelandic shares of the costs through the drilling stage until a commercial find has been made. This principle has been applied to the Continental Shelf of mainland Norway. Important experience and valuable results have been obtained from this approach. However, the difficulties with such an approach in the present case should not be minimized. The combined Norwegian-Icelandic state participation should be at least 50 percent. The areas are unknown and the available information of the geology thereof not very encouraging. Consequently, the Conciliation Commission could not form any opinion as to whether it would be possible to obtain the necessary risk capital from private sources.

Negotiations for the establishment of effective joint-venture groups are necessarily complicated. Various considerations affect the possibility of forming a group possessing the optimal combination of assets for the task. Among such considerations are: experience in deep-water technologies; experience with high-pressure formations; capital and rig availability; geological expertise; differences of view on work programs, etc. In most cases it is a combination of a number of factors which produces the optimal results.

**The areas north and south of the northern demarcation
line of the Icelandic 200-mile economic zone**

The part of the specified area south of the Icelandic 200-mile economic zone would as mentioned above consist of an area of about 12,725 km². The part north of the 200-mile line would measure about 32,750 km².

(a) The area north of the Icelandic 200-mile economic zone

Recognizing Iceland's need for hydrocarbons, the Commission proposes that Iceland should obtain an interest in all licensee groups north of its 200-mile line. In the case of the Norwegian continental shelf, where exploration and exploitation activities have already taken place, it is the practice to form joint-venture groups for each license area. In the case of the specified area, Iceland would be entitled to join each joint venture with an option to acquire a fixed percentage of 25% (or less if Iceland so wishes). Iceland would have the opportunity to participate in all joint-venture negotiations with the private companies. If the Norwegian licensing system is changed to permit other contract forms such as "service contracts" or "production sharing" contracts, Iceland would have the right to participate in such arrangements with the same percentage.

Norwegian legislation, oil policy and control, safety and environmental regulations, and administration would apply to the activities in question. In negotiations with oil companies for "carried interest," it must be assumed that both Norwegian and Icelandic state participation will so far as possible be carried up to the moment a commercial find has been declared. The extent to which the oil companies should be reimbursed for the governments' share of costs incurred by the companies up to the time a commercial find has been made, would depend on the terms of the joint-venture contract. Frequently the governments' share of such costs is reimbursed through payments in kind from the production over a period of years. In more recent cases Norway has been able to obtain a few contracts where such expenses are not reimbursed.

Certain difficulties will arise if it proves impossible to obtain joint-venture contracts under which the petroleum companies undertake to carry the costs of the two governments as envisaged above. In that case two possibilities may be foreseen: (a) the companies may be willing to carry a part of the expenses of the two states; (b) the companies may not be willing to undertake any amount of carried interest.

In these circumstances the two governments must decide whether they are willing to undertake the venture, either on their own or in conjunction with oil companies. In the event that the Norwegian Government decides to go forward with the project either on its own or in a joint venture, but Iceland decides that it will not participate due to the added risk, the question arises as to what should be the status of Iceland.

If the results are negative and no commercial finds are made, Norway has taken a risk and must carry the loss. In case a commercial find is made, the situation is less obvious. The Commission recommends, however, that in such a case Iceland should be allowed to acquire its share of participation in the development phase, provided that within a reasonable time it reimburses Norway for its share of the exploration and drilling costs incurred before that phase.

When a find has been declared commercial, a new phase – the development phase – will be entered. Although the cost in the drilling stage is substantial (some 100-150 million N.kr. per well), it is in the development phase that the really large investments are required. These may amount to billions of N.kr. The state participation is not carried in this phase. Statoil – the Norwegian state-owned petroleum company – pays its share of such investments in proportion to Norway's participation in the license area concerned. The same principle must apply in the northern part of the Jan Mayen Ridge area. Statoil will then pay its share according to Norwegian state participation, and Iceland, presumably through its own state company, should likewise pay its share of the costs of development in the case of a commercial find.

**(b) The area south of the northern demarcation line
of the Icelandic 200-mile economic zone**

In this part of the specified area Icelandic oil legislation, oil policy and control, safety and environmental regulations and administration would apply. Norway should be allowed to participate in negotiations with oil companies and have an option to acquire a 25 percent interest in joint-venture arrangements. However, it should not be expected that Iceland should accommodate Norway with a carried interest arrangement in the same manner as has been proposed that Norway should do in regard to Iceland in the Norwegian part of the specified area.

The Conciliation Commission has considered the problems which may arise if a petroleum deposit extends on both sides of the demarcation line of the specified area or extends both north and south of the Icelandic 200-mile economic zone line.

The Conciliation Commission recommends the following solutions of these problems:

If a hydrocarbon deposit is situated both north and south of the Icelandic 200-mile economic zone line, the usual unitization, exploitation, and distribution procedures for the petroleum deposits should be agreed upon.

If a hydrocarbon deposit is situated on both sides of the demarcation line of the specified area south of the Icelandic 200-mile economic zone line, the same utilization approach would be applicable (i.e., the deposit should be divided in accordance with a fair expert assessment and unitized exploitation procedures).

If a hydrocarbon deposit is situated on both sides of the demarcation line of the specified area north of the Icelandic 200-mile zone line, the whole deposit should be considered as lying inside the specific area where the rights and obligations of the two states are concerned.

OTHER FIELDS OF COOPERATION

The Conciliation Commission has considered – in the course of its deliberations – whether other possible fields of cooperation should be contemplated in connection with the proposed cooperation arrangements. Such additional fields of cooperation could be directly or indirectly related to hydrocarbon activities or pertain to other possible spheres of activity not involving hydrocarbons. Examples of such cooperation would be access to and transfer of technology and data in the hydrocarbon sector, conclusion of long-term agreements which might secure petroleum supplies to Iceland at reasonable prices, and access to scientific and practical training in the petroleum sector. The Commission felt, however, that such proposals may lie outside its mandate.

Section VII

SUMMARY OF RECOMMENDATIONS

1. For the purpose of these recommendations the Commission proposes a specified area defined by the following coordinates:

- 70³⁵° N. Lat.
- 68° N. Lat.
- 10³⁰° W. Long.
- 6³⁰° W. Long.⁵

2. Taking the demarcation line between the 200-mile economic zone and the Norwegian fisheries zone as a dividing line, the specified area has two parts: the part north of the demarcation line comprises some 32,750 km². The area south of this line comprises some 12,725 km².

3. The Commission proposes a joint cooperation arrangement for the area so defined.

4. In the pre-drilling stage, which includes a systematic geological mapping of the specified area mainly by seismic surveys, the Commission

⁵ See Figure 3 [...] [in the front pocket of this volume]

recommends that such surveys should be undertaken jointly by the Norwegian Petroleum Directorate and the equivalent government organization of Iceland. These seismic surveys should be carried out by the Norwegian Petroleum Directorate according to plans elaborated by the two governments jointly. The costs of such surveys should be borne by Norway unless otherwise agreed by the parties. Icelandic and Norwegian experts should have the opportunity to participate in the seismic surveys on an equal footing. The results and evaluations of the surveys should be equally available to both parties.

If any profits accrue from the sale of the seismic surveys to interested companies or organizations, such profits should be shared by the two countries on a basis to be negotiated.

5. If the surveys justify further exploration, drilling and possible exploitation activities, the Commission proposes that concession contracts with joint-venture arrangements between the two parties and oil companies be negotiated.

6. In the part of the specified area north of the Icelandic 200-mile economic zone Iceland should have the opportunity to acquire a 25 percent interest in any joint-venture arrangement. In negotiations with oil companies an effort should be made to assure that the costs of both Norwegian and Icelandic state participation are “carried” by the oil companies up to the moment when a commercial find has been declared.

Should the oil companies refuse to “carry” the state Participation wholly or in part, the Conciliation Commission refers to its proposals made for such event in the foregoing Section VI.

Norwegian legislation, oil policy and control, safety and environmental regulations and administration would apply to the activities in this part of the specified area.

7. In the part of the specified area south of the northern demarcation line of the Icelandic 200-mile economic zone, Norway should have an option to acquire a 25 percent interest in any joint-venture arrangement. However, it should not be expected that Iceland will accommodate Norway with a carried-interest arrangement in the same manner and to the same extent proposed for the Norwegian part of the specified area. However, Norway should be allowed to participate in the negotiations with the oil companies.

Icelandic legislation, oil policy control, safety and environmental regulations and administration would apply to the activities in this part of the specified area.

8. In the development phase in any part of the specified area it is understood that each of the two states parties would carry a share of the development costs proportional to its share of state participation.

9. The Commission at the end of Section VI has made certain recommendations for dealing with deposits on both sides of the 200-mile demarcation line or overlapping some part of the specified-area boundary and refers to its proposals in this respect and considers them included among the present recommendations.

(Signed) Elliot L. Richardson
Chairman

(Signed) Hans G. Andersen,
Conciliator for Iceland

(Signed) Jens Evensen
Conciliator for Norway