

Venture Development Project

Report of the Sable Island
Environmental Assessment Panel



Nova Scotia



Province of
Nova Scotia

Canada

a

Sable Island Environmental Assessment Panel

**The Honourable Charles Caccia
Minister of the Environment
Ottawa
Ontario**

**The Honourable George Mbody
Minister of the Environment
Halifax
Nova Scotia**

Dear Ministers:

In accordance with the terms of reference provided to the Environmental Assessment Panel a review of the proposed Venture development project has been completed. We are pleased to submit the Panel Report for your consideration and advise you of the means by which the project could proceed in an environmentally safe manner.

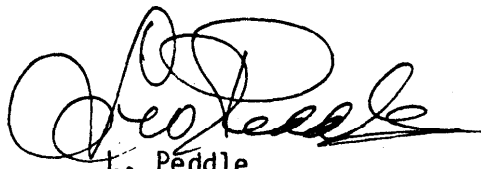
As requested, the impacts of the project on the environment and of the environment on the project have been examined, with appropriate reference to related social impacts. Recommendations are made to address both onshore and offshore impacts. Concerns related to the safety of the platforms, pipelines, landfall terminal and gas plant have been included as an integral part of the review.

Further recommendations and observations are included on matters related to the review process.

Respectfully yours,



P. Paradine



L. Peddle

**Co-Chairmen
Sable Island Environmental Assessment Panel**

Canada

Nova Scotia
 **Province of
Nova Scotia**

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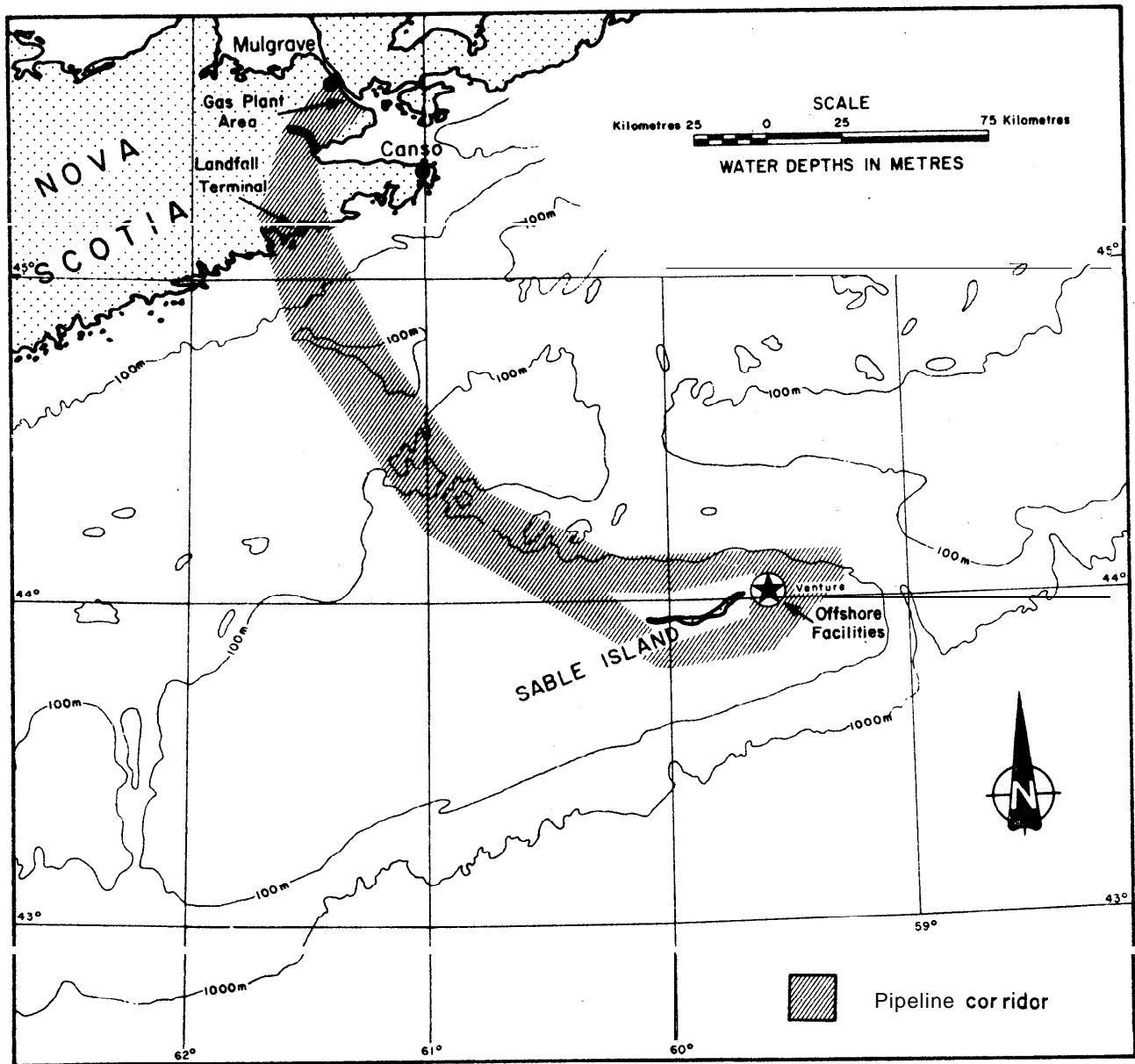


Figure 1 — Venture Project Components

EXECUTIVE SUMMARY

This Report conveys the findings of an Environmental Assessment Panel review of a proposal to produce natural gas and condensates from the Venture field, near Sable island off the coast of Nova Scotia. The proponent of the project is Mobil Oil Canada Ltd.

The project includes offshore platforms and transportation of the gas and condensate to a gas plant through a subsea pipeline, a landfall terminal and an overland pipeline system. It is estimated that reserves are sufficient for 18 years of production at 11 million m³/day.

In Spring 1983, after receiving the proponent's Environmental Impact Statement (EIS), the Panel held public information sessions at various locations in Nova Scotia. Many comments were subsequently received from the public and technical agencies on deficiencies in the EIS. The proponent was requested to respond and provide additional information. Following receipt of an EIS Supplement in late August, the Panel held final public meetings in Guysborough, Port Hawkesbury and Halifax.

This Report contains conclusions on major issues raised during the review and recommendations on the means by which the project may proceed in an environmentally safe manner.

The Panel concluded that there is a significant risk of a blowout during development and production of the Venture field. A major blowout could result in mortality of juvenile fish in the Sable Island area and tainting of commercial catch. Because of the possibility of disruption to the fisheries industry a recommendation has been made to ensure that compensation mechanisms are in place prior to development. Compensation is also recommended for losses resulting from construction.

To deal with fire hazards resulting from a blowout, the Panel recommends incorporation of fire prevention and control measures to the maximum extent feasible. The threat from waves is also a major concern and the Panel concluded that further study is required to ensure

appropriate design. Other possible impacts of the environment on the project have led to recommendations concerning seismicity and ice. Conclusions on search and rescue co-ordination and facilities and the need for safety training are provided in the Report.

The conclusion that a failure of the offshore pipeline is probable is accompanied by a recommendation that it be buried wherever practicable. This would avoid potential conflicts with fishing gear. It was also concluded that significant environmental impacts could occur in the nearshore area, either during construction or in the event of a hydrocarbon release. Several recommendations are made to mitigate the potential nearshore impacts.

With regard to the onshore pipeline, it was concluded that an environmentally acceptable route could be found within the corridor proposed by Mobil but consultation with resource management authorities is recommended prior to finalisation of the route. Further study is recommended on mitigation of acid drainage problems from mineralized rock which the pipeline must cross. The onshore pipeline as well as the landfall terminal and gas plant, requires detailed safety review by regulatory authorities.

Other concerns addressed include drilling muds, hydrostatic testing fluids, shipping conflicts and effects on Sable Island and marine birds.

An overall condition to proceeding with the project is the development of comprehensive contingency plans and monitoring programs. Items that should be included in such plans and programs are listed throughout the Panel's Report.

The Panel strongly recommends special efforts to continue public consultation as more information becomes available from the proponent. Finally, a number of recommendations are made to address remaining concerns related to the review process.

1.0 PROJECT AND REVIEW PERSPECTIVE

1.1 Project Description

The Venture Development Project is a proposal to develop the Venture gas field off the coast of Nova Scotia and produce natural gas and condensate at a rate of approximately 11 million m^3 per day. It includes transportation of the gas and condensate to a gas plant through a subsea pipeline, a landfall terminal and an overland pipeline system. The project is proposed by Mobil Oil Canada Limited, the proponent, in association with Petro-Canada Resources Incorporated, Texaco Canada Resources Limited, Nova Scotia Resources Limited and East Coast Energy Limited.

The Venture field, approximately 38 km^2 , is located on the Scotian Shelf approximately 210 km off the east coast of Nova Scotia and 16 km east of the northeast tip of Sable Island (figure 2).

Exploration work began near Sable Island in 1959 when Mobil conducted a seismic program. In 1967 Mobil drilled an exploratory well on Sable Island and discovered non-commercial quantities of gas and traces of oil. In May, 1979, Mobil completed the Venture discovery well, Venture D-23. Two appraisal wells B-I 3 and B-43, were completed by April, 1982. Gas and condensate were discovered in both. Natural gas reserves in the Venture field are estimated in the Environmental Impact Statement (EIS) at 72 billion m^3 .

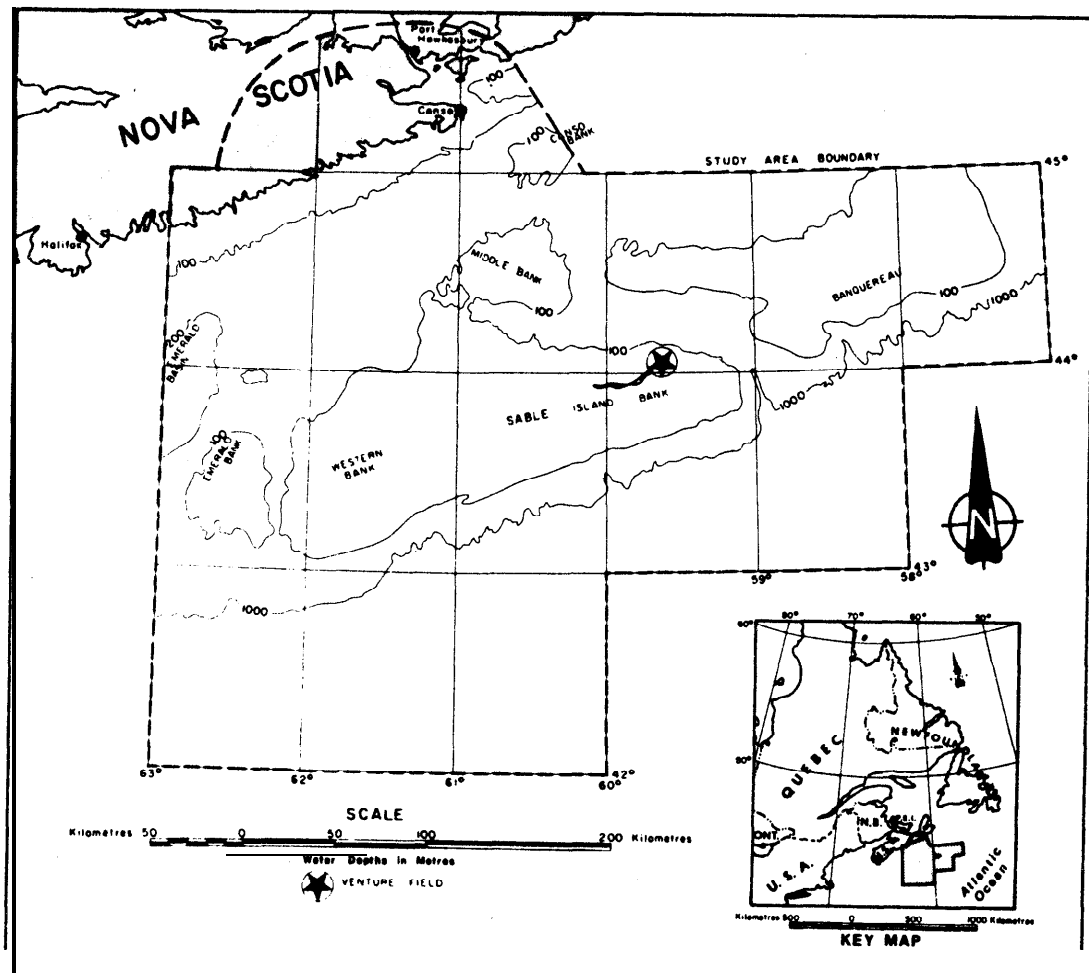


Figure 2 - General Location of Venture Field

1.1.1 Development Drilling

The proponent has scheduled approximately 2.5 years to drill the 16 to 20 wells required to bring the Venture field into production. Production drilling is tentatively slated to begin in 1984, using as many as four separate cantilever type jackup drilling units (figure 3) on a continuous year-round basis.

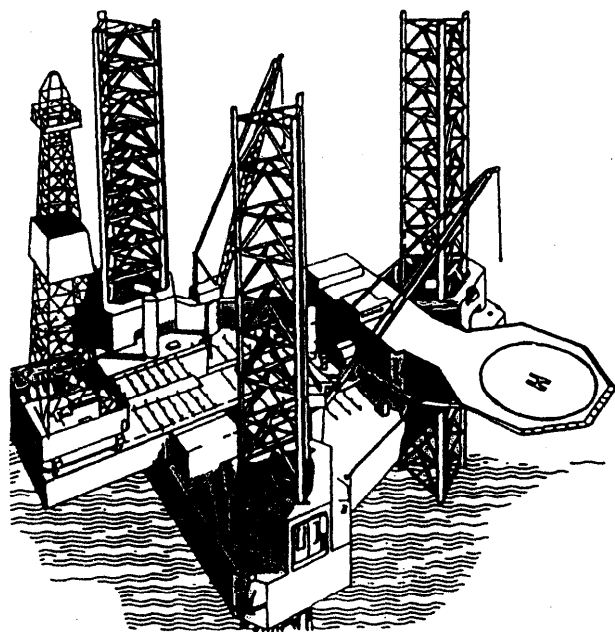


Figure 3 — Typical Cantilever Type Jackup Drilling Unit

The proponent will first locate and install the well templates on the ocean floor using piles to anchor the equipment to the seabed; the templates serving as conductor guides for the drilling operation. Following their installation, drilling units will be positioned and drilling will begin. Mobil proposes to drill two groups of five wells each on the east lobe of Venture and two groups of three wells each on the west lobe. If necessary, to compensate for wells that do not produce as expected, one additional well may be added to each of the four wellhead clusters.

Two supply boats will attend each jackup drilling unit and helicopters will transport personnel to and from the units.

1.1.2 Offshore Production Facilities

The proponent is proposing construction of two offshore complexes. Each complex will contain two wellhead

platforms, a production platform, an emergency flare structure, and an accommodation platform (figure 4). A 1000 m exclusion zone will be established around each complex.

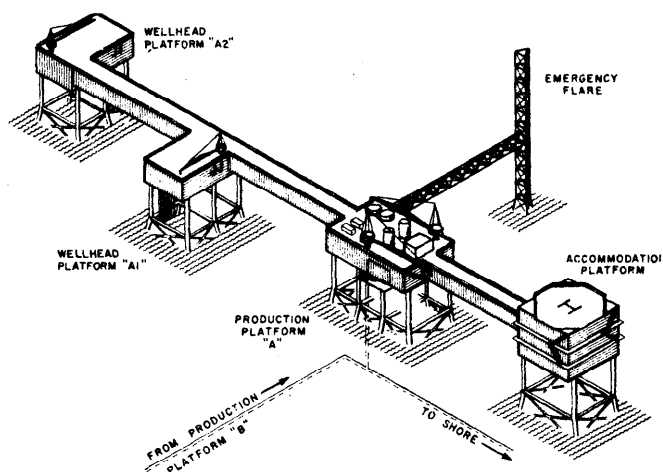


Figure 4 — Typical Offshore Production Complex

The three types of platforms considered for the Venture Project were steel jacket, gravity, and floating. Steel jacket platforms are preferred because they have a long history of successful operation, including service in the southern North Sea in an environment similar to that at the Venture site,

Also, they are relatively inexpensive and easy to construct. A steel jacket is a supporting structure for an offshore Platform, and is held in place by concentric piles through the legs (figure 5).

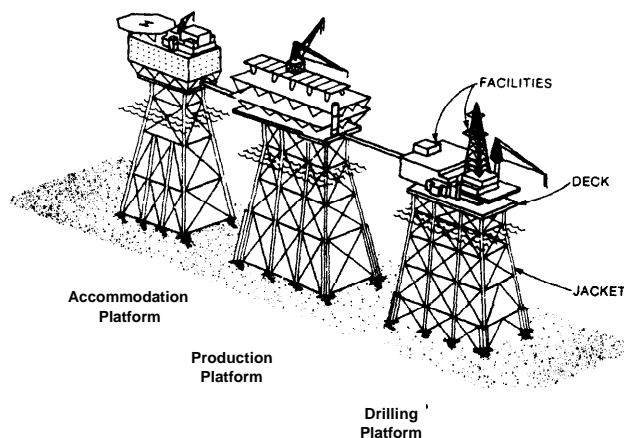


Figure 5 — Typical Lattice Type Structural Details of A Platform Jacket

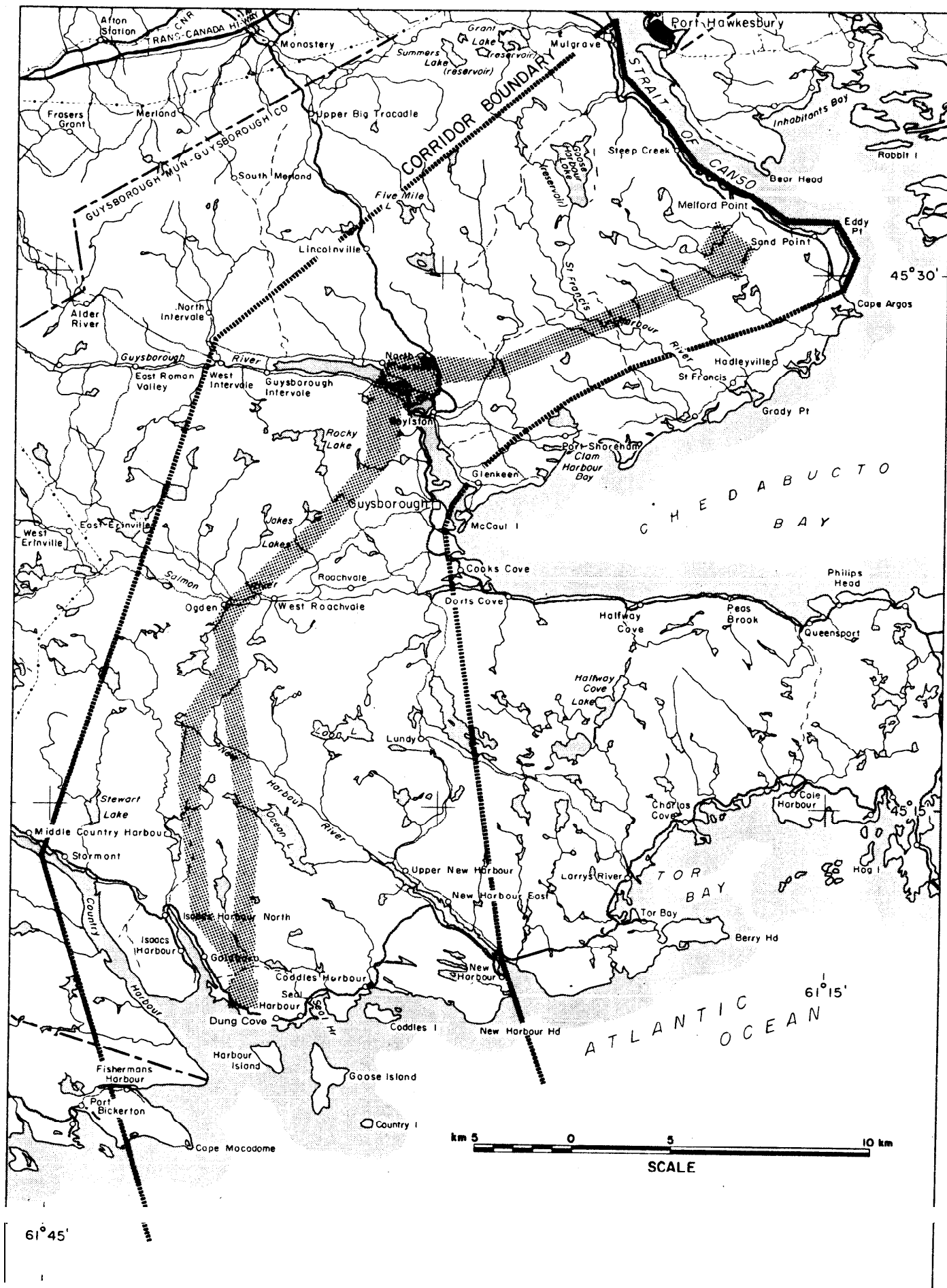


Figure 7 — Onshore Pipeline Corridor

1.1.2.1 Wellhead Platforms

Wellhead platforms will replace the **jackup** drilling units and will be used as **conductor** support structures for the **wells**. Each platform will have two decks, approximately 360 m² per deck, and will be supported on six legs. The wells will be connected to the production platform via **flowlines** across interconnecting bridges.

1.1.2.2 Production Platforms

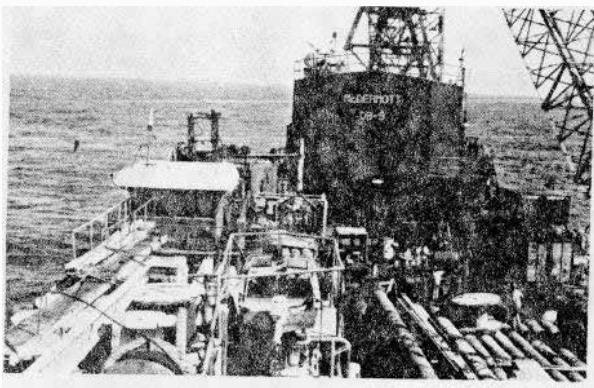
Production platforms will contain the equipment necessary for initial gas processing. They will be eight-legged structures with two decks each approximately 1100 m². The initial processing that will take place offshore includes removal of water and heavy particles such as sand.

1.1.2.3 Accommodation Platforms

The accommodation platform will be a four-legged structure with three decks of approximately 400 m² each. A helicopter deck will be located above the accommodation facilities. In addition to living quarters designed to accommodate 50 personnel during normal operation and an additional 25 as required, this platform will house storage areas.

1.1.3 Subsea Pipeline

The gas and condensate will be transported to shore in a single 914 mm two-phase flow pipeline. This will be rated at 14.9 MPa (2235 psi) with a nominal operating pressure less than 12.4 MPa (1860 psi) and will be capable of carrying a maximum of approximately 14 million m³ per day gas and 4770 m³ per day condensate. The pipe will be made of steel but to ensure negative buoyancy it will be coated with reinforced concrete.

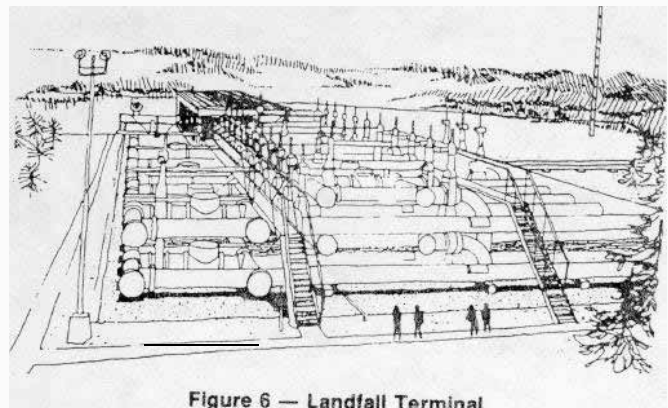


The **subsea** pipeline corridor from the Venture field to the landfall terminal is approximately 210 km with a maximum water depth estimated at 125 m. The proponent proposes to trench the pipeline into the ocean floor at both ends and elsewhere, where necessary, for the purpose of stabilizing the line. However, according to Mobil's EIS, the majority of the line will be placed on the ocean floor. The pipeline will be equipped with appropriate leak detection, and emergency **blowdown** and shut-down equipment as required by the various government and industry codes, guidelines and regulations.

1.1.4 Landfall Terminal

The landfall terminal would be sited on approximately two ha of land in the vicinity of Dung Cove near Country Harbour in Guysborough County (figure 6).

The primary function of the landfall terminal or slug catcher facility is to separate gas from liquid. A certain volume of liquid will condense from the gas in the **sub-sea** pipeline and be carried along in the gas stream, generally as slugs. The slug catcher uses gravity to separate the gas and liquid into separate streams, and direct them to their respective onshore pipelines for transport to the gas plant.



1.1.5 Onshore Pipelines

On leaving the terminal the gas and condensate will be transported approximately 65 km to the gas plant near the Strait of Canso (figure 7). The preferred transportation system is two single-phase flow pipelines each rated at 14.9 MPa (2235 psi) with a minimum delivery pressure of 7.3 MPa (1095 psi) at the gas plant. The gas pipeline will be 610 mm in diameter and the condensate pipeline 324 mm.

Where the soil thickness is adequate the two pipelines will be laid in separate trenches approximately four m apart. In areas where blasting is required to excavate the trenches a single ditch will be prepared and the pipelines laid a minimum of one m apart. Following pipeline installation and burial, debris will be removed to an approved disposal site and the right-of-way (ROW) stabilized and revegetated.

Pipeline sectionalizing valves will be installed in accordance with the provisions of the National Energy Board Pipeline Regulations.

1.1.6 Gas Plant

The proponent proposes to locate the gas plant on approximately 145 ha of land within the industrial park reserve in the Melford Point area of Guysborough County.

The plant will perform three functions: gas condensate separation, liquid stabilization, and condensate fractionation. The separation facility is required to remove a portion of the heavier hydrocarbons, thereby producing sales gas (methane and ethane) which will be sold to the main transmission system. The liquid stabilization facility

will boil off selected light ends of the liquids and return them to the gas stream leaving a stabilized liquid product at a specified vapour pressure. Following stabilization the natural gas liquids (NGL) may either be sold as an NGL raw mix product or fractionated to produce separate liquid petroleum gases (LPG) such as propane, butane, and pentanes plus.

1.2 Environmental Review Process

1.2.1 Referral

The March 1982 Canada-Nova Scotia Agreement on Offshore Oil and Gas Resources Management included provisions for a public review process (clause 7) and an environmental assessment review process (clause 8) to meet the federal Environmental Assessment and Review Process (EARP) as well as the Nova Scotia environmental assessment requirements. These clauses set the stage for a two Panel review. Clause 7 was the basis for creation of a Socio-Economic Review Committee which later became the Socio-Economic Review Panel (SERP).

Although the Agreement stipulated two review processes, it was not until the September 21, 1982 letter of

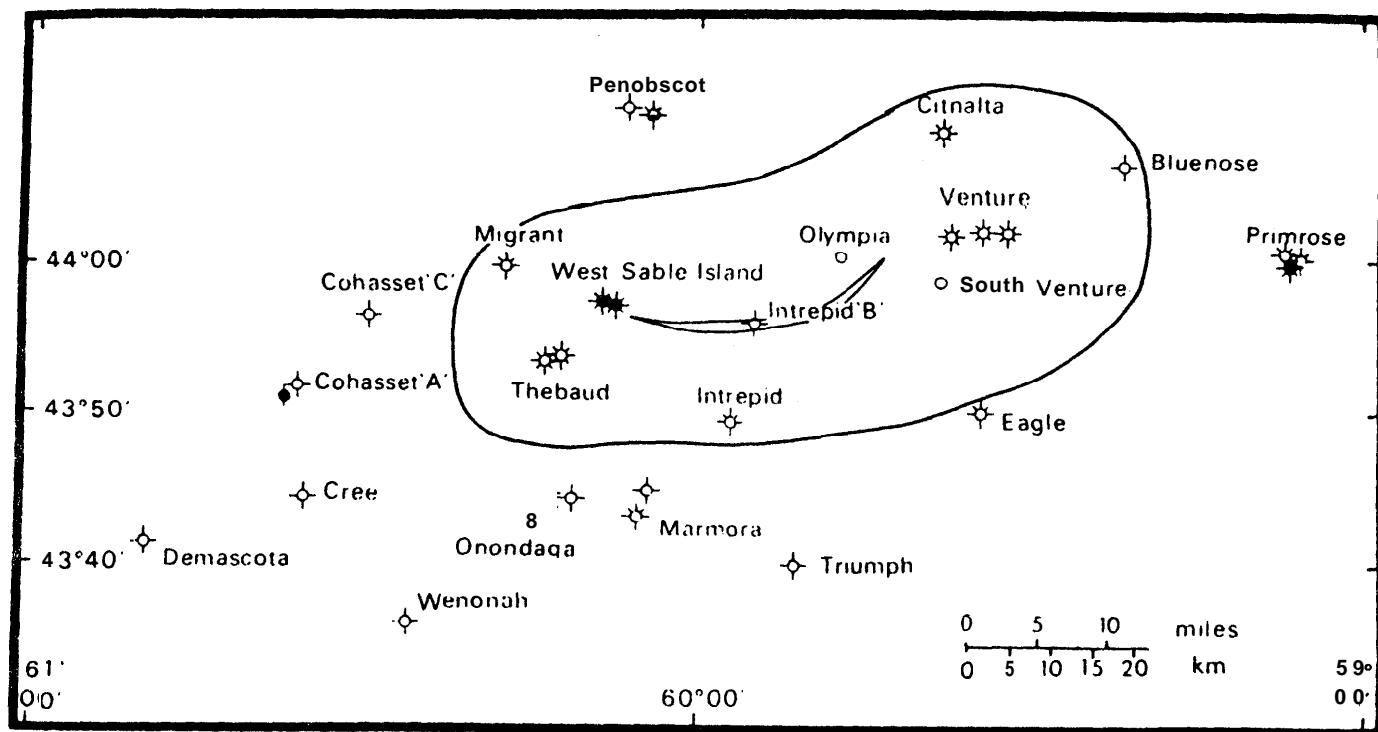


Figure 8 — Area of Significant Discoveries of Natural Gas

referral from the Honourable Jean Chrétien, Minister of Energy, Mines and Resources to the Honourable John Roberts, then Minister of the Environment that details started to be known. This letter reflects previous correspondence involving provincial Ministers. The project referred in September 1982 was the production of natural gas and condensates from the Sable Island area (figure 8).

The letter of referral suggested an Environmental Assessment Panel of four members, two from each jurisdiction, with one member from each as co-chairman. The objective and scope of the review were also mentioned in the letter of referral and later included in terms of reference issued to the Panel by the federal and provincial Ministers of the Environment (appendix A).

The letter also pointed out that there should be co-operation between the Environmental Assessment Panel and SERP particularly during public meetings. It further suggested the Environmental Assessment Panel consult with the Canada-Nova Scotia Fisheries Advisory Committee.

1.2.2 Environmental Assessment Panel

The Panel was appointed by the Ministers of the Environment on November 4, 1982. The members are Philip Paradine (co-chairman), Leo Peddle (co-chairman), Robert Burgess and Lewis Day. Biographies of the Panel members are contained in Appendix B.



1.2.3 The Review

The Panel's mandate was to determine the means by which the project may proceed in an environmentally safe manner. The scope of the review was to include matters relating to gas field development, gas and liquids transportation to shore and major ancillary facilities associated with the production of gas and condensates in the Sable Island area (figure 8). The Panel was directed by the Ministers to address all aspects relating to the impact of the environment on the project, the impact of the project on the environment and related social impacts. The letter of referral indicated a desire for the review to be completed in a 12 month period.



During the review it became evident that the Venture development was the only known commercial field in the area and the review could focus only on Venture. The Canada Oil and Gas Lands Administration (COGLA) confirmed that the only information that would be forthcoming during the proposed review period would be an EIS for Venture.

After the Panel received its terms of reference, it published operational procedures describing the general principles and the various stages of the public review. These procedures served as a general guide for participants in the review.

The Panel Secretariat contacted various interest groups and community organizations along the southern and eastern shores, in the Strait of Canso and in the Sydney and Halifax-Dartmouth areas to advise them of the review. Documentation submitted to or prepared by the Panel was placed in 18 information centres for viewing by the public and mailed to approximately 400 people.

The Panel prepared draft guidelines for the proponent to use in preparing an EIS. These were distributed to the public and review participants on November 16, 1982. Notices were placed in newspapers in Nova Scotia inviting written comments on the draft guidelines by December 31, 1982. Ten briefs suggesting changes were received. The Panel reviewed the comments and on January 21, 1983, issued its final guidelines to Mobil Oil.

Following the submission of the EIS on March 28, 1983, the Panel Secretariat distributed it to review participants, including government agencies, interest groups and individuals. The EIS and support documents were also placed in the information centres throughout Nova Scotia. Notices were placed in newspapers in Nova Scotia announcing the beginning of the review of the EIS, the details and dates of public information sessions and the due date for written comments on the adequacy of the EIS.

The Panel also retained the services of four independent advisers to review specific aspects of the EIS and supporting documents and to provide the Panel with an appraisal of the information presented in comparison with that requested in the guidelines. The technical experts were Dr. William Ford (oceanography); Dr. Ian McLaren, (ecology); Dr. Douglas Napier (safety and risk analysis) and Mr. William Bowes (pipeline engineering).

Between April 30, 1983 and May 5, 1983, the Panel held public information sessions in Sheet Harbour, Guysborough, Sydney, Port Hawkesbury, Halifax and Bridgewater. The purpose of these sessions was to provide review participants with an opportunity to ask questions about the project and to help them in preparing comments on the EIS. These sessions were held jointly with SERP. Approximately 500 people attended these sessions. Transcripts of the proceedings (598 pages) were placed in information centres and distributed to participants.

As a result of review of the EIS, the Panel received 28 submissions, seven from its technical experts, five from government agencies, 13 from public interest groups and three from individuals. A compendium of comments was made public at the end of June 1983.

The Panel reviewed the comments and on June 28, 1983, requested further information from the proponent on fisheries, onshore facilities and overland pipeline



alignment, employee and public safety, search and rescue, and the nature and extent of post-Panel review processes. It also directed Mobil to respond to all comments received. On August 19, 1983, Mobil submitted a Supplement to the EIS which was immediately distributed to all review participants. Details concerning the dates and locations of final public meetings were announced on August 30, 1983 together with topics to be discussed and meeting procedures.

Community meetings were held in Guysborough on September 25, and Port Hawkesbury on September 26 with four days of technical discussions in Halifax from October 11 to, 14. The topics discussed in Halifax were environmental impact and safety of offshore facilities; environmental impact and safety of onshore facilities; impact of project on fisheries; surveillance, monitoring, follow-up and future planning. A general session was also held in Halifax. The purpose of the meetings was to provide a final opportunity to review participants to present their views and opinions on the proposal. Approximately 550 people attended the six days of meetings. Transcripts of the proceedings (788 pages) were placed in public information centres.

Forty presentations were made to the Panel during the meetings, (appendix C). Officials from Mobil, Environment Canada (DOE), Fisheries and Oceans (DFO) and Transport Canada (DOT) were present throughout the meetings. Officials from Energy, Mines and Resources (EMR) were also available during the discussions on offshore issues. Although representatives from COGLA had been invited to attend the meetings, the invitation was declined.

From the written material received and presentations made at the public meetings, as well as site visits, the Panel was able to acquire an understanding of the range of technical information and public opinion on this project. A bibliography is attached in appendix D.

1.3 Issues Related to the Process

1.3.1 The Environmental impact Statement (EIS)

Most reviewers have expressed the view that the Venture Project could be developed in an environmentally safe manner. However, many participants considered the EIS understated the impact of the project on the environment and was inadequate for prediction of environmental impacts. Some suggested the review process was in danger of being brought into disrepute. These criticisms were made despite review of the EIS, coordinated by COGLA and the Nova Scotia Department of Environment (NSDOE), prior to its submission to the Panel.

The fact that the EIS did not follow the guidelines in all respects and the failure by the proponent to justify these deviations was of concern to participants. The guidelines required detailed information and an ecological approach. However, the EIS identified environmental impacts and mitigation measures only in general terms.

Mobil responded that the project was at an early planning stage and its approach would allow environmental factors to be taken into account before design was finalised. Concerns identified during the Panel review would be addressed as more detailed project information became available.

Following Mobil's response to the Panel's request for further information, the conceptual nature of the project was of less concern to technical review agencies. However, the need for post-Panel public consultation and technical review continued to be an issue. Some public intervenors wanted the Panel to continue its role after the proponent had provided project details. These matters are discussed in section 13.2.

The Panel concludes that the inadequacy of the EIS delayed completion of the review and caused considerable difficulties for participants. While subsequent information helped to correct this deficiency, the Panel believes that better mechanisms are necessary to ensure improved EIS quality in future reviews.

The Panel also considers that future projects should be referred early enough to allow for appropriate guidance to be given to proponents in the preparation of their studies.

1.3.2 Scope of Review

A concern was raised that the scope of review excluded transportation of gas and associated liquids to markets. It was DOE's position that an evaluation of alternative methods of transporting gas to market, should have received more attention in the EIS. While the Panel is sympathetic to this argument, the question of transportation to market is outside its mandate.

1.3.3 Two Panel Review

The Environmental Assessment Panel co-operated with SERP and established compatible procedures and public meeting schedules. Public information sessions were held jointly and both Panels were represented at the final meetings. Briefs filed with either Panel were exchanged to prevent duplication of effort by participants.

Although considerable effort was expended in coordinating the activities of the two Panels the public expressed concern with the separation of functions. The Panel wishes to draw this concern to the governments' attention.

2.0 THE OFFSHORE PLATFORMS

2.1 Gas and Gas Condensate Blowout

2.1.1 Background

In its EIS, Mobil states that the impacts of gas and gas condensate blowouts during the drilling, construction and operations phases would be minor to negligible. Mobil defined the worst-case blowout as a 200 day discharge with a high condensate-to-gas ratio, and a flow of condensate of approximately 1000 barrels per day. The resulting plume was modelled up to 80 km away beyond which point the worst case condensate concentration would drop below 10 ppb.

Mobil also provides worst-case hydrocarbon concentration data that it used for its impact predictions. These ranged from levels causing fish kills in the immediate area of the blowout down to concentrations causing larval mortality and tainting of fish and shellfish (10 ppb prolonged exposure).

2.1.2 Blowout Probability

Mobil considers a Venture blowout to be unlikely. Statistics presented in the EIS indicate that 97.5 per cent of all wells in operation in recent years were incident-free. However, since Mobil proposes to drill at least 16 wells the possibility of a blowout requires careful consideration.

At the request of the Panel and its technical experts, Mobil provided the following information in its EIS Supplement:

	Gulf Canada (1981)	Dahl et al (1983)
Exploration drilling	1 blowout / 160 wells	1 blowout / 125 wells
Development drilling	1 blowout / 1344 wells	1 blowout / 500 wells
Production	1 blowout / 3617 well-years	1 blowout / 4000 well-years

At the final public meetings, Mobil was asked to calculate the probability of a Venture blowout. Using Dahl's figures, Mobil determined that for development drilling, and 18 years of production, there would be a 15 per cent chance of a blowout (1 in 6.6) and a 3.3 per cent chance of a blowout with a fire (1 in 30). The Panel's

technical expert noted that the risk at Venture was not likely to exceed these figures. It was also noted that not all blowouts would be worst-case.

2.1.3 Potential Impacts

Mobil's EIS identifies the potential impacts of gas and gas condensate blowouts to be lethal or sublethal effects on zooplankton and members of the biofouling community, effects of thin slicks on marine birds, condensate slicks reaching Sable Island, and interruption of fisheries activity, tainting of catch and fouling of nets.

In all cases, Mobil rates the impacts to be minor, and the residual impacts after mitigative measures to be negligible. Mobil does not give any details of specific mitigative measures in its EIS, but states that they will be provided in its blowout contingency plan. It became apparent that, while the proponent intends to try to control the blowout at source or, if necessary, drill a relief well, cleaning of affected areas and fouled birds is the only measure Mobil considers feasible.

Mobil maintains that the most significant factors affecting the fate and behaviour of Venture condensate spills from blowouts are the low condensate concentration of the gas and its subsequent rapid dilution into the water column or atmosphere. While this would assist in reducing environmental impacts, Mobil acknowledges a fire hazard.

The Panel concludes that there is a significant possibility of a well blowout during development and production of the Venture field and that this could result in major fire hazards as well as environmental impacts. Contingency plans need to be established prior to development drilling to take these risks into account. Platform designs should incorporate fire prevention and control measures to the maximum extent feasible. Specific environmental impacts are discussed in more detail in later sections of this Report.

2.2 Drilling Muds

Venture drilling requires water-based drilling muds, although development wells will likely also use oil-based muds. Mobil's EIS rates the impacts of drilling muds dur-

ing development drilling and production to be minor or negligible, depending on the base.

Mobil carried out toxicity tests on the three types of drilling muds under consideration: water-based, low-toxicity oil-based and conventional oil-based. The studies indicated that for water-based and low-toxicity oil-based muds, plume concentrations from both operational discharges and bulk dumps would have negligible impacts. Studies on conventional oil-based drilling muds indicate that minor impacts could be registered by benthic organisms, biofouling organisms, and fish which remain in the immediate area for a prolonged period of time.

Mobil's EIS Supplement acknowledges the potential for biological impact from the disposal of conventional oil-based drilling mud, and identifies two possible mitigation measures: oily water clean-up or non-toxic oil-based drilling fluids. However, no specific commitments were made. Mobil merely stated at public meetings that the best available technology would be used in development drilling, subject to the approval of COGLA.

DFO remains concerned as to the potential adverse effects on benthic organisms and fish in the vicinity of the production platform, and on organisms occurring in the Sable Island area. Both DOE and the Panel's technical expert maintain that Mobil should be required to use non-toxic muds.

The Canadian Nature Federation (CNF) voiced strong concern regarding a scientific knowledge gap of the cumulative impacts of drilling fluid disposal, a gap identified by Mobil in its Supplement. The CNF recommended formation of a committee to plan and implement a detailed study of chronic releases in the Venture area so that scientific information may be accumulated for Venture and future projects. It also recommended that only low-toxicity or water-based drilling muds should be allowed for Venture development. If oil-based muds are required, Mobil should recycle as much as possible and dispose of such oil-based muds onshore at approved sites.

The Panel concludes that the disposal of oil-based drilling muds offshore could be deleterious to the environment, and that water-based or low-toxicity oil-based muds should be used whenever possible. If conventional oil-based drilling muds prove to be necessary, their disposal should be at suitable onshore sites. It also concludes that monitoring of drilling wastes, including mud, is required to determine what, if any, long-term effects will arise from development of the Venture field.

2.3 Impacts of Environment on the Platforms

2.3.1 Sea Ice and Icebergs

A discussion of the threat of ice to the production and transportation systems, and possible countermeasures, was requested in the guidelines. Mobil's EIS contains a description of historical sea ice and iceberg conditions.

Comments received after the information sessions included sea ice and iceberg impact concerns. EMR and DFO indicated that Mobil's study of potential sea ice impacts was adequate since sea ice found in the region of interest is both rare and in a well-advanced state of decay. It was pointed out that icebergs are also rare, but potential impacts should be addressed, due to recent sightings. It was noted that icebergs have not been considered under project design. These agencies recommended that the proponent address this problem from both an historical and a modelling point of view, discussing such aspects as iceberg size, potential damage to structures, preventive measures, design criteria, and scouring probability.

Mobil expands its discussion of potential iceberg impacts in the Supplement. After examining the situation from an historical point of view, Mobil concludes that all existing iceberg scours are relict and that the low probability of impacts does not warrant further examination.

EMR pursued its concerns of potential iceberg impacts on platforms at the final public meetings stating that, although the ice-related problems that had been focussed on to date related to the seabed, the problems associated with potential iceberg damage to platforms should be considered. Mobil indicated that although it has not been studying this particular question for the Scotian Shelf, it has been carrying out reconnaissance programs and studying iceberg towing techniques. Mobil stated that it plans to incorporate the information gathered into its contingency plans on icebergs.



A technical expert to the Panel raised the potential threat of pack ice on the offshore platforms. Mobil stated that after it incorporates current, wave, and wind considerations into its final design, it will determine whether or not the design is safe from simultaneous occurrences of pack ice events. If it is deemed necessary, Mobil will incorporate an appropriate criteria into its engineering design.

The Panel concludes that the proponent's evaluation of the threat of ice on the project is adequate, but contingency plans and platform design should take into account information that is to be gathered on icebergs and sea ice. An iceberg reconnaissance program will be required throughout the life of the project, even though the probability of an incident is slight.

2.3.2 Seismicity

The EIS states that the Venture field is located in a zone of low seismic activity. Mobil based this statement on the results of a 1982 study but, because geotechnical considerations are site-specific, the matter would be studied in detail at a later date.

At the public information sessions and in written comments to the Panel, the accuracy of Mobil's statement concerning the low seismicity of the Venture site was questioned. Less than 200 km from the Venture field there is an area of historic concentration of earthquake epicenters, including a 1929 earthquake of 7.2 on the Richter Scale.

Further information was requested by EMR on Mobil's assessment of earthquake risk in the offshore area. Mobil agreed that additional seismic information was required and stated that a Venture Development Earthquake Study had been initiated. The EIS Supplement indicates that the results of this study will be incorporated in the Venture Development Plan, to be filed with COGLA in January, 1984.

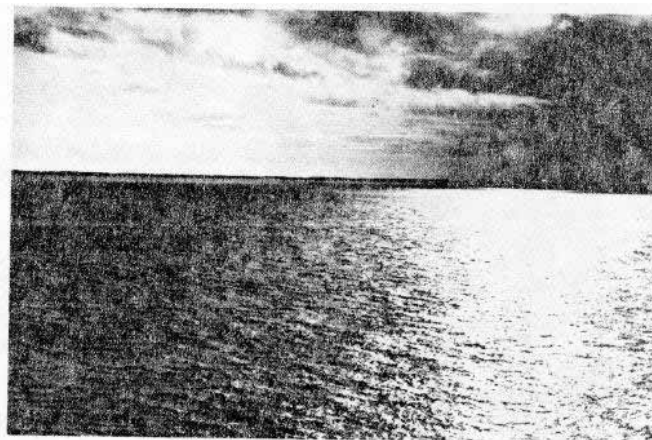
The hazard to offshore platforms posed by seismic ground motion was not an issue of significant concern at the final public meetings. EMR indicated that although the hazard has not yet been adequately assessed, Mobil's proposed studies should provide the information required to remedy the deficiency.

The Panel concludes that the results of the proponent's seismicity studies, should be subjected to review by agencies with appropriate expertise in determining

potential risks from earthquakes. Measures to protect the offshore production facilities from earthquakes should be incorporated as appropriate in the design.

2.3.3 waves

A Panel expert noted the uncertainty involved in estimating extreme wave conditions in the shallow waters of the Venture site. Although Mobil addresses normal and extreme wave climate conditions, there is no physical model capable of describing the behaviour of waves at the Venture site, taking into account the interaction of effects arising from sheltering, shoaling, refractive focussing, bottom friction, breaking and currents.



In its EIS Supplement, Mobil responds to concerns regarding wave climate and outlines six studies to be conducted in support of engineering requirements for the project.

The significance of and necessity for further wave climate studies was emphasized at the final public meetings. DFO indicated that a satisfactory resolution of wave climate concerns should be a condition of project approval. DFO acknowledged Mobil's studies of the percentages of time that waves in excess of various critical heights would occur. However, verification of design wave conditions in the shallow water around Sable Island is required. DFO's concerns were shared by one of the Panel's technical experts who indicated that wave climate is probably the single most important environmental factor in the Venture development.

The Panel concludes that waves could pose a significant threat to the project platforms and that there is a requirement for further study before proceeding with design.

2.4 Safety Issues

2.4.1 Employee Safety

The EIS guidelines required Mobil to provide a description of planned employee safety measures in hazardous conditions. Mobil's EIS contingency plan section states that personnel will be trained in compliance with the Canada Oil and Gas Production Regulations. Onsite inspectors will audit and monitor all the contractor programs, and ensure that safety regulations are being followed. Mobil briefly outlines planned safety training related to the offshore facilities.

The Panel's technical expert contended that a more adequate disclosure of the measures for employee safety is required. Safety training courses should be detailed, contingency plans should be made publicly available, and fire prevention and control systems specified.



DOT complained that the details of training programs for personnel in safety and pollution countermeasures were not addressed in the EIS. It recommended that Mobil indicate the different types of training required during the various phases of the project.

After reviewing the information presented, the Panel determined that the issue of employee safety required further attention before public meetings could proceed. Mobil's EIS Supplement describes a safety program for

all who could be affected by the project, including Mobil employees and contractor personnel.

At the final public meetings, the Panel's technical expert considered the information provided for employee safety training generally satisfactory. The expert acknowledges that Mobil has plans for loss prevention and control measures, but remains concerned as to implementation methods and plans for loss situation follow-up.

The Panel concludes that the need for a detailed safety training program to ensure employee safety on the platform and other areas of the project has been recognized by the proponent, but that specific plans, measures and methods have not yet been developed. There is a requirement for submission of a detailed training program for workers and monitoring of its implementation by regulatory authorities throughout the project.

2.4.2 Search and Rescue

Comments submitted to the Panel expressed concern regarding the omission from the EIS of search and rescue information. In response to a request from the Panel, Mobil addresses this issue in its EIS Supplement by describing the current search and rescue facilities in the project area, and industry/government co-operation.

Mobil also advised of industry plans to construct and operate an emergency base on Sable Island. The facility will consist of a helicopter landing pad, accommodation facilities and associated emergency equipment. One person will be required on site at all times for maintenance and operation.

At the final public meetings, DOT recommended that liaison be developed among the offshore industry and the appropriate federal government departments to ensure that each becomes more familiar with the others' concerns, limitations and procedures.

The Panel concludes that an emergency base on Sable Island for evacuation purposes could be considered by the regulatory authorities provided it can be installed in an environmentally acceptable manner. The base should be installed to provide increased search and rescue capabilities for the benefit of all offshore operators.

3.0 THE SUBSEA PIPELINE

3.1 Integrity of Pipeline

The EIS gives a very limited description of the design of the proposed subsea pipeline. It states that gas and condensate will be transported about 210 km to shore in one 9 14 mm diameter concrete-coated subsea pipeline trenched into the seafloor where necessary.

Initially, Mobil described the possibility of an offshore pipeline rupture as very remote. However, after several pipeline failure studies were examined at the request of the Panel, it became evident that at least one rupture will probably occur over the life of the project.

Studies in the Gulf of Mexico indicate a probability of one failure over the life of the project, based on a rate of 0.23 failures per 1,000 kilometre-years of pipeline. A Gulf Canada study of 347 pipeline accidents between 1955 and 1980 concluded that 0.56 pipeline accidents occurred per year per 100 wells in production. Based on 18 years and 16 wells, this yields a probability of 1.6 failures over the life of the Venture project.

Mobil determined the worst-case pipeline spill would release 10,000 barrels over a period of one day. Mobil determined that condensate would disperse quickly, and that any slicks would be quickly reduced in size by evaporation. It was concluded that if a rupture occurred close to land during onshore winds, shoreline contamination would be inevitable, and this was confirmed by the Panel's technical expert. In addition to pollution resulting from an accident, there is also a possibility of fire.

The Panel concludes that there is a probability of a failure of the pipeline proposed by the proponent over the life of the project. Contingency plans need to be developed prior to operation of the pipeline to take into account not only environmental effects but also dangers to vessels and the platforms.

3.1.1 Impacts from Fishing Gear

At the initial public information sessions, Mobil was asked to clarify its plans for pipeline trenching and/or burial. However, no criteria were outlined. The Panel's technical expert recommended untrenched portions of

the pipeline not be in locations where the pipe could be in danger from impact by trawler gear or ships' anchors.

Although fishing vessel anchoring has been identified as an important potential cause of pipeline failure Mobil concluded that trenching will not usually provide protection because some anchors may penetrate to a depth of six m.

In its EIS Supplement, Mobil provides evidence from numerous studies in an attempt to indicate that trenching or burial is not necessary to ensure pipeline safety if hit by trawl gear.

EMR observed that over the lifetime of the pipeline there will be numerous impacts from fishing gear which could affect the integrity of the concrete coating. Mobil did not demonstrate the potential impacts of a trawl board on a pipeline free span (a section of pipeline that lies unsupported between undulations in the seabed), and both the Panel's technical expert and EMR considered that this situation was more likely to result in damage.

The Atlantic Fishing Vessel Association (AFVA) reiterated that studies show free spans to be a common occurrence. It recommended that Mobil sponsor independent research with fishing gear similar to that in use on the Scotian Shelf to assess the impacts on the pipeline.

DOT's major concern is that the design of trawl gear is not static, and gear may become heavier in time. It recommended that through liaison with fishing authorities, the proponent should be kept advised of new gear designs to avoid future problems.

Both AFVA and EMR indicated that burial of the pipeline should be considered in intensely fished areas. A technical expert to the Panel stated that Mobil cannot make a reasoned assessment of the reliability of the pipeline until more detailed information has been provided. The integrity of the pipeline and the impact of the pipeline on fishing operations are considered in more detail in Sections 3.1.2 and 4.2. However, in the event that any section of the pipeline remains unburied, a liability waiver will be necessary for damage to the pipeline during routine fishing activities.

3.1.2 Wave/Current Forces and Seabed Topography

Wave and current forces can become threats to the integrity of the subsea pipeline by scouring away supporting material. This causes a free span in the pipeline. Inadequate support can also occur when a straight pipe is placed on an undulating seabed.

At the initial public information sessions, a technical expert to the Panel expressed concern as to the impact of wave/current forces on pipe that lies unsupported between undulations in the seabed. He noted that current and wave action will provide a flow of water under as well as over the pipe, and even with a steady flow an oscillating vertical force can be exerted on the pipe. Such a force could cause the pipe to bend cyclically and increase the potential for fatigue.

In its EIS Supplement, Mobil again does not specifically detail the impacts of and potential for pipeline fatigue. However, it makes the commitment to carry out investigations along the corridor to identify areas where unstable slopes or high currents occur.

Mobil also addresses the concerns of the technical expert in the monitoring section of its EIS Supplement. It identifies a plan to monitor the integrity of the pipeline every 12 months, and specifies that this will include a visual survey for spans of unsupported pipeline.

The potential problems associated with unsupported pipeline was an issue of major concern at the final public meetings. EMF? noted that Mobil's studies indicated these conditions occur on almost all pipelines and that this increases the chance of friction-relation failures at suspension points. EMR therefore recommended that, if the pipeline cannot be laid in a manner that eliminates such conditions, it should be stabilized in a trench or berm.

Because current Canadian codes and regulations give no guidance on the question of subsea pipelines, the Panel's expert examined the practice of other nations. After considering various codes, the pipe to be used, the forces likely to be acting on the pipeline, and the area involved, the expert concluded that non-burial should be the exception rather than the rule.

The Panel concludes that burying the offshore pipeline could significantly decrease the probability of pipeline failure.

3.1.3 Iceberg Scour

Mobil's coverage of potential threats to the integrity of the pipeline from icebergs is limited to noting that the corridor lies outside the normal limits of iceberg drift.

Both DOE and EMR commented on Mobil's lack of detail on the possibility of icebergs scouring the seabed. EMR suggested that Mobil should address the likelihood of iceberg incursion into the area and the potential effect on the pipeline. DOE stated that, since icebergs have occasionally been sighted in the project area, Mobil should attempt to indicate what size icebergs could be encountered, whether they could damage the subsea pipeline, and what measures could be taken to mitigate the threat in a heavy iceberg year.

Mobil did not include any additional information on potential iceberg impacts in its EIS Supplement. At the final public meetings EMR noted that data are insufficient to project the probability of iceberg impacts on a seabed pipeline. Mobil is studying the characteristics of icebergs on the Scotian Shelf, but does not plan to design the pipeline with any provision for iceberg protection.

The Panel concludes that although no method of pipeline protection from icebergs was detailed by the proponent, the likelihood of such an event is far less than the possibility of pipeline failure from a number of other causes.

3.1.4 Potential Pipeline Rupture Impacts

Mobil identifies moderate potential impacts of a pipeline rupture on the nearshore environment. It indicates in its EIS that it would respond to a spill by trying to prevent slicks from stranding on shorelines. Low energy areas characterized by salt marshes or eelgrass beds would be a priority for protection in its contingency plans. However, when asked by the Panel to elaborate on its plans, Mobil stated only that conventional booms and skimmers might be used. No mention is made of the expected effectiveness of mitigation measures, although Mobil predicts negligible residual impacts.

After analysing Mobil's worst-case scenario the Panel's technical expert questioned its adequacy in covering possible extreme consequences of a nearshore pipeline rupture. It was noted that for dispersal of a slick in static inshore waters, knowledge of spreading dynamics would be vital in determining the areas of risk.

Another technical expert to the Panel stressed the need for spill trajectory information. It was noted that trajectory estimates should be based upon the wind and currents acting on the spilled hydrocarbon at the time of the event.

Mobil initially stated that an offshore pipeline rupture would affect microbiota and marine birds. The potential impacts were rated as minor, and the residual impacts after mitigation as negligible. However, a technical expert to the Panel pointed out that condensate from a pipeline spill could reach Sable Island, since the corridor is within 1.5 km of the Island.

In its EIS Supplement, Mobil outlines an offshore condensate spill countermeasure strategy. It states that because condensate is a non-persistent product in the Sable Island environment, self-cleaning would be a preferred option on environmental grounds. It also states that if clean-up is deemed necessary, it will be carried out by a few people with beach cleaning equipment.

These impacts are discussed in more detail in subsequent sections of this Report.

3.2 Pipeline Routing

The EIS does not include a finalized route for the subsea pipeline but did indicate a corridor from the Sable Island area to Country Harbour. DOE generally objected to Mobil's route selection approach, stating that it would have been more appropriate to select two specific alternatives for comparison, rather than a general pipeline corridor. One intervenor considered that a routing to Sheet Harbour rather than Country Harbour would have been advantageous. EMR submitted that should Mobil select a new corridor, an environmental assessment of the new area should be undertaken.

Mobil's EIS Supplement did not mention specifics of pipeline routing, other than to identify factors to be considered such as seabed slope and stability, obstructions and presence of fishing grounds.

DFO initiated several discussions on the routing issue at the meetings. A general comment made was that post-Panel review processes should include a mechanism for consultation with DFO on selection of pipeline routes. More specifically DFO indicated its concern with sensitive nearshore organisms such as lobster and other shellfish. It stated that detailed information is needed on precisely where the pipeline is going to come ashore.

At the final public meetings, a representative of the Eastern Shore Development Commission presented a pipeline routing to a landfall terminal at Sheet Harbour, as opposed to Mobil's proposal for Country Harbour. The Commission believes that the Sheet Harbour route would only involve 12- 16 more kilometres of subsea pipeline and would eliminate 65 km of onshore pipeline. The alternative assumes that the gas plant can be located in the immediate vicinity of the landfall. The Commission representative argued that the reduction of potential onshore impacts combined with an overall lower project cost makes a Sheet Harbour landfall more environmentally and economically beneficial.

Mobil stated that the Department of National Defence operates an artillery range which would prevent the pipeline going directly to the Sheet Harbour area. This would require 80 km of additional offshore pipeline and cause difficulties in locating a geotechnically suitable route.

The Panel notes that if government desires to consider the Sheet Harbour alternative, further detailed information and review of the proposal would be required.

Mobil was asked whether it had a preference for routing the pipeline north or south of Sable Island. Mobil responded that the routing will be governed by the need for pipeline stability and for this reason the northern route is now favoured. DFO mentioned that the area to the south of the Island possibly represents a more important nursery ground for juvenile fish.

A technical expert to the Panel stated that geotechnical factors and bottom currents are primary considerations affecting pipeline routing. However environmental damage could be less from a spill originating on the south side, due to the high energy nature of southern coastal waters.

The Panel concludes that detailed studies of the pipeline routing are essential to ensure that geotechnical and fisheries concerns are satisfied in the design alignment. The possibility of routing the pipeline further away from Sable Island but within the corridor should also be considered. Based on the information provided to date the Panel concurs that the selection of routing around Sable Island should be based on pipeline stability requirements as neither of the routing alternatives have clear-cut environmental advantages. The results of pipeline routing studies should be reviewed by appropriate scientific and regulatory authorities prior to route finalisation.

3.3 Hydrostatic Testing Fluid

Hydrostatic testing fluid is water containing corrosion inhibitors, biocides, and fluorescent marker dyes, and is used to test the pipeline for leaks once installation is complete. After Mobil completes testing it will release 134 000 m³ of fluid under controlled conditions. Mobil predicts minor impacts on fish and benthos in the near-shore environment. Mitigation measures involve controlling the timing, location, rate of fluid discharge and dilution and dispersion.

Both DOE and DFO expressed concern regarding Mobil's assessment of potential hydrostatic testing fluid impacts. DOE considered it possible that Mobil has underestimated the biological impacts of the fluid release. DFO expressed concern at the lack of effluent treatment prior to discharge, and indicated a need for bioassays.

The EIS Supplement makes a commitment for a site selection study for disposal of hydrostatic testing fluid. Mobil plans to consider local characteristics, the possible immediate effects of disposal, and what the most

sensitive periods might be. Based on the results of this evaluation Mobil plans to select an appropriate site and discharge rate. Mobil also states that hydrostatic testing pressures and procedures will follow appropriate standards and regulations.

A potential impact not addressed by Mobil is the uncontrolled flow of hydrostatic testing fluid if a pipeline ruptured during testing. A survey of pipelines in the North Sea indicated that the most serious incidents occurred during hydrostatic testing.

Prior to final public meetings DOE restated its concern that Mobil has underestimated the potential impact of the release of hydrostatic test fluid. DOE believes that improper release or injudicious use of certain biocides could have serious and long-lasting impacts, particularly if released into low-energy coastal environments.

The Panel concludes that further information is required to complete the assessment of planned or accidental release of hydrostatic testing fluid. Information should be reviewed and approved by appropriate resource management and regulatory agencies prior to testing of the pipeline.

4.0 OFFSHORE FISHERIES

4.1 Disruption during Pipeline Laying

Mobil identifies possible effects on offshore fishing activity in the immediate vicinity of lay barge operations. It rates the impacts to be negligible to minor and plans to mitigate by adjusting construction schedules and locations whenever practicable. The concern expressed in this section is also applicable to the nearshore fisheries.

AFVA and DOT asked Mobil whether there would be an exclusion zone around the lay barge that would interrupt fishing activities. Mobil indicated that because the barge is winched along the pipeline route, small sections of traditional fishing areas will be unavailable for short periods of time. Where trenching is required, the lay barge will remain in the area for a longer period of time.

Concerns were also raised regarding potential interference with the migration of herring and mackerel. AFVA requested an investigation of the likely degree of interference that pipeline construction would have on these migrations. Mobil does not address this concern in its Supplement. At the final public meetings AFVA restated its concern, and recommended consultation with interested parties.

The other concern with potential impacts of pipeline construction on offshore fisheries involves construction debris. This is addressed in section 7.0.

The Panel concludes that disruption of offshore fishing during pipeline laying is likely to be temporary and a consequence of the need for safety exclusion areas during construction rather than environmental impacts. There is a need for the proponent to consult with fisheries interests to establish a timing for the construction of the offshore pipeline that will minimize disruption.

4.2 Pipeline Interference with Fishing Operations

The major concern with potential pipeline operation impacts on the offshore fisheries is the hazard to bottom trawl fishing. A particular concern of DFO is that the pipeline is projected to go through lucrative domestic fishing areas. AFVA noted that it disagrees with Mobil's conclusion that the offshore pipeline does not cross

important fishing areas. It pointed out that Middle Bank and the Gully are intensively fished and would be areas of potential conflict. DFO indicated that a pipeline barrier would potentially preclude east-west trawling along a 15 km wide corridor between Sable Island and the mainland. It requested an assurance that the subsea pipeline would not render large areas of fishing grounds untrawlable during any phase, including abandonment. In its EIS Supplement, Mobil indicates that it is possible to design large diameter pipes such that trawl gear will pass over without snagging or hooking.

DFO then indicated that, although it could not verify all of Mobil's new information, it is willing to waive the effect of the offshore pipeline on trawling as a major concern, with the condition that Mobil provides a comprehensive compensation scheme should problems arise. However, the scheme presented by Mobil at the final public meetings excludes compensation in cases where there is known to be an obstruction on the sea floor.

At the final public meetings, Mobil presented a film segment showing a 1200 kg trawl board impacting a 400 mm diameter pipeline that rested on the seabed. The trawl board passed over the pipeline undamaged. However, the potential problem of a trawl board crossing a free span segment of pipeline has not been resolved.

In response to a concern expressed by Fisheries Resource Development Limited, Mobil stated that scallop drags would also bounce over the pipeline. It should be noted that these predictions were not based on tests, but Mobil stated at the meetings that it will carry out field tests in the near future to verify this prediction.

The Panel concludes that the information provided was insufficient to provide assurance that there would not be problems for fishing gear or disruption to the fishery as a result of an unburied pipeline. It is apparent to the Panel that unless the proponent is able to demonstrate that conflicts with fishing gear will not occur, burial of the pipeline would be preferable in intensively fished areas. In the event that any section of the pipeline remains unburied, a compensation plan will be necessary to ensure that damage to fishing gear and other related costs would be covered.

4.3 Impacts of Hydrocarbons on Fisheries

A study presented by Mobil of potential effects upon the Nova Scotia fishing industry from offshore petroleum development indicates that after looking at three past blowouts (Ekofisk, IXTOC 1, and Santa Barbara), it has been proven difficult to show a direct impact on the fishery. However the study warns that negative impacts to the fishery still result. In the case of IXTOC, the Mexican government forbade fishing in the area. Another potential problem is fish buyer suspicion of all fish from the region of a blowout, whether they are tainted or not. The study warns that if this becomes a serious problem, fishery managers may be forced to close parts of the fishery to avoid suspicion. Concern was expressed at the final public meetings that this could occur to the Nova Scotia fisheries after a Venture blowout.

4.3.1 Tainting of Catch

Mobil predicts that after a worst-case blowout hydrocarbons would remain in the upper layer of water. In its opinion, tainting of benthic organisms therefore is unlikely and pelagic fish of commercial size probably would not stay in the plume long enough to become tainted. However, it states that vessels fishing in an affected region could have their gear fouled and thus their catch tainted.

DFO stated that it does not have experience in dealing with tainting of catch from gas or gas condensate. However, from its experience with light oil and crude oil spills, it concludes that fish swimming at large do not run a high risk of becoming tainted, while fish that become entrapped in oil-fouled nets have often failed to meet fisheries inspection criteria.

A potential problem brought to light during discussions at the final public meetings is the uncertainty of standards for determining the point at which tainting is apparent. At present, taste panels are used to determine whether tainted fish are fit for marketing or processing.

The Panel concludes that immediate disruption to fisheries in the event of a pipeline failure was more likely to arise from tainting than fish kills. The information provided does not allow a definite determination of the areas that could be affected. Tainting could occur anywhere along the pipeline route to shore. There is a need for a better determination of the area in which fish tainting is likely in order that the zone of interruption to fisheries activities be known in the event of a platform blowout or pipeline failure. Further studies are required on the concentrations of condensate and the time involved in the tainting of seafish and shellfish. There will also be a need to provide compensation if such events occur.

4.3.2 Juvenile Fish Species

Numerous concerns were raised at the public information sessions, regarding the potential impacts of a platform blowout or pipeline rupture on concentrations of eggs and larvae of cod, haddock and silver hake around Sable Island and in the pipeline zone. After further study at the request of the Panel, Mobil determined the shallow waters around Sable Island to be an important nursery ground for juvenile fish species, particularly haddock, and also identified numerous factors that suggest potential vulnerability.

At the final public meetings, DFO stated that the potential adverse effects of a blowout on the survival of fish eggs and larvae is one of its major concerns. It agrees with Mobil's comment that because of natural year-to-year variability the effect on subsequent fish catches could probably not be detected. However, it maintains that a blowout could cause heavy mortality in a sensitive part of the ecosystem. AFVA expressed similar concerns.

The Panel concludes that the most significant environmental impact of a major blowout would be on juvenile fish but that adult stock losses would not be detectable, given natural population fluctuation.

5.0 NEARSHORE IMPACTS

5.1 Pipeline Construction

During construction of the subsea pipeline, the near-shore fisheries will be affected by seabed alteration and suspended sediments. Mobil indicated that the fish plant, local wharves, salmon traps, lobster and scallop fishing, herring spawning, and shellfish aquaculture are all vulnerable.

Mobil rates the nearshore impact of seabed alteration during pipeline construction as moderate to nil. The major area of concern involves proposed trenching activities. DOE stressed that pipelaying scheduling would be critical to avoid serious damage, and recommended that Mobil consult DFO and DOE to determine suitable periods for dredging and pipelaying.

Government agencies reviewing the EIS have pointed out that trenching deepens water channels, increases flow, and causes marsh erosion. Because marshes are of considerable ecological value and sensitivity, reviewers recommended that extreme caution should be taken in the approach to and traversing of any marsh or estuarine system.

A technical expert to the Panel submitted, prior to final public meetings, that previous concerns for pipeline construction impacts on salt marshes and eelgrass beds are not pertinent in the Country Harbour location now proposed by Mobil. He stated that salt marshes will definitely not be traversed, and eelgrass areas will probably not be traversed.

Mobil rates the nearshore impact of suspended sediments generated by pipeline construction to be from moderate to negligible. Impacts will occur when the operation of trenching equipment makes a slurry of bottom sediments. Mobil states that because sediment settling time is short and the pipelaying rate will be 1.6 km per day, any disturbances will be short-term and local. However, the potential effects of suspended sediments include temporary smothering of fish food, filter feeders and herring spawn and local interference with habitat use or migration routes.

Mobil's mitigative measures include a combination of route selection and construction scheduling should an estuary be crossed. Aquaculture sites would be restored.

In the EIS Supplement, Mobil committed itself to undertaking an assessment of the environmental aspects of the Country Harbour landfall area as part of the final route selection process. Geotechnical investigations have been carried out, but future studies will provide the site-specific data needed to minimize impacts in near-shore areas.

At the final public meetings, DFO stated that it remains concerned with the possible adverse effects of pipeline construction on shallow, sub-tidal environments that are important to lobster and other shellfish. It recommended that a monitoring program be designed to address this concern.

The Panel concludes that seabed alteration and suspended sediment from pipeline construction will cause short-term disruption of fishing activities in the Country Harbour area. Compensation together with monitoring of effects and development of an acceptable construction schedule would be required. The Panel also concludes that site-specific information is required to select a final route in the Country Harbour area to minimize impacts on the shoreline, related installations and fisheries activities. Compensatory measures including site restoration should be implemented as necessary.

5.2 impacts of Hydrocarbon Releases

In its EIS, Mobil rates the potential nearshore impact from a pipeline rupture as moderate to negligible. Based on a worst-case condition Mobil predicts that concentrations potentially lethal to fish larvae and other plankton could occur within the plume boil for the one-day release period, and that there would be moderate impacts on the benthos, fish, and fisheries in the near-shore environment.

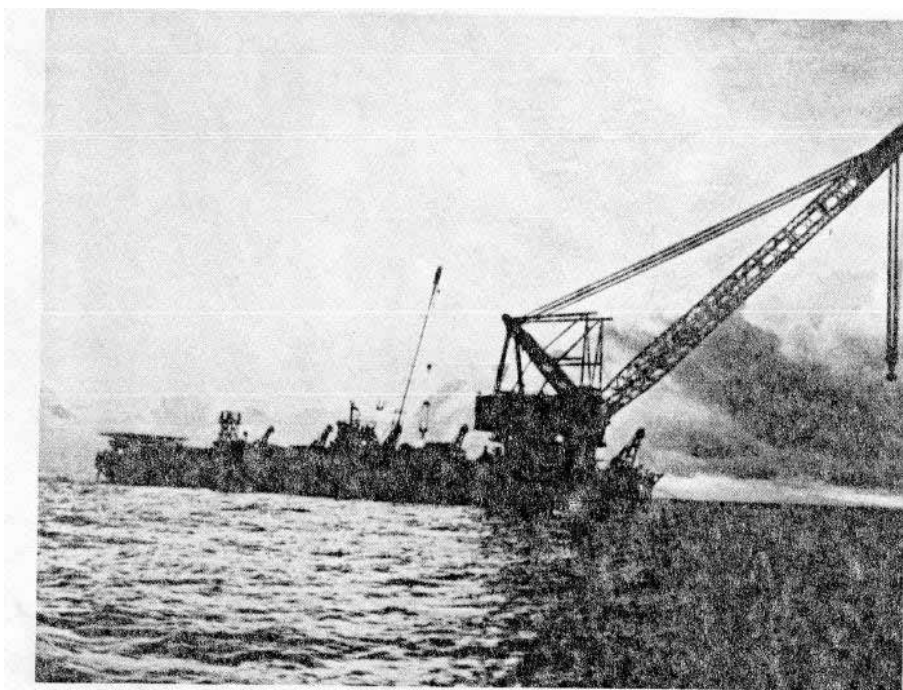
Mobil's plans for mitigative measures in the event of a rupture are to attempt to prevent slicks from stranding on shorelines, especially in low-energy areas characterized by salt marshes or eelgrass beds. Care will also be taken to protect aquaculture sites, fixed gear associated with inshore fisheries, and the facilities that serve these operations. Mobil predicts minor residual impacts.

Several written comments submitted to the Panel after the public information sessions addressed the pipeline

rupture hazard. A technical expert to the Panel considers the possibility of shoreline contamination to be real, especially after finding tar patches from an older spill near Seal Harbour. The expert also believes that inshore fisheries and aquaculture could be even more affected than the EIS predicts, if the worst occurs. In particular, mussels absorb a range of hydrocarbons, thus even a minor spill could have serious consequences for mussel farmers. ,

in its EIS Supplement, Mobil makes a commitment to map sensitive shorelines, access points, and disposal sites, in order to formulate clean-up priorities and plans.

The Panel concludes that there could be significant environmental impacts in the event of a pipeline rupture in the nearshore area. A nearshore spill contingency plan is required to protect sensitive areas.



6.0 SHIPPING CONFLICT

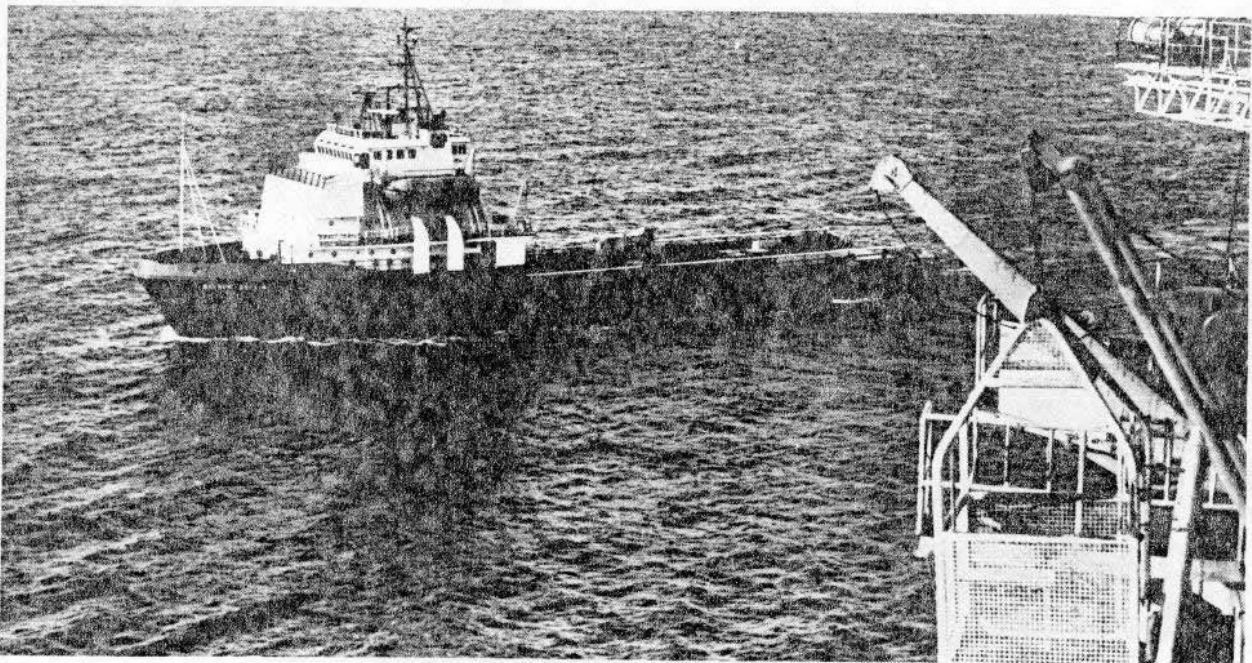
Mobil indicated that, in addition to the analysis of present marine traffic contained in the EIS, a survey had been recently completed that studied the interaction between the oil and gas industry and the fishing industry in Nova Scotia. The survey attempted to identify the concerns of the participants, as well as their suggestions on minimizing the potential conflict between fisheries and the offshore industry. Mobil indicated that the survey results will be discussed with local fishermen, in an attempt to find ways to alleviate potential problems identified.

The lack of appropriate information in the EIS on projected marine vessel traffic was identified as a problem. Information still required includes details of ship size, velocity, frequency and cargo along with expected casualty risks and the factors determining them. In its EIS Supplement, Mobil indicates some of the transportation options being considered, and states that better-defined information will be available for the Development Plan.

The Oil and Gas Committee of Voluntary Economic Planning (Fisheries Sector) stated at the final public meetings that it anticipates substantial traffic associated with offshore developments, and it believes Mobil has not adequately examined the potential problems.

At the final public meetings, DOTI indicated that it does not plan to establish shipping lanes for supply boats. However, it does plan to issue notices to mariners that there is activity in a particular area.

In the absence of detailed information the Panel is unable to determine the extent to which conflicts will arise. The Panel concludes that potential conflicts between increased marine traffic and offshore fishing movements could best be resolved by the provision of detailed supply vessel traffic information as it becomes available.



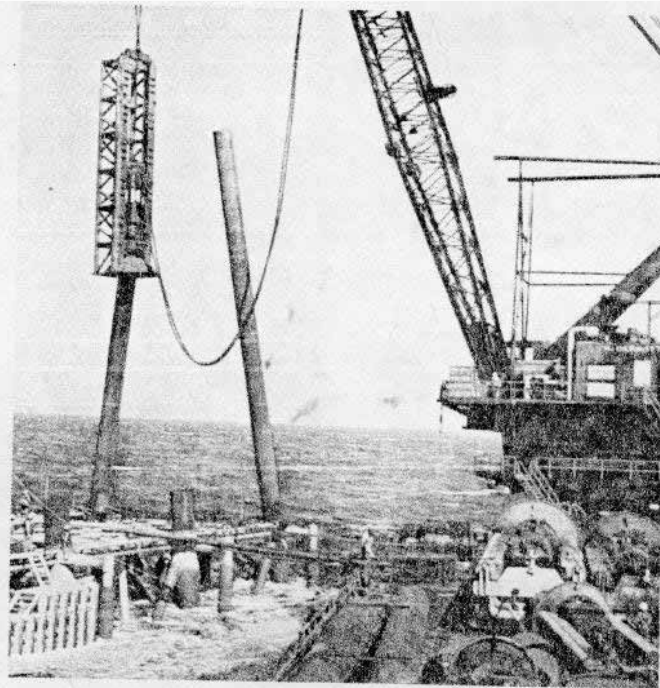
7.0 SEABED DEBRIS

Throughout the review process, an issue of major concern has been the potential damage to fishing equipment caused by seabed debris. Studies indicate that there have been many instances of damage to fishing equipment caused by oil and gas industry debris in the North Sea, and that the worst problems occur along the pipeline routes during pipelaying operations.

An East Coast Petroleum Operators Association (EPOA) study shows that North Sea fishermen have suffered damage to both their gear and vessels when their nets became entangled with accumulated garbage. A secondary impact is reduced access to affected grounds because fishermen avoid debris-ridden zones.

Mobil acknowledges that the interaction between debris and fishing nets was an important impact in North Sea oil and gas development and intends to exercise strict controls over its contractors and to provide compensation if damage occurs.

The Panel concludes that debris from construction activities represents a potentially serious conflict between the oil and fisheries industries but problems can be minimized with good management policies together with compensation for any residual problems. Adequate arrangements should be established between the proponent and its contractors to ensure that debris resulting from offshore platform and pipeline construction is not deposited on the seabed.



8.0 COMPENSATION TO FISHERMEN

Although the guidelines required the proponent to discuss compensation measures for fishermen, the EIS merely states that Mobil is conducting an analysis of world-wide fisheries compensation practices. Numerous written comments submitted to the Panel after the public information sessions addressed the issue. DFO indicated that fishermen are legally entitled to compensation, and believed that a mechanism for restitution should have at least been discussed in the EIS.

AFVA viewed compensation as one of the most critical areas not adequately addressed in the EIS. It recognized that the fishing industry has been working separately with EPOA on the development of a mutually satisfactory compensation scheme. However, it recommended that the Panel monitor the development of compensation programs to ensure that they cover the results of oil spills, debris and loss of access. The view was expressed that a compensation scheme should be in place before development permits are issued.

In its EIS Supplement, Mobil responded to the Panel's request by detailing its past, present and future activities related to the development of a fishermen's compensation plan. Mobil indicated that it was considering a draft compensation policy.

This policy would allow for compensation for damage to or loss of fishing vessels and gear caused by oil industry activities and include consideration of lost catch. It would also provide guidelines for the basis of settlement for claims for loss, damage and lost catch due to oil companies exploration and production on the east coast. A compensation claims settlement board would be established to assess claims for damage which can be attributed to the oil industry. The board could have representation from the fishing and the oil industries.

AFVA stated that the information provided in the Supplement was inadequate, and that the Panel should not permit the proponent to proceed with development without an acceptable fisheries compensation program. DFO did not make specific comments on Mobil's plans, but stated that the scheme must be acceptable to all segments of the fishing industry that may be directly impacted.

At the final public meetings, Mobil presented a draft fishermen's compensation policy prepared by the Fisheries Advisory Committee of EPOA. The policy is for damage from debris and supply and seismic vessels, when the party responsible cannot be identified.

AFVA was concerned that the wording of the agreement implied that oil pollution compensation was not included and that the processing industry was also excluded. Mobil maintained that compensation for attributable pollution is covered by legislation but that if the procedures outlined in the draft policy were acceptable they would be used in settling pollution and debris claims. However, the oil companies did not believe that they could assume responsibility for unattributable pollution. AFVA considered the existing legislation for unattributable pollution to be ineffective. DFO advised however that this legislation is being revised. AFVA was also concerned that there was no provision for loss of access. Loss of access or processing industry compensation is not being considered by Mobil.

The Panel concludes that a compensation plan satisfactory to fisheries interests has not yet been developed by the oil industry. A plan mutually satisfactory to the fisheries and oil industries should be established, but if this is not possible by the time development proceeds, the appropriate government agencies should establish a mechanism to provide suitable compensation.

9.0 MARINE BIRDS

9.1 Noise and Other Disturbances

The most significant potential impact on birds will be on the common tern and roseate tern of the Sable Island area. Both species are on international endangered species lists and only four nesting pairs of roseate terns were recorded on Sable Island in 1982. It has been shown that terns are very sensitive to aircraft noise and human disturbance. Nesting terns become very agitated by human intrusion and abandon eggs and chicks to gull predation. Mobil plans to require helicopters to maintain a minimum altitude of 650 m over Sable Island. However, it still remains uncertain as to whether deleterious effects will result. CNF expressed particular concern about impacts on terns.

Mobil identifies minor impacts on nearshore marine birds as a result of pipeline construction. Several species were projected to suffer minor impacts from seabed alteration and suspended sediments while others would likely face a certain degree of habitat destruction.

The Panel concludes that construction and operation of the project could affect a number of sensitive birds and their habitats and that special care will be needed to avoid unnecessary disturbances.

9.2 Oiling

Although Mobil predicted minor impacts on marine birds if they encountered slicks, the Panel's expert concluded that a near-shore spill could conceivably place an entire population of over 1000 eiders at risk. Concern was also expressed for transient seabirds that use the waters surrounding Sable Island and are known to be vulnerable to oiling. A contingency plan for cleaning the eiders and other transient sea birds was recommended.

In its EIS Supplement, Mobil responds to the concerns for the oiling of birds by including what it refers to as a contingency plan for cleaning oiled birds. However Mobil makes no commitments to rehabilitate oiled birds nor does it mention any arrangements. It notes that no guidance is available from the Canadian Wildlife Service (CWS) or the Environmental Protection Service for dealing



ing with oiled birds. Local veterinarians may be able to treat small numbers of affected birds. The co-operative efforts of trained personnel and interest groups could also be used.

At the final public meetings, a member of the Sable Island Environmental Advisory Committee (SIEAC) stated that the responsibility for cleaning oiled birds does not lie with the oil industry. SIEAC indicated that the responsibility lies with CWS, whose policy is that birds will not be cleaned. Unless very rare or endangered species are involved oiled birds will be destroyed painlessly.

The Panel concludes that a policy for treating oiled seabirds should be established and incorporated in the appropriate contingency plans.

10.0 SABLE ISLAND

EIS guidelines specifically required Mobil to give special attention to Sable Island when discussing project design and cumulative impacts. Mobil provided a description of the Sable Island environment and acknowledged a possibility of condensate reaching the Island, and potential disturbance from helicopter overflights.

During the initial review period, a major concern was that the EIS provided very little impact prediction for Sable Island even though numerous activities will take place nearby. A technical expert to the Panel stated that although Mobil claimed that no additional facilities would be built on the Island, the future would inevitably bring further developments. Mobil should be asked to consider ways in which the increased use of Sable Island could be accommodated, and monitor and control its activities and developments on the Island.

In its EIS Supplement: Mobil attempts to address concerns of reviewers by detailing the past, present, and likely future uses of the Island. Future uses involve the installation of an emergency base and the intermittent deployment of small numbers of personnel. In response to numerous requests, Mobil also evaluated other potential impacts on the Island in the same format used for the EIS.

The most significant impacts identified in the EIS Supplement appear to be those on birds that inhabit the area. Both terns and Ipswich sparrows will be subjected to moderate impacts from noise. Mobil plans to use various mitigative measures, including construction scheduling, control of aircraft, and adherence to all codes and policies of the SIEAC.

At the final public meetings, CNF still considered Mobil's description of impacts on Sable Island was deficient. CNF concluded that the potential impacts of both accidental and chronic releases of contaminants on Sable Island should be addressed in greater detail.

It stated that in the case of an accidental spill, even the small amounts of hydrocarbons carried by a supply vessel could seriously damage the island's coastline and associated organisms. CNF indicated that not only has Mobil failed to examine the probability of an accidental



spill near Sable Island, it has failed to appreciate the potentially serious environmental consequences of such an event.

Mobil restated its position on the clean-up of Sable Island in the event of spills. It maintained that the high energy beaches of Sable Island dictate that the best clean-up strategy is to let nature take its course with condensate spills. The Panel's technical expert agreed with this approach.

A further concern of CNF was the impacts of condensate on the Sable Island flora, fauna and groundwater. Mobil presented study results to show that a single application of hydrocarbons is not very detrimental. The problems appear to result from multiple or repeated applications of hydrocarbons.

It is clear to the Panel that special vigilance should be exercised in ensuring the potential effects of oil and gas activities on Sable Island are minimized. The Panel believes that the existing SIEAC mechanism should continue to be used for providing protection of the sensitive Sable Island environment. Careful monitoring is required to protect the Island's unique features.

Neither CNF nor any other intervenor objected specifically to installation of the emergency facilities on the Island. However, any proposals should be carefully examined by SIEAC to ensure they are environmentally acceptable.

11.0 THE ONSHORE PIPELINE

11.1 Safety

In the EIS Supplement it is noted that NEB records indicate between one and two pipeline failures per 1000 km per year. Statistics from the Canadian Petroleum Association indicate a frequency of 1.5 failures per 1000 km per year. The Panel's technical expert advised that, of these failures, a maximum of one in ten could be an acute accident event resulting in fire.

The worst situation would be a complete separation of the pipeline, as a result of construction defects, material failure, corrosion, or actions by a third party. The operation of the gas pipeline at pressures greater than those normally encountered in Canada does not present any additional safety concerns, other than the increased possibility of debris being scattered in the area of a break.

The Panel's technical expert advised that safety considerations should concentrate on monitoring and detection systems and on control of third party activities along the pipeline route rather than on the establishment of buffer zones. Industry experience during the past 10 to 15 years shows a reduction in pipeline failure due to construction defects, material failure and corrosion, thereby making the incidence of failure caused by a third party much more significant than in the past. This statement is supported by statistics indicating that 96 of 140 pipeline incidents over a six year period were attributed to third party activity in the corridor.

The EIS Supplement acknowledges that third party activity is the most frequent cause of pipeline failure and outlines how the proponent proposes to minimize this type of accident. Mobil intends to install pipeline route markers, provide personnel to locate the pipelines prior to the beginning of any excavation and inspect pipelines that are disturbed by nearby excavation to ensure they are not damaged.

Mobil advised that pipeline sectionalizing valves will be installed at intervals not to exceed 30 km for type 1 zones and 12 km for type 2 as specified in the NEB Pipeline Regulations. In a type 1 zone there would be no more than five dwellings intended for human occupancy. In a type 2 zone there would either be more than five dwellings or a building or area where twenty or more

persons may live or assemble. Information on the response time for control valve operation in the event of a mishap and the expected volume of gas or condensate likely to be released from various types of pipeline breaks was not detailed.

Participants wished to know how condensate leakage will be detected. The proponent advised that a volume flow rate leak detection system would be installed in the pipeline. These systems are capable of detecting leaks as low as one-eighth of one per cent of the flow in the line. In the case of this particular project the system would be sensitive to any leak in excess of one barrel per hour.

Condensate spills was raised as an issue and Mobil stated that condensates do not penetrate deeply into organic soils. However this is not the case in permeable till and bedrock. If a spill penetrated fractured bedrock it would be extremely difficult to contain and clean up. The extent of the spill would be determined by using hydrocarbon detectors and by excavating test wells. When the spill is encountered it would be removed by pumping from wells and recovering the condensate. The process is time-consuming and expensive but has proved to be successful. However, organic soils require only soil aeration and an application of fertilizer.

The Panel concludes that the safety risks associated with the onshore pipelines will be compatible with current industry standards. Detailed safety requirements and contingency plans should be reviewed by appropriate regulatory agencies to ensure they are acceptable.

11.2 Resource Use Conflicts

In its EIS, Mobil described a pipeline corridor ranging in width from approximately 12 to 20 km. In response to a request from the Panel, a more specific one km wide corridor was described in the EIS Supplement.

During the final public meetings, the Panel heard concerns related to the validity of the pipeline routing proposed by Mobil. A particular concern was whether the pipeline would be constructed along the route shown in the proponent's documents. To ensure the protection of

biological resources reviewers also wished to be consulted on the construction schedule. Specific concerns related to resource use conflicts arising from pipeline construction and operation included forestry, wildlife, and water resources.

The Panel was advised by the Municipality of Guysborough that it supported the project but wanted construction and operation of the onshore component to meet a number of conditions such as: least possible interference with existing land uses, protection of open space, conservation areas and shoreline areas, avoidance of disturbance of residential areas, and non-interference with productive use of the land in the future. The landfall terminal and gas plant should not detract from the aesthetic appeal of the countryside. Finally, the proponent should ensure the protection of natural resources and avoid disruption of forest land, natural vegetation, wildlife and the fishery.

11.2.1 Forestry

Participants wanted to know how the project would affect private woodlot operations. Concerns included Christmas tree plantations, forest management plans, and the use of heavy equipment. An accurate prediction of impacts was not possible since the final location of the 15 m wide ROW within the proposed one km wide corridor is not known. However, a final pipeline routing must be presented to the NEB after design has been completed.

Mobil intends to negotiate a settlement with individual owners whose land would be crossed by the pipeline. Where a landowner and the proponent cannot agree NEB would require a mediation process and if necessary, arbitration.

Mobil stated that in forest management areas, reforestation would be carried out following pipeline construction but use of heavy equipment might not be permitted within the ROW. The Panel notes however that crossing points will be required.

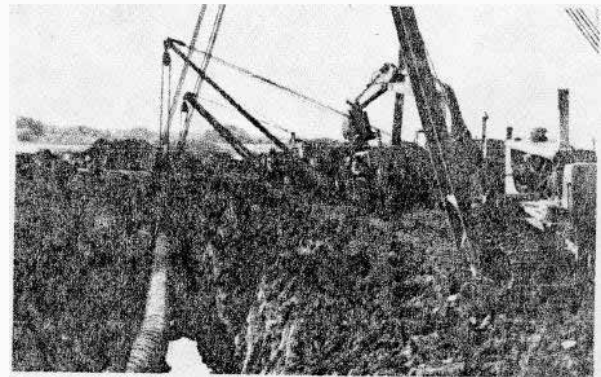
Participants reminded the Panel of the severe limitations on tree growth because of thin, infertile soil in roughly half the corridor area. Therefore a large forest fire could destroy local ecosystems for decades. DOE considered that the proponent has underestimated the significance of forest fires and should develop contingency plans for forest fires.

In response to questioning from the Panel the proponent advised that discussions have been held with the forest

industry in Nova Scotia regarding the disposition of merchantable timber. Non-merchantable material could be chipped and spread over the ROW.

11.2.2 Wildlife

Wildlife is an important resource to the people of Guysborough County and surrounding areas. Increased hunting and fishing could result from improved access to deeryards or remote lakes and streams via the pipeline ROW. There is a possibility of disturbance of wildlife by recreational vehicles such as four-wheel drives and snowmobiles. Wetlands, which constitute important wildlife habitat, may be disturbed during pipeline construction. Participants wished to know what degree of wetland restoration is possible.



Concern was also expressed that an open trench would interfere with the normal movement of wildlife. Mobil advised that trenches are only open for about a kilometre ahead of the pipeline installation crews and that, in areas of significant wildlife activity, crossing points would be established over the trench.

Vehicular access to the ROW would be controlled in accordance with the wishes of each landowner. If a landowner wishes to restrict access to his property the proponent will plant trees and construct fences or berms. The proponent indicated it would not avoid deeryards unless instructed to do so by wildlife regulatory officials.

The EIS recognizes the importance of wetlands as wildlife habitat and has identified important wetlands using the rating system of the Nova Scotia Department of Lands and Forests. The EIS Supplement indicates that

impacts on wildlife can be minimized by avoiding disturbance of wetlands between the months of March and August, and by maintaining buffer zones of native vegetation to control erosion. During construction the prevention of water level changes and avoidance of erosion and siltation could be accomplished. Mobil feels the primary concern with wetlands is the restoration of drainage patterns and company experience has indicated that such restoration can be successfully accomplished.

11.2.3 Water Resources

Aquatic resources are of high recreational value to Nova Scotians and concerns related to stream crossings focussed primarily on the impact on fish habitat, including siltation of watercourses. The impact of trenches on water supplies was also raised as an issue.

11.2.3.1 Stream Crossings

The Panel was advised that watercourses should be studied for a distance of one to two km downstream of a proposed crossing location. Stream crossings should be studied for proximity to spawning, nursery and overwintering areas. These data are considered necessary before any environmental or engineering design. Timing of fish migrations should be considered in construction scheduling.

Mobil's EIS Supplement acknowledges that habitat inventories should be conducted to aid in the selection of crossing points. timing of migrations should be determined to define construction scheduling and that siltation should be minimized during and after construction. Although many of the concerns expressed by reviewers are acknowledged the proponent has not yet developed specific mitigatory measures.

During the meetings there were questions regarding the possibility of suspending pipelines over rivers rather than disturbing the river bed. The proponent felt the pipeline could be subject to third party damage if it was exposed, but suggested it might be possible to drill under rivers, thereby avoiding disturbance of the river bed.

11.2.3.2 Siltation of Watercourses

Participants were concerned with the possibility of siltation of watercourses resulting from soil erosion both during and after construction. It was noted that the soils

along much of the corridor are prone to erosion when disturbed. It was also observed, that if the ROW is accessible to recreational vehicles, the revegetated corridor could be disturbed and thus contribute to siltation problems. Intervenors wished to know how Mobil plans to control soil erosion during construction and following restabilization of the ROW.

In its response, Mobil stated its intent to avoid the problem where possible by selecting a route that would avoid steep slopes and unstable materials. During the construction process vehicular traffic would be controlled in unstable areas. Geotechnical fabric and slash could be placed on sensitive areas to lessen the impact of mechanical equipment. Direct discharge of sediment into water courses can be controlled by placing suitable structures along the banks or in the water course.

During operation the proponent intends to monitor the ROW for potential erosion resulting from mistakes in the selection of revegetation species or disturbance of the vegetation.

11.2.3.3 Water Supplies

During the course of the final public meetings the Panel heard concerns regarding the impact of trenches on water supplies.

A participant indicated that trenches could act as a conduit and alter normal drainage patterns. It was noted that the trenches may create a **drawdown** effect on shallow groundwater, which could result in local impacts on wet areas, vegetation and water flow to small springs and brooks. The participant wished to be informed of Mobil's plans for monitoring the impacts of longitudinal drainage within and parallel to trenches.

Mobil acknowledged the importance of restoring drainage patterns and indicated its intent to implement a groundwater and well monitoring program to detect any problems. Although it does not have definitive baseline data on the existing quantity and quality of shallow groundwater systems, Mobil is convinced it does have sufficient information to identify potential problems.

If problems occur the proponent is prepared to implement the necessary corrective measures including the modification or relocation of domestic wells.

11.2.4 Summary

The Panel concludes that site-specific information is required to ensure resource use conflicts and other envi-

ronmental problems are minimized along the pipeline route. However, the Panel believes that an environmentally acceptable route can be found within the corridor proposed by the proponent. Consultation with resource management agencies will be necessary prior to the finalisation of routing and development of specific mitigation measures.

11.3 Acid Drainage

In its EIS Supplement Mobil identifies the potential for acid drainage following trench construction through mineralized rock of the geological formations known as the Meguma Group. Significantly lowered pH and increased heavy metal concentrations can occur as a result of disturbance of these mineralized slate and quartzite deposits. The Supplement states that surficial tills derived from this bedrock can also cause problems and should also be considered in the mitigation of acid drainage problems.

During the final public meetings Mobil estimated that between 30 and 35 per cent of the proposed pipeline corridor, including the landfall terminal, is within the Meguma Group, of which 10 to 30 per cent along the ROW could be mineralized. Since the pipeline corridor is 65 km long, approximately two to seven km may be mineralized. These estimates are subject to verification through field studies yet to be commissioned. The proponent also stated that acid drainage potential may, in some cases, be determined only during the actual trenching process. Mobil's intent is to develop a mitigation procedure that will deal rapidly with acid drainage.

Mobil indicates that consideration of acid drainage will be included in its construction monitoring. The Panel was advised that acid drainage could be minimized through control of surface drainage and seepage from spoil disposal areas. Since continued diffusion of oxygen and infiltration of precipitation will allow acid producing reactions to continue, long-term objectives would be to minimize oxidation, control seepage and provide for permanent vegetation growth.

The Panel's technical expert has identified acid drainage as the most severe potential problem associated with the onshore facilities and participants expressed concern with the potential impact on local watercourses.

DOE was not convinced that Mobil has addressed acid runoff in sufficient detail to determine that significant

impacts would not occur. It noted that, while the proponent intends to follow provincial Guidelines for Excavation of Slate Bedrock, residual problems could occur.

The question of disposal of mineralized waste rock excavated from the trenches was raised by participants. The proponent has not developed a specific plan to address this problem but has offered several options for consideration. One option would be crushing mineralized spoil and disposing of it in the trench. Drainage control plugs would be installed in the trench as required and, if the trench walls are fractured they could be sealed with various grouts. Alternatives are trucking of mineralized spoil to a disposal site or incorporating crushed spoil with aggregate for concrete production. The proponent also suggested that, if acid drainage presents a problem at stream crossings, the trench could be sealed with concrete.

The Panel notes that, in addition to disruption of the actual pipeline routes, the construction of associated access roads could cause similar problems and mitigation measures should take this into account. The Panel also notes that the impact of acid drainage on the integrity of the pipeline requires consideration by appropriate regulatory authorities.

While careful routing and other mitigation measures could reduce impacts, the widespread occurrence of the Meguma Group parallel to the Nova Scotia coastline makes complete avoidance of mineralized zones impracticable. The Panel concludes that there is a particular potential for environmental problems where the pipeline or associated access roads cross areas of mineralized rock that can produce acid drainage. The feasibility of the mitigation measures proposed by the proponent requires further study in order to ensure that acid drainage problems along the pipeline route are minimized. Such studies should address both chemical and bacterial production of acid drainage.

11.4 Material Management and Restoration

The issues addressed in this section include the disposal of surplus material after pipeline trenching and burial and special problems associated with pipeline construction in the vicinity of abandoned gold mining operations.

11.4.1 Spoil Disposal

During the final public meetings a reviewer estimated that at least 40 000 to 50 000 m³ of rock and soil would

remain after the pipeline is buried. Mobil estimates that 20 to 70 per cent of the waste rock can be disposed of in the trench and some of the remainder would be placed over the trench to create a slight berm. It is expected that the berm will eventually settle and become flat. The rest of the spoil will be evenly distributed along the ROW and revegetated.

The Panel notes that such practices are standard but cautions that special care will be required in disposing of mineralized spoil that could produce acid drainage.

11.4.2 Abandoned Gold Mining Operations

The area proposed for the landfall terminal was a site of extensive gold mining operations. The Panel has been advised that five mills used the mercury amalgamation process in the Dung Cove area. DOE has determined that the sediments of the nearby Seal Harbour Run contain high concentrations of arsenic from the gold mining operations.

The proponent indicated that contaminated areas could be avoided. DOE noted that problems could be avoided if the project was constructed outside the proposed corridor or minimized if special care was taken during construction.

Detailed studies are required to ensure that environmental problems resulting from disturbance of abandoned gold mining operations are minimized by mitigation measures or avoided by appropriate routing.

11.5 Hydrostatic Testing Fluid

A participant detailed the following constraints in discharging test fluid: the required volume of test fluid could exceed the low streamflow of small watersheds, the Fisheries Act prohibits the discharge of deleterious materials into fish habitat; bogs or wetlands are sensitive

areas providing wildlife habitat and sources of water for streams and rivers; and the Nova Scotia climate is not conducive to the implementation of an effective disposal system relying on evaporation. In consideration of the above the proponent was asked how 'it intended to dispose of hydrostatic testing fluid and what monitoring programs will be undertaken.

In its EIS Supplement Mobil states that one of the environmental considerations in route selection will be the determination of discharge criteria for release of hydrostatic testing fluid. It plans to prepare a program to deal with the disposal of hydrostatic testing fluid into an appropriate water body during periods of high streamflow. It is noted that this monitoring program will be the subject of a separate application.

In the EIS Mobil rates the impacts of hydrostatic testing fluid as moderate to negligible. The EIS states that small quantities of additives such as corrosion inhibitors, biocides and fluorescent marker dyes will be used in the testing fluid. However, during the final public meetings, Mobil indicated that the additives will be limited to an oxygen scavenger and a photo-degradable dye.

The EIS points out that fluid release is neither continuous nor confined to a single area. During the final meetings Mobil suggested that the possibility of creating a high chemical oxygen demand in receiving waters could be reduced by either discharging the fluid over broken rock or controlling the rate of discharge. The EIS states that on-land release of testing fluid generally causes fewer impacts than discharge directly to water courses. Mobil stated that both the source of water for the preparation of testing fluid and the selection of discharge locations will be in accordance with federal and provincial agency requirements.

The Panel concludes that further information is required to complete the assessment of planned or accidental release of hydrostatic testing fluid.

12.0 LANDFALL TERMINAL AND GAS PLANT

12.1 Landfall Terminal

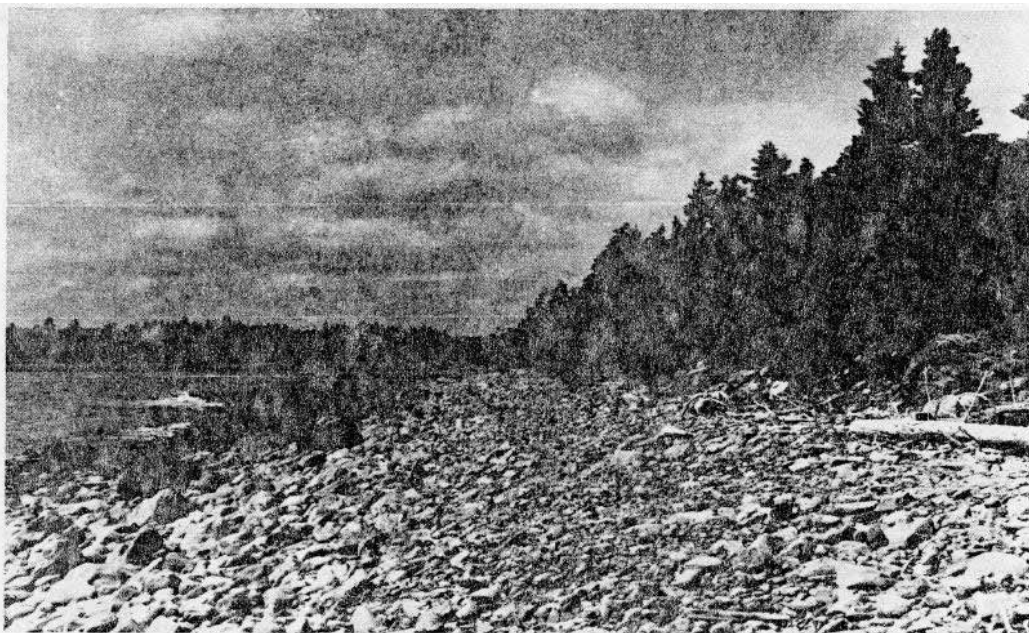
Initial information on the landfall terminal in the EIS indicated the location might be anywhere within the 15 km wide pipeline corridor. This lack of specificity caused concern for participants. In a support document six potential landfall terminal sites were mentioned. The Panel's technical expert visited these sites and determined that no particular problems existed at any of them. Subsequently Mobil identified one site near Country Harbour as its favoured location. The Panel's expert identified the same two ha site, at Dung Gove, as one of the most environmentally acceptable of the six.

Participants did not indicate any concern regarding the location or operation of this facility. However, one participant proposed an alternate landfall site at Sheet Harbour in Halifax County but no environmental information was provided. The proponent opposed the alternative for reasons related primarily to its offshore implications (see section 3.2).

The Sheet Harbour proposal assumes the gas plant can be located in the immediate vicinity of the landfall terminal thereby eliminating the 65 km pipeline and its associated environmental impacts. However, Mobil considered that pipeline between the landfall terminal and the gas plant would smooth flows of gas and condensate.

In discussion of risk associated with the landfall terminal the Panel's expert advised that the facility is a pressurized system and if it fails fire and possibly explosion are not unlikely. A safety zone around the terminal might be required.

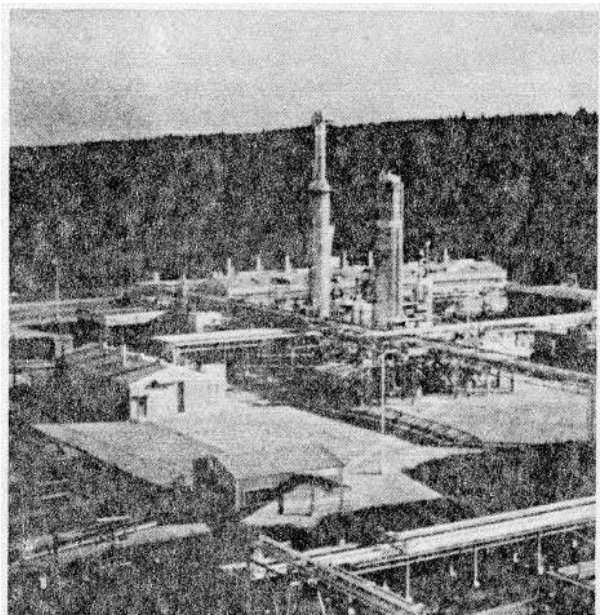
In its response Mobil indicated that the design of the landfall terminal is not sufficiently advanced to permit a risk analysis but that it did not present special problems as the slug catcher was essentially a wide spot in the pipeline.



The Panel concludes that a landfill terminal site at Dung Cove can be safe and environmentally acceptable. Care should be taken to ensure that the exact location does not result in unnecessary disturbance of abandoned gold mine wastes along the pipeline route.

12.2 Gas Plant

Mobil proposes to locate the project gas plant on lands in the Melford Point area designated for industrial use by the Province of Nova Scotia. The proponent maintains that specific environmental impacts resulting from construction cannot be identified until a particular site is selected but generally predicted a rating of negligible impact after mitigation.



Participants considered the EIS deficient because it did not predict in more detail the impact of air emissions and liquid effluents from the plant.

Mobil maintains that air quality studies are not necessary because Venture gas does not contain sulfur and that matters related to emissions could be handled on a routine basis by the responsible regulatory agencies. The proponent indicated there would be only two sources of air emissions. The plant flare is expected to produce carbon monoxide, carbon dioxide and minor amounts of particulate matter while compressors are

expected to produce nitrogen dioxide or nitrous oxide. The proponent is unable to provide information on quantities of nitrous oxide emissions until the equipment size is known. The only liquid effluents expected are storm water drainage and domestic sewage.

The Panel's technical experts did not indicate any problems related to effluents and emissions.

The Panel concludes that the emissions and effluents from the gas plant would be similar in nature to other such installations elsewhere in Canada and would not pose unusual problems. However, monitoring as required by regulatory agencies would be necessary in order to ensure compliance with government requirements.

In discussions related to safety matters during the final public meetings, a participant observed that neither the Province of Nova Scotia nor NEB have regulations dealing with gas plant safety. The Panel was urged to ensure that safety standards are in place prior to construction of the gas plant.

Safety considerations relating to the gas plant were discussed in detail between the Panel's technical expert and the proponent. It was revealed that while the gas plant operation poses the threat of various types of fire, suitable safety zones would prevent damage to nearby facilities.

The issue of the possibility of siting a liquefied natural gas facility near the gas plant was discussed. The safety experts concluded that potential safety conflicts between the two facilities could be resolved by separating the two plants with appropriate safety zones, or by bringing the two plants together and treating them as one unit operating in accordance with common codes.

It was noted that risks associated with the onshore facilities can be reduced to acceptable levels by existing technology. Detailed analyses must be undertaken of potential safety problems and appropriate standards established by regulatory agencies.

The Panel concludes that a safe and environmentally acceptable gas plant site could be located within the provincial land reserved for industrial development near Melford Point.

13.0 MONITORING, FOLLOW-UP, AND FUTURE PLANNING

13.1 Monitoring

The guidelines required Mobil to describe a program to monitor for possible environmental consequences of the proposed project. The EIS briefly outlines a planned monitoring program, and states that it will not be fully developed until engineering design is detailed. The lack of detailed monitoring plans was met by a multitude of critical comments.

Mobil attempted to respond by providing additional detail in its EIS Supplement. It outlines the projected content of monitoring plans for the offshore environment, the subsea pipeline, the overland pipeline, and the gas plant.

At the final public meetings Mobil elaborated on its monitoring plans. It plans to carry out effects and compliance monitoring. Effects monitoring is defined as the repeated observation or measurement of pre-determined environmental parameters over a period of time in order to assess changes. Compliance monitoring is intended to check compliance with government regulations or company environmental standards and guidelines.

Mobil stated that it plans to carry out effects monitoring for the offshore platform site and overland pipeline corridor only. Compliance monitoring will focus on debris from construction and operation of the platform and subsea pipeline, the structural integrity of the subsea pipeline, some aspects of onshore pipeline construction, and certain onshore pipeline parameters during operation. At the gas plant, Mobil plans to monitor discharges.

DOE stated that a more thorough and up-to-date presentation of baseline data specific to project elements is required prior to the start of construction. Mobil indicated that it has no intention of gathering more baseline data, because such surveys are time-consuming and not cost-effective. Mobil considered that baseline work has very limited value and that it is extremely hard to establish a cause and effect relationship. DFO restated its concern with the lack of emphasis placed on monitoring biological responses to chemical discharges.

A technical expert to the Panel suggested that biological surveys within and around the Venture area after field development could reveal impacts without Mobil having to carry out baseline studies. This would partially address DOE's concerns for wider assessment. He also suggested that the technical aspects of effluent monitoring should be reviewed by COGLA and that DFO might be given primary responsibility for the work involved in effects monitoring.

The subject of monitoring was also addressed by CNF which recommended ' that a special committee be formed to plan and implement a detailed study of chronic releases in the Venture area so that scientific information may be accumulated not only for Venture but for possible future field expansions. The Wilderness Society of Newfoundland also proposed extensive use of committees to establish a system of effects monitoring and guide its implementation.

The Panel notes that the issue of monitoring is of great concern to many parties but that study methods are not yet clearly established or agreed upon. However, plans do exist for studies under the Environmental Studies Revolving Fund to determine how effective monitoring of offshore oil activities could be conducted. The Panel concludes that monitoring is essential to ensure an environmentally acceptable project but the proponent has not yet developed satisfactory details of such a plan. A comprehensive monitoring plan for all components of the project should be developed for approval by the regulatory agencies, taking into account the concerns of resource managers and other interested parties. In various sections of this report, the Panel has identified areas where monitoring is required in addition to those mentioned in this section.

13.2 Follow-Up

Among the information requested by the Panel after the public information sessions was the nature and extent of post-Panel review processes that would apply for the Venture project. It was suggested that this information include the opportunities for technical agency and public input.

With regard to the need for ongoing consultation expressed by communities, Mobil plans a program to provide information through speeches, attendance at appropriate committees, and formation of new committees where necessary. A mailing list of interested individuals within the impact area will be established, and the proponent will meet with community groups. Mobil advised that a local committee would be established to deal with nearshore fishermen's concerns.

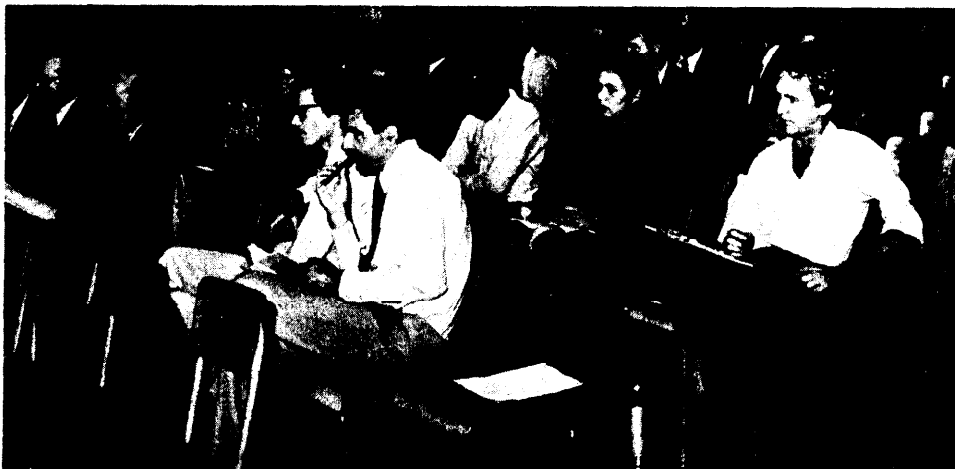
One of the main regulatory agencies on which Mobil provided information is COGLA. It has a mandate to administer oil and gas activities offshore and is a prime contact between government and industry. One of COGLA's most important functions with respect to the post-Panel review process is Development Plan approval. Mobil intends to submit a Development Plan for this project in January, 1984. COGLA has regulatory responsibilities for the Venture field and related activities. It also has the responsibility for monitoring offshore operations.

NEB is the other main regulatory organization dealing with the Venture project. The Panel was advised that NEB will hold hearings and render decisions on proposals for the exportation of natural gas from Venture. Similarly, it will hold public hearings and render decisions on applications for any interprovincial pipelines. Following authorization of energy transmission facilities, NEB is responsible for ensuring that landowners views are considered. NEB's regulatory responsibilities also relate to the offshore pipeline and the gas plant. NEB is responsible for monitoring installations under its jurisdiction.

Two further mechanisms were established as a result of the Canada-Nova Scotia Agreement. As previously mentioned in this Report, a Fisheries Advisory Committee has been created. It has a mandate to advise Ministers of Fisheries on relevant offshore development matters. This Committee has representation from the federal and provincial Departments of Fisheries as well as industry. It first met in June, 1983. The Fisheries Committee government representatives also serve as members of the Environmental Co-ordinating Committee which is co-chaired by COGLA and NSDOE. Although this Committee has not been active its existence provides a mechanism for discussion of issues of common interest to a number of government departments, including DOE.

The Sable Island Environmental Advisory Committee was created in 1974 to advise DOT. Government agencies concerned with Sable Island participate. The Committee's original mandate was to monitor, advise and prepare a code of conduct for the Island. DOT also has direct regulatory responsibilities that relate to the project and uses TERMPOL to assist proponents and government agencies in meeting project approval requirements.

Voluntary Economic Planning considered that fishing interests and oil and gas interests should meet regularly for frank discussions via the existing committees and that the oil and gas industry should establish a series of contacts in both the primary (harvesting) and secondary (processing) sectors of the fishing industry in the coastal areas likely to be impacted by Venture development. CNF recommends that a public interest committee be established with secretary and co-ordinator.



DOE suggested that advisory mechanisms should operate to assist the lead regulatory agencies at each stage of development. DFO sought post-Panel review processes that would ensure consultation on selection of pipeline routes and development sites. DOT and EMR also requested consultation as detailed plans become available.

None of these agencies had particular concerns as to the system that had been established. However, they were uncertain as to how effectively it would function, because parts of it had only recently been established.

The Panel concludes that special efforts will be required by the proponent and responsible government agencies to continue consultation with the public after completion of the Panel review. This is particularly so because the review has taken place at an early stage in the planning cycle. In particular, it recommends the continued use of the public information centres established during the Panel review and that a government information officer be made available to assist interested members of the public.

The Panel recommends that the existing mechanisms for interdepartmental consultation be used during development and operation of the Venture project, with modifications to improve effectiveness as experience is gained.

The Panel further recommends that the federal and provincial Departments of Environment monitor the implementation of this Report's recommendations and the proponent's commitments, and provide an annual report to their Ministers for public distribution,

Provided these measures are followed, the Panel believes that review of a project at an early stage in its development is appropriate in determining the means by which it may proceed in an environmentally safe manner.

13.3 Future Planning

A number of reviewers noted that there are associated projects on which little information had been provided by Mobil. In its EIS, Mobil provides a rating of the likely environmental impacts from facilities such as wharves, permanent operations and supply base, temporary supply bases for offshore pipeline and platform installation,

and pipecoating and steel fabrication yards. However, details of these facilities and the required mitigation measures are not available as the sites are unknown.

DOE stated that cumulative impacts arising from subsequent offshore hydrocarbon development and associated activities in the vicinity of Sable Island need to be addressed. DOE suggests that COGLA immediately begin to develop a plan which would identify the environmental limitations for the Sable Island area and form the basis for planning and evaluating development scenarios. DOE appreciated that the information was not available to develop a strategic plan immediately but wished work to start toward that objective.

CNF recommended that Canada, Nova Scotia and EPOA promptly initiate a broader-based process to evaluate environmental impacts from the range of Scotian Shelf hydrocarbon activities, particularly in the vicinity of Sable Island.

Mention was made of a DFO discussion paper concerning fish habitat and the implementation of a cooperative resource planning strategy. It was felt that planning would have to be a combination of both oil and fishery inputs.

Mobil responded that it is difficult to conduct strategic planning since it is not known what resources will be discovered and hence what areas would be subject to development. In particular it noted that Venture appears to be the only field that the market can absorb given present conditions.

The Panel concludes that although the feasibility of a strategic framework for gas development from the Sable Island area has not been demonstrated at this time, early planning could be of benefit. To avoid unnecessary conflicts, existing means of communication should be used to ensure that advance information on proposed future projects and resource limitations is available to all parties.

The Panel also concludes that projects related to the Venture development will require review once site-specific information becomes available. The appropriate regulatory authorities should carefully consider any projects related to the Venture development, but not considered in this Panel review, to ensure that environmental impacts are minimized through appropriate mitigation measures.

14.0 SUMMARY OF MAJOR CONCLUSIONS

The Panel reached a number of conclusions, many of which were considered major and are listed in this chapter.

The Panel concluded that:

- 1) there is a significant possibility of a well blowout during development and production of the Venture field and that this could result in major fire hazards as well as environmental impacts;
- 2) the disposal of oil-based drilling muds offshore could be deleterious to the environment, and that water-based or low-toxicity oil-based muds should be used whenever possible;
- 3) monitoring of drilling wastes, including mud, is required to determine what, if any, long-term effects could arise from development of the Venture field;
- 4) the proponent's evaluation of the threat of ice to the project is adequate, but contingency plans and platform design should take into account information that is to be gathered on icebergs and sea ice;
- 5) the results of the proponent's seismicity studies should be subjected to review by agencies with appropriate expertise in determining potential risks from earthquakes;
- 6) waves could pose a significant threat to the project platforms and this problem has not yet been adequately assessed;
- 7) the need for a detailed safety training program to ensure employee safety has been recognized by the proponent, but that specific plans, measures and methods have not yet been developed;
- 8) an emergency base on Sable Island for evacuation purposes could be considered by the regulatory authorities provided this can be installed in an environmentally acceptable manner;
- 9) there is a probability of failure of the offshore pipeline proposed by the proponent over the life of the project;
- 10) burying the offshore pipeline could significantly decrease the probability of pipeline failure;
- 11) although no method of pipeline protection from icebergs was detailed by the proponent, the likelihood of such an event is far less than the possibility of pipeline failure from a number of other causes;
- 12) detailed studies of the offshore pipeline routing are essential to ensure that geotechnical and fisheries concerns are satisfied in the design alignment;
- 13) further information is required to complete the assessment of disposal or accidental release of hydrostatic fluids used in pipeline testing both offshore and onshore;
- 14) disruption of offshore fishing during pipeline laying is likely to be temporary and a consequence of the need for safety exclusion areas during construction, rather than environmental impacts;
- 15) information provided was insufficient to provide assurance that there would not be problems for fishing gear or disruption to the fishery as a result of an unburied pipeline;
- 16) immediate disruption to fisheries in the event of a blowout or pipeline failure was more likely to arise from tainting than fish kills;
- 17) the most significant environmental impact of a blowout would be on juvenile fish but that adult stock losses would not be detectable given natural population fluctuations;
- 18) seabed alteration and suspended sediment from nearshore pipeline construction will cause short-term disruption of fishing activities;
- 19) site-specific information is required to select a final pipeline route in the Country Harbour area to minimize impacts on the shoreline, related installations and fisheries activities;
- 20) there could be significant environmental impacts in the event of a pipeline rupture in the nearshore area;
- 21) potential conflicts resulting from increased marine traffic could best be resolved by the provision of detailed supply vessel information as it becomes available;

- 22) debris from construction activities represents a potentially serious conflict between the oil and fisheries industries but problems can be minimized with good management policies together with compensation for any residual problems;
- 23) a compensation plan satisfactory to fisheries interests has not yet been developed by the oil industry;
- 24) the construction and operation of the project could affect a number of sensitive birds and their habitats;
- 25) there is no established policy for the treatment of oiled marine birds;
- 26) special vigilance will need to be exercised to protect the sensitive Sable Island environment during offshore oil and gas activities;
- 27) the safety risks from the proposed onshore pipelines will be compatible with current industry standards;
- 28) an environmentally acceptable route can be found within the proposed onshore pipeline corridor;
- 29) site-specific information is required to ensure the onshore pipeline route minimizes resource use conflicts and other environmental problems;
- 30) there is a particular potential for environmental problems where the pipeline crosses areas of mineralized rock that can produce acid drainage;
- 31) a landfall terminal in the Dung Cove area could be safe and environmentally acceptable;
- 32) emissions and effluents from the gas plant would be similar in nature to other such installations elsewhere in Canada and would not pose unusual problems;
- 33) a safe and environmentally acceptable gas plant site could be located within the provincial land reserved for industrial development near Melford Point;
- 34) comprehensive monitoring is essential to ensure an environmentally acceptable project but the proponent has not yet developed the details of such a plan.

15.0 RECOMMENDATIONS

15.1 The Panel recommends that:

Development and production of the Venture field be allowed to proceed subject to the following conditions which are required to make the project environmentally safe:

- 1) contingency plans be established prior to development drilling to take into account safety and environmental concerns with particular attention to threats from waves, hazards from fire and disruption to fisheries resulting from a blowout;
- 2) platform designs incorporate fire prevention and control measures to the maximum extent feasible;
- 3) water-based or low-toxicity oil-based drilling muds be used whenever possible. If conventional oil-based muds prove to be necessary their disposal should be at suitable onshore sites;
- 4) monitoring of the effect of drilling wastes be carried out to determine if any long-term effects are occurring, and if necessary, further mitigation measures be implemented;
- 5) gathering of further information on sea ice and icebergs be continued for incorporation into contingency plans and platform design. An iceberg reconnaissance program will be required throughout the life of the project, even though the probability of an incident is slight;
- 6) results of seismicity studies be reviewed by technical agencies with expertise in this field and measures to protect the offshore production facilities from earthquakes be incorporated as appropriate in the design;
- 7) further studies of wave climate be conducted before proceeding with design of the offshore production facilities;
- 8) a detailed training program for project workers be submitted to regulatory agencies and its implementation monitored throughout the project;
- 9) satisfactory search and rescue procedures be agreed upon among the offshore industry and appropriate federal government departments prior to development and operation of the Venture field;
- 10) contingency plans for offshore areas be developed prior to operation of the pipeline to take into account not only environmental effects but also dangers to vessels and the platforms;
- 11) the offshore pipeline be buried wherever practicable unless the proponent is able to demonstrate through detailed studies that the integrity of the pipeline on the seabed can be assured and that conflicts with fishing gear would not occur;
- 12) detailed offshore pipeline routing studies be conducted to ensure that geotechnical and fisheries concerns are addressed. The results of these studies should be reviewed by appropriate scientific and regulatory authorities prior to route finalisation;
- 13) release and disposal of hydrostatic fluids be further reviewed by appropriate resource management and regulatory agencies prior to testing of the pipeline both offshore and onshore;
- 14) consultation with fisheries interests to establish a timing for the construction of the offshore pipeline that will minimize disruption;
- 15) that in the event that any section of the pipeline remains unburied, compensation be available for any damage resulting to fishing gear and other related costs. An additional requirement is a liability waiver for damage to the pipeline;
- 16) a better determination be made of the area in which fish tainting is likely to be experienced. This will help to define the zone of interruption to fisheries activities in the event of a platform blow-out or pipeline failure. Further studies are required on the concentrations of condensate and the time involved in tainting of seafood and shellfish;
- 17) site-specific surveys, appropriate pipeline routing, compensatory measures, monitoring of effects and a suitable construction schedule be developed to ensure that the nearshore pipeline is environmentally acceptable;
- 18) a nearshore spill contingency plan be developed to protect sensitive areas that could be impacted as a result of a pipeline rupture close to shore;

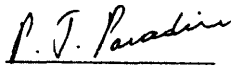
- 19) more information be provided on projected vessel traffic associated with the project, as it becomes available;
- 20) adequate arrangements be established between the proponent and its contractors to ensure that debris resulting from offshore platform and pipeline construction is not deposited on the seabed;
- 21) the proponent establish a compensation plan mutually satisfactory to the fisheries and oil industry. If this is not possible by the time development proceeds, the appropriate government agencies should establish a mechanism to provide suitable compensation;
- 22) special care be taken to avoid unnecessary disturbances to sensitive birds and their habitats during construction and operation of the project;
- 23) a policy for treating oiled marine birds be established and incorporated in the appropriate contingency plans;
- 24) careful monitoring of the potential effects of offshore oil and, gas activities on Sable Island be carried out to protect its unique environment;
- 25) resource management agencies be consulted prior to finalisation of onshore pipeline routing and during the development of specific mitigation measures;
- 26) further study of mitigative measures, including avoidance, be carried out to minimize acid drainage problems along the pipeline route;
- 27) detailed studies be carried out to ensure that disturbance of gold mine waste is avoided by appropriate onshore pipeline routing or minimized by suitable mitigation measures. This will require care in selecting the exact location of the landfall terminal;
- 28) detailed safety requirements and contingency plans for the landfall terminal, onshore pipeline and gas plant be reviewed by appropriate regulatory agencies. Necessary standards should be established by regulatory agencies as appropriate;
- 29) proposed emission and effluent levels from the gas plant be reviewed by appropriate regulatory agencies as engineering details become available;

- 30) a comprehensive monitoring plan for all components of the project be developed for approval by the regulatory agencies taking into account the concerns of resource managers and other interested parties.

15.2 It is further recommended that:

- 1) better mechanisms be developed to ensure that EIS's for future reviews are of improved standards;
- 2) future projects be referred early enough to allow for appropriate directions to be given to proponents in the preparation of their studies;
- 3) special efforts be made by the proponent and responsible government agencies to continue consultation with the public. Information centres established during the Panel review should be maintained and a government information officer made available to assist interested members of the public;
- 4) the existing mechanisms for interdepartmental consultation be used during development and operation of the Venture project, with modifications to improve effectiveness as experience is gained;
- 5) the federal and provincial Departments of Environment monitor the implementation of this Report's recommendations and the proponent's commitments, and provide an annual report to their Ministers for public distribution;
- 6) industry and government share advance information on proposed future projects and resource limitations to avoid, at an early planning stage, unnecessary conflicts;
- 7) appropriate regulatory authorities carefully consider any associated projects related to the Venture development, but not considered in this Panel review, to ensure that environmental impacts are minimized through appropriate mitigation measures.

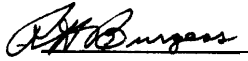
SABLE ISLAND
ENVIRONMENTAL ASSESSMENT PANEL
VENTURE DEVELOPMENT PROJECT



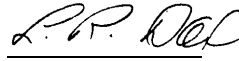
P. J. PARADINE
(Co-Chairman)



L. PEDDLE
(Co-Chairman)



R.H. BURGESS



L.R. DAY

APPENDICES

APPENDIX A

TERMS OF REFERENCE FOR THE SABLE ISLAND ENVIRONMENTAL ASSESSMENT PANEL ISSUED BY THE FEDERAL AND NOVA SCOTIA MINISTERS OF THE ENVIRONMENT

Introduction

This Panel has been established by the Ministers of Environment for Canada and Nova Scotia in accordance with Section 8 of the federal-provincial Agreement on Offshore Oil and Gas Resource Management. The proponent of the development proposal under review is Mobil Oil Canada Limited.

Purpose

The purpose of this document is to delineate the responsibilities of the Environmental Assessment Panel, the review process it should follow and the expectations that the federal and provincial governments have for this review.

Mandate of the Panel

The mandate of the Panel is to determine the means in which the project may proceed in an environmentally safe manner. The Panel is to carry out a thorough, and expeditious review of hydrocarbon production from the Sable Island area (figure 8).

Scope of the Review

The scope of the review should include matters relating to gas field development, gas and liquids transportation to shore and major ancillary onshore facilities associated with the project. The Panel should be prepared to address all aspects relating to the impact of the environment on the project, the impact of the project on the environment, and related social impacts.

Panel Review Process

The main components of the panel review process are as follows:

1. Panel formation with two nominees each from the federal and provincial governments, one nominee from each to serve as a co-chairman.
2. Environmental Impact Statement Guidelines issued in draft form by the Panel to the public, proponent and government agencies.
3. Written comments on the draft EIS guidelines received by the Panel.
4. EIS guidelines completed by the Panel and issued to the proponent.
5. EIS completed by proponent and submitted to the Panel.
6. EIS distributed by the Panel to the public and government agencies.
7. Public and technical agency review of the EIS and submissions of written comments to the Panel.

8. Following public and technical agency review of the EIS, the Panel may ask for more information or proceed directly to (9).
9. Public meetings held by the Panel to review the implications of the project. The Panel will invite the two-member socio-economic review panel (established under Clause 7 of the Offshore Agreement) to participate in its public meetings.
10. Panel prepares its report and submits it to the Ministers of Environment.

Panel Relationships

A secretariat to the Panel shall be established to provide administrative services associated with the Panel's review under the direction of the Panel Co-Chairmen and the Panel members. The role of FEARO and the Nova Scotia Department of Environment in the Panel's activity will be to provide this secretariat.

The Panel's activities are independent of those of the Canada-Nova Scotia Offshore Oil and Gas Board and the various federal and provincial agencies.

The Panel will seek advice where appropriate from the joint Fisheries Advisory Committee established under Section 9 of the Offshore Agreement.

APPENDIX B

BIOGRAPHY OF PANEL MEMBERS

Philip J. Paradine, Co-Chairman

Mr. Paradine graduated with a B.Sc. (Civil Engineering) and later completed a M.Eng. (Water Resources) at the University of Ottawa.

He joined the Public Service of Canada in 1967 and held positions as a professional engineer with Transport Canada, the National Capital Commission and Environment Canada. Since 1973 he has specialized in environmental protection and assessment.

In 1978, Mr. Paradine joined the Federal Environmental Assessment Review Office (FEARO) and has been responsible for the administration of several panel reviews, including the Banff Highway project (km 0- 13) and (km 13-27).

Since 1979 he has been chairing Panel reviews in the Atlantic area including Lower Churchill and Grand Banks, and is currently a Director, Atlantic Region, with FEARO.

Leo Peddle, Co-Chairman

Mr. Peddle, retired Vice-President, Marketing, Twin Cities Co-operative Dairy Limited, was appointed to the Environmental Panel by the Nova Scotia Government.

Mr. Peddle retired in 1980 after 35 years with Twin Cities Dairies, where for 28 years his responsibilities included labour negotiations, public relations and advertising and personnel management.

A resident of Halifax, he is a former Vice-Chairman of the Halifax School Board and has been active in many community and business activities. He is a former President of the Rotary Club of Halifax North West and a former President of the Halifax Ad and Sales Club. Mr. Peddle has been active in community musical organizations and activities.

Robert H. Burgess

Mr. Burgess, of Truro, was appointed to the Environmental Panel by the Nova Scotia Government.

He is a former Deputy Minister of Lands and Forests for Nova Scotia. He retired as Deputy Minister in 1977 after 30 years with the Department of Lands and Forests.

A graduate of the University of New Brunswick and a veteran of World War Two, Mr. Burgess is a member of the Canadian Institute of Forestry and the Nova Scotia Land Surveyors Association.

He was an executive member of the Nova Scotia Environmental Control Council from 1978 until December 1982.

Lewis R. Day

Born in Harrowsmith, Ontario, Mr. Day graduated with a B.A. (Biology) from Queen's University in Kingston. He subsequently completed an M.A. (Marine Biology and Fisheries) at the University of Western Ontario in London and was a Ph.D. candidate in the same discipline at the University of Toronto until he joined the Canadian forces and served overseas from 1942 to 1945.

He joined the Public Service of Canada in 1945 and held various positions as fisheries biologist and Assistant Director at the Biological Station of the Fisheries Research Board of Canada in St. Andrews, New Brunswick.

In 1963 he was appointed Executive Secretary of the International Commission for the Northwest Atlantic Fisheries (ICNAF) which became the Northwest Atlantic Fisheries Organization (NAFO) in 1979. He was Executive Secretary of NAFO when he retired from the public service in 1980.

Mr. Day has been involved in the development and implementation of research programs for Canadian Atlantic fisheries through his career.

APPENDIX C

PARTICIPANTS IN PUBLIC REVIEW

1. PARTICIPANTS AT PUBLIC MEETINGS

A. GROUPS

1. ATLANTIC FISHING VESSEL ASSOCIATION (AFVA)
2. CANADIAN NATURE FEDERATION (CNF)
3. COMMUNITY AWARENESS FORUM
4. EASTERN SHORE DEVELOPMENT COMMISSION (ESDC)
5. MOBIL OIL CANADA LTD (PROPONENT)
6. MULGRAVE INDUSTRIAL COMMISSION
7. MUNICIPALITY OF THE DISTRICT OF GUYSBOROUGH
8. OFFSHORE TRADE ASSOCIATION OF NOVA SCOTIA
9. SCHOOL AND HOSPITAL BOARD, GUYSBOROUGH
10. STRAIT OF CANSO INDUSTRIAL DEVELOPMENT AUTHORITY (SCIDA)
11. TOWN OF CANSO—INDUSTRIAL COMMISSION
12. VOLUNTARY ECONOMIC PLANNING-FISHERIES SECTOR-OIL AND GAS COMMITTEE

B. GOVERNMENT AGENCIES

1. ENERGY, MINES AND RESOURCES CANADA
2. ENVIRONMENT CANADA
3. FISHERIES AND OCEANS CANADA
4. TRANSPORT CANADA--CANADIAN COAST GUARD

C. INDIVIDUALS

- R. ADDISON (B.3)
- S. AITKEN (A.5)
- W. BARCHARD (B.2)
- A. BILLARD (A. 12)
- D. BOLLIVAR (A. 1)
- W. BOWES (PANEL TECHNICAL EXPERT)
- L. BRUNTON (A.9)
- L. CHISHOLM
- M. COOLEN (A.5)
- R. COTE (8.2)
- G. CROSS
- H. CROSS
- K. CURREN (B.4)
- R. EDWARDS (B. 1)
- A. ENGLAND (A.6)
- G. FADER (B. 1)
- W. FORD (PANEL TECHNICAL EXPERT)
- F. FRASER (A. 11)
- L. GRATTAN (A.5)
- E. HAL-LORAN

G. JAMIESON (A.7)
M. LEWIS (B. 1)
T. LOCK (B.2)
Z. LUCAS (A.5)
K. MACDONALD (A. 10)
F. MACINTOSH (A.8)
K. MANN (8.3)
C. MASON (B.3)
A. MCIVER (8.2)
I. MCLAREN (PANEL TECHNICAL EXPERT)
T. MILLAR (A.4)
H. MILLS (A.2)
K. MUELLER (A.3)
D. NAPIER (PANEL TECHNICAL EXPERT)
P. NEIMA (A.1)
H. NEU (B.3)
A. REDDICK
D. RILEY (8.3)
C. ROSS (A.5)
S. ROSS (A.5)
D. SCARRATT (B.3)
D. STALKER (8.3)
R. STRIGHT (B.4)
P. TSUI (A.5)
J. VANDERMEULEN (8.3)
D. VANDER ZWAAG
R. WHITE (A. 11)
G. WILLIAMS (B.4)
R. WILSON (B.2)
M. WOOLDRIDGE (A.5)

2. WRITTEN BRIEFS SUBMITTED TO THE PANEL PRIOR TO, DURING AND AFTER PUBLIC MEETINGS

A. GROUPS

1. ATLANTIC FISHING VESSEL ASSOCIATION (2)
2. CANADIAN NATURE FEDERATION (2)
3. CAPE BRETON DEVELOPMENT CORPORATION (1)
4. COMMUNITY PLANNING ASSOCIATION OF CANADA/NOVA SCOTIA DIVISION (1)
5. DALHOUSIE OCEAN STUDIES PROGRAMME (1)
6. EASTERN SHORE DEVELOPMENT COMMISSION (2)
7. FISHERIES RESOURCES DEVELOPMENT LTD (2)
8. MAYORS AND WARDEN OF CAPE BRETON COUNTY (1)
9. MUNICIPALITY OF THE DISTRICT OF GUYSBOROUGH (1)
10. STRAIT OF CANSO INDUSTRIAL DEVELOPMENT AUTHORITY (2)
11. VOLUNTARY ECONOMIC PLANNING-FISHERIES SECTOR-OIL AND GAS COMMITTEE (1)
12. VOLUNTARY PLANNING (2)
13. WILDERNESS SOCIETY OF NEWFOUNDLAND (2)

B. GOVERNMENT AGENCIES

1. CANADA-NOVA SCOTIA FISHERIES ADVISORY COMMITTEE (1)
2. ENERGY, MINES AND RESOURCES CANADA (3)
3. ENVIRONMENT CANADA (2)
4. FISHERIES AND OCEANS CANADA (2)
5. TRANSPORT CANADA—CANADIAN COAST GUARD (2)

C. INDIVIDUALS

- W. BOWES (PANEL TECHNICAL EXPERT) (4)
- G. AND H. CROSS (1)
- A. D'ENTREMONT (1)
- W. FORD (PANEL TECHNICAL EXPERT) (2)
- J. LOTZ (1)
- I. MCLAREN (PANEL TECHNICAL EXPERT) (5)
- D. NAPIER (PANEL TECHNICAL EXPERT) (3)
- D. VANDER ZWAGG AND OLIVE FORD (1)

3. ORAL PRESENTATIONS TO THE PANEL AT THE PUBLIC MEETINGS**A. GROUPS**

1. COMMUNITY AWARENESS FORUM
2. EASTERN SHORE DEVELOPMENT COMMISSION
3. MOBIL OIL CANADA LTD (PROPONENT)
4. MULGRAVE INDUSTRIAL COMMISSION
5. OFFSHORE TRADE ASSOCIATION OF NOVA SCOTIA
6. SCHOOL AND HOSPITAL BOARD, GUYSBOROUGH
7. TOWN OF CANSO, INDUSTRIAL COMMISSION

B. INDIVIDUALS

- L. BRUNDON (A.6)
- A. ENGLAND (A.3)
- F. MACINTOSH (A.5)
- T. MILLAR (A.2)
- K. MUELLER (A.1)
- A. REDDICK
- R. WHITE (A.7)

PARTICIPANTS AT THE PUBLIC INFORMATION SESSIONS

The following representatives from Mobil Oil attended all six sessions:

- S. AITKEN
- H. BONES
- M. COOLEN
- W. OOSTENBRINK
- C. ROSS
- P. TSUI

SHEET HARBOUR

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APPENDIX D

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APPENDIX E

GLOSSARY OF SYMBOLS

ha	hectare
kg	kilogram
km	kilometre
km ²	square kilometre
m	metre
m ²	square metre
m ³	cubic metre
mm	millimetre
MPa	megapascal
ppb	parts per billion
ppm	parts per million
psi	pounds per square inch

APPENDIX F

DEFINITIONS

Benthic—of, pertaining to, or living on the bottom or at the greatest depths of a large body of water.

Biofouling—the encrustation of structures with living organisms such as barnacles, seaweeds and molluscs.

Microbiota—microscopic organisms, including animals, plants, bacteria, yeasts, fungi, etc, which are primarily single-celled, although some colonial forms and multi-celled organisms are included.

Pelagic—pertaining to water of the open portion of an ocean, above the abyssal zone and beyond the outer limits of the littoral zone.

ph—a term used to describe the hydrogen-ion activity of a system (0-7 is acid, 7 is neutral, 7-14 is alkaline).

Vortex Shedding—in the flow of fluids past objects, the shedding of fluid vortices periodically downstream from the restricting object (e.g. smokestacks, pipelines, orifices).

Zooplankton—microscopic animals which move passively in aquatic ecosystems.

APPENDIX G

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