

**THE  
JOINT PUBLIC  
REVIEW  
PANEL  
REPORT**

**SABLE  
GAS  
PROJECTS**

**Canadian Environmental  
Assessment Agency**

**Nova Scotia Department  
of Environment**

**National Energy Board**

**Natural Resources Canada**

**Nova Scotia Department  
of Natural Resources**

**Canada-Nova Scotia  
Offshore Petroleum Board**

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# Summary and Conclusions

The Joint Review Panel (the Panel) after taking account of the evidence, cross-examination, argument and public comments during its examination of the Sable Offshore Energy Project (SOEP) and the Maritimes and Northeast Pipeline Project (M&NPP), concludes that SOEP and M&NPP are not likely to cause significant adverse environmental effects, provided that appropriate mitigation identified in the course of the review proceedings is applied to both Projects and that the Panel's recommendations are followed and implemented. As well, the Panel concludes that the socio-economic outcomes are favourable for the Maritimes and Canada. As a consequence, the Panel encourages the appropriate regulatory authorities to proceed with all necessary approvals for SOEP and M&NPP without further delay.

In reaching its conclusions, the Panel had for its review information gathered from twenty information and scoping sessions held throughout Nova Scotia and New Brunswick, 1270 exhibits representing either direct written evidence or responses to formal information requests, and a total of 12,266 pages of transcripts from the 56 hearing days in Halifax and Fredericton.

## *Alternatives*

Prior to the start of the hearings, a motion was put forward by Trans Québec and Maritimes Pipeline Inc. (TQM) to request that the Panel consider their proposal as an alternative to M&NPP and allow for a full environmental assessment of the TQM Pipeline Project, and that the National Energy Board (NEB) panel delay any decision on M&NPP until TQM's proposal has been heard. In addition, the Panel heard arguments from Tatham Offshore Inc. and Seafloor Structures Consulting Ltd. requesting that their proposals be considered as alternatives.

The Panel considered whether procedural fairness required it to delay issuance of its Report in order to conduct a comparative environmental assessment of the alternatives to the Projects under review. The Panel believes that it has satisfied its obligations in this regard through the 56 day hearing convened to examine the SOEP and M&NPP Applications, which includes evidence submitted with respect to alternatives to the Project. In view of this, the Panel concludes that it would be inappropriate to delay its report in order to embark upon multiple environmental assessments of potential alternatives. In addition, the NEB panel has also decided to reject requests for delay.

## *Offshore Environment*

In reaching its conclusion with regard to significant adverse effects, the Panel considered many issues, both environmental and socio-economic. A major concern was the Proponents' introduction of waste discharges into the marine environment, particularly drill cuttings with their attendant residues of oil base drilling muds.

Based on the evidence presented, the Panel believes that SOEP's proposed methodology for the treatment and discharge of drilling and production wastes will not result in significant adverse effects to the Scotian Shelf. The Panel notes that SOEP has stated that it will meet or fall well below the limits outlined in the "Offshore Waste Treatment Guidelines" for hydrocarbon content in liquid wastes and on drill solids. The Panel recognizes the importance of monitoring platform discharges.

Accordingly, it has provided recommendations to ensure that SOEP implement adequate monitoring and to encourage the incorporation of new drilling waste management technologies when they become available, if they are proven to be environ-

mentally sound and economically feasible. Another major concern was the possible impacts of the Project on the Gully, an area of special ecological significance on the Scotian Shelf. Concerns were raised regarding the impact of platform discharges and noise generated by Project-related activities potentially reaching the Gully. An additional concern that emerged was that future project expansion might lead to developments even closer to the Gully.

The Panel is concerned over the possibility of project expansion encroaching on the Gully. It has concluded that additional research must be conducted to obtain baseline data on water circulation, sediment transport and acoustic transmission effects on marine mammals. Accordingly, the Panel recommends that, prior to regulatory approval, SOEP submit its Code of Practice outlining protection measures for the Gully as part of their final Environmental Protection Plan. Included in the Code will be details on proposed monitoring programs and mitigative measures. The Panel further recommends that SOEP initiate or contribute to research activities that will provide the baseline data necessary for Environmental Effects Monitoring programs. Additional data are essential to permit effective decision-making with regard to further development of the resource, particularly at sites nearer to the Gully.

The impact of onshore and offshore construction activities on the aquaculture industry raised a number of issues, particularly in the area of Country Harbour, Nova Scotia. Blasting and trenching near the pipeline landfall raised concerns as to the potential for re-suspension of sediments. The siting of supply or service bases near Country Harbour was also raised. Increased vessel traffic associated with

these bases could seriously impact on current aquaculture leases in the area. Of particular importance to the industry was the possibility of actual or perceived tainting, given that consumers view Country Harbour as a pristine marine environment.

The Panel was concerned here as well about the lack of baseline data regarding possible adverse effects on the aquaculture industry. Accordingly, it recommends that SOEP commit to a minimum of one full year of baseline water and sediment monitoring. As to the potential impact of supply or service bases on the aquaculture industry near Country Harbour, the Panel recommends that SOEP remove Country Harbour from consideration as a base site.

### ***Onshore Environment***

Onshore issues of particular importance to both the SOEP and M&NPP proposals included watercourse crossings, of which 260 are anticipated, and the potential impact of acid generating rock. Issues arising from watercrossing activities were focussed on potential adverse effects on fish and fish habitat. Blasting and excavation can expose acid generating rock, which can increase acid levels in the aquatic environment, thereby adversely affecting some organisms. Special emphasis was directed at the adverse impacts on salmon.

The Panel recommends that SOEP and M&NPP mitigate potential Project impacts by addressing: watercourse crossing methods; wet weather shut-down policy; construction techniques and mitigative measures; methods to deal with mitigation of acid generating rock; and finally, new environmental issues resulting from construction activities.

Route selection and land use conflicts were additional areas of concern. The Panel believes that the M&NPP route selection process was thorough and involved considerable public participation. The proposed general route for M&NPP is adequate, if proper mitigative measures are followed. Moreover a detailed 25 metre route will be identified and studied further. This should afford further opportunities for avoidance or mitigation of any sensitive environmental areas and address any new or remaining concerns which were raised by aboriginal

and environmental interests. It will also permit persons who believe that their lands may be adversely affected to make their views known and ensure that their rights are protected.

The Panel recognizes that many rural residents fear that the presence of a pipeline will detract from the rural quality of life. It heard concerns during scoping and information sessions on matters such as pipeline safety, adverse effects on wildlife, property trespass and the aesthetics of right-of-ways. The Panel recognizes their validity but feels that the evidence before it indicates that these kinds of impacts can be avoided or mitigated to insignificance through proper planning, construction and maintenance practices. SOEP and M&NPP have committed to ensure that there will be no significant adverse impacts and the Panel has provided recommendations to ensure this happens.

### ***Socio-Economic***

Issues brought forth in the Hearing were not limited to environmental matters alone; they included many areas related to socio-economic effects and benefits. One issue of some importance was the adequacy of the public consultation program, which is required by the NEB and by the environmental assessment legislation of Nova Scotia and Canada. The Panel found SOEP and M&NPP's programs to be extensive, and it was satisfied with their overall effectiveness. One exception was the inadequate initial contact with the aboriginal community.

Jobs and business opportunities were a concern. The Panel found that direct construction benefits will be short-term and limited, especially when compared to overall economic activity in the Maritimes. The benefits will be real and welcome but they will not be an economic panacea.

The main economic benefits lie in the future. Attaining these benefits will depend on SOEP and M&NPP acting as a catalyst to further hydrocarbon exploration and development. Attainment of that goal will provide an energy alternative for existing industry as well as providing a stimulus for new industrial development, especially in the area of petrochemicals.

The Panel believes that more could be done to enhance opportunities in the Maritimes. In particular, there is no commitment to process gas liquids in Nova Scotia. They appear to be destined solely for export markets. The Panel sees industrial development opportunities arising from the availability of natural gas and its liquid by-products. The Panel was also struck by a lack of foresight in developing training programs in anticipation of the increased economic activity that a 'seed' project will generate. A similar concern was the absence of a long range research and development program. Such a program will be needed to provide a requisite environmental and socio-economic information base for future regulatory decisions and to ensure that the Canada and Nova Scotia capture as many future benefits as possible.

### ***Markets and Tolls***

From the perspective of the Panel, a primary objective of SOEP and M&NPP is to provide access to natural gas for the Maritimes markets. At the same time, the Panel recognizes that markets in the U.S. northeast are a prerequisite to the success of the Projects.

Further, the Panel is of the view that the appropriate toll design is linked to several market development factors. First, SOEP and M&NPP are seed projects, which will provide the foundation for future activity. Second, the building of laterals will encourage access to and growth of natural gas markets in the Maritimes. Third, while preserving the overall economic viability of the pipeline, it is important to recognize the relative economic position of different groups of shippers.

Because of the importance the Panel places on use of Sable gas in the Maritimes, it is inclined to look at the toll design and laterals policy as a "package". The Panel was attracted to M&NPP's postage stamp toll design methodology and Lateral Policy on the basis that it would provide a solid economic foundation for the pipeline in its early years and the greatest potential for the development of the Maritimes market through M&NPP's Lateral Policy.

While the Panel recognizes that the Province of Nova Scotia withdrew their support for the "Joint Position" in reply argument, it is of the view that the Joint Position provides the best available package for promoting gas market development in the Maritimes and, through discounts, partially recognizes the Nova Scotia position that distance should be a factor in toll design.

Nova Scotia intervenors were also opposed to the commitment by SOEP to sell the entire gas production from the first six Sable fields exclusively to M&NPP shippers. They argued that because of their proximity to the Goldboro gas plant, they should not be required to become shippers on the M&NPP pipeline in order to have access to Sable gas. While recognizing that sufficient gas production must be available to M&NPP to make the pipeline economic, the Panel will not sanction tied sales by SOEP because it believes that access to natural gas for Canadians should not be conditional on buyers/shippers transporting their gas on designated facilities.

The Panel believes that the option of bypassing the M&NPP pipeline addresses Nova Scotia interests in arranging their own transportation, while preserving the prerequisite capacity to serve the U.S. northeast.

### ***Monitoring***

Natural gas production and transportation will bring new challenges to the Maritimes, but they are not dissimilar to those faced in the past 25 years of offshore petroleum exploration and production. Projects require detailed planning for the proposed operations prior to construction, and thereafter, effective inspection, monitoring and enforcement programs. Planning for SOEP and M&NPP is still evolving. The Panel in making its recommendations is aware that in some instances it has assessed principles rather than details. This is the nature of the offshore development process. Inspection, monitoring and enforcement are tools that guarantee that a project will be built and operated according to plan. The Panel has recommended a number of safeguards to ensure that any modifications to plans result in greater safety, less environmental impact

and more benefits. The Panel has, to the best of its ability, ensured that effective inspection and enforcement mechanisms are in place, consistent with the precautionary principle which ensures a conservative approach to environmental protection. It has also supported mechanisms by SOEP and M&NPP to encourage monitoring through continuing dialogue and input from the public, stakeholders, regulators and special interest groups. SOEP and M&NPP have initiated a range of consultative committees and the Panel has suggested how these committee mechanisms can be improved. Committees offer a meaningful opportunity to monitor work in progress and ensure that local and special concerns are addressed. The Panel recognizes the efforts that SOEP and M&NPP have taken to date and encourages them to build on these for the future.



## Introduction

### PROJECT DESCRIPTIONS

Since the early 1970's significant accumulations of natural gas have been discovered on the Scotian Shelf near Sable Island. Six natural gas fields have been initially identified for development: Venture, South Venture, Thebaud, North Triumph, Glenelg and Alma. These fields are estimated to contain 85 billion cubic metres of recoverable natural gas. The fields lie near the edge of the Scotian Shelf in water depths between 20 and 80 metres.

The Sable Offshore Energy Project (SOEP), a consortium consisting of Mobil Oil Canada Properties Limited, Shell Canada Limited, Imperial Oil Resources Limited, and Nova Scotia Resources Limited, plans to develop these six fields.

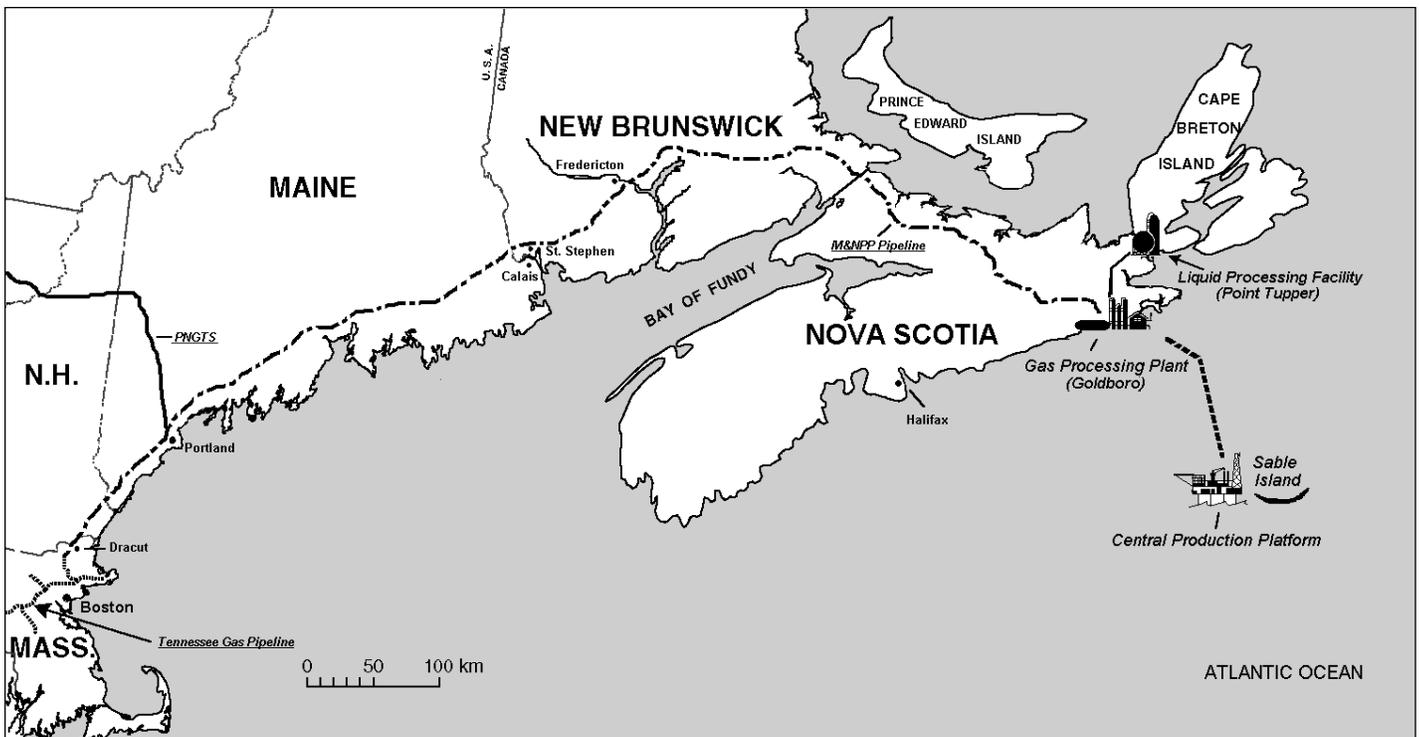
SOEP proposes the construction of offshore and onshore facilities for the drilling, production, transmission and processing of natural gas. Gas and associated natural gas liquids will be collected from offshore production platforms and brought ashore by means of a submarine pipeline to a gas plant to be located at Goldboro, Guysborough County, Nova Scotia. Natural gas liquids will be transported from the gas plant by an onshore pipeline to Point Tupper, Nova Scotia for further handling and shipping.

The SOEP proposal has two parts. The development phase will include drilling to provide the initial producing wells plus the construction of offshore and onshore treatment and transportation facilities. The production phase will involve the removal and

processing of the natural gas over a projected 25 year project life.

Gas production is projected for late 1999, starting at Thebaud, Venture and North Triumph. Additional fields will be developed as required to maintain the sales gas rate of 13.0 million cubic metres per day (460 million cubic feet per day). Development of the South Venture, Glenelg and Alma fields is currently planned for 2004-2007. Project facilities will be designed so that, with proper inspection, maintenance and repairs, they can be used well beyond the current proposed Project life of 25 years. This design approach should enable later development of additional satellite fields. Further exploratory discoveries will be incorporated into the Project as warranted.

Figure 1. The Sable Gas Projects



Accordingly, this Project is viewed as a seed project which should promote future development of offshore gas reserves on the Scotian Shelf.

The Maritimes and Northeast Pipeline Project (M&NPP) proposal will transport the processed natural gas via an onshore pipeline to Canadian and U.S. markets. The pipeline will begin at the outlet point of the Goldboro gas plant, and traverse Nova Scotia and New Brunswick to the Canada-U.S. border near St. Stephen, New Brunswick. At the border, the pipeline will connect with U.S. facilities that will deliver the gas to the northeastern states and ultimately tie into the existing North American natural gas pipeline grid.

## ENVIRONMENTAL REVIEW PROCESS

The SOEP consortium and Maritimes & Northeast Pipeline Management Ltd. (referred to as the Proponents) submitted applications to the following regulatory agencies: the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB), the National Energy Board (NEB), and the Nova Scotia Energy and Mineral Resource Conservation Board (NSEMRCB). SOEP filed applications in June 1996 while M&NPP applied to the NEB in October 1996.

Given that each jurisdiction required a public review of both Projects, an opportunity emerged to conduct a joint public review as a means of streamlining the regulatory process. The outcome was the Agreement for a Joint Public Review of the Proposed Sable Gas Projects (the Agreement) forged among the Ministers of Environment for Canada and Nova Scotia, the Ministers of Natural Resources for Canada and Nova Scotia, the Chairman of the National Energy Board and the Acting Chief Executive Officer of the Canada-Nova Scotia Offshore Petroleum Board (the Parties). The purpose of the Agreement (see Appendix I) was to coordinate the environmental and socio-economic assessment requirements of the Parties by providing a review of the environmental and socio economic effects likely to result from the Projects. The Agreement provided that the review would

meet the requirements of the *Canadian Environmental Assessment Act* (CEAA), the *Nova Scotia Environment Act* and the *National Energy Board Act*. (NEB Act) In addition, the Agreement would meet the requirements of the CNSOPB and their appointed Commissioner under the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act* and the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation (Nova Scotia) Act* (Accord Acts).

The NEB formally referred the SOEP proposal to the Minister of Environment Canada in June 1996 for environmental assessment by a panel and the M&NPP proposal was added in October 1996.

A Joint Review Panel was struck by the Parties and consists of the Chairman, Dr. Robert Fournier, two full-time NEB Members, Mme Anita Côté-Verhaaf and Mr. Ken Vollman, Dr. John Sears and Ms. Jessie Davies. The Chairman was appointed as a temporary member of the NEB and Dr. Sears was appointed as Commissioner pursuant to the Accord Acts (Appendix II, Panel Biographies).

The Agreement set out the process for conducting the Joint Public Review. It provided that the public review would allow for the collection and examination of environmental evidence and the hearing of argument on the environmental effects of the Projects for use in subsequent deliberations and decision making on the applications by regulatory authorities. It also provided a forum for the Commissioner to distribute publicly the Development Application as well as permitting the collection of information in relation to the Development Application for use in subsequent deliberations and recommendations to the CNSOPB.

The Terms of Reference, contained in the Agreement, stipulated that the Review procedures set by the Panel would include the NEB Rules of Practice and Procedure which provide for sworn testimony, cross-examination and argument. The applications received from SOEP and M&NPP were simultaneously considered by the NEB during the Joint Public Review pro-

ceeding. Mr. Vollman, Mme Côté-Verhaaf and Dr. Fournier acted as the NEB panel for both SOEP facilities and M&NPP facilities under Hearing Order GH-6-96.

The Panel's specific mandate was to review the effects of the Projects in accordance with the Terms of Reference appended to the Agreement as Schedule 1, following which they would prepare a report setting out their conclusions and recommendations with the rationale. To assist the Panel in its public examination, scoping and information sessions were conducted during the fall of 1996, with seven sessions in Nova Scotia on SOEP issues and thirteen sessions in Nova Scotia and New Brunswick on M&NPP issues.

Many of the issues relating to SOEP and to M&NPP are the same or interdependent, and in addition, many of the specific issues to be considered by the Panel, the National Energy Board panel and the Commissioner are the same or are interdependent. The Panel, the National Energy Board panel and the Commissioner (referred to collectively as the Panel) therefore decided to hear evidence and argument with respect to both SOEP and M&NPP in a single consolidated proceeding in accordance with the "Directions on Procedure" issued by the Joint Review Panel on December 16, 1996.

Public hearings into the Projects started with informal hearings in Moncton, New Brunswick and Antigonish, Nova Scotia on 4 and 5 April 1997, respectively. Formal hearings began on 7 April 1997 in Halifax, Nova Scotia and continued in Fredericton, New Brunswick from 28 April to 16 May, before returning to Halifax from 26 May to 14 July 1997.

The scope of these Projects includes consideration of construction and operation activities which are delineated by Project descriptions provided to the Panel by the Ministers of the Environment (see Appendix I). The Panel accepted geographic boundaries which defined the "project areas" and temporal project boundaries of twenty-five years as described by the Proponents.

The following Report is divided into four chapters preceded by a Summary and Conclusions. Chapter 1, Introduction, describes the Projects and the review process. Chapter 2 covers the purpose and need, design issues, method of regulation, environmental and socio-economic issues for the SOEP proposal. Chapter 3 deals with the purpose and need, conditions of service, facilities, design, environmental and socio-economic issues for the M&NPP proposal. Chapter 4 deals with matters that are common to both Projects.



# 2

## The Sable Offshore Energy Project

### DESCRIPTION

The basic components of the preferred development plan for SOEP consist of the phased development of six offshore natural gas fields (Venture, Thebaud, North Triumph, South Venture, Alma and Glenelg) in the general vicinity of Sable Island. An estimated twenty-eight production wells are anticipated for the Project. The first twelve are planned for the Thebaud, Venture and North Triumph fields, and are scheduled to be completed by the end of 1999.

The 100-year storm criteria applied in this Project establish the minimal acceptable rig design. As a result of the application of those criteria, two cantilever jack-up drilling rigs capable of operating year-

round will be used for development drilling. The jack-up rigs will have a water depth capacity of 90 metres and will be equipped with dual water and low toxicity mineral oil drilling mud systems. Drilling muds are used to lubricate the drill bit and stem, stabilize the hole, bring cuttings to the surface and control reservoir pressures. Low toxicity mineral oil based muds are especially important during directional drilling.

Under the current plan, one rig will remain in the area to service the production wells until 2004. The second phase of development drilling will be scheduled for the South Venture, Glenelg and Alma gas fields as required to maintain the sales gas production rate.

Three supply boats will be required to service the two rigs, if they are operating at the same time. A supply boat will be on standby at each rig at all times. Current estimates indicate approximately eighty personnel per rig. Some thirty of these will be drill crew workers while the remainder will include mariners, caterers, service workers, and administrative and technical support personnel.

The offshore production facilities will consist of one central, manned platform complex at Thebaud. A second platform at Thebaud will accommodate forty offshore production workers and support personnel.

Water will be removed from the produced gas stream at the Thebaud platform. The gas will then be transported to the gas

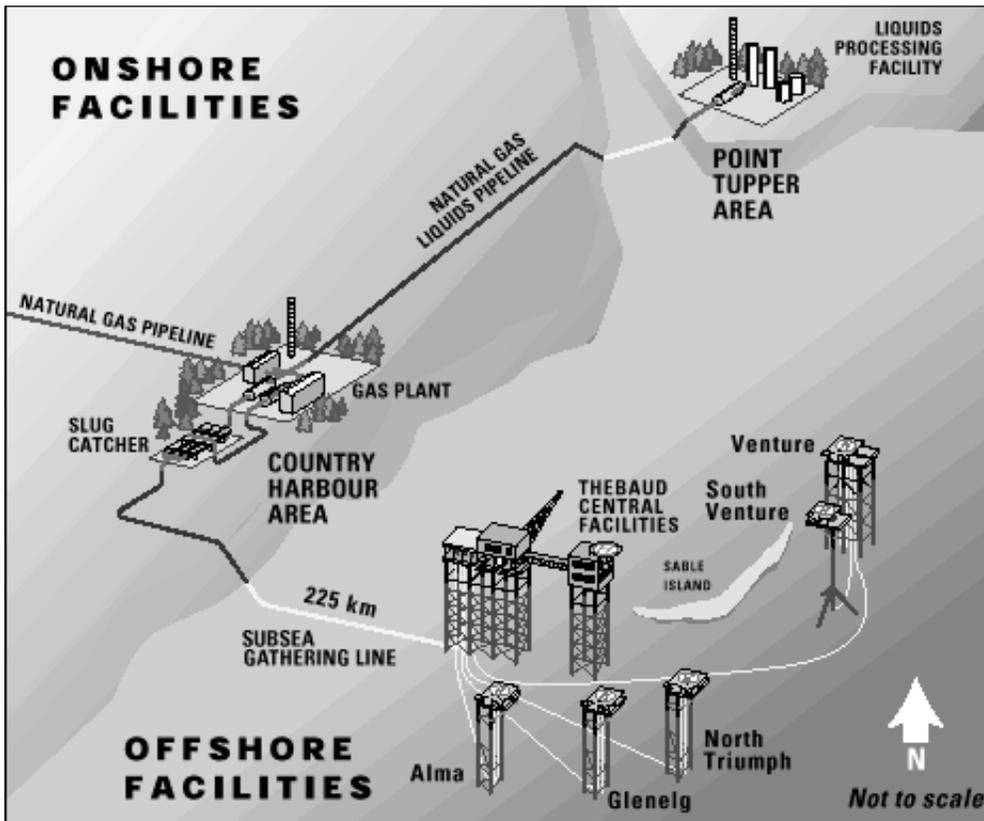


Figure 2  
SOEP Project Schematic

plant at Goldboro in order to prepare the gas for transmission to market.

A slugcatcher adjacent to the gas plant is a device used in uneven flow situations to simultaneously separate the incoming gas from associated liquids. It also steadies the incoming flow to the plant inlet.

The Goldboro gas plant will have the capacity to process approximately 17.0 million cubic metres per day (600 million cubic feet per day) of raw inlet natural gas. The plant has a matching design capacity to remove 3,849 cubic metres per day (24,207 barrels per day) of natural gas liquids (NGLs). The actual volume of product shipped will vary according to production practices.

## **PURPOSE AND NEED**

### ***Supply Availability***

A total of 121 test wells have been drilled on the Scotian Shelf since 1959, resulting in substantial discoveries as well as preliminary estimates of future gas resources in the region. The Proponents relied upon information from the Geological Survey of Canada, the CNSOPB and historical test well information to make their estimates. Based on this information, total gas resources for the Scotian Shelf basin, both discovered and undiscovered, are thought by the Proponents to be 512 billion cubic metres. The CNSOPB has issued twenty-two Significant Discovery Licences (SDLs), for sites estimated to contain a total of 163 billion cubic metres of recoverable gas.

The Proponents have identified six of the twenty-two Significant Discoveries as central to the Sable Offshore Energy Project. The mean expected quantity of raw recoverable gas in these six fields has been calculated to be 84.3 billion cubic metres, with a 90 percent probability that the reserves will exceed 32.3 billion cubic metres and a 10 percent probability that the reserves will exceed 145.1 billion cubic metres.

The six fields were chosen because of low anticipated development costs, a relatively large resource base and the relative certainty of the resource estimates. Following the

submission of the Development Plan, the Proponents obtained 3D seismic data for five of the six fields. These data will be interpreted and integrated into mapping and reservoir simulation studies throughout 1997 and early 1998. The Proponents are planning to utilize the additional seismic information to provide greater confidence in the determination of the number and placement of development wells, required to efficiently exploit the resource.

SOEP submitted applications based on the proposed development of only these six fields. Nevertheless, they identified the six fields as a "seed project" and "a catalyst" for future development with a potential life longer than the proposed 25 year production period. They stated that they intend to continue exploration drilling and to evaluate the remaining "Significant Discoveries" for future development potential.

The Proponents' original submission stated that gas production would be at the level of 440,000 million British Thermal Units per day (MMBtu/d) for a minimum of fifteen years. They later revised their production design to 480,000 MMBtu/d for a minimum of thirteen years. (Note, sales gas rates were referred to during the Hearing in imperial energy units (MMBtu/d) rather than the imperial or metric volumetric units commonly used for raw gas production, therefore this Report will use the imperial energy units throughout).

The Proponents developed the revised production schedule with an approximate one-well excess deliverability. They discussed several measures that might be taken to increase production in the event of a possible shortfall. These include adding fields more quickly, enhancing deliverability of existing wells through recompletion, and reducing pressure decline through increased compression earlier in the project life.

The Proponents used reliable sources for their resource estimates and a consensus exists among different government departments and agencies that gas potential is adequate. Even though the Proponents revised their production design upward, the Panel believes the proposed deliverability to be adequate.

The Panel is satisfied that the supply of gas does not pose a major risk for the Projects. The Project is based on a small portion of the gas resources either known to exist, or predicted to be discovered on the Scotian Shelf.

### ***Markets***

The main markets to be served by SOEP production are located in eastern Canada and the northeastern United States. These markets represent a mix of existing and new gas markets with high growth potential. These market areas are dependent on high-priced fuels and are characterized by a general lack of access to gas pipeline transportation and distribution systems.

Nova Scotia and New Brunswick, while possessing several energy options, do not have natural gas as part of that mix. Today both provinces rely pre-dominantly on Nos. 2 and 6 fuel oils, coal, wood residue and electricity. Based on the NEB's "1994 Energy Supply and Demand Report", total energy demand for both is forecast to grow at an average annual rate of approximately one percent between 1991 and 2010. Proposals advanced by SOEP will provide a catalyst for development and growth of domestic gas use, and initiate long-term gas supply.

Additional evidence for market strength in Nova Scotia and New Brunswick can be found in the fact that since filing its application, Precedent Agreements (PAs) for some 200,000 MMBtu/d of firm service capacity have been executed with three large Maritimes consumers.

A full discussion of both domestic and export markets can be found in Chapter 4.

### ***Design of the Proposed Facilities***

SOEP adopted a design approach for the offshore facilities which would handle the expected production from the six fields and provide a design allowance of approximately ten percent. As design work progressed, this resulted in the design capacity converging at around 21.1 million cubic metres per day (600 million cubic feet per day) of raw gas. (Sales gas rates are less than this due to shrinkage from liquids removal and fuel usage). The relationship of the design rate to the raw gas and sales

gas production rates is shown in Figure 3. Furthermore, as there may be need for future expansion, due to increased reserves in the base project or new discoveries in the area, the Proponents also conducted an investigation of the feasibility of facility expansion by some fifty percent.

The main concern of intervenors with respect to design focussed on the possible expansion of the facilities. Specifically, cost estimates were sought for expanding the throughput to 33.2 million cubic metres per day (945 million cubic feet per day) from the design basis of 21.1 million cubic metres per day (600 million cubic feet per day). The Proponents indicated that the slugcatcher and the liquids pipeline to Point Tupper could accommodate the increased throughput without any further capital investment. However, the subsea pipeline would require additional compression at a cost in excess of \$100 million, and both the Goldboro gas plant and the Point Tupper facilities would require incremental processing facilities at a cost of approximately sixty percent of the original

cost of each of the plants.

The Proponents indicated that the Project was optimized on an economic basis, taking into consideration such factors as: the recovery efficiency of the six fields proposed for development; the market demand; and the incremental current costs versus the future additional costs that would be involved. The Proponents studied the economics of pre-building some excess capacity into the design versus expanding in the future and concluded that approximately 2.8 million cubic metres per day (100 million cubic feet per day) of excess capacity could be incorporated into the base design. The Proponents also submitted that providing space and weight allocations on the Thebaud Platform, to facilitate the future addition of compression, and pre-building additional process trains at both Goldboro and Point Tupper, to accommodate a throughput of 33.2 million cubic metres per day (945 million cubic feet per day), would not be economically justified. Further details on these matters are provided in the following sec-

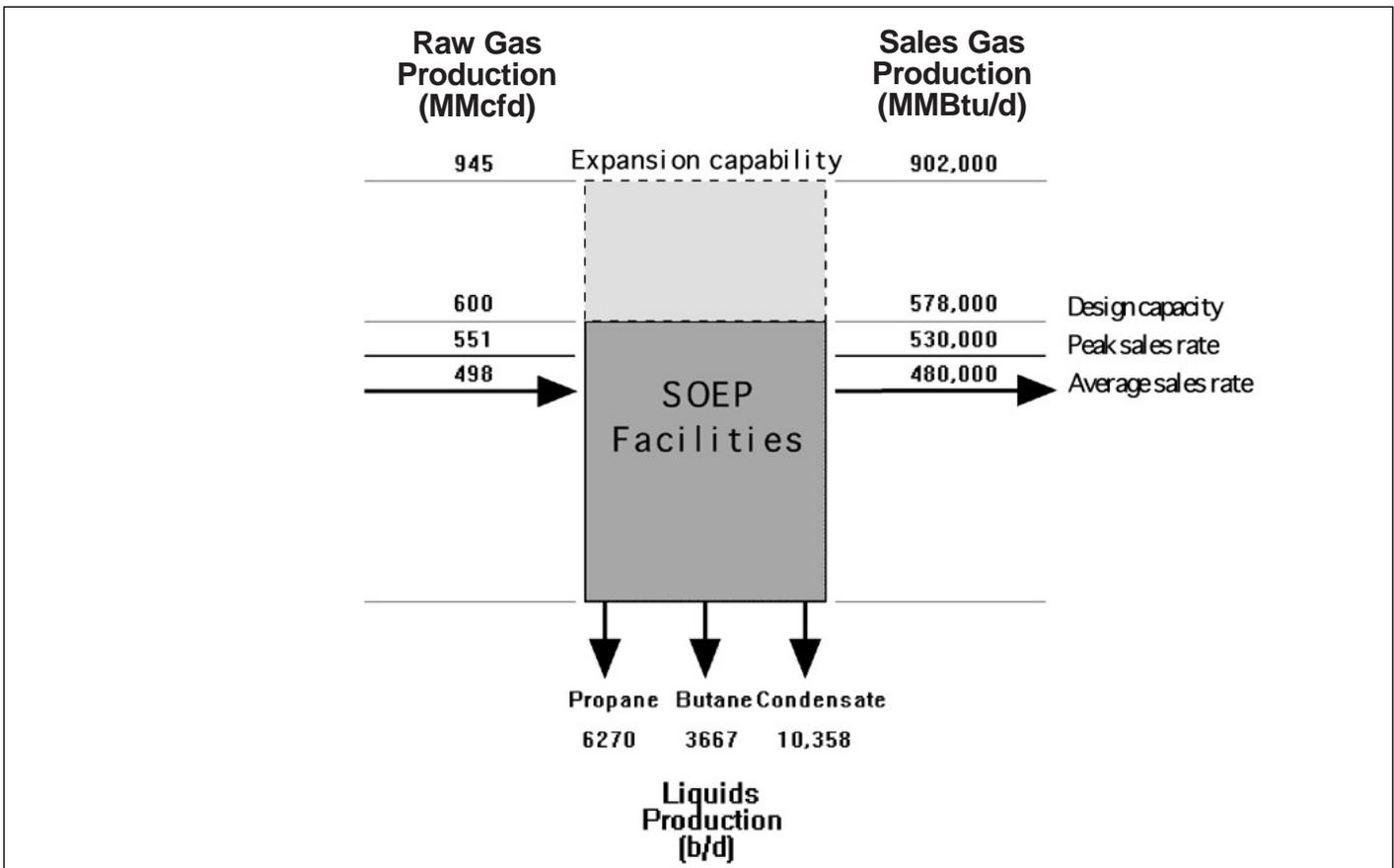
tions which discuss each facility installation in turn.

The Panel is satisfied with the design basis put forward by the Proponents. The philosophy of pre-building expansion capability, where it is economically justifiable, recognizes the likelihood of additional gas being developed in the area of the six fields, and is prudent in terms of keeping the supply costs down for future development.

**Offshore Platforms**

The offshore production facilities will consist of one central, manned platform complex at the Thebaud field which will receive gas from the five satellite fields, each with its own unmanned platform. In the current design, the Thebaud complex will consist of two platforms connected by a walkway. One platform will support the wellhead and processing equipment to collect and dehydrate gas from all of the fields under production. The second platform at Thebaud will have accommodations for about forty offshore production workers

Figure 3. Design Rates for SOEP Facilities



and support personnel. Facilities will include living quarters, storage, a helicopter deck, a sewage treatment system, emergency power, and fire protection and safety systems. Steel jacket platforms will be used at all locations.

Intervenors questioned whether the design of the Thebaud platform could facilitate the future addition of compression. The Proponents indicated that the proposed six-leg platform design would not be large enough to incorporate the required extra space and weight bearing capacity. To include the additional capability in the design would require using an eight-leg platform which would not be economically justifiable.

The Panel accepts the argument that it would not be economically justifiable to install an eight-leg platform now when a six-leg platform is adequate for the design basis put forward by the Proponents. In reaching this conclusion the Panel has also considered future sources and levels of production which may result in other solutions eventually becoming optimal.

#### ***Offshore Pipeline***

The proposed two-phase production pipeline from the Thebaud Platform to the Goldboro Gas Plant will be approximately 208 kilometres in length. The pipe will be 660 millimetres in diameter, with a wall thickness of 17.48 millimetres, and has been designed with excess capacity in order to provide for future expansion of the offshore production facilities. The 660 millimetre pipe diameter replaced the originally proposed 609 millimetre pipe in order to allow for this expansion. The design pressure will be approximately 15 300 kPa, in accordance with Canadian Standards Association (CSA) specifications. However, the approved maximum operating pressure will be approximately 11,700 kPa. The pipeline will be externally coated with a fusion bond enamel and possess cathodic protection to prevent corrosion. The Proponents have also considered the option of coating the pipeline with concrete to give it additional weight and add stability, but the final decision on this option has yet to be made.

The subsea production pipeline corridor

## **THE ROLE OF THE CERTIFYING AUTHORITY**

The role of a Certifying Authority (CA) in offshore oil and gas developments is regulated by the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB).

The CA's role is to serve as a technical resource for the CNSOPB to review and audit the work of the Proponents as the Project advances from detailed design, through construction and operations, to abandonment. Ultimately the CA issues Certificates of Fitness for the various offshore production installations that make up a Project. These installations may include "a production facility and any associated platform, artificial island, subsea production system, loading system, drilling equipment, facilities related to marine activities and dependent diving system." Pipelines are not specifically identified under this definition, but "production risers" and "flowlines" are included in the definition of "subsea production system".

Under the regulations, a CA may issue a Certificate of Fitness in respect of a production installation (or a drilling installation, or an accommodation installation, or a diving installation) if the installation:

- (i) is designed, constructed, transported and installed in accordance with all applicable regulations under the Accord Acts;
- (ii) is fit for the purpose for which it is to be used and can be operated safely without polluting the environment;
- (iii) will continue to meet the requirements of (i) and (ii) for the period of validity endorsed on the Certificate of Fitness, in accordance with inspection, maintenance, and weight control programs approved by the Certifying Authority; and
- (iv) carries out the scope of the work in respect of which the Certificate is issued.

The CNSOPB approves the scope of work of the CA and the CA is restricted, by conflict of interest provisions in the regulations, from being directly involved in the Project.

On the basis of the Certificates of Fitness issued by the CA during detailed design and construction, the CNSOPB will issue "Authorization to Install" and "Authorization to Open" permits for various elements of the Project.

Through a competitive bidding process, and with the CNSOPB's concurrence, Lloyds Register of Shipping ("LR") was selected from this list as the CA for the SOEP. For more information contact the CNSOPB in Halifax.

was selected on the basis of distance, slope, water depth and the avoidance of unsuitable substrate materials. The line is expected to be trenched in shallow water, and in many cases will self-bury. Design criteria for burial will be refined in forthcoming geotechnical studies. The line will be routed, where possible, to avoid extreme water depths in order to simplify lay barge requirements and to avoid rock outcrops and severe slopes.

Although the Proponents have provided the Panel with options for the final design of the subsea pipeline, they did not commit to final design parameters. Consequently, the Panel focussed on five main areas of concern with respect to the Proponent's design philosophy.

The first was the absence of a specific list of standards, codes and specifications. The Proponents indicated that their design will meet the requirements of the CSA Z662-96 with respect to standards, codes and specifications. However, they also indicated that certain design considerations, such as pipeline burial, pipeline installation and subsea riser connections, may require the use of other standards which have not yet been specified. The Proponents indicated that it is their intention to develop the design specifications once a contractor has been selected and construction techniques and installation are known.

The Certifying Authority (CA) and the regulatory bodies have a set of standards and requirements which the Proponents are required to meet. The Proponents indicated that a preliminary set of standards has been reviewed with the CA and the CNSOPB, and that they are revisiting these standards on a continuing basis. At the point of final design, they will file with the relevant regulatory authorities, all standards, regulations, specifications and codes used for design, construction and installation.

The second concern dealt with the engineering criteria that would form part of the final route selection. The Proponents indicated that, in selecting the final route, they will look at the geological features of the seabed in order to avoid spanning, bending and over-stressing the pipe. If possible, the most direct route will be chosen so as to

decrease the amount of pipe required, thereby minimizing costs. They further indicated that the exact route will emerge from the detailed design which is unlikely to be available until the latter part of 1997.

The Proponents stated that when designing offshore pipelines there is less initial route knowledge than there would be for an equivalent onshore pipeline. They also indicated that the design of offshore pipelines typically contains two or three stages. During "scope definition", general route options and lengths are based on public domain maps or available surveys. During the second or "preliminary design" (the current stage of the Proponents' planning) the pipeline design is further refined based on readily available bathymetry and meteorological-oceanographic data. They further indicated that additional surveys and studies will be carried out prior to establishment of a detailed design. The Proponents stated that their swath surveys and cone penetration tests showed that bedrock will not be encountered in the pipeline corridor. In addition, boulder movements, which could endanger the integrity of the pipeline, were not geologically consistent with processes on the Scotian Shelf.

The third area of concern involved the potential for spanning to occur. Spans usually develop because of an uneven seabed profile where the pipeline does not have continuous contact with the sea bottom. In addition, strong tidal currents can, in sandy seabed conditions, scour under pipelines and leave sections of pipe suspended. The Proponents are aware of the potential for spanning and are examining means of avoiding or mitigating the problem. They have not yet committed to specific methods. SOEP indicated that their design philosophy is to avoid unacceptable spans by placing the pipeline in a trench at a depth below which the sediment is not mobile during storms. They further indicated as part of their overall design, that they will perform an assessment of critical spanning distances and conduct periodic inspections. The frequency of inspections will be determined by the occurrence of major storms and information obtained from bottom current measurements. Towed side scan sonar will then be employed to identify spanning

conditions, followed by extensive surveys, using Remote Operated Vehicles, or other similar methods.

The Proponents argued that the existence of a span is not necessarily a cause for concern. Rather, it is the length and the angular displacement of the unsupported pipe that are the critical factors in managing pipeline stress which can result from spans. Operational experience gained with the pipeline should make it possible to identify sites where problem spans might occur with more certainty. Initially, this will result in more frequent and extensive inspections. Once operational experience shows where and when spans do or do not occur, it should be possible to adjust inspection frequency to match the environmental conditions experienced in the actual operation.

A series of measurements were taken in 1995 to determine the mobility of seabed sand ridges. After the winter storm season the same corridor was re-surveyed. A comparison of the two data sets found that much less sand movement occurred than was expected. The Proponents indicated that since it was a typical winter season, the results they obtained were encouraging. The Proponents also compared their recent data set with that from a 1982 Canadian Hydrographic Service bathymetry survey and found it to be virtually identical.

The fourth concern dealt with criteria to be used regarding the need for trenching. The Proponents are looking at trenching in both the Sable Island area, and the nearshore pipeline route to a water depth of about 60 metres. The design has not been finalized, but the detailed design phase will examine trenching in more detail, including design calculations which cover one-year and 100-year conditions. The results will be incorporated into a spanning analysis to determine if the pipeline will be over-stressed or over spanned, due to bottom topography. Trenching will be considered as one means of alleviating such conditions.

The fifth and final concern included studies of earthquake activity. A pipeline's stability and structural integrity could be affected adversely by seismic activity when limits

of intensity and duration are exceeded. Massive soil displacements, horizontally or vertically, mud slides on steep slopes, relative movement of bedrock, weakening of the soil strength and liquefaction may all occur. In addition, pipe spans can be subjected to severe vibrations resulting from shock waves through the soil, which can cause resonant motions and eventual failure of the pipe.

Earthquakes also generate long period ocean waves called tsunamis. When questioned as to whether they had completed studies of earthquake generated tsunamis in the area, the Proponents indicated that these phenomena would not control the pipeline design, and that no further work was anticipated. They also indicated that regional seismic data will be reviewed in order to incorporate any advances in site seismicity characterization.

The Panel accepts that a submarine pipeline can be installed using a wide variety of methods and equipment, quite different from the methods used for onshore installation. The Panel also understands that, by involving the installation contractor in the detailed design process, the Proponents can make significant improvements in their design. The Panel notes that, by selecting the contractor during the preliminary design rather than after the detailed design, designs can be optimized to suit the contractor's equipment and the Proponents can benefit from the contractor's installation experience. As such, the Panel is of the view that the resulting design approach is acceptable and will be better suited to the Project.

Although the Panel finds this approach to the final design to be reasonable, the Panel is of the view that the Proponents should submit their detailed design information and other related documents and studies as they become available, prior to the installation of the offshore pipeline.

### Recommendation 1

**The Panel recommends the following conditions for any approval of the Offshore Pipeline that may be granted. The Proponents shall submit to the National Energy Board, for review, at least one hundred and eighty (180) days prior to the commencement of installation:**

**(a) the pipeline design data and the final pipeline design, including, but not limited to:**

- (i) the final Offshore Pipeline Design Basis Memorandum;**
- (ii) detailed materials specifications;**
- (iii) any relevant supporting design studies;**
- (iv) limits of unacceptable spans found during installation testing and operation, and mitigation measures to be used if an unacceptable span was to develop; and**
- (v) construction schematics.**

**(b) a list of the regulations, standards, codes and specifications used in the design, construction and operation of the pipeline from the Thebaud platform to the Goldboro gas plant, indicating the date of issue;**

**(c) reports providing results and supporting data from any geotechnical field investigations for the evaluation of:**

- (i) the potential for slope instability;**
- (ii) the geotechnical and geological hazards and geothermal regimes which may be encountered during installation and operation of the facilities; and**
- (iii) the special designs and measures required to safe guard the pipeline.**

**(d) the pipeline route, detailed on appropriate scale maps, indicating all seabed, geotechnical and other features to a sufficient depth and resolution.**

**The Proponents shall not start any pipeline installation activity until the final pipeline design has been approved by the National Energy Board.**

**Unless the National Energy Board otherwise directs, the Proponents shall submit, at least thirty (30) days prior to the commencement of construction, a detailed construction schedule. The Proponents shall provide the National Energy Board and all other appropriate regulatory authorities with regular updates on the progress of construction activities and with any changes in the schedule as construction progresses.**

**The Proponents shall submit to the National Energy Board, for review, at least thirty (30) days prior to the commencement of construction, all construction manuals, including:**



Figure 4. Photograph of a Typical Pipe-Lay Barge

(a) a pipe laying and pipe trenching manual (including, but not limited to, other pipeline construction activities such as pipeline stabilization or anchoring);

(b) a construction safety manual (containing appropriate procedures for the reporting of any incidents to the NEB);

(c) a pipeline emergency response procedures manual; and

(d) all other manuals relevant to construction, installation and operation of the subsea gathering line from the Thebaud Platform to the Goldboro Gas Plant.

Unless the National Energy Board otherwise directs, the Proponents shall, during construction, for audit purposes, maintain at each construction site a copy of the welding procedures and non destructive testing procedures used on the Project together with all supporting documentation.

The Proponents shall file with the National Energy Board, no later than one hundred and eighty (180) days after completion of the pipe laying, an as-laid pipeline survey report and maps.

The Proponents shall submit to the National Energy Board, for review, at least thirty (30) days prior to "Leave to Open", an operation and maintenance manual including, but not limited to, inspection and remedial correction procedures for seabed movements causing spanning.

If the National Energy Board determines that the pipeline design assumptions, relative to the pipeline burial, pipeline stability and seabed changes, cannot be confirmed, the Proponents shall submit to the National Energy Board, for review, at least one hundred and eighty (180) days prior to "Leave to Open", a pipeline in-place monitoring program. This program shall include all the inspection procedures and schedules, and criteria that will initiate specific inspection and remedial action

procedures (such as storm conditions and limiting span lengths). This program will also identify all equipment required on-site or near-site for remedial action procedures, as well as any such equipment that has to be brought from remote locations. The program shall include the procedures for reporting incidents to the National Energy Board.

The Certificate for the subsea pipeline facilities shall be issued to and held by Mobil Oil Canada Ltd. pending the establishment of the legal operating entity for SOEP. Upon establishment of that legal entity, the Proponents shall apply for permission to transfer the Certificate so that the pipeline facilities, in respect of which the Certificate is issued, shall be held and operated by that entity.

The Panel recommends that unless the National Energy Board otherwise directs, any certificate issued should expire on 31 December 2000, unless the construction and installation of the offshore pipeline facilities has commenced by that date.

### *Slugcatcher*

Temperatures may decrease while the rich natural gas is flowing to shore, with the result that liquids may condense in the sub-sea pipeline. Since liquid tends to flow along the bottom of the pipeline it typically collects in low spots or in uphill sections. When the flow rate in the pipeline is increased, some liquids will be swept out and an incremental flow of liquid or a liquid 'slug' will exit the pipeline. To manage the receipt of these liquids, the Proponents propose to install a slugcatcher between the pipeline and the gas plant.

The slugcatcher consists of an array of large-diameter parallel sections of steel pipe (up to 1220 millimetres in outer diameter approximately 200 metres in length, sloped downwards towards a liquid collection manifold. It will be installed adjacent to the gas plant and will require approximately five hectares of land. Production will flow through the slugcatcher, with the liquids separating from the gas in the course of moving through the piping. The gas and liquid products from the slugcatcher will be directed through separate piping systems into the gas plant.

The slugcatcher piping system will be constructed of carbon steel, and the pre-fabricated sections will be welded together and given a corrosion protective paint coating on site. The finished assembly will have a maximum operating pressure of 8,275 kPa and will meet all applicable Canadian and Nova Scotian approved codes and standards. The slugcatcher will be designed to provide sufficient capacity to address changes in flow and normal operating slug sizes. No serious concerns were raised during the hearing regarding the design of the slugcatcher and the Panel is also satisfied with its design.

### *Goldboro Gas Plant*

The principal functions served by the gas plant are: separation of the natural gas liquids from the gas; removal of unwanted constituents; compression of the gaseous portion for transmission through the onshore pipeline; and de-ethanization of the liquids prior to their transportation to Point Tupper.

The Proponent intends to accomplish the removal of liquids using an integrated

turbo-expander recompressor unit. Turbo-expansion is a process that makes it possible to extract all liquefiable hydrocarbons. When natural gas under high pressure is allowed to expand, due to its entering the lower pressured environment of the turbo-expander, the expansion of the gas causes it to cool to as low as  $-73^{\circ}\text{C}$  and hydrocarbons heavier than methane drop out as liquids. The expander is mechanically coupled to a compressor unit. This results in a very efficient process for liquids extraction because much of the energy that is lost in the expansion process is put back into the gas stream by the compressor. Efficiency is further improved by using the cold liquids to pre-cool the gas that is headed for the turbo-expander. The turbo expander will occasionally require maintenance. When required, the gas plant will use a specially designed expansion valve (Joule-Thompson Valve) as an alternative to the turbo-expander.

It is very important that all water from the gas stream be removed before the gas enters the cold zone. The slugcatcher will remove most of the water that leaves the offshore processing area. To prevent freezing in the gas plant, additional water must be removed. The gas plant will be using a system known as a "dry-desiccant system". This system has the advantage of being very efficient in removing water, while at the same time it can be configured so that there are zero emissions. Selection of this process has allowed the Proponents to eliminate the need for an ethylene glycol system for dehydration.

Once the gas has been stripped of its liquids, the plant must then re-compress the gas to get it from its expanded pressure back up to pipeline pressure. This is accomplished in part by using a compressor that is on the other end of the shaft of the turbo-expander. The remaining compression is done with conventional compressors.

The Proponents indicated that the Project design elements will meet all applicable Canadian and Nova Scotian regulations and standards and, where these do not exist, accepted international standards applicable to petroleum development projects, such as those of the American Petroleum Institute and the ANSI. The

Proponents likewise indicated that safety systems and devices will be designed to meet the requirements of all applicable standards, codes and local regulations. Where there is a conflict, the Proponents stated that the more stringent requirements will take priority. In all instances, however, it was indicated that local regulations will be met, unless exceptions are sought for alternatives that will provide for an equivalent level of safety.

Intervenors questioned the Proponents on two main aspects of the gas plant design. The first was the expandability of the plant and the second concerned emissions from the plant. With respect to the first concern, the Proponents described the gas plant as resulting from a fit-for-purpose design, and as such it would not have expandability beyond the 17.0 million cubic metres per day (600 million cubic feet per day). Expansion would probably mean the installation of another processing train, similar to the one being proposed, with equivalent costs on a unit basis.

The questions about emissions and acci-

dental exposure associated with the operation of the gas plant were based on concerns about the health and safety of employees at the gas plant and of individuals living in close proximity to it. In responding to this concern the Proponents referred to adherence to the Canada Occupational Health and Safety Regulations, to its own industrial hygiene programs, and to the design features which would minimize emissions.

In order to reduce the occurrence of accidental releases, the Proponents intend to monitor the entire plant with electronic control systems designed to detect over-pressure or leaks, and to immediately begin an automatic shutdown of any gas or liquid feeds to the processing equipment, to ensure that the quantity of lost product is minimized. Any natural gas released in such a situation would be directed to the emergency flare, where it would be safely burned off. Hydrocarbon liquid products present in the piping in an emergency shutdown situation would be collected into a central storage tank for processing once the emergency situation was rectified.



Figure 5. Photograph of a Typical Gas Plant

Flaring (relief and blowdown) systems are required to depressurize the plant and, if required, the subsea pipeline, either as part of scheduled maintenance or inspection shutdowns, or in an emergency situation. These systems will utilize a flare stack, estimated to be a maximum of 97 metres in height. Under normal operating conditions, the stack would have a constant flame, approximately one metre in height, to burn off a small amount of gas products. On an occasional basis, the flare would burn off increased quantities of gas from process upsets or during maintenance activities. In this case, the visible flame at the stack would be approximately one to ten metres in height and the duration could be from several minutes to several hours depending on the circumstances. If the flare is used in an emergency situation (e.g. to facilitate a controlled release of the entire gas volume contained in the plant's process units) the flame height could be up to fifteen metres, but the duration of such an event is estimated to be less than one hour. Activation of the emergency flare systems will be on a very infrequent basis (i.e. shutdown conditions).

The Panel is convinced that the Proponents have designed the gas plant using state-of-the-art technology that will result in process efficiency and minimum impact on workers, people living near the plant and the environment. The recommendations we are making are designed principally to ensure that commitments made by the Proponents during the course of the Hearing are in fact realised.

## Recommendation 2

**The Panel recommends the following conditions for any approval of the gas plant that may be granted.**

**The Proponents shall cause the gas plant facilities to be designed, manufactured, located, constructed and installed in accordance with those specifications, drawings, and other information set forth in the application, or as otherwise adduced in evidence by the Proponents before the Panel, except as varied in accordance with paragraph 1(b) hereof.**

**At least thirty (30) days prior to the commencement of any relevant construction activities, the Proponents shall submit to the National Energy Board, for review, an abbreviated design information package of the gas plant containing:**

**(a) process flow diagrams, with temperatures, pressures, mass balances and capacity, as well as the energy requirements of compressors, heaters and turbo-expanders;**

**(b) piping and instrumentation diagrams for all plant systems; and**

**(c) the codes, standards, and material specifications, to be used for all major equipment and piping;**

**Design and specification changes shall be tabled for review and consideration by the National Energy Board at least 30 days prior to implementation.**

**The Proponents shall design, fabricate and install all components of the gas plant in accordance with applicable codes and standards in the Province of Nova Scotia.**

**The Proponents shall, at least ninety (90) days prior to the proposed date for the commencement of construction of the gas plant authorized by any order issued, file with the National Energy Board for its review:**

**(a) the procedures for project quality assurance and quality control in**

**the design, fabrication and construction of the gas plant, including audit and corrective action procedures; and**

**(b) the construction pressure piping and pressure vessel, non-destructive and pressure testing program including audit and corrective action procedures.**

**The Proponents shall review with regulatory authorities the results of all plant Hazard and Operability Studies (HAZOP) within thirty (30) days of the completion of the studies. The Goldboro Gas Plant HAZOP review shall occur at least thirty (30) working days before final design is completed;**

**The Proponents shall, at least sixty (60) days prior to the commencement of construction, file with the National Energy Board a detailed construction schedule or schedules identifying all major construction activities and shall notify the National Energy Board of any modifications to the schedule or schedules at least ten (10) days before they occur; and**

**The Proponents shall prepare and submit for approval to the National Energy Board a construction safety manual pursuant to section 26 of the *Onshore Pipeline Regulations*.**

**The Proponents shall, prior to applying for "Leave to Open" for any segment of the gas processing facilities authorized by any Order issued, file with the National Energy Board for its review:**

**(a) a detailed explanation of the programs for monitoring internal and external conditions of the pressure retaining equipment in the gas plant, having particular regard to those parts of the gas plant with the potential to cause danger to the employees, the public and the environment; and**

**(b) a detailed training program based, at least in part, on the plant's process hazard analysis, wherein competency of the employees can be verified before assignment of the task.**

The Proponents shall at least sixty (60) days prior to turn-over or commissioning of any gas plant equipment, submit for to the National Energy Board for review:

(a) the turn-over, commissioning and start-up procedures and schedules for all plant equipment, including information regarding the number of persons on site during each of the commissioning and start-up procedures; and

(b) the turn-over, or commissioning safety management policies and procedures, showing how the safety of all employees and the public will be ensured during the commissioning phases of the gas plant.

The Proponents shall submit to the National Energy Board for approval, at least sixty (60) days prior to commencing plant operations:

(a) an Operations and Maintenance Manual pursuant to section 48 Part VII of the *Onshore Pipeline Regulations* which shall include all the safe work procedures required to maintain, commission, start-up, operate and shutdown all equipment in, and associated with, the gas plant;

(b) a gas plant specific emergency response procedures manual; and

(c) contingency plans for hydrocarbon releases to the atmosphere within the gas plant and related facilities.

Any certificate issued shall expire on 31 December 2000 unless the construction and installation of the Goldboro gas plant has commenced by that date.

The operators of the Goldboro gas plant shall ensure that the plant is operated within the environmental codes and standards approved or adopted by the Province of Nova Scotia.

The operators of the Goldboro gas plant shall at least once per quarter, with at least 24 hours notice, allow representatives of the Nova Scotia Department of the Environment, if necessary, to inspect, audit, or verify calibration of those metering measuring and sample collection devices.

The operators of the Goldboro gas plant shall ensure that all modifications, repairs and expansions regulated by the Canada Labour Code conform to the applicable codes or standards that are approved or adopted by the Province of Nova Scotia.

### ***Natural Gas Liquids Pipeline and Treatment Plant***

The responsibility for the approval of the detailed design and matters related to the detailed design for the NGL pipeline and the NGL facilities at Point Tupper, Nova Scotia rests with the Province of Nova Scotia. Discussion and review of these matters will be part of their subsequent regulatory permitting and reporting. The Panel will limit its review to the environmental and socio-economic issues connected with these facilities.

### **METHOD OF REGULATION**

The traffic, tolls and tariffs for federally regulated pipelines must conform with Part IV of the *NEB Act*. A requirement of the Act is that a company cannot charge for service on a pipeline unless it has a tariff on file with the NEB. Among other things, the Act requires that all tolls be just and reasonable and charged equally to all traffic of the same description.

For administrative purposes, the NEB has categorized the pipelines it regulates as Group 1 and Group 2. The larger pipelines, which typically have many shippers and require ongoing regulatory monitoring, are in Group 1. The remaining Group 2 pipelines are regulated on a complaint basis and are generally subject to a lower level of regulatory monitoring. A common situation for a Group 2 pipeline is one where the shipper is also the owner of the pipeline.

At the outset and for an indeterminate period, SOEP will be the sole user of the transportation and processing facilities. Since it will bear full ownership and operating costs of the facilities, SOEP will not charge a "toll" for transportation or processing service. SOEP therefore submitted that there would be no need for the NEB to regulate its activities. Alternatively, it suggested that it would be appropriate to be regulated as a Group 2 company on a complaint basis. In this regard, SOEP also requested that it be granted relief from the following accounting and financial reporting requirements; to keep its book of accounts pursuant to the code of accounts prescribed in the *Uniform Accounting Regulations*; to file audited financial statements; to file a

### Recommendation 3

tariff; to file detailed information to support a tariff specified in Part X of the NEB's "Guidelines for Filing Requirements" issued 22 February 1995; and to comply with the *Toll Information Regulations*.

SOEP indicated that, at a minimum, a code of accounts will be established for the pipeline and processing facilities, that would segregate capital and operating costs for individual components of the Project. These could then be filed with the NEB, if and when tolling was necessary. As well, segregated financial information will be maintained at all times for joint venture accounting purposes.

The Province of New Brunswick requested that the NEB regulate the SOEP facilities as a Group 1 pipeline, at least in the initial years of operation. New Brunswick submitted that the issue does not relate solely to third party access but also to equal treatment and protection for all Canadians. NEB financial regulation hearings serve as a forum where the plans and activities of a pipeline company can be closely scrutinized and the pipeline owners held accountable by those who depend on their facilities. New Brunswick noted the level of regulation accorded to the NOVA system which is regulated by the Alberta Energy and Utilities Board and the fact that all NEB pipelines connected to NOVA's system are Group 1 pipelines.

In reply, SOEP argued that the appropriate time to regulate its facilities on a Group 1 basis will be when third parties seek access to the system. With respect to possible future requests for access to its facilities by third parties, SOEP indicated that it was prepared to permit third party access in accordance with normal industry practice.

The Panel is of the view that, at the present time, regulation as a Group 2 company is appropriate for the SOEP facilities on the basis that the owners of the facilities will be its sole shippers and that no tolls will be charged. The Panel has considered the analogy New Brunswick made between the NOVA system and the SOEP facilities and is not persuaded that the analogy is valid. Distinguishing factors include the fact that third party facilities are located

upstream of NOVA's facilities and the fact that NOVA offers a transportation service but does not own the gas.

With respect to SOEP's request for relief from certain accounting and financial reporting requirements, the Panel believes that a minimum reporting level for SOEP should include a requirement to keep its book of accounts pursuant to the code of accounts prescribed in the *Uniform Accounting Regulations*; and the requirement to file audited annual financial statements. In addition, the Panel notes that SOEP will be required to comply with Section 60(2) of the NEB Act and the requirements contained in the *Memorandum of Guidance - Regulation of Group 2 Companies* (Schedule B) dated 6 December 1995.

The Panel notes that there is no direct link between the classification of a company for regulatory purposes and the classification of a company for cost recovery purposes. The share of the NEB's cost recovery charge that SOEP will be required to pay under the NEB's *Cost Recovery Regulations* will be decided at a later date.

**The Panel recommends to the National Energy Board that the SOEP operating entity be designated as a Group 2 Company for the purposes of regulation under the NEB Act. The Panel also recommends that SOEP be required to keep its book of accounts pursuant to the code of accounts prescribed in the *Uniform Accounting Regulations* and to file audited annual financial statements.**

## ENVIRONMENTAL SETTING

### *Physical Environment*

A prominent feature of offshore Nova Scotia is an extensive continental shelf, known as the Scotian Shelf. It is approximately 700 kilometres long, extending from the entrance of the Gulf of St.

Lawrence in the north-east to the Gulf of Maine in the south-west. The Shelf varies in width from 100 kilometres off south-western Nova Scotia to 250 kilometres off Cape Breton. In all it covers a total area of about 120,000 square kilometres.

The use of the word shelf is a slight misnomer in that the Scotian Shelf is topographically quite variable. Inshore, north of Halifax, the bottom is composed of a variety of rocks, shoals and islands.

Moving offshore surface features alternate between shallow banks and moderately deep basins. The outermost region generally consists of broad flat banks with very little relief except perhaps for Sable Island, which is a unique feature off the north-east coast of North America and the Gully which is a major submarine canyon indenting the seaward end of the Scotian Shelf.

The general flow of water on the Scotian Shelf moves from the north-east to the south-west parallel to the coastline. This flow originates from two main sources: the outflow from the Gulf of St. Lawrence and water moving southward from the coast of Labrador. Superimposed over this general trend are any number of eddies or gyres which reflect localized conditions which emanate from specific energy inputs.

The six SOEP fields are situated along the edge of the Scotian Shelf (see Figure 6) in the general vicinity of Sable Island. There they will experience, in addition to the circulation already described, additional energetic inputs which occur as the result of tidal activities and the influence of seasonal wind stress on surface waters. The combined effect will be to further complicate local water movement conditions. In addition, these cumulative inputs will also exert a continuing influence on the movement of sand and other sediments on the sea floor. This can lead to varying degrees of erosion or alternatively create and continually alter a wide variety of bottom features. The intensity of transport of these bottom fea-

tures usually increases with increasing shallowness of the overlying waters.

### *Marine Biological Environment*

The type and abundance of marine organisms which occur from the coastline out to the edge of the continental shelf depend largely on the physical and chemical characteristics of the environment. As mentioned above the character of the bottom, depth of the water and the dynamics of water movement all vary considerably from place to place.

Inshore waters are commonly thought to be relatively rich because the shallow setting permits the growth of seaweeds which act as a primary food source for many animals. In fact the Atlantic coast of Nova Scotia is an important producer of rockweed, which is collected for the commercial production of certain food additives. Although the greatest harvesting occurs off southwestern Nova Scotia, significant rockweed harvesting is also done on the eastern shore and in several locations along the Guysborough County coastline.

Animals inshore include those which burrow in the sediment, attach to available substrates and others that freely move on and just over the bottom. Examples of these include clams, mussels and lobsters. Included as well are other animals capable of rapid and wide ranging mobility such as fish and birds which feed upon and contribute to the inshore ecosystem. Lobsters, urchins, scallops and rockcrabs are some of the more important commercial fishery species.

The major fish species occurring inshore are widely distributed across the entire project area. Cod, haddock and pollack are three important and closely related organisms which have been of major importance to Atlantic Canadian fisheries. Prior to its dramatic decline in 1993, cod had dominated the fishing industry of Atlantic Canada for almost 500 years. Today a commercial fishing moratorium has been established in the hope that it will allow a resurgence in the numbers of fish. Atlantic cod winters on the Scotian Shelf with the largest concentrations normally found near the outer edge beyond the various outlying banks, such as Sable.

The outer reaches of the Shelf are also the location of a number of other commercial species of fish and shellfish as well as a number of whale, dolphin, porpoise and seal species. The Gully is believed to contain a higher than average level of biological productivity and, along with the physical protection it affords, represents an important habitat for some of these mammals. Fifteen species of whales, including a unique population of bottlenose whales, have been observed in and around the Gully leading to its designation as one of three whale sanctuaries on the east coast.

### *Terrestrial Environment*

Nova Scotia terrestrial ecosystems have a limited biological diversity due to the fact that the land bridge connecting the Province to the rest of the continent is a relatively recent geological formation. In all there are 54 species of mammals and 25 species of amphibians and reptiles in Nova Scotia. Many of these can be found in the Atlantic Shore portion of the Acadian Forest. The Atlantic Shore is characterized by stands of fir, black and white spruce, pine and hardwoods. Tree growth is slow due to dense growing conditions and coastal exposure.

The proposed gas plant, the pipeline corridor as well as the immediate surrounding area do not constitute a unique or critical habitat for mammal, herpetile or avian species of special status. However, potentially sensitive regions in the project area do include deer and moose wintering areas and raptor nesting sites.

The proposed gas plant site will be located approximately two kilometres inland on the eastern shore of Country Harbour/Issacs Harbour. The site is gently rolling and forested with some interspersed open lowlands and bog areas with few trees. The broader surrounding area includes open lakes, intermittent streams and is predominantly hummocky in character. Groundwater throughout this area originates from percolation of surface water derived from rain or snowmelt. Some problems frequently encountered in this area include high iron and manganese concentrations plus occasional salt water intrusion. Groundwater quality at the proposed Project sites and local private wells is

acceptable for domestic use.

The proposed natural gas liquids pipeline corridor, from Goldboro to Point Tupper, will traverse three different geological regions in the eastern part of mainland Nova Scotia: the Southern Uplands, the St. Mary's Graben and the Pictou-Antigonish Highlands. A large portion of the area is underlain by glacial till deposits of varying makeup. Within the preliminary one kilometre corridor there are thirty-four watercourses and eleven lakes. However, most of the lakes lie along the corridor border and none actually traverse its entire width. No significant wetlands have been identified within the corridor, although two are located immediately adjacent.

Atlantic salmon, brook trout and brown trout are the most valued fish species in the region due to their importance for recreational angling and their sensitivity to habitat disturbance. The gas plant site appears to drain naturally to the north toward Gold Brook and Seal Harbour Lake.

**Public Consultation**

A basic issue for any project assessment is the adequacy of a proponent's public consultation process. Nova Scotia, the CEA Agency and the NEB require satisfactory early public consultation. Four basic questions can be applied to test the adequacy of a public consultation process. Did the consultation program result in broad public awareness early in the project planning process? Was the public given an opportunity to understand potential Project impacts, provide comments and influence Project design? Are the results of the public consultation on the public record and open to scrutiny? Is there a plan for an ongoing public communications and awareness process through the life of the proposed Project?

SOEP maintained that its public consultation was based on a thorough and open process where the public has a "right to know" about potential impacts and an ability to influence Project design. SOEP's goal was to develop a consultative and cooperative understanding with the public. It believed that this was achieved by the fact that the great majority of issues were

resolved at the planning stage.

SOEP's consultation program began in 1994 with information briefings, news releases and specific communications which were directed at government representatives, special interest groups and the media. The aims were to foster awareness of the imminent Project application and to begin identifying key potential issues. A four stage public program was initiated in 1995. Stage one took place from January to August 1995 and included ongoing discussions with key stakeholder and government groups and the initial public announcement. Stage two ran from September to December 1995 and involved detailed sessions with public and government audiences to obtain views on potential impacts. The feedback from these meetings was incorporated into Project design. Stage three began in December 1995 and is planned to continue into 1998. It includes a continuing information and consultation program in response to public interest and stakeholder needs, as well as the incorporation of views received via the Panel process. Stage four will begin at the Project construction stage and continue throughout the operations and decommissioning stages. The intention is to keep the public informed of Project activities and deal with any issues if and when they emerge.

SOEP believes that it has engaged in an unprecedented level of public consultation and that its program was successful in raising public awareness. In its Application, SOEP stated that it had addressed all issues and questions raised by the public and other interested parties. During the consultation process, the public was able to review alternatives and provide recommendations. Public feedback influenced key decisions such as the selection of the

pipeline landfall and the gas plant sites. The following table shows the nature and extent of consultation as of May 1996.

SOEP also held a series of meetings since May 1996 with Nova Scotia business and labour organizations, as well as with individual companies. The aim of these was to explain how to prepare for and participate in the proposed contract bidding process.

Early in the public consultation process, three ongoing consultative structures were established. The Benefits Advisory Committee (BAC) was formed as a consultative body to review and help communicate the Canada-Nova Scotia Benefits programs and its opportunities, and to provide a forum for discussing issues pertaining to the participation of local businesses in the Project. Membership is flexible, and includes representatives of SOEP, government, business and trade organizations, unions and other stakeholder groups. BAC first met in January 1997. It is administered and funded by SOEP.

The Sable Community Advisory Committee (SCAC) was established in November 1996. Its core objective is to maximize Project benefits for Guysborough County. This would be accomplished by providing information to SOEP on local issues and concerns, as well as by making suggestions for Project design, construction and operation. Ten members were appointed to SCAC from the four area municipalities and the regional development authority. SCAC operates independently of SOEP. Interested parties may participate in its deliberations at the request of SCAC.

The SOEP-Fisheries Liaison Committee (SFLC) and the SOEP-Country Harbour/Drumhead Fisheries and Aquaculture Liaison Committee were

Table 1. Nature and Extent of SOEP Consultation as of May 1996

FORM OF CONSULTATION	PERSONS INVOLVED
91 Private Meetings	1,535
39 Community Meetings	2,243
Master Mailing List	10,800
1-800 Line	422
Telephone Survey	2,500

initiated in March 1995 to provide a forum for communications, education and resolution of potential problems related to Project-fisheries interactions. Membership includes representatives of SOEP and the fisheries industry. SFLC is an open forum.

SOEP indicated during the Hearing that all of these committees are functioning well. As measures of success, it identified the accomplishments of SCAC in representing local concerns and SFLC's role in negotiating a SOEP-Fisheries Industry Agreement. SOEP has undertaken to continue meeting with these committees in order to ensure that community, benefits and fisheries issues are resolved.

Some intervenors questioned the adequacy of the SOEP consultation program. They felt that it had not resulted in the views of all parties being represented. The main challenge came from two intervenors who received participant funding from the CEA Agency to provide the public with information on the Project based on a sustainable development perspective, and to research public perceptions of Project impacts. Both research projects were based on small samples and restrictive sampling criteria. Neither intervenor claimed that their results were broadly representative of the opinions of Nova Scotians nor of those groups most likely to be affected by the Project.

The Panel concludes that the SOEP process considered positively and fully the questions posed above. Broad public consultation occurred early in the project planning phase, and resulted in clear public awareness of the Project. One exception was a failure to consult with aboriginal groups early in the process, an issue which is discussed in Chapter Four of this report. Otherwise the public had numerous opportunities to understand potential impacts, provide comments and influence Project design. The extent of public involvement in route and plant site selection and the testimonial of local government on the extent of public dialogue supports this conclusion. SOEP filed a complete public record which was open to public scrutiny. In the final analysis, none of the intervenors produced evidence to seriously challenge or negate the adequacy of the SOEP public

consultation program. Finally, consultation and future public involvement are planned at all stages of the Project. The Panel is satisfied with the adequacy of the public consultation program.

## **OFFSHORE ENVIRONMENTAL ISSUES**

### *Framework for Analysis*

The potential marine environmental impact of SOEP is complex, varied and leads itself to a myriad of issues. In order to put these issues into perspective, the Panel created a simple framework within which to discuss these matters. Firstly, generic Project threats and environmental risks will be reviewed. The next part of the framework will consider the impact of Project activities on marine life and special areas, the likelihood of these threats and risks actually occurring, and the sensitivity of the environment to these disturbances. These will be considered on a component by component basis. Finally, the offshore environment will be considered in the context of its potential impact on Project facilities.

Environmental risks resulting from Project construction and operations can arise from several sources. These include: drilling and production wastes, resuspension of seafloor sediments, underwater noise, animal disturbance, supply bases and accidents. Valued Environmental Components which warranted the greatest concern included: fish habitats; fisheries and aquaculture; marine mammals; marine birds; the Gully and Sable Island. The environment can also represent a threat to Project facilities through the action of sea ice, icebergs and other forms of extreme conditions.

## **PROJECT INTERACTION WITH THE ENVIRONMENT**

### *Drilling and Production Wastes*

Liquid wastes from the development and production of offshore wells typically include drilling fluids, produced water, deck drainage, effluent from living quarters such as sewage, grey water and solid wastes, well treatment fluids, hydrostatic test fluids, cementing discharge and miscellaneous fluids such as engine coolants, fuels, lubricants and fugitive effluents.

Potential pathways for these discharges to enter the marine environment are in the form of contaminants to surface and bottom waters as well as directly to the seafloor. From the perspective of impact assessment on the receiving environment, the key issues are the quantity and content of identified contaminants of concern, including petroleum hydrocarbons, trace metals and selected chemical contaminants associated with any waste stream.

The Proponents have indicated that they plan to use oil base muds (OBMs) in the deeper portions of the wells, where water base muds (WBMs) would be ineffective. However, the Proponents have not yet committed to using synthetic base muds (SBMs), even though adoption of these would be consistent with SOEP's advocacy of "Most Appropriate Technology" and reflect Project Principles and Guidelines. A major concern during drilling will be the introduction of drill cuttings to the benthic habitat with their attendant residue of drilling mud. In other regions, containing multiple well sites, significant changes in biological communities have been observed within 500 metres of the drilling rig.

Produced water will be extracted along with oil, gas condensate and gas during production. It has a higher density than seawater and contains process chemicals such as coagulants, demulsifiers and defoamers. Produced water is continuously discharged as it is separated from commercial product.

Naturally Occurring Radioactive Material (NORM) was mentioned briefly during the Hearing. NORM can occur in produced fluids although the risks associated with offshore discharges are extremely small, and only become a problem when scale and other deposits form on the inside of processing equipment. The Proponents stated that a monitoring program will be designed to determine whether or not NORM is an issue at SOEP.

Domestic wastes from the living quarters will issue from the drilling platforms at the approximate rate of 32 cubic metres per day. This includes daily rates of 11.2 cubic metres of sewage effluent and 21.2 cubic

metres of grey water from laundry, shower and sinks. Both sources will be treated prior to discharge. Discharge pipes will be positioned to produce maximum dispersal and care will be taken to avoid mixing chlorinated wastes with hydrocarbon discharges in order to prevent formation of chlorinated hydrocarbons which could bioaccumulate and become toxic.

### ***Resuspension of Seafloor Sediments***

Activities used to lay subsea pipelines, such as trenching, ploughing, blasting, jetting and dredging, as well as the movement of equipment itself, can cause resuspension of bottom sediments. The environmental impact of these activities will vary depending on the following factors: physical and chemical composition of the bottom sediments; type, duration and location of the construction activity; the season; and proposed mitigative measures.

Impacts from the construction of the offshore pipeline will include: the possible resuspension of sediment contaminants into surface waters; the release of chemicals from the pipeline during testing; a temporary reduction in light penetration; and suffocation of benthic organisms due to settlement of disturbed sediments.

In the shallow approach to the landfall at Betty's Cove, it is likely that the first 150 metres of the pipeline route will be trenched and later fully backfilled. Maximum trench depth inshore is likely to be four metres, generally decreasing to about one metre, one kilometre out from the shore. At that point the top of the pipe will be roughly at or near the level of the seabed, where it will remain as it passes outward through Country Harbour to a distance of about seven kilometres. Beyond that point the pipe will lie directly on the sea floor.

### ***Underwater Noise***

Underwater noise from offshore production facilities will be produced by drilling, by platform activities and from the operation of support and supply vessels. The Proponents have stated that fixed, steel-jacket platforms will transmit very little noise directly into the marine environment. Only the steel legs will be in direct contact with the water, so that noise will be pri-

## **Drilling Muds and Cuttings**

Drilling fluids or muds are an essential requirement for all rotary drilling operations. Their major functions include the removal of cuttings from the drill hole, controlling the subsurface pressure to prevent blowouts, and cooling and lubricating the bit, drill pipe and drill collar. Types of drilling fluids include: freshwater, salt-water, salt-added water, water-base muds (WBMs), oil-base muds (OBMs), polyemulsions, air and foams.

Alternate or synthetic-base drilling muds (ABMs or SBMs) have been developed to provide an alternative to OBMs using low toxicity mineral oil, for offshore hydrocarbon developments. Their use is a response to the increasing trend towards regulatory reductions in oil content of conventional formulations. SBMs are more expensive than OBMs or WBMs but they can be cost effective in drilling problem wells. In terms of environmental benefits there are conflicting reports as to whether or not SBMs are more biodegradable and less toxic to aquatic organisms than OBMs. The type of mud used depends on the cost of the system, associated drilling expenses, requirements for evaluating well characteristics, and anticipated problems related to the drilling formation to be encountered.

Drill solids or cuttings are particles which are generated by drilling into subsurface rock formations and are carried to the surface with the drilling muds. Cuttings size is the most important factor in terms of the amount of oil retained on the cuttings; typically, oil retention increases exponentially as the particle size decreases. Drilling muds will be reused until they are spent, and depending on the type of base, disposed into the marine environment (in the case of WBMs) or, processed in a solids control system to recycle as much mud as possible back to the drilling units (in the case of OBM/ABMs). Spent mud will be transported to shore where it will be reconditioned or disposed of by incineration or in landfill. The resulting ash will be disposed of in a designated landfill site.

marily from machinery vibration. If the ambient noise level is low, then project activities will be detectable at longer distances. Underwater ambient noise levels are closely correlated with wind speed, which in turn creates surface waves. In general, intensity decreases with distance from the source, a process referred to as transmission loss. Sound transmission velocities in shallow water are highly variable and site-specific; they are strongly influenced by the reflective properties of both bottom and surface, as well as by variability inherent in the water itself. The principal issue in this area is the potential effect of Project related underwater noise on marine mammals of the Scotian Shelf, especially the northern bottlenose whales (*Hyperoodon ampullatus*) that live year-round in the Gully.

#### **Animal Disturbance**

Whales and other marine mammals can also be affected by the passage of ships and low-flying aircraft. The effects can vary from collisions to behavioral disturbances known as "startle" reactions. All whales found in the SOEP project area are at some risk from potential collisions, but northern right (*Eubalaena glacialis*) and humpbacks (*Megaptera novaeangliae*) appear to be most vulnerable; the former because of its tendency to rest and feed at the surface, and the latter because major shipping lanes cross important feeding grounds. In addition, disturbance of breeding bird colonies by construction noise such as trenching or blasting could produce a moderately significant impact.

#### **Fabrication, Supply and Service Bases**

The Proponents have indicated that a temporary base for jacket construction and facilities fabrication will require from two to five hectares of waterfront land plus a minimum of sixty metres of wharf. They also reported that an additional temporary pipeline supply base will be required for offshore pipeline installation. The latter should be located as close as possible to the pipeline route and will require a waterfront site of fifteen to forty hectares for warehousing and a pipe-coating yard and a minimum of 300 metres of wharf, with water depths of six to nine metres to allow simultaneous loading and unloading of pipe supply barges and supply vessels.

Both facilities will require access to road and railway systems. Details of final locations are not yet available but they intend to make use of existing wharf facilities.

Some of the factors to be considered in site selection include the sailing time between base and work site, the qualifications of the base operator and the type of programs for safety and environmental effects management which are in place. The Proponents identified potential environmental impacts associated with a supply base to include: possible product spills such as fuels and drilling muds; discharges from vessels such as bilge or ballast water; or accidental releases of fuel, lubricants or sanitary wastes.

#### **Accidents and Malfunctions**

Accidental releases of gas and condensate from the Project could result from blowouts, offshore pipeline breaks or from a tanker accident. If a spill occurred, the volatile nature of the condensate would produce a thin slick at the sea surface, which would evaporate even more rapidly than crude oil or gasoline. Based on a combination of modelling and historical data, the Proponents submitted statistics for various blowout and spill scenarios. The worst case scenario would be a breach in the 225 kilometre subsea production and gathering pipeline from the Thebaud platform to the mainland. Maximum impact would occur if the breach was close to shore resulting in a contaminated shoreline before the condensate had an opportunity to dissipate. However, modelling results showed that condensate will evaporate rapidly under normal wind conditions.

In the Point Tupper area, stabilized condensate will be transported to markets by various methods including marine tankers. Modelling predicted that surface slicks from the two large tanker condensate spills (worst-case event 31,800 cubic metres, and average event 8,000 cubic metres) will break up within twelve hours, while dispersed plumes could persist for up to eight days before diminishing below the one part per million hydrocarbon threshold for the worst-case scenario.

## **EFFECTS ON VALUED ENVIRONMENTAL COMPONENTS**

Valued Environmental Components (VECs) are areas or organisms of concern that can be linked to project activities. VECs identified for the marine environment include: fish habitats; fish, fisheries and aquaculture; marine mammals; marine birds; and unique or protected areas, specifically the Gully and Sable Island.

#### **Fish Habitat**

Harmful alteration, disruption or destruction of fish habitat in the offshore and near Betty's Cove during construction of the offshore facilities could occur from placement of the production platforms, deposition of construction-related drill wastes and laying of the subsea pipelines.

Environment Canada suggested that the Proponents consider remediation of environmental impacts beyond the 500 metre radius around each platform, and to use the area within this radius to focus on assessing project-related impacts or accumulations.

DFO submits that, based on the North Sea experience, drilling wastes will disrupt fish habitat. In addition, they report additional studies which indicate that discharges could cause more widespread contamination than was originally envisaged. Thus, the Project is likely to cause Harmful Alteration, Disruption, or Destruction (HADD) of fish habitat and the Proponents will therefore be required to apply for an Authorization for Works or Undertaking Affecting Fish Habitat. DFO will be a Responsible Authority, and will prepare the necessary (HADD) decision framework. DFO also stated that the Proponents' justification for the use of OBMs over SBMs was inadequate.

The Proponents acknowledged that over the lifetime of the Project, an estimated 2,100 cubic metres of drill cuttings will be produced and that within a 500-600 metre radius of each drilling platform, some smothering of benthic fauna will occur. The Proponents modelled drill cuttings transport, including under storm conditions, and showed that the likelihood of

drill cuttings and associated mud reaching the Gully would be very small (0.27 percent of the time). Additionally, the probability of their reaching the Gully at concentrations capable of adversely impacting the Gully's marine life is even smaller.

In response to DFO, the Proponents have proposed the following measures to mitigate any adverse environmental effects: adoption of specialized mud handling equipment; acceptance of a compliance and effects monitoring program, as outlined to the Panel; and adherence to sound and responsible environmental management.

The Proponents have also stated that the fate and effects of drill cutting discharges will be investigated as part of the five year Environmental Effects Monitoring (EEM) programs, and will involve benthic sediment chemistry, benthic community analysis, in-situ monitoring and organalytic testing of sea scallops. If for example, the EEM program showed greater than anticipated impact to the environment, the use of SBMs would be investigated to determine whether they could mitigate those effects. The Environmental Effects Monitoring (EEM) program would continue should other fluids be utilized. In addition, regular compliance monitoring will be conducted on the drilling units to measure discharge volumes, rates and percentages of retained oil. The Proponents also stated that whole oil-base or synthetic drilling mud will not be disposed into the ocean. Water base fluids which will be used in the upper sections of the hole will be disposed overboard along with the associated cuttings. SOEP stated that they will work to develop agreed upon criteria for the possible use of alternative methods for the disposal of drilling cuttings and mud. Furthermore, waste discharges will not be combined into common outflows with the objective of diluting a waste stream to meet specified discharge concentrations.

Some intervenors argued for a zero-discharge policy in accordance with their interpretation of the precautionary principle. Based on the confidence expressed by DFO in the modelling scenarios and the proposed use of low toxicity mineral oils with stringent environmental effects

### Precautionary Principle

Recognition of the gap in scientific information and data has led to the development and increased acceptance of the "precautionary approach" as a decision-making principle in situations involving environmental effects. This principle states that where there are threats of serious or irreversible damage to the environment, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

The first significant application of the precautionary principle in international environmental law took place in 1987 at the signing of the Montreal Protocol on Substances That Deplete the Ozone Layer, Other global conventions which Canada has signed incorporating this principle include the 1992 Rio Declaration on environment and development and the 1996 United Nations Convention on Straddling Fish Stocks and Highly Migratory Fish Stocks.

The precautionary principle is referred to in the *Nova Scotia Environment Act*, and in the *Oceans Act*. This principle is also one of the guiding principles in the federal Department of Fisheries and Oceans revised policy on Underutilized Species (or Emerging Fisheries):

The precautionary approach has also been recommended for inclusion into the revision of the *Canadian Environmental Protection Act* by the House of Commons Standing Committee on Environment and Sustainable Development.

monitoring, the Proponents felt that a zero discharge policy was not warranted. In addition, discharge modelling studies predicted that it is unlikely that any significant adverse environmental effects will occur due to disposition of drilling cuttings or the release of the related oil-base muds.

Concern was expressed over the chemical composition of produced water and the lack of proposed treatment prior to its release into the marine environment. The Proponents listed expected constituents such as composite organics, trace metals, trace organics, suspended solids, total organic carbon plus various treatment chemicals. The Proponents stated that, significant dilution will occur with all liquid discharges. Modelling carried out for the "1983 Environmental Impact Statement at Venture" showed that produced water released at the rate of 700 cubic metres per day, which is about midway between the current estimates of 400-1,600 cubic metres per day for each of the SOEP locations, would undergo a 1,000-fold dilution within the immediate 0.01 square kilometre surrounding the platform. Model simulations using hydrocarbon levels of 40 milligrams per litre predicted that in the produced water concentrations will fall to as low as 1.7 parts per trillion within five kilometres from the discharge site. However, intervenors' views were that dilution is not an appropriate mitigative method, especially since some waste components may flocculate and then be deposited in areas at some distance from the point of discharge.

A further concern expressed by intervenors was that the Proponents should design and implement a research program to investigate the fate and sub-lethal effects of produced water on fish habitat. They suggested that measurements to detect the environmental effects of discharges should be incorporated into an EEM Program, and a management/contingency plan be developed for implementation if undesirable effects were detected. Several intervenors recommended a zero discharge policy for produced water. DFO's position was to recommend a careful well-planned monitoring program in place of a zero-discharge policy, because in the latter case, sufficient

uncertainty exists with respect to the impacts of the proposed project that this "type of extreme action" is not warranted. In general, the majority of substances likely to be released, such as heavy metals in the produced water, tend to have chronic impacts only after long-term exposure, and hence, according to the Proponents, will not be a significant concern given the high dilutions and short exposures likely to occur. As a result, no significant effects are anticipated by the Proponents and they do not intend to monitor possible effects of produced water discharges. Consequently, re-injection of produced water was also not considered to be necessary.

Environment Canada raised further concerns regarding chlorination and suggested that it should not be employed for the treatment of wastewater and that alternative technologies such as UV radiation or ozonation were preferred.

The Venture to Thebaud interfield pipeline route has not yet been selected; three routes are under consideration. Trenching and laying along this route will affect the habitat of some marine seabed organisms. DFO raised the issue of how much of the interfield pipeline will be buried. The Proponents replied that the extent of pipeline trenching and burial had not yet been finalized. The present assumptions are that all interfield lines will be trenched and then will self-bury following installation.

Although the platforms themselves will temporarily reduce fish habitat, this will eventually be redressed by the addition of 82 hectares of hard surface habitat from the pipeline itself.

The Panel recognizes that the introduction of drilling and production wastes into the marine environment is a major environmental issue. The Panel's analysis of the acceptability of SOEP's proposals has taken into account a number of factors including: SOEP's commitment to meet or better the "Offshore Waste Treatment Guidelines (1996)"; the nature of the fluids; the various modelling studies put into evidence respecting the fate of discharges, observations of the environmental effects

in other offshore projects; and SOEP's Monitoring and Adaptive Management Program.

The Panel believes it important to recognize that the Guidelines were developed by a joint industry government group, which included Environment Canada and DFO. The Guidelines, in draft form, received wide public distribution, including non-government environmental organizations and aboriginal groups, for review and comment before final issuance in September 1996. The Panel recognizes that the Guidelines are based on current knowledge and experience, and notes that they encourage offshore operators to consider and implement new drilling mud and waste handling technology, provided it is proven to be environmentally, technically and economically feasible. The option of re-injecting drill solids, provided it is technically and economically feasible, is promoted by the Guidelines for consideration by operators when planning drilling programs.

The Panel also notes that drilling conditions require the use of an OBM and that the LTMO fluids proposed to be used are of low aromatic content, less than five percent. The Guidelines state that the specified levels are considered minimums, and provide general direction on the reduction of volumes of wastes and concentrations of contaminants in those wastes. Despite this, the treatment proposed by SOEP is targeted to achieve eight percent LTMO on cuttings, well below the Guidelines limit of fifteen percent.

SOEP's modelling of the fate of discharges, observations of impacts at other sites, notably Cohasset-Panuke, and a commitment to proper monitoring, assisted the Panel in reaching a conclusion that there will be no significant alteration or destruction of fish habitat as a result of drilling and production waste discharges. The Panel further concludes that the Proponents' proposed methodology for the treatment and discharge of drilling and production wastes is not likely to result in significant adverse environmental effects to the Scotian Shelf area. The Panel emphasizes that the monitoring of platform discharges is especially important from a

## Recommendation 4

The Panel recommends that the appropriate regulatory authorities ensure that the Proponents:

a) develop a statistically and scientifically valid Environmental Effects Monitoring program to ensure that mitigative measures are effective and to confirm predicted environmental effects with respect to discharges of drilling wastes and produced water including sublethal effects of produced water, flocculation of waste and the creation of chlorinated hydrocarbons within the 500 metre radius of the drilling platforms;

b) further explore the alternatives to the use of OBMs and commit to considering and implementing the most environmentally and geotechnically sound options when available;

c) consider and implement new waste treatment during the lifetime of the Project which is proven to be environmentally and technically superior to the initial methodology;

d) explore alternative techniques other than chlorination for treatment of liquid domestic wastes from the Project facilities, prior to their release into the marine environment; and

e) in conjunction with compliance monitoring requirements for the disposal of hydrostatic test water for the offshore pipelines, at least 30 working days prior to the commencement of any hydrostatic testing portion of the Project, submit to the appropriate regulatory authorities for approval detailed information regarding hydrostatic testing including:

- (i) the source selected for hydrostatic test water;
- (ii) the location of the hydrostatic test water;
- (iii) the type and quantity of antioxidant to be used, including a justification for selecting this particular antioxidant;
- (iv) site-specific mitigative and restorative measures to be employed as a result of consultations with regulatory agencies; and
- (v) evidence to demonstrate that all issues raised by regulatory agencies have been adequately addressed, including all necessary updates to the environmental assessments where deficiencies have been identified.

regulatory compliance viewpoint and for the verification of predicted environmental effects.

In order to reduce the disturbance on fish habitat from any contaminated sediments in Country Harbour, the Proponents indicated that several trenching alternatives will be considered. They provided information on ploughing and dredging, plus the criteria which will be used to evaluate each. Long term effects of pipeline trenching are expected to be minimal due to the cleansing action of natural sediment transport regimes.

The Proponents have acknowledged that trenching will cause a short term loss of fish habitat. Trenching may also cause a short term loss of approximately 2.5 hectares of good lobster habitat in the vicinity of Betty's Cove. An intervenor raised the issue of sedimentation from the trenching activities and the extent to which it would penetrate Country Harbour and affect aquaculture leases, one of which is approximately 3.75 kilometres from the proposed activity. The Proponents indicated that the distance that the sediments might travel is still unknown; however, DFO is currently conducting a study in the inner parts of Country Harbour which should give some information on the nature and the distribution of currents in that area. The Proponents are considering broadening their efforts to develop a predictive model to describe sediment movement. It could also assess the potential vulnerability of aquaculture facilities. The Proponents admitted that siltation criteria had not been established to determine when mitigative measures will be employed or when to stop the operations completely. This intervenor raised special concerns regarding the spawning period for mussels which occurs from July through September, and whether trenching could realistically be suspended during that time. SOEP responded that within the next six months, the modelling would be done which would allow a fairly accurate indication of possible sediment levels.

The Proponents stated that they do not expect to encounter contaminated sediments in the nearshore pipeline corridor approaching Betty's Cove. However, as part of the forthcoming detailed engineering process further sampling will be undertaken primarily to identify possible contamination from heavy metals associated with old gold mine tailings and waste rock near or along the shore of Betty's Cove. At the request of the Panel, the Proponents submitted a detailed sampling plan proposal with the main objective to determine whether sediments expected to be disturbed by trenching or other construction activities are contaminated and, if so, to ensure that appropriate construction measures will be employed to mitigate any effects which might result from disturbance. The Proponents also stated that in order to accomplish this, the sampling program would be conducted early enough to provide input to construction design. The Proponents will be using the "User's Guide to the Application Form for Ocean Disposal" developed by Environment Canada (EPS 1/MA/1 Dec 95) as a reference for contaminant levels, as well as *Ocean Dumping Regulations* for collection and analysis of biological samples. The Proponents stated that the biological sampling will be conducted after the final survey design is approved by Environment Canada. However no commitment was made to have the sediment program or its results submitted for similar approval.

The Panel is concerned that the Proponents have not presented sufficiently detailed information to allow proper assessment of: a) any important habitat types lie along the nearshore subsea pipeline route; b) the extent of these habitats; and c) the degree to which it might be significantly affected. In addition, the possibility of sediment contamination in Betty's Cove has not been adequately addressed to ensure that there are no significant adverse effects during the nearshore subsea pipeline construction activities.

## Recommendation 5

**The Panel recommends that at least 60 working days prior to the commencement of construction of the nearshore pipeline in Betty's Cove, the Proponents submit to the appropriate regulatory authorities for approval, additional information regarding the proposed specific routes of the subsea pipeline and the specific installation method for the landfall point. The additional information shall set out:**

**(a) the results of the sediment sampling program along the specific route into Betty's Cove;**

**(b) an underwater habitat assessment along the specific route into Betty's Cove;**

**(c) an environmental issues list identifying all relevant effects of the selected route on marine biological Valued Environmental Components;**

**(d) the associated mitigation measures to render those environmental effects insignificant; and**

**(e) the details on the selected installation method for the landfall point.**

## *Fish, Fisheries, and Aquaculture*

During the initial fisheries consultations conducted by the Proponents, they determined that the single most important fisheries issue was the threat of contamination (tainting) of fish and shellfish from OBMs. Tainting is typically an indicator of whether or not an organism has been exposed to hydrocarbons. This can be determined through organoleptic (trained "taste-test" Panels) or chemical analyses. The working definition of tainting used by the "Group of Experts on the Scientific Aspects of Marine Pollution" (GESAMP) is: "The development of a flavour or odour in the organism when caught or harvested which is not typical of the organisms themselves". In most studies, a concentration of five parts per million in the flesh is sufficient to discern taint. Confirmed or even suspected tainting of fish stocks may have severe marketing consequences, possibly resulting in a boycott of these and other seafood products from the Sable Island Banks areas. DFO has expressed concern about the possibility of tainted fish products reaching market and therefore suggested that the Exclusion Zone should be increased to ten kilometres from the drilling site. Furthermore, because of the real and perceptual concerns about tainting, and the potential for impacts on the fishing industry, DFO has stated that a well-defined environmental effects monitoring program is required.

The potential impact from Project-related hydrocarbons is greatest immediately beside and under drilling structures, and decreases with distance from the discharge. The scallops most at risk will be those within the 500 metre radius safety zones around the drilling platforms. Once the offshore facilities are in place, safety zones will be created under the *Accord Act Regulations* and the *Canada Shipping Act*. As these areas will be Fisheries Exclusion Zones, they will not be fished.

Concerns were raised regarding the possibility of taint in juvenile haddock (*Melanogrammus aeglefinus*). The Proponents submitted that; there was no evidence that juvenile haddock are fished commercially, or that the area surrounding

the platforms can be identified as habitat for juvenile haddock. There is no evidence that mature haddock inhabit this area to any significant degree nor that taint persists in haddock over a number of years.

Pipelines can be tested with fresh water, seawater or chemically treated seawater. The latter is of most concern because the hydrostatic test fluid left in pipelines consists of water with corrosion inhibitors, biocides and fluorescent dyes. Any discharge will produce a discharge plume and introduce biocides into the marine environment. Four options for the discharge of hydrotest waters have been considered: freshwater release (with no chemical additives) into the watershed of Betty's Brook, which could result in reduced salinity at the mouth of Betty's Cove; release of freshwater off Country Harbour Head, where tidal and current movement would preclude significant movement of discharges back into the inlet; untreated saltwater released off Country Harbour Head, where it would mix readily; and, inhibited salt water (containing additives) released off Country Harbour Head. Dispersion and dilution of any released fluid are expected to minimize the impact of freshwater of low concentrations of biocides on important coastal resources such as lobsters and sea urchins.

Blasting activities will probably be required near the pipeline landfall in Country Harbour and could cause impacts on important wild species such as lobster (*Homarus americanus*), sea urchins (*Strongylocentrotus droebachiensis*) and rockweed (*Ascophyllum nodosum*). There is currently one sea urchin harvesting permit in the route of the proposed pipeline corridor. The fishing season for wild urchins is from October to March while farmed urchins are harvested year-round; typically the breeding season is in late winter and the larval period in Spring.

Fishermen expressed concern that the lobster catch would decline following blasting and the Proponents agreed that localized losses will amount to 300 - 500 square metres of good habitat plus some animals. However, the Proponents submit that this concern should be reduced if blasting occurs outside the lobster fishing season, which in this area extends from April 30 to June 30. Blasting would involve the use of buried charges, which exert most of their force directly upwards. Lobster within a small area around and on top of the blast site would be affected. Mitigation measures could include: the use of silt curtains to reduce the pressure waves; minimizing the size of the charge; fishing and relocating the lobsters; and restricting blasting to

outside the lobster fishing season. It was suggested that the draft DFO "Guidelines for the Use of Explosives in Canadian Fisheries Waters " be followed when carrying out blasting activities.

Aquaculture resources in this area were assessed by the Proponents in discussions with local fishers, DFO and the Nova Scotia Department of Fisheries and Aquaculture. Farmed mussels are harvested year-round, and their breeding and larval seasons are from May to July. Scallops are also fished near the landfall on an occasional basis, but no specific grounds were identified; five fishers in this area hold scallop licenses.

The potential impact on underutilized aquaculture species such as sea urchins, which are found north of Harbour Island and close to the pipeline landfall at Betty's Cove, was raised. Considering that caged sea urchins normally experience occurrences of increased sediments following storms without ill effect, the Proponents have stated that no mitigation is anticipated. The favoured mitigation for larval scallops would be to schedule pipe-laying to occur prior to deployment of collectors. As there is a limited harvest of sea weeds close to the pipeline route and landfall, little adverse effect is expected.

Fig.6 Offshore Fishery



The Proponents have stated that the potential for suspended sediment or other contaminants to affect aquaculture operations during trenching can be reduced by a number of measures. The pipeline can be routed away from aquaculture operations, silt screens and bubble curtains can be used to keep sediment away from sensitive areas and sediment and water quality can be monitored for natural and Project-related sedimentation or for the presence of contaminants, such as the dinoflagellates which are responsible for paralytic shellfish poisoning (PSP). Ploughing could decrease the zone of disturbance to approximately half that of jetting or pre-dredging, resulting in approximately only 2.25 hectares of lobster habitat being affected.

The Proponents have stated that the proposed baseline monitoring program and operational program for the inshore elements of the pipeline construction program are currently being developed. In order to monitor for PSP, the Proponents intend to use local fishermen as much as possible and enlist aquaculture technicians to conduct field work under the direction of qualified scientists who will do the analysis and reporting. The Proponents will subscribe to the Phytoplankton Monitoring Program administered by the Aquaculture Association of Nova Scotia. Sampling at two local shellfish farms will be carried out at two week intervals during the construction phase in accordance with the Monitoring Program Directives. It will continue until six months after the completion of underwater construction work. Furthermore, the Proponents will include the monitoring of phytoplankton as part of the baseline and environmental monitoring programs and undertake shellfish monitoring if any increase in toxicity attributable to the Project is detected. This matter has been raised and discussed by the Country Harbour-Drum Head Fisheries and Aquaculture Liaison Committee and the Proponents. The Committee is also involved in the design of a water quality monitoring program for the Country Harbour-Drum Head area.

## Recommendation 6

**The Panel recommends that the appropriate regulatory authorities ensure that the Proponents conduct a minimum of one full year of baseline water and sediment quality monitoring prior to any trenching activity in Country Harbour. Furthermore, that the results of this program and those of the sediment modelling study for Country Harbour be reviewed by both the SOEP-Fisheries Liaison Committee and the Department of Fisheries and Oceans, and any issues raised be addressed prior to commencement of trenching activity.**

Aquaculture in Country Harbour could be most vulnerable to the release of hydrostatic test fluid. The Proponents submitted that the selected site, Betty's Cove, is about five kilometres from the closest aquaculture operation. The controlled discharge of hydrostatic testing water, in accordance with industry standards, during ebb tides would provide adequate protection for aquaculture, resulting in no impact. Monitoring of this activity will also be carried out to ensure that adequate dilution of the test water was provided by tidal and turbulent mixing. The Canadian standard practices are the use of LC50 tests and the regulation of flow rate to ensure that concentrations at the end of the pipe are less than the LC50. The Proponents have stated that dilution will be sufficient to minimize impacts and that any chemicals used are not persistent and will be inactivated, probably in a relatively short time in the marine environment.

The Panel is concerned about the lack of baseline information with respect to resuspension of bottom sediments, particularly with regard to potential adverse effects on the aquaculture industry in Country Harbour. As a result, the Panel questions the effectiveness of the Proponents proposed mitigative measures.

The Panel recognizes the importance of protecting the marketability of fish products from tainting, real or perceived.

Concern was expressed that the Proponents have not ruled out the possibility of Country Harbour being selected as a location of the potential supply and service base(s), despite the absence of any critical examination of the potential environmental and economic impacts on aquaculture operations in the Harbour. Any vessel that enters Country Harbour, whether it be a SOEP vessel or a fishing vessel, has to pass by seven aquaculture leases. If base was constructed it would involve a significant increase in related commercial traffic in Country Harbour, an area described by SOEP as a pristine environment. Current vessel traffic in this area is at most one large fishing vessel per week. The Proponents have estimated that the number of supply vessels involved would be six, and result in movements back and forth on a fairly continuous basis over the life of the Project. Additionally, there is the issue of where spent drilling fluids would be brought to shore and whether or not Country Harbour would be considered for this activity as well. An intervenor was concerned that this increase in industrial, Project-related activity may result in both actual and perceived tainting of aquaculture products. If consumers no longer view these products as originating from a pristine marine environment, markets could be affected. In terms of the latter issue, the Proponents have stated that they have begun eliminating the name "Country Harbour" from their literature and documents to avoid perception issues.

### Recommendation 7

**The Panel recommends that, to adequately assess the potential for impacts of tainting on the fishing industry, the appropriate regulatory authorities ensure that the Proponents include a taint test as part of their Environmental Effects Monitoring (EEM) program.**

Additionally, the Proponents have stated that they will work with local aquaculture interests, to rectify perception issues and, as a last resort full and fair compensation will be provided where there is direct economic loss.

In terms of selecting possible port locations, the Proponents have not provided any analysis from the perspective of specific shipping services available, distances to offshore operations, costs, safety or other criteria that could be used in choosing among possible alternatives. Intervenor believed that the Proponents have failed to address the specific concerns of aquaculture in Country Harbour, by not providing information regarding the decision-making

process for the service and supply bases. As such, intervenors were of the view that Country Harbour should be removed from consideration for potential service and supply and fabrication base sites. The Panel shares these concerns.

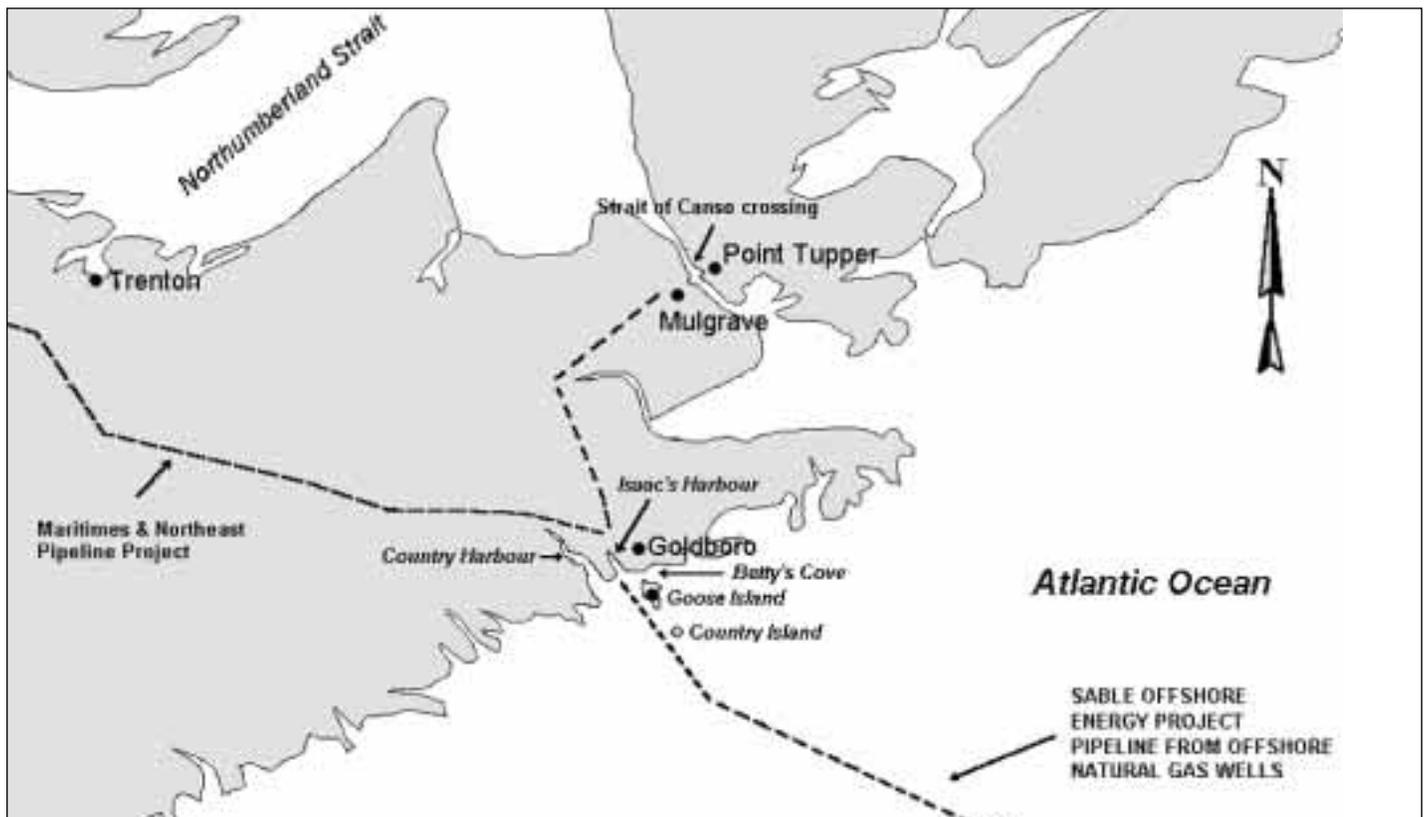
#### *Marine Mammals*

Many marine organisms, marine mammals in particular, rely on sound for communicating, for seeking and tracking food prey and for navigating. Cetaceans are particularly dependent on passive and active sound signals (echo-location) for sensing their environment, engaging in social behaviour and communicating. The potential adverse effects of increased noise (sound and frequency changes) can be: permanent deafness; temporary threshold shifts and reduced sensitivities; stress; psychological effects and changes in behavioral responses, such as orientation away from the sound or cessation of feeding and mating; and masking of prey or same-species sounds. Some cetacean species may also be initially attracted by certain frequencies, which may lead to detrimental interactions (vessel collisions and/or death) with the source.

### Recommendation 8

**The Panel recommends that the appropriate regulatory authorities ensure that the Proponents remove Country Harbour from consideration for base sites, and that the final selections be made as expeditiously as possible.**

Figure 7. Overview of the proposed sites for SOEP's Gas Plant, Liquids Line and Handling Facilities



Concern was further expressed about the extent to which noise could affect habitat use by cetaceans. Despite the lack of site-specific acoustic data and actual field sound measurements of underwater noise due to construction-related activities on the Scotian Shelf, the Proponents have asserted that noise generated by SOEP will diminish quickly with increasing distance from the various sound sources, and that the effects on cetaceans will be minimal. An intervenor was of the view that not only is this view antithetical to the precautionary approach, but it is quite likely wrong as well. Prediction of the way in which sound propagates through water is far from an exact science, and the manner in which sound will affect a particular species of whale or dolphin is even less exact.

Quantitative experimental studies of disturbance responses have not been conducted on east coast marine mammal species. Furthermore, it is difficult to predict which transmission loss model is most appropriate because of the lack of site-specific acoustic data. A criticism of the Proponents' approach was that they have appeared to focus exclusively on acute or short-term disturbance, and even more narrowly, on overt behavioral avoidance by cetaceans of the Project area. More subtle effects are also of concern, including noise-induced changes in feeding, communication and other behaviours and the physiological stress imposed by long-term exposure to noise. These subtle effects are difficult to measure, but that does not make them less real or less significant. The uncertainty about sound propagation characteristics, coupled with the uncertainty of the effects of noise, especially over the long-term, indicate that a precautionary approach to predicting and mitigating the effects of SOEP generated noise on cetaceans is preferred.

DFO stated that the Proponents need to establish better baseline data against which changes in distribution and abundance of cetaceans can be assessed, and better data on the attenuation of noise from production sites, including drilling activity. In response to concerns expressed by various intervenors, the Proponents have committed to discussing the scope of project-related noise monitoring with interested parties in conjunction with their proposed SOEP Environmental Effects Monitoring Advisory Group (SEEMAG) and in consultation with acknowledged noise experts. In addition, the Proponents have indicated that a professionally prepared monitoring program will be useful in addressing data gaps.

The Panel is concerned that despite the lack of quantitative experimental studies on noise levels affecting marine mammals, particularly for the Project area, the Proponents have determined that no significant adverse impacts are likely as a result of Project activities. Furthermore, the Proponents have submitted that the underwater sound generated from the Project will likely diminish to background levels by the time it reaches the Gully, and is therefore unlikely to cause a disturbance on the cetacean inhabitants of the area. As there is considerable uncertainty about the noise the Project will generate and how it will propagate in the Project area, the Panel believes that the Proponents should develop a data base of measurements of underwater noise from Project-related activities, and incorporate this as part of a monitoring component of their proposed EEM program.

## Recommendation 9

**The Panel recommends that the appropriate regulatory authorities ensure that the Proponents undertake the following: design and implement an acoustic monitoring program to measure noise (source) levels of Project activities, transmission losses in the Project area, and received levels in key locations, such as the Gully and nearby Logan Canyon. This should be done by, or under the direction of, an experienced third party, as part of their Environmental Effects Monitoring program planned for the Project.**

### *Marine Birds*

The Proponents have recognized marine birds as a VEC and have paid particular attention to the roseate tern (*Sterna dougalli*) and its population on Country Island and at Country Harbour. The former location, about eight kilometres from the proposed Goldboro gas plant, contains the largest breeding population of the roseate tern in Canada. Disturbance of breeding activities from construction noise could result in a moderately significant impact. Roseate terns are sensitive to disturbance during the mid-May to mid-August nesting period. Construction of the pipeline in the vicinity of Country Island with associated increased traffic could cause birds to abandon their nests. Pipelaying activities nearshore, which may include blasting, will occur within two to three kilometres of Country Island. The Proponents state that blasting will be localized and of short duration and that there is little likelihood of significant adverse environmental effects of blasting on marine birds, coastal waterfowl and shore birds.

The Country Island colony could also be negatively affected by reductions of their most important food items, sand lance (*Ammodytes americanus*) and silver hake (*Merluccius bilinearis*). Various gulls (*Larus spp.*) are known to feed on human rubbish associated with construction activities, if it is not carefully managed. Any resulting increase in native gull populations, who displace terns and prey on their young, could result in decreases in population of the terns.

As a means of monitoring Project impacts and assessing mitigative measures, the Proponents accepted an independent research proposal to conduct studies on roseate terns. The technical and financial oversight of these studies will be through the proposed SEEMAG which will be formed following project approval.

Intervenors preferred that no construction occur within a twenty kilometre radius of Country Harbour during the nesting season. As twenty kilometres is believed to be the extreme foraging range for these birds, and because they also tend to forage along the coastline, the Proponents believe that this is excessive and should not be accepted by the Panel. The pipelay barge is able to lay pipe at a rate of two to four kilometres a day, which means that it could complete its pass through a twenty kilometre radius in a week. The Proponents submitted that pipelay activities can safely take place during that period, in conjunction with appropriate environmental effects monitoring. The Proponents also agreed, where possible, to schedule construction of the offshore pipeline so that it minimizes impact upon the roseate terns.

The Panel is encouraged by the initiative shown by the Proponents to undertake research and monitoring studies on the roseate tern population in the Project area, and that the results will be taken into consideration by the Proponents in terms of potential modifications to currently proposed mitigative measures.

### Recommendation 10

**The Panel recommends that the appropriate regulatory authorities ensure that the Proponents, to the extent possible, conduct pipeline laying activity at Country Harbour and Country Island outside the mid-May to mid-August nesting season, particularly until the appropriate baseline data has been collected and analyzed on roseate tern population in this area.**

### The Gully

The Proponents concluded from their modelling results that "drill cuttings and muds will not 'spill over' into the Gully" and that the long-term fate of platform discharges is not a concern. Intervenors noted apparent discrepancies in interpretation and questioned the depiction of the hydraulic fence as an impermeable barrier to all particles sizes, along its entire length. Intervenors offered that other research suggests that fine sediments do move through the fence and will be deposited in certain parts of the Gully, namely the canyon area.

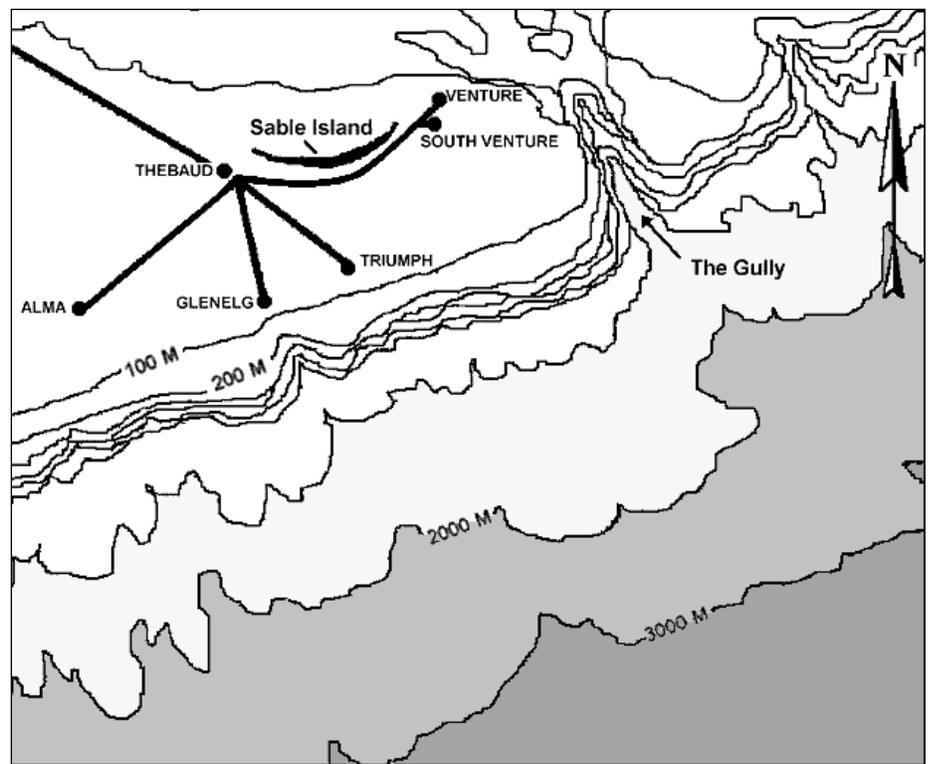
The potential for drilling platform waste discharge to reach the Gully was a concern expressed by many intervenors. Despite the fact that general flow of water is away from the Gully and towards the platforms, the Proponents did not provide a thorough discussion of small-scale circulation in the area, particularly as it relates to upwelling. The Proponents submitted that, based on current meter data and modelling, the predicted storm transport of drilling wastes towards the Gully would be negligible. However, there were no current meters

moored directly in the Gully, only at the drill sites.

There was a lack of consensus on the actual geographical extent of the Gully, which gave rise to differences of opinion as to potential project effects. The only SOEP sites that are close enough to warrant concern as to possible export of significant amounts of particulate wastes are Venture and South Venture.

A concern was raised by the Panel regarding the need to properly delimit the Gully so as to establish appropriate mitigation measures. Much of the oceanography of this area is not well understood and the Gully ecosystem needs to be better defined. From the perspective of mitigation, it was suggested that an in-depth oceanographic study of the gyre, that is believed to exist at the northern end of the Gully, would better define the potential for entrainment of various discharges and how they might impact on the Gully ecosystem. An integrated oceanographic study of the Gully would also better define the location of cetaceans in relation to sound sources. It

Figure 8. Map of Scotian Shelf and Gully



should also allow for the development of sound propagation models so as to give an understanding of noise effects.

Concern was also expressed by intervenors that the project may expand, or lead to additional development at sites even closer to the Gully. The primary concern is the Primrose field, which lies about five kilometres from the core area of the northern bottlenose whales. It was felt that development of this field could lead to irreparable damage to the Gully ecosystem, and would foreclose the possibility of establishing a viable marine protected area in the Gully. The Panel concurs with these views.

The Panel is encouraged that the Proponents recognize the biological significance of the Gully and have proposed mitigative measures to protect its ecological integrity, in the form of a Code of Practice.

### Recommendation 11

**The Panel recommends that the appropriate regulatory authorities ensure that, at least six months prior to the commencement of any fabrication or construction activity, the Proponents submit the Code of Practice to protect the Gully, as part of their final Environmental Protection Plan. The Code should include details on proposed Environmental Effects Monitoring (EEM) programs and mitigation procedures, as they specifically relate to the Gully and be in accordance with the requirements of the appropriate regulatory authority relevant to the activity. To obtain the baseline data necessary for EEM programs, the Proponents should initiate or contribute to basic physical-biological oceanographic research in the Gully.**

### Sable Island

The Proponents have recognized the historical and environmental significance of Sable Island, which resulted in the Island as a whole being identified as a Valued Environmental Component (VEC). The Proponents have stated that a program will be instituted to prevent the release of debris from project activities. The Proponents have stated that the occasional overflights of mammals by project aircraft are unlikely to cause more than a short-term startle reaction by the animals involved. However, helicopters for the Project will avoid low-level overflights of seal haulout locations to prevent effects on seals. Project traffic is not expected to impact on the harbour and grey seal populations, since both species are known to accommodate to ship traffic. However, there are some seasonal sensitivities, when harbour seals will react strongly to any approach by going into the water, potentially risking the mother-pup relationship.

It has been deemed unlikely that an accidental spill of condensate would foul the shores of Sable Island and impact on the breeding seal population. If such an event were to occur, the Proponents stated that every effort would be made to return the Island to its pre-existing condition as quickly as possible. SOEP did not identify any significant impacts on marine mammals as a result of Project activities, nor any significant residual impacts.

Intervenors suggested that increased traffic and associated Project-related activity near the Island would disturb nesting birds and cause abandonment of eggs and/or young. This has been documented in the case of the roseate tern after minimal human disturbance. To reduce the potential impact of the SOEP development on roseate terns, an intervenor recommended that construction activities in the vicinity of Sable Island should be restricted to the period before or after the breeding season (before mid-May or after mid-August)

Although noise and spills would not seriously threaten adult seals, there is concern that their pups could be adversely affected. Observational data has shown that harbour seals can be discouraged from hauling out or pupping in areas of high tourist traffic.

While the potential impact of SOEP cannot be quantitatively assessed, it should not be dismissed without some critical evaluation. Potential mitigation could mean cessation of operations for sustained periods during the immediate post-weaning period for gray seals (March to April) and harbour seals (mid-May to August).

Concerns were expressed that the brightly-lit Thebaud production platform could be a possible distraction for migrating passerines, specifically the Ipswich sparrow, from the regular route to Sable Island. However, expert testimony indicated that the Ipswich sparrows (*Passerculus sandwichensis princeps*) would not be deflected or in any way disturbed by the rigs.

The Proponents may use Sable Island for small boat and helicopter landings and concerns were raised regarding the monitoring that will be in place to ensure that this activity will be minimized. The Proponents stated that written requests and approval clearly demonstrating a need to conduct any activity on the Island are required from DFO. The Proponents have stated that frequent landings on the Island are not anticipated. However, the reasons for occasional landings include the conduct of environmental management/monitoring programs, the inspection of emergency facilities and equipment and the installation of temporary equipment such as navigation stations. Additionally, in its agreement with prospective contractors, SOEP expressly restricts access to Sable Island unless required for emergencies or with government and company approval.

Although Project-related impacts on the Island are not considered likely to be significant, the final Environmental Protection Plan will contain a Code of Practice which will guide project activities with respect to protecting the uniqueness and integrity of Sable Island. The Proponents will sponsor a study on noise disturbance of roseate terns on Sable Island caused by overflights and drive-by vehicle noise.

The EEM program is expected to run for five years, beginning in 1997/98. A program funded by PanCanadian to survey oiled seabirds on the north and south beaches of Sable Island will continue. As

part of the SOEP monitoring program, the ongoing seabird surveys would be enhanced by laboratory analysis of oil found on seabirds on the beach during the monitoring period (May to October). The Proponents will apply all appropriate recommendations from research studies in order to minimize environmental impacts from their activities. The initial stages of the EEM program have commenced, however specific details regarding the reporting structure, details of the monitoring program and identification of who will administer it have not yet been provided.

The Panel agrees with intervenors who have concluded that the Proponents' proposed Sable Island Code of Practice, and other commitments that they have made to protect the Island and its inhabitants from adverse effects of the project, seem to be appropriate.

### Recommendation 12

**The Panel recommends that the appropriate regulatory authorities ensure that, at least six months prior to the commencement of any fabrication or construction, the Proponents submit the Code of Practice to protect Sable Island, as part of its final Environmental Protection Plan. The plan must include details on proposed Environmental Effects Monitoring programs and mitigation procedures, as they specifically relate to Sable Island and be in accordance with the requirements of the appropriate regulatory authority relevant to the activity.**

## ENVIRONMENTAL EFFECTS ON THE PROJECT

### *Sea Ice and Icebergs*

The design of an offshore structure or pipeline in Canadian waters is challenged by the many hazards common to the climate. To provide a consistent level of safety in the offshore environment, a design standard was developed and approved for use by the Canadian Standards Association (CSA). This standard has explicitly defined environmental events and processes in terms of their annual probability of occurrence. Where the probability of occurrence is less than one in 10,000 this event need not be considered in the design but should still be addressed from an operational perspective.

Historically, the presence of sea ice, pack ice and icebergs has not been a major threat to safety of life at sea on the Scotian Shelf. Sea ice in the Scotian Shelf area forms almost entirely in the inlets and bays during the winter months. This ice usually deteriorates rapidly and does not pose any threat to navigation nor the proposed Project. However, much thicker sea ice forms in the Gulf of St. Lawrence and could drift onto the Scotian Shelf and pile up along the Nova Scotia coastline.

With regard to the offshore, the probability of a compact ice field approaching the SOEP sites is almost nil. However, it is appropriate to consider the presence of sea ice on production operations and operational practices.

Only a very small number of icebergs have been observed on the Scotian Shelf over the last 150 years. They have drifted in generally from the Grand Banks and the Gulf of St. Lawrence. These icebergs are in the advanced stage of deterioration due to the effects of wind, waves and rising temperatures of the currents. Only those of small or medium size have any chance of drifting onto the shallow waters of the Scotian Shelf. It is the Panel's belief that these factors reduce the threat of icebergs on the Sable Bank to a very low level and consequently need not be considered from a design perspective. However from an operational standpoint, it would be prudent to consider any possible threat that might

be posed by even a rare occurrence of an iceberg and to develop a contingency plan.

### *Extreme Conditions*

The Proponents state that they will comply with international standards in the design and operation of offshore structures and pipeline to deal with extreme conditions such as a hundred year wave. Details on which standards will be used have not been specified. The Proponents proposed that the Certifying Authority, mutually agreed to by the Proponents and the CNSOPB, will verify the final design to ensure compliance with all standards.

In the operations phase of the project, the Proponents stated that they will comply with the "Guidelines Respecting Physical Environmental Programs during Petroleum Drilling and Production on Frontier Lands" (Physical Guidelines) except for the provision of collecting and reporting Conductivity - Temperature - Depth (CTD) profiles. These (Physical Guidelines) assist with the forecasting of severe or extreme events that exceed design or operational limits.

The Proponents will file operations, emergency response, environmental alert, ice management and other manuals as required. These manuals will provide operational limits and procedures to ensure that all operations occur when specified thresholds are expected to be reached or are actually exceeded. Further, the Proponents stated that monitoring and maintenance programs will be in place to detect and repair damage to the offshore structures and pipelines from damage resulting from extreme conditions.

The Panel recognizes that, the collection, analysis and reporting of data on storm and other extreme events and the collection of CTD profiles, are directed to assist in identifying the possible onset or manifestation of climate change effects within the life span of the Project.

## Recommendation 13

**The Panel recommends that the appropriate regulatory authorities ensure that the Proponents collect, analyze, and report data pertaining to storm and extreme events. The Panel recommends that the Proponents comply with the Conductivity - Temperature - Depth (CTD) profile provision of the Physical Guidelines.**

### *Navigable Waters*

The addition of any permanent structure to the seafloor can produce a need for prudent navigational practices. Damage can be caused by the interaction between a vessel anchor and a subsea pipeline. This risk will vary according to traffic patterns, proximity to ports and water depths. The Proponents have minimized this risk with their choice of the corridor. To assist in limiting possible pipeline damage by anchors, SOEP will apply to the Minister of Fisheries and Oceans Canada to have the location of all SOEP pipelines shown on the applicable Hydrographic Service Charts.

In questioning the data in the Proponents study, “Sable Offshore Energy Project Fishing Interactions with SOEP Pipeline”, DFO felt that the Proponents underestimated the potential hazards that pipelines present to bottom trawl fishing. Primarily, the concern was that the data used represented a much reduced interaction rate with the fisheries interest in the area. Subsequently the Proponents have signed an agreement with the fisheries industry to address DFO’s concerns.

The Panel is satisfied with the mitigative measures proposed to date by the Proponents.

## Recommendation 14

**The Panel recommends that the Proponents submit to DFO, as expeditiously as possible, all information relevant to impacts on navigation including: drill sites, standby vessel base locations and potential traffic**

## MONITORING

Intervenors had several concerns with SOEP’s monitoring activities and plans. One concern was with the adequacy of the proposed SOEP monitoring system. Another was with the role of environment groups and government agencies in the monitoring process. A third was with the nature and extent of baseline information and the timing of the monitoring process. Finally, intervenors made recommendations on particular VECs and on cumulative effects, where they saw a need for monitoring.

The adequacy of SOEP’s proposed monitoring system was raised by Environment Canada as well as other intervenors. They recommended that SOEP register with and use the ISO 14000 standards. Using these standards, an environmental management plan identifies from the project outset: the organization which will carry them out; the implementation plan and the means by which it will be carried out; the policies which are in place; the means by which the plan will be reviewed and continuously improved; and the accountability of those responsible. An independent third party audit is required by the standard, to test the effectiveness of a monitoring program.

A common concern of intervenors was the apparent lack of third party impartiality for SOEP’s Environmental Management System (EMS), despite assurances for the goals and make-up of an advisory committee. Considering the proposed life of the Project, during which advances in environmental technology may occur, intervenors argued that it might be prudent for SOEP to initiate compliance with the ISO 14000 environmental management plan program. At a minimum, within two years of the instigation of the SOEP EMS, it should be subjected to an external audit by an independent third party to ensure compliance with their own EMS and allow a detailed comparison with the ISO 14000 system.

SOEP argued that its planned programs not only encompass but exceed the basic five elements of the ISO 14000 standard. By requiring the use of these standards, SOEP stated that there would be an additional

cost with no benefit to the environment, the public interest or to SOEP.

SOEP has committed to develop a comprehensive Environmental Health and Safety Management System as the basis for the overall management of Project-related environment, health and safety issues. One component of this system is the EPP, which will consolidate the proposed environmental mitigation and monitoring procedures for construction (onshore and offshore), drilling, production, decommissioning and abandonment.

The main instrument in implementing the EPP is the EEM plan which is intended to ensure no irreparable environmental damage. It also provides scientific data for future environmental management decisions.

## **ISO 14000 Environmental Management Program**

ISO 14000 is a series of voluntary international standards covering environmental management tools and systems developed by the International Organization for Standardization (ISO). Best known for producing the ISO 9000 series of quality management system standards, ISO is a Swiss-based, worldwide organization of national standards bodies from 111 countries. The new series of ISO 14000 standards are designed to cover environmental management systems, environmental auditing, environmental performance evaluation, environmental labelling, life-cycle assessment, environmental aspects in product standards and glossary.

ISO 14001 describes how an organization can establish a disciplined system for achieving stated environmental objectives that adhere to relevant legislative and regulatory requirements, to perform according to its own policies and procedures, and to audit to assure full compliance and continual improvement. As a result, an ISO 14000-defined environmental management system can be integrated with overall management activity ensuring that all operational processes are consistent and effective and that the stated environmental objectives of an organization will be achieved.

The five principles on which the ISO 14000 Environmental Management System (EMS) Model is based are as follows:

**1. Commitment/Policy:**

A company should define environmental policy and ensure commitment to its EMS;

**2. Planning:**

An organization should formulate a plan to fulfil its environmental policy;

**3. Implementation:**

Requirement for capabilities and support mechanisms for effective implementation;

**4. Measurement and Evaluation:**

An organization should measure, monitor and evaluate its environmental performance; and

**5. Review and Improvement**

An organization should review and continually improve its environmental management system, with the objective of improving its overall environmental performance.

Environment Canada proposed that it play a technical advisory role in developing the EEM program. SOEP acknowledged that its EEM program must be transparent and accountable to many stakeholders, and be both scientifically and cost effective. SOEP will establish the voluntary SEEMAG with 11 members drawn from various sources. These members will be invited on the basis of expertise rather than affiliation. SEEMAG will advise SOEP on its effects monitoring strategy to verify important predictions and allow early detection of environmental changes resulting from the Project. It will assist in ongoing definition of the requirements of the effects monitoring program, consider proposals to meet those requirements, and make recommendations to SOEP on the implementation of those proposals. Advice and recommendations from SEEMAG would be made available for public examination, either in the form of seminars or publications.

Concerns have been expressed by several intervenors in regard to the limited time available for SOEP to initiate adequate baseline information studies prior to construction activities which are scheduled to begin as early as January 1998. Intervenors are of the opinion that it would take at least one year to set up, organize and execute an offshore baseline survey.

The EEM program will be used to establish detailed standard operating protocols for the sampling methods, for handling of samples and laboratory analyses, and for conducting baseline surveys. In addition to the EEM, SOEP has committed to carry out four physical environment monitoring programs: weather and seastate data collection; current measurement to obtain information relative to sediment transport and effluent dispersion prediction; surface ocean wave measurements; and weather forecasting to evaluate construction and operational constraints.

With respect to the monitoring of VECs, SOEP identified whales in the Gully, effects upon Sable Island and its wildlife, impacts on roseate terns, and the effects both of produced water and drilling cuttings as key issues. However, very few details have been provided in regard to specific programs to monitor these poten-

tial impacts. SOEP accepted a proposal for monitoring the impact of Project noise on roseate terns and other seabirds near Country Harbour. Observations will also be made of disturbances caused by over-flight and drive-by vehicle noise. SOEP stated that such data will help to determine the level of protection necessary for the roseate tern population and that it will apply all appropriate recommendations from these studies, and any other related studies, in order to minimize environmental impacts from SOEP activities. SOEP has also agreed to intervenors' suggestions of support for monitoring of bottlenose whales over the life of the Project.

An intervenor was concerned that SOEP has concluded that there is no need to monitor cumulative environmental effects. This intervenor was of the view that the environmental effects monitoring must be established using a meaningful ecosystem-based monitoring framework where: a network of linked sampling parameters to reflect ecological relationships is used to evaluate the impact of stressors on the ecosystem; emphasis is placed on assessing long-term and cumulative effects rather than short-term and isolated effects; the monitoring network provides information on the overall condition of the ecosystem instead of focusing on known problems in certain areas; and the outcomes of monitoring answer questions related to ecological sustainability.

SOEP stated that despite the quantitative experimental studies and measured data on noise levels which affect marine mammals, its analysis has determined that no significant adverse impacts are likely upon marine mammals as a result of Project activities. SOEP indicated that proposed monitoring by various experts will be useful in addressing these gaps. However, discussions between these experts and SOEP have only resulted in submission of a proposal to the Panel. It stated that although the proposed study is not needed for the current environmental impact assessment, data from it would be useful in enhancing pre-construction environmental baseline information. At the time of the Hearing, SOEP did not have a planned marine mammal monitoring program. If further cetacean monitoring is desirable, it will be discussed and established at SEEMAG,

and subsequently implemented under its auspices.

SOEP explained that it is important that the EEM program be focussed upon the effects of the Project and not simply become a basis for funding of research. EEM monitoring should also be flexible enough so that if it has been satisfactorily demonstrated that there is no effect upon a given component of the environment, the effects monitoring of that component may be discontinued.

The Panel, while acknowledging SOEP's framework for both SEEMAG and EEM programs, is concerned that specific monitoring details or proposals are lacking. This is of concern as SOEP has stated that this will be used as a tool to ensure that there are no Project-related significant adverse environmental effects. The Panel believes the pre-development data should be collected with respect to the identified VECs and research undertaken as appropriate in conjunction with the environmental coordinating committee. In addition, the Panel is convinced that an EEM program should be ecosystem based and adaptable; it should not only be planned to discontinue unnecessary monitoring but also add additional studies if environmental effects are greater than anticipated or new technology or operational procedures are adapted.

## Recommendation 15

With respect to Environmental Effects Monitoring programs for offshore facilities, the Panel recommends that at least six months prior to the commencement of any fabrication or construction activity requiring regulatory approval, in accordance with the requirements of the appropriate regulatory authority relevant to the activity, the Proponents shall submit to those authorities the final Environmental Protection Plan, which shall include or address the following factors:

- (a) Environmental Policy;
- (b) Standards and codes of practice, including the Code of Practice to protect Sable Island and the Gully;
- (c) Mitigation/operating procedures (construction, drilling, production, decommissioning and abandonment);
- (d) Environmental education, training and orientation procedures/programs;
- (e) Chain of command (mechanisms for environmental decision making);
- (f) Environmental Effects Monitoring practices and reporting, including detailed information on every monitoring program included in or referred to in its Application, in its Undertakings made to other government agencies, and in commitments made by the Proponents in evidence before the Joint Review Panel;
- (g) Environmental Compliance Monitoring practices and reporting;
- (h) Reference Laws, Regulations, Guidelines, Licences, Permits and Approvals;
- (i) Waste Management Plan;
- (j) Atmospheric Release Management Plan;

(k) Effluent Release Management Plan;

(l) Accidental Discharge Contingency Plan, including spill prevention methodology;

(m) Relevant contractual commitments, including special environmental clauses;

(n) Environmental inspection and audit procedures;

(o) Special conservation plans, where appropriate; and

(p) Environmental Management Continuous Improvement.;

The Proponents shall file with the appropriate regulatory authorities a post-construction environmental report within six months of the in-service date. The post-construction environmental report shall set out the environmental issues that have arisen and shall:

- (a) indicate the issues which are resolved and unresolved; and
- (b) describe the measures SOEP proposes to take with respect to the unresolved issues;

The Proponents establish, with regard to waste discharges in the offshore marine environment, criteria for tolerance of contamination at the platform site, in relation to recognized Maximum Acceptable Effects Levels (MAELS), in consultation with CNSOPB, before drilling commences;

The Proponents shall, based on consultations within SEEMAG and with respect to specific VECs, :

(a) examine the potential impacts of produced water and the potential to cause tainting in identified VECs;

(b) monitor the accumulation and movement of drill wastes around the platforms closest to the Gully; and

(c) monitor traffic and noise-related Project effects on marine mammals, particularly the northern bottlenose whale.

## ONSHORE ENVIRONMENT ISSUES

### *Framework for Analysis*

The potential terrestrial environmental effects of the Project are associated with construction activities of the NGL pipeline and plant facilities. Project threats or risks arise from physical construction methods, operational practices, air emissions, and accidents. The magnitude and importance of these threats or risks depends on how well the project is planned and implemented, and the sensitivity of the environment to disturbance.

The environmental components at risk will vary according to the specific Project siting and to safeguards. Intervenor raised several key issues with respect to the onshore portion of SOEP. The main issues are watercourses and fish and fish habitat, Canso Strait sediments, acid drainage, wildlife and old growth forests.

## PROJECT INTERACTION WITH THE ENVIRONMENT

### *Watercourse Sedimentation*

SOEP's NGL pipeline route will cross 34 watercourses, including the Strait of Canso and eight rivers. It also passes near two lakes which are used for municipal and industrial water supply. A number of the watercourse are important fish rivers. Salmon, in particular, is a highly valued resource, and one that is susceptible to siltation and water quality and level changes.

During construction of watercourse crossings, the removal of protective cover of vegetation adjacent to watercourses would cause erosion and deposition of silt into aquatic habitats. The silt can smother fish roe and larva. Disturbances to water quality and habitat may also result in changes to benthic invertebrates, typically the food source for fish. As well as risks from physical construction activities, there may also be spills of oil, gas or other products from the equipment used in the construction process. These spills can be toxic to marine organisms.



Figure 9. A wet crossing



Figure 10. A directional drilled crossing



Figure 11. A dry crossing

### ***Strait of Canso***

Canso Strait waters receive effluent releases from industrial and urban development. There are several sewage outfalls along the Strait. The combination of significant historical and ongoing deposits of organic matter into the Strait and limited bottom circulation in the Strait has resulted in a build up of fine-grained and organic-rich sediments which have a tendency to retain contaminants such as trace metals and organics. Dredged spoil from the Strait may contain elevated levels of mercury, lead and polychlorinated biphenyls (PCBs). PCBs are of particular environmental concern because they are insoluble in water, and tend to bioaccumulate in aquatic organisms. Pipeline construction across the Strait may disturb toxic sediments.

### ***Acid Drainage***

Natural weathering of bedrock containing sulphur-bearing minerals yields sulphuric acid which dissolves a variety of heavy metals. The process is accelerated if the bedrock is fractured and crushed during surface clearing, trenching and blasting. Surface water and ground water flowing over newly exposed rock surfaces will transport any acid and heavy metals that are generated and, in turn, affect downstream environments.

Acid drainage generation may release iron, sulphur, copper, lead, zinc, arsenic, cobalt, and nickel. The main concern with acid drainage is that the deposition of leached heavy metals in water courses may result in acute toxicity to aquatic organisms. As well, there is a potential for the infiltration of these toxins into domestic wells and water supplies thus posing a hazard to human health.

### ***Habitat***

The effects of construction and operation of the shore to plant pipeline, the gas plant, the NGL pipeline and the NGL handling and shipping facilities could include loss of habitat, impairment of habitat quality, direct wildlife mortality, behavioral changes in wildlife and reduced ecological productivity. This could occur through operations such as clearing, grubbing, excavation, and blasting.

### ***Accidental Events***

Hazardous materials used during the construction of the pipeline include petroleum, oil, and lubricants (POLs), solvents, and epoxy resins. An accidental release of these chemicals may occur at storage sites or during use. Loss of POLs may also occur from parked vehicles and refuelling points. Accidental releases of hazardous materials could potentially cause ground-water pollution and result in significant impacts.

During operation of the pipeline, line breaks, fires or explosions may produce adverse environmental effects. Pipeline breaks may be caused by such things as subsidence or third-party encroachment.

## **EFFECTS ON VALUED ECOSYSTEM COMPONENTS**

### ***Water-course Crossings***

As discussed earlier the main watercourse crossing issue is the effect on fish and fish habitat. Recreational fisheries in watercourses along the proposed route alignment are directed primarily toward Atlantic salmon, brook trout and brown trout. These fish have a high sensitivity to habitat disturbance. SOEP identified these species as VECs. Electrofishing surveys conducted in 1996 revealed that Atlantic salmon juveniles were found only within the Salmon River. SOEP stated that during the final selection of the 25 metre easement, further field work will be conducted to confirm the initial findings.

Intervenors had several concerns with the proposed watercrossings. They indicated that the terrain at proposed crossing areas of the Salmon and Milford Haven Rivers is quite steep and extreme precautions must be taken to eliminate erosion and sedimentation. The Salmon River crossing will also impact an area designated as a candidate Provincial Park. They felt that additional fieldwork would be required prior to the selection of the 25 metre wide easement. Additionally they indicated that monitoring, mitigation and contingency plans must be developed to ensure protection of terrestrial and aquatic environments at these two crossings.

Watercourse crossings may be constructed using wet, dry or directional drilling methods. Wet crossings are performed in flowing water. Various dry crossing methods include temporary stream diversion through a culvert or using cofferdams, or construction at a time when the watercourse is not flowing. Directional drilling is where the pipeline is installed in a tunnel beneath the stream bed. Open trenching for either wet or dry crossings is generally believed to pose more risks to fish and their habitat than would result from directional drilling. The reasoning is that since directional drilling entails no direct contact with the watercourse, silt and other contaminants would not enter the watercourse. However, this view fails to recognize that directional drill activity utilizes more space for the staging and receiving areas on either side of the watercourse than other methods do. This would require more clearing and a heightened risk of run-off and siltation. Moreover, added risks of accidents are posed by the accidental release of drilling fluids. Finally, this method can only be used in suitable soil conditions where there is an absence of boulders.

Intervenors recommended that, where technically feasible, directional drilling of watercourse crossings for permanent streams should be employed. They asserted that wet crossings will have associated massive amounts of sediment that will be swept downstream to impact upon biota and habitat. In addition, they suggested that in order to minimize impacts of riparian zone clearing, the absolute minimum amount of vegetation should be removed and the area stabilized with grasses and shrubs. Buffer strips between the right-of-way and watercourses should be a minimum of fifteen metres or the top of the slope leading to a watercourse, whichever is greater. In addition, to avoid interruption of migrating salmon, intervenors strongly recommended that any construction equipment should not be in these rivers after September 15.

SOEP noted its intent to trench through the watercourses and install the pipeline in the mid-June to mid-September period, in consideration of fish vulnerability during their spawning and early life stages. It estimated

that small to medium size streams can be crossed within one to three days and were confident could be met. All watercourse crossings and culvert installations are subject to approval under the Nova Scotia Environment Act. The "Nova Scotia Watercourse Alteration Specifications" will be used for technical guidance in designing watercourse crossings. According to SOEP, no significant residual impacts are likely with proper implementation of approved mitigation measures.

In the case of rainfall events, SOEP submitted that work through or near a watercourse shall not proceed if water flows are substantially higher than normal or if weather forecasts are predicting rain. A wet-weather shut-down policy will be developed to guide construction activities during rainy conditions. During the crossings there will be an environmental inspector, appointed by and responsible to SOEP, on site, full time, directing and working with the contractor. The inspector will ensure timely crossings and adherence to the measures in SOEP Construction Specifications.

SOEP committed to implement a detailed Environmental Protection Plan (EPP) during construction. An EPP identifies specific scheduling requirements of appropriate regulatory agencies. When construction cannot be accommodated within appropriate construction windows, arrangements will be made to review with these agencies, the proposed environmental protection measures and revise them as required. Additionally, it intends to submit detailed information, including information on proposed blasting operations, on all stream crossings to the appropriate regulatory authorities and to obtain all pertinent approvals.

#### Recommendation 16

**The Panel recommends that the appropriate regulatory authorities ensure that the Proponents prepare detailed Contingency Plans (as part of the Environmental Protection Plan) which focus on spill prevention and response, and strategies for cleaning up the marine and terrestrial environments. These plans should be submitted prior to the commencement of any fabrication or construction activity requiring regulatory approval in accordance with the requirements of the appropriate regulatory authority relevant to the activity.**

The Panel notes the concerns for the potential disruption or destruction of salmon and other fish, and their habitats during construction of the NGL pipeline. It is concerned that a wet-weather shut-down policy which focusses on increased erosion and sedimentation into watercourses, has not been submitted for consideration. This submission should include the results obtained during the summer 1997 field sampling work and watercourse characterizations for the selection of the 25 metre easement. In order to address these concerns the Panel makes three recommendations.

#### Recommendation 17

**The Panel recommends that the Proponents commit to empowering their Environmental Inspectors with the authority to terminate any onshore pipeline construction activities which impact negatively on fish and fish habitat.**

## Recommendation 18

The Panel recommends the following conditions for any approval of the NGL pipeline that may be granted.

The Proponents shall submit to the appropriate regulatory authority at least six months prior to the commencement of any fabrication or construction activity, the details of the proposed specific route for the NGL pipeline, and shall include:

- (a) the results of all pre-construction surveys to identify special status species/habitat along the proposed corridor, including specific measures to be implemented;
- (b) an environmental issues list identifying all relevant effects of the selected route ; and
- (c) the associated mitigation measures to render those environmental effects insignificant.

The Proponents shall, at least 30 working days prior to the commencement of construction of the NGL pipeline, submit to the appropriate regulatory authorities for approval, additional information regarding the stream crossings. The additional information shall set out:

- (a) construction designs of the crossing;
- (b) proposed duration of the crossing;
- (c) in-stream timing restrictions identified by regulatory agencies;
- (d) erosion and sediment control plan;
- (e) site-specific mitigative and restorative measures to be employed as a result of consultations with regulatory agencies;

(f) if a directional drilling method is used, the detailed drilling fluid plan addressing the methods of drilling fluid containment and storage, and specific methods for disposing of and/or recycling of the drilling fluids;

(g) if blasting is required, the blasting plan, including comments from the Department of Fisheries and Oceans;

(h) evidence to demonstrate that all issues raised by regulatory agencies have been adequately addressed, including all necessary updates to the environmental assessments where deficiencies have been identified;

(i) evidence to demonstrate that the proposed construction method and site specific mitigative and restorative measures are in compliance with federal and provincial legislation; and

(j) a wet-weather shut-down policy; and,

(k) the status of approvals, including environmental conditions.

The Proponents shall also, at least 30 working days prior to the commencement of construction of the NGL pipeline, submit to the appropriate regulatory authorities for approval, additional information regarding the treatment method to deal with acid drainage and specific mitigative measures to be implemented at stream crossings. The additional information shall set out for each stream crossing to be affected:

- (a) name and location of the stream;
- (b) the selected treatment method of the runoff water;
- (c) the proposed “Canadian Water Quality Guideline” values for specific use to be adhered to;

(d) site-specific mitigative and restorative measures to be employed as a result of consultations with regulatory agencies;

(e) evidence to demonstrate that all issues raised by regulatory agencies and other interested parties have been adequately addressed, including all necessary updates to the environmental assessments where deficiencies have been identified; and

(f) status of approvals, including environmental conditions.

The Proponents file with the appropriate regulatory authorities a post-construction environmental report within six months of the in-service date for the SOEP Project. The post-construction environmental report shall set out the environmental issues that have arisen and shall:

- (a) indicate the issues resolved and those unresolved; and
- (b) describe the measures SOEP proposes to take in respect of the unresolved issues.

### ***Strait of Canso Crossing***

The NGL line will cross the Strait of Canso from a point on mainland Nova Scotia approximately one kilometre south-east of Mulgrave, to a point on Cape Breton Island, near Point Tupper. The width of the Strait of Canso at this location is approximately 1.2 kilometres with a maximum depth of approximately 37 metres.

Intervenors expressed concerns that the pipeline laying and related activities would disturb sediments contaminated with potentially toxic compounds. Intervenors were also concerned that SOEP had not indicated what would constitute acceptable levels of contamination in sediments.

SOEP is evaluating various crossing options in the Front End Engineering Design process. The conventional method for a crossing such as the Strait of Canso is to prepare a trench using a clamshell dredge. Other methods could be jetting or ploughing with the pipe string winched across from one shore to the other.

Directional drilling beneath the Strait is an alternative method, but the width of the crossing is near the upper limit of the current state of the technology and the acceptability of the geotechnical conditions have not yet been established. Bottom lay of the pipe on the floor of the Strait of Canso is also an alternative.

SOEP prefers the bottom lay as it is thought to represent the best balance among construction cost, physical security of the pipeline and the reduced potential for environmental impacts. Some shallow nearshore trenching may be required in the transition zone between land and water to provide adequate pipeline protection; if trenching is not possible, then rip-rap protection may be required. Additional analyses of the possible construction methods will determine which mitigative and restorative measures will be required.

SOEP stated that erosion and sedimentation control will be incorporated into the planning and design of the entire pipeline. When the precise location of the crossing has been determined, SOEP will submit the appropriate permit application information to DFO, as per the *Navigable Waters*

### ***Protection Act.***

SOEP indicated that blasting could be required, particularly in the nearshore areas. DFO expressed concerns about the effects of explosions on marine and freshwater organisms and their habitats. In the event that blasting is required in the nearshore areas for the Strait Crossing, DFO recommends that their draft "Guidelines for the Use of Explosives in Canadian Fisheries Waters" be followed by the Proponents.

Concerns were raised regarding estimates of potential lobster mortality and loss of habitat as a result of construction activity. The overall area of lobster habitat within the pipeline corridor is less than eighty hectares. If the pipeline was pre-dredged or jetted, trenching would likely cause a 30 metre wide zone of disturbance, representing approximately 1.35 hectares, giving a maximum short term disruption of less than two percent of the habitat within the corridor.

The results of field sampling conducted by the SOEP along the proposed pipeline route revealed that all samples passed the *Ocean Dumping Regulations* of the *Canadian Environmental Protection Act* except for polyaromatic hydrocarbons (PAHs), PCBs and cadmium. Sediment sample analysis conducted for dioxins and furans has not yet been submitted.

SOEP is of the view that the condition of the sediments will not be expected to significantly influence the method of pipeline construction, although a risk assessment needs to be done and appropriate action taken. It also stated that the detailed methods of dealing with contaminated sediments will be determined in conjunction with Environment Canada, in compliance with the *Ocean Dumping Regulations*. The results of the May 1997 sampling program will be forwarded to regulatory authorities. A detailed crossing analysis will be reviewed through the regulatory process of the Province of Nova Scotia. SOEP submitted that they will meet all of the regulatory requirements.

The Panel notes that SOEP has not conducted specific habitat surveys for the

Strait, although they have presented information in regards to the fishery and aquaculture licenses. Despite SOEP's sediment sampling program, the Panel is concerned about the contamination of sediment in the vicinity of the proposed pipeline crossing, particularly as the dioxin and furan results have not been made available for review by regulatory agencies. It is essential that the SOEP work closely with regulatory agencies to ensure that all aspects of the techniques to be used for the Strait crossing will protect fish habitat from the release and disposal of contaminated sediments.

### **Recommendation 19**

**The Panel recommends that SOEP, at least 30 working days prior to the commencement of construction for the crossing of the Strait of Canso, submit to the appropriate regulatory authorities for approval, additional information regarding this crossing. The additional information shall set out the following:**

- (a) proposed duration of the crossing;
- (b) watercourse timing restrictions identified by regulatory agencies;
- (c) site-specific mitigative and restorative measures to be employed as a result of consultations with regulatory agencies;
- (d) if blasting is required, the blasting plan, including comments from the Department of Fisheries and Oceans;
- (e) evidence to demonstrate, in the form of a risk assessment, that the proposed construction method and site-specific mitigative and restorative measures are in compliance with federal and provincial legislation;
- (f) status of approvals, including environmental conditions; and
- (g) the complete set of sediment data for all measured contaminants obtained during the 30 and 31 May 1997 sampling program for the Strait of Canso.

### **Acid Drainage**

Acid rock along the pipeline corridor mainly occurs in the Halifax Formation, which runs in an east to west band across the study area. One area of acid rock extends eastward across Isaacs Harbour to Goldboro and halfway to Upper New Harbour. A second area is centred in Upper New Harbour and is roughly U-shaped extending approximately two kilometres on each side of New Harbour. The third area extends from just north of Middle Country Harbour eastward and widens in the area of Lundy on the east side of the corridor.

Intervenors see acid drainage as a serious concern during the construction phase. They indicated that: Nova Scotia streams have little inherent buffering capability; that juvenile salmon stages are very sensitive to acidic conditions; and that monitoring should be carried out before, during and after construction. Their opinion is that SOEP's mitigation measures are not well developed and that the potential effects on water bodies and wetlands could be significant. In areas of suspected or known acid rock drainage, intervenors suggested the monitoring of site-runoff and stream flow before and during construction and then periodically during the Project lifetime.

SOEP indicated that in areas where acid drainage was expected to occur, the overburden was typically deeper than the 1.5 metre depth to which the pipeline trench would be excavated. Acid drainage will only be of real concern in areas of shallow or exposed bedrock, such as at stream crossings where bedrock outcrop is more likely to occur and the excavation will be deeper. During the detailed design stage and final route surveying for the 25 metre easement, a suitable field program will be carried out to identify areas where acid generating bedrock may be encountered. The *Nova Scotia Sulphide Bearing Material Disposal Regulations* provide criteria for determining if a particular type of bedrock can be considered acid generating. Any excavated acid generating bedrock will not be used as backfill and will be disposed of in accordance with the aforementioned Regulations.

### **Acid Generating Rock**

Rocks have the potential to generate acid, it's a question of balance. Rocks have either acid producing potential (APP) or acid consuming potential (ACP). APP is affected by the nature and content of sulphide minerals in the rock, whereas ACP is affected by the content of carbonate minerals that tend to neutralize the acid generated. Acid drainage will only be generated when the APP exceeds the ACP of the rocks. In the *Sulphide Bearing Material Disposal Regulations* of the *Nova Scotia Environment Act*, criteria are provided for determining if a particular type of rock can be considered acid-generating: the sulphide content exceeds 0.4 percent of the rock mass; and the rock does not contain sufficient minerals, such as calcite, to neutralize acid.

Rocks with the potential to generate acid are a particular group that contain a mix of sulphide minerals, of which pyrite is the most common and easily recognized. When these rocks are exposed to water and oxygen, the unweathered sulphide minerals become oxidized and generate acid. The presence of bacteria functions as a catalyst to this chemical reaction and greatly accelerates the acid generation process. If there are no buffering minerals, such as carbonates present in the rock, acid is generated to a point where very high levels of acidity and heavy metals are produced in the aqueous solution. This potentially hazardous solution of high amounts of acidity and dissolved metals is referred to as acid drainage when it flows from the site where it is generated.

Acid drainage will be generated only when rocks containing sulphide minerals are disturbed and fresh rock fractures are created and exposed to air, water, and bacteria. In fractured sulphide bearing rocks at or near the earth surface, the necessary ingredients of sulphur and iron have been leached from the rock by infiltrating ground water over geologic time. Within this zone, the exposed sulphide minerals have been weathered and reduced to a stable oxidized form, generally seen as a reddish brown iron oxide coating on the mineral grains. As such, red coloured sedimentary rocks consisting of oxidized iron can not generate acid and thus their potential to be hazardous is greatly reduced or eliminated.

## Recommendation 20

**The Panel recommends that the Proponents, at least 30 days prior to the commencement of NGL pipeline construction, the results of the field program identifying possible locations of acid generating bedrock and the proposed methods of avoiding disturbing those areas.**

Prior to pipeline construction, SOEP will conduct a water quality survey on wells that may potentially be affected. If the water quality of a well may be affected, a specific monitoring program will be developed and implemented and the water quality of these wells will be monitored periodically during and after construction for a one year period. Where water is affected by acid drainage, the shallow aquifer to the well will be sealed and the well deepened. If necessary a new well could be drilled. SOEP maintains that no significant residual adverse impacts are likely with proper implementation of its mitigation measures.

The Panel acknowledges the concern regarding acid generation. It believes that, through an effective field program, SOEP should be able to avoid excavation in any areas of acid generating rock during the route selection for the NGL pipeline.

### *Habitat*

Intervenor concerns centred around endangered species and their identification; the use of parks, designated areas, old growth forests and wetlands; fragmentation of habitat; and the effects of increased access.

SOEP indicated that it had used the most up-to-date "Committee On Status of Endangered Wildlife In Canada" (COSEWIC) list will use any updated list that becomes available. Predictive modeling was used to identify high potential habitat that could support plant species of special status. One of the methods identified for dealing with rare plants communities was relocation. SOEP viewed the creation of edge habitat as a positive effect for certain species by providing access to food and cover.

In respect of parks and protected areas in

Nova Scotia, SOEP's primary method for protection is to select a right-of-way that avoids them. Where possible, this includes special natural areas that are not specifically identified or designated in order to ensure appropriate protection and functional integrity. No old growth forest was identified within the proposed corridor.

SOEP will revegetate the right-of-way using seed mixes determined with the Nova Scotia Departments of Agriculture and Environment, as well as by landowners. In wetland areas, local-occurring plant species would be utilized. It further indicated that disturbed habitat will be restored to its original condition as possible. The exception to this would be forested areas.

Access control measures will be implemented by SOEP in consultation with landowners. SOEP will incorporate specific monitoring into its EPP. It predicted that significant adverse effects, due to increased access, are unlikely when control measures are in place.

The Panel concludes that the implementation of measures such as avoidance of special areas through careful route planning, suitable revegetation methods, and access control measures, when combined with an effective monitoring program is not likely to result in significant adverse environmental effects on habitat along the onshore route and at plant and facilities sites.

### *Accidental Events*

Intervenors raised several general issues about the risks of accidents, particularly as they relate to the health and safety of workers and persons living near to the pipeline and facilities. SOEP's principal means for minimizing the potential for accidental releases of hydrocarbons is to ensure that an adequate level of environmental awareness is maintained by its workers and contractors, and to incorporate appropriate measures into construction practices. Specific mitigative measures will be included in contract specifications and strict on-site control and inspection programs will be conducted to ensure that the special considerations are not neglected or overlooked. These measures include the following: personnel will be trained in the proper handling of any hazardous materials

present on-site during construction; construction equipment and machinery will be maintained in good working condition and will be monitored to prevent leakage of fuels, lubricants, and other fluids; fuels, lubricants, and other hazardous materials will be stored in designated areas outside of established buffer zones; additional absorbent material will be available to assist in spill cleanup; and storage tanks/areas will be checked regularly to identify potential problems, such as leaks; and contingency plans will be prepared. SOEP maintained that if accidents are prevented and state-of-the-art emergency responses are in place, the risk to workers and nearby residents is low and within acceptable limits.

The Panel concludes that, given SOEP's commitments, accidents should be minimized, and to the extent that they may occur, that proper contingency and emergency procedures will be in place.

### *Decommissioning and Abandonment of Facilities*

DFO noted that SOEP gave no consideration to decommissioning and abandonment in the agreement with the fisheries industry. As such, DFO recommended that SOEP be required to develop an abandonment plan and a monitoring plan for nearshore pipeline impacts. DOE expressed concerns about post-abandonment hydrocarbon contamination from the drill cuttings piles. This could result in continued dispersion and/or persistence of contaminants (including metals) even after the drilling has ceased. Environment Canada recommended to the Panel that the development of the decommissioning plan should include a full consultation process.

SOEP confirmed that it has not prepared a specific decommissioning and abandonment plan. It maintains that it is too early to do so. Industry practices and standards, and regulatory requirements, are bound to change over the 25 year project life span. SOEP committed to preparing a specific plan at the appropriate time.

Wells will be abandoned according to standard industry practices, in compliance with applicable drilling regulations. Offshore pipelines will be abandoned "in place"

after they are purged internally of gas and condensate and filled with seawater. Their ends will be capped. No adverse impact on the environment is expected.

SOEP stated that, after decommissioning, it will assume responsibility if storms expose abandoned pipelines and pose a threat to fishing gear. This will apply provided that fishing is not excluded from that area by regulation.

The Panel concurs with SOEP that due to the anticipated 25 year life span of the Project, industry technology and regulatory requirements are likely to change. Accordingly, it agrees that detailed decommissioning and abandonment plans are not necessary at this time.

## CUMULATIVE EFFECTS

The *CEA Act* requires a consideration of "any cumulative environmental effects that are likely to result from the project in combination with other projects that have been or will be carried out" including the significance of those effects.

The main types of cumulative effects that are of potential public concern, and are relevant to this Project, are: long-range transport of air pollutants and its addition to existing sources or other future industrial developments in the area of concern; additional vessel traffic; increased sediment, chemical and thermal loading of marine habitats over the Project life span; and other existing and planned offshore development and exploration drilling activities by SOEP and others.

SOEP addressed various aspects of cumulative effects including future projects, experience from elsewhere, multi-discipline effects, space and time crowding and lags, and indirect, threshold and incremental effects.

SOEP identified potential interactions of its offshore construction and operations with commercial fishing activity; with operations at Cohasset-Panuke; and with other vessel traffic. In nearshore areas, the interactions would involve the impact of pipeline construction on aquaculture, mining tailings and industrial discharges. In

the onshore portion the Project interactions would involve air emissions at the NGL facilities and other industrial emissions, NGL pipeline construction and timber harvesting, as well as the construction of the M&NPP.

Intervenors questioned the scope of the cumulative effects assessment, indicating that it should include such things as the development of other Scotian Shelf fields. In response, SOEP stated that the future development of other fields was hypothetical and as such was not considered in the cumulative effects assessment. Instead, the assessment concentrated on the interaction with projects that have been or will be carried out.

Intervenors also raised as a concern the cumulative effects of supply base operations on aquaculture operations. SOEP indicated that the operations of supply and service bases would fall under its Environmental Management Plan. The plan would prevent or minimize, through mitigation, any adverse effects that might lead to any cumulative effects from all operations. A monitoring program will be designed and implemented to verify the accuracy of the environmental assessment predictions of cumulative environmental effects, and to determine the effectiveness of a mitigation measure designed to reduce or eliminate these environmental effects.

The Panel accepts SOEP's predictions regarding cumulative effects of this Project together with other projects which will be tested through the planned EEM program. The Panel recognizes that there may be future gas development on the Scotian Shelf and believes that future projects should not bear the burden of elevated levels of contamination from this Project, especially when constraints could have been exercised at the Project's inception.

## LAND MATTERS

### *Land Use Conflicts*

Several intervenors identified land use conflicts as an issue. Many of these issues were raised in the context of M&NPP and are discussed in Chapter 3. However certain issues are either unique to SOEP or have an important local dimension. These

are discussed here.

The Point Tupper industrial park has been proposed as the future site of the natural gas liquids plant. Proposed Projects in this heavy industry zone require a development agreement with the municipality. This procedure should address land use conflict issues. At present, there are no other projects planned for the sites being considered for the natural gas liquids facility.

The Goldboro Gas Plant is proposed for a rural coastal area where strong local support exists for a minimum impact approach to plant design and siting. This view is grounded both in the rural way of life and the current and potential importance of tourism. During the public consultation phase, SOEP recognized the need to site and design the plant in as unobtrusive a way as possible. To minimize the Project impact, SOEP carried out an analysis of the potential visibility of the gas plant from both the harbour area and the main roads along its periphery. As a result of public consultation and the visibility analysis, the proposed gas plant site has been moved farther inland from the main harbour road and local residences.

There were also concerns about the visual impact of the 25 metre right-of-way. Questions were raised about how to mitigate adverse visual effects. SOEP stated that it would agree to the growth of bushes and shallow rooted trees on the right-of-way, if these do not interfere with the safety or the maintenance of the pipeline. This would provide a visual buffer zone as well as wildlife habitat.

On the general question of land use conflicts for the onshore facilities portion of the offshore Project, there is no sign of active land uses on either the proposed natural gas plant site or immediately adjacent lands. However, potential land use conflicts can occur from constructing the natural gas liquids pipeline and its future operation. Potential conflicts would exist whenever the right-of-way intrudes on the privacy and seclusion of camps and seasonal homes. SOEP has undertaken to avoid such land use conflicts, wherever possible. Critics have argued that a right-

of-way would heighten access to remote areas. SOEP has responded that a network of logging roads already provides unrestricted access through much of the area. To prevent unwanted access via the right-of-way, SOEP has offered to erect fences and/or barricades for lands not previously accessible to the public, when requested to do so by private owners.

Another area of potential conflict concerns forest resources impacts. The main issue is possible restrictions on the crossing of the pipeline right-of-way by heavy forestry machinery and other vehicles, which is dealt with in Chapter 3 of this report. The issue considered here is the loss of forest productivity. SOEP estimates that the gas liquids pipeline right-of-way will affect some 200 hectares, 87 percent of which is forested. This would be a minor impact given that there are 301,900 hectares of forest in Guysborough County. As well, compensation would be paid for current and future losses that can be quantitatively demonstrated.

The Panel believes that potential Project-related land use conflicts are either insignificant or amenable to avoidance, mitigation or compensation. The Panel sees as positive SCAC's ongoing role in advising and monitoring for issues such as these. This role should ensure timely feedback and follow-up on any land use concerns.

### *Gas Plant Noise*

SOEP recognized the need to site and design the Goldboro gas plant in a way that is as unobtrusive as possible. While SOEP has taken steps to minimize the visual intrusion, the noise aspects of the plant have not received any special consideration. SOEP's commitment has been to design the plant so as not to exceed the maximum of "Nova Scotia Noise Guidelines for Environmental Noise Measurement and Assessment" (the NS Guidelines) These are 65 dBA daytime, 60 dBA evening and 55 dBA nighttime. SOEP has set its design criteria at 60 dBA daytime and 55 dBA nighttime at the plant fence lines, under normal operating conditions.

M&NPP is proposing a metering station adjacent to the gas plant. Its analysis indicates that the current design for the metering station, coupled with the SOEP operation, would create a noise level marginally above the NS Guidelines. Accordingly, M&NPP has committed to work with SOEP to comply with the Nova Scotia requirement.

The proposed noise levels for the plant would be significantly greater than the current 31 to 40 dBA ambient noise levels at the site. In the Panel's view, this could have a negative bearing on local perception of the impact of the Goldboro gas plant, and it could well be a source of friction. Moreover, by designing the plant to the maximum of the NS Guidelines, any expansion of capacity could result in the need for a costly retrofit to the facilities. The Panel recognizes that the Proponents can meet their legal obligations by planning to the NS Guidelines maximum limit, but questions the long term wisdom of this approach both from a community relations and financial perspective particularly in light of the cumulative effect of the gas plant noise combined with noise from the M&NPP metering station.

### Recommendation 21

**The Panel recommends that SOEP revisit its use of the upper limit of the Nova Scotia Noise Guidelines as the design criteria for the Goldboro gas plant. The Panel further recommends, as part of any regulatory approval, a condition that requires the Proponents to carry out regular noise monitoring at the natural gas plant, and that SOEP add plant noise to its Environmental Issues List.**

The natural gas liquids plant is proposed for an industrial park in Point Tupper. SOEP has undertaken to ensure that noise levels at the nearest dwelling are consistent with the NS Guidelines. The facilities will be designed to meet these standards. SOEP has also undertaken to carry out regular noise level surveys to monitor compliance with the facility licence. The Panel is comfortable with this approach given the industrial nature of the proposed facilities location and SOEP's monitoring program. The Panel makes a clear distinction between what constitutes tolerable noise levels for a relatively pristine rural area and a heavy industrial area.

## SOCIO-ECONOMIC ISSUES

### Methodology

Intervenors expressed concern that the method used to forecast benefits was not optimal, and suggested that additional or different types of modelling or analyses should or could have been used. One intervenor maintained that because a cost-benefit analysis was not used, the socio-economic assessment was incomplete and that further study was essential. SOEP responded that an adequate socio-economic analysis was provided to the Panel and that a benefit-cost analysis is not a requirement of environmental assessment legislation. The Panel ruled that a cost-benefit analysis was not required, it being but one approach among many regularly used to provide an adequate socio-economic analysis.

Other intervenors requested that the socio-economic assessment be broadened to consider specific impacts on industrial Cape Breton. In particular, they wanted studies of potential impacts of coal displacement by natural gas and a study of the impact of the provision or absence of a natural gas lateral to industrial Cape Breton. The Panel believes that the existing analytic approach, which considered general effects on Nova Scotia and specific effects on the most likely affected areas of Guysborough and Halifax Counties, was a sufficient basis for assessment. The Panel sees the studies proposed by intervenors as matters for comprehensive, long range provincial development planning, which is beyond the scope of this review.

Intervenors also questioned the appropriateness of the econometric models and assumptions used by SOEP. However, SOEP's methods and assumptions were presented in the application and were tested both through Panel and Province of Nova Scotia information requests and through cross examination. The Panel concluded that a number of acceptable methods exist which can provide a satisfactory economic assessment. There is no requirement to use several different methods where one is sufficient.

### Direct Economic Benefits

SOEP estimated overall Canadian, Nova Scotian and foreign development phase Project expenditures at \$1.8 to \$2.5 billion. Total direct Project employment for all development phase years is estimated at 5,570 person-years. During the 25 year production phase, estimated to cost between \$1.7 to \$2.4 billion, there would be an estimated employment of 3,840 person years. The ongoing operation would be run by 156 full time staff and 84 contract personnel. Tables 2 and 3 below break out the employment, procurement and other expenditures by location. Of the direct expenditures on material and labour, 35 percent is projected to go to Nova Scotia in the development phase and 74 percent in the production phase. In addition to the impact of direct

expenditures, there would be additional benefits through the multiplier effect as expenditures for the Project flow through the economy. SOEP has estimated the multiplier for Nova Scotia would result in 11,000 indirect and induced jobs in the development phase and 1,075 such jobs in the production phase.

During the construction or development phase, the number of direct Project jobs is typically greater than the number of person-years. This is because some jobs would last for only a portion of a year. SOEP has estimated that the appropriate conversion factor from person-years to jobs is 1.35 jobs for each person year. Moreover, each direct Project job would create a number of indirect and induced jobs through the multiplier effect. SOEP

Table 2. Estimated SOEP Materials and Labour Expenditures By Location and Project Phase (\$million 1995)

LOCATION	DEVELOPMENT PHASE EXPENDITURES				PRODUCTION PHASE EXPENDITURES			
	Material	Labour	Other <sup>a</sup>	Total	Material	Labour	Other <sup>a</sup>	Total
Nova Scotia	341	206		547	700	475		1175
Other Canadian	355	118		473	275	13		288
Foreign	513	67		580	125	12		137
Other			400	400			400	400
Totals	1209	391	400	2000 <sup>b</sup>	1100	500	400	2000 <sup>b</sup>

<sup>a</sup> Other includes Project overheads, insurance, remote location allowance, staff relocation, financing costs and exchange rate exposure.

<sup>b</sup> The totals for the phases are the 50 percent probability values for each phase.

Table 3. Estimated SOEP Direct Person-Years of Employment By Location and Project Phase

LOCATION	DEVELOPMENT PHASE		PRODUCTION PHASE	
	Person-Years	Percentage	Person-Years	Percentage
Nova Scotia	2920	53	3680	96
Other Canadian	1685	30	80	2
Foreign	965	17	80	2
Totals	5570	100	3840	100

has estimated that there will be as many as 2.8 additional jobs for each Project job. These jobs would be of varying duration and occur at different times during the Project's life span.

The Panel notes that the number of permanent jobs during the operations phase will be small, amounting to 156 of which some 40 positions are to be located in the Goldboro area of Guysborough County. Nonetheless, these jobs will make a significant difference to an area which has suffered chronic high unemployment and out-migration. In addition, SOEP established a Project Implementation Office in Halifax in September 1996 where they expect to have a staff of 15 to 20 in place by the third quarter of 1997. The marginal impact of these jobs on metropolitan Halifax will be modestly improved by additional appointments made if the Project proceeds.

Government revenues are an additional potential Project benefit. They include royalties and sales, income, capital and property taxes. Royalties have been specifically excluded from the Panel's mandate and are not discussed further; tax revenue estimates were not included in the SOEP submission.

#### **Other Benefits**

The Panel is of the view that the significant long term impact of the Project for Nova Scotia and Canada will be found in the area of "other benefits" rather than in the direct expenditures for labour and material. As was noted by several intervenors, the obvious sources of such benefits derive from the use of natural gas as an energy source and, alone or together with the liquids, as a raw material for use in other products; the liquids alone could form the base for a petrochemical industry in Nova Scotia. However, as will be noted below in the Panel's views with respect to tolls and laterals, the gas and liquids part of the package could generate benefits when combined with education and training, research and development and a significant SOEP presence in a provincial office. The Panel believes that this package can be an effective means of increasing the other benefits of the Project and can stimulate the development of the infrastructure

required for further development of the Scotia Shelf.

SOEP adheres to the principle that Nova Scotia should be the primary beneficiary of Sable gas development, its natural gas liquids appear destined for export. Unfortunately it took the narrow view that the most important benefit from this Project is access to natural gas, and conveyed the view that the natural gas liquids were destined for export.

The Panel is struck by the lack of vision, from any of the parties that appeared before it, that would capture the full, long-term potential inherent in natural gas production. If SOEP is truly a 'seed' project, for petrochemical industry, then all of the available physical and human resources have to be brought together to make the 'seed' grow.

A second aspect of 'other' benefits is the impact of the availability of natural gas for existing industries. SOEP, government and industry intervenors saw significant benefits arising from having a new energy source that could allow existing Maritimes industries to operate more cost-effectively. There was general agreement that expansion of the available energy mix through access to natural gas could be an important element in the future viability of a number of vital export-oriented industries, particularly heavy energy users.

#### **Recommendation 22**

**The Panel recommends that the Province of Nova Scotia examine options for an industrial strategy that would include hydrocarbon-based development. Given its stated commitment to future Nova Scotia development, SOEP should be expected to provide input to this process.**

#### **Research and Development**

SOEP has committed to fostering research and development related to offshore oil and gas development. Such an initiative will form part of the business plans for each of its functional management areas. The focus will be on improving performance in the areas of health, safety, environment and operational efficiency and reliability. The BAC would play an important role as the public forum for consultation on the program. In addition, SOEP would actively work with Nova Scotian educational institutions and organizations such as the Bedford Institute of Oceanography and the Offshore Trade Association of Nova Scotia to develop and coordinate research programs and projects. Support would likely come in the form of industrial partnerships or joint ventures, and require contributions from all participants. The Panel notes that the approach to research and development is still at a conceptual level. The Panel suggests that the BAC be given a clear role to flesh out, monitor and report on the state of and benefits from SOEP's operations-related research and development program.

The Panel sees this proposed research and development activity focussing mainly on near-term, operational requirements. SOEP's plan fails to address broader needs that must emerge if the current Project, as SOEP maintains, is truly a seed project capable of stimulating future development. The Panel has noted that direct benefits from the Project development phase are temporary and not large, while the major benefit from SOEP is its longer term benefits, including an enhanced infrastructure for further offshore development. A strong case can be made regarding the need to design and carry out research and development studies in order to ensure that greater, direct Canada and Nova Scotia benefits are realized in the future.

### Recommendation 23

**The Panel recommends a comprehensive research program that examines and designs ways and means to enhance local skills and business opportunities and to prepare Nova Scotia for further offshore development. The Panel recommends that SOEP work closely with the federal and Nova Scotia governments and other key stakeholders to examine the need for research in these respects, and set an appropriate direction for research and development programs.**

#### *Employment Opportunities and Training*

At issue is whether Canadians and Nova Scotians will have satisfactory access to employment and training opportunities. The provision of these is a requirement of the Canada-Nova Scotia Accord Act, which applies to both the Proponents' and its contractors' activities. The legislation provides for the employment of Canadians on offshore petroleum projects, and gives first consideration to Nova Scotia workers. It also provides for access to employment opportunities for disadvantaged individuals and groups. SOEP is required by law to submit a Benefits Plan to the CNSOPB which then takes these matters into account. Readers wishing more detail on these matters are referred to the Commissioner's Report to the CNSOPB. It is the CNSOPB that must ultimately rule on the adequacy of the SOEP Benefits Plan in regard to employment and training opportunities, and any required follow-up and/or monitoring.

SOEP has elaborated a number of principles regarding its Benefits Plans obligations. They essentially reiterate the legislated requirement. One principle already mentioned above is that Canadians and Nova Scotians be given first consideration. The main mechanism offered to attain the goal is a conceptual communication process. The process envisages various ways of informing Nova Scotians of employment opportunities with SOEP. A concrete step to enhance employment possibilities has been the hiring of engineering and business cooperative students in order to encourage the development of core competencies related to future project employment.

It is unclear how SOEP intends to ensure that its contractors give Canadians full and fair access to employment, other than by making the contractors aware of the Project principles and requiring them to report on their performance on a monthly basis. There is a large element of trust in the approach proposed by SOEP to ensure performance compliance. SOEP has not discussed mitigative measures in the case where reasonable performance was not achieved.

SOEP has committed in principle to providing disadvantaged groups and individuals with fair and full access to training and employment opportunities, subject to safety considerations. SOEP has undertaken not to intentionally discriminate against, or place barriers in the way of disadvantaged persons or groups, and has adopted the principle of removing barriers. SOEP proposes several specific actions in light of this principle, including the provision of living and sleeping facilities for women on offshore platforms, education of women regarding available job opportunities, and encouragement of skills development. SOEP's monitoring, reporting and remediation systems would include ongoing diversity training and awareness programs, anti-harassment policies and annual surveys of the work climate in terms of employment access for the disadvantaged. SOEP also sees the BAC as having an important role in this regard. Further to employment access for disadvantaged groups, SOEP has recommended that a representative of the aboriginal community participate in the BAC process. This matter is discussed in Chapter 4 in the section on aboriginal issues.

While SOEP has considered providing disadvantaged persons with opportunities, the picture seems far from clear. During the development phase, much of the work would be concentrated over a short three year time span and an annual review would provide little meaningful opportunity to make changes. If SOEP is committed to the employment principles that it espouses, it must plan for timely performance reviews and adopt responsive mitigation measures.

### Recommendation 24

**The Panel recommends that prior to any construction, SOEP provide the CNSOPB with a plan that details the employment and training review process and the specific mitigative measures to respond to unsatisfactory performance on the part of its contractors.**

Another aspect of training, and one which a number of intervenors saw as a core issue, was training for development phase jobs. One perceived difficulty is the lack of lead time to plan and organize courses. Costs of organizing programs might not be justified, given the short term nature of the development work. In response to a Panel query, SOEP predicted that there is sufficient experienced labour in Nova Scotia to look after the onshore construction aspects of its Project. SOEP implied that there may be little need for training programs for much of the onshore activities. With respect to offshore development phase work, SOEP feels that the labour force would be made up mostly of experienced foreign specialists, and there would be insufficient time to put in place formal succession plans. An example was cited of pipe-lay vessels tending to have their own experienced crews. The contractor would be unlikely to need to train additional workers. Another factor, militating against the need for training, is the possibility that Nova Scotians working abroad in the offshore industry may wish to return home and thereby further diminishing the need for training.

With respect to operational training during the operations phase, SOEP notes that a pool of qualified labour exists in the region to meet immediate operational requirements. Over the longer run there will be an ongoing need to train workers, particularly to meet evolving government requirements and industry standards. SOEP is committed to the development of additional education programs through academic institutions and the private sector in order to meet necessary requirements or standards. SOEP activities carried out to date have included consultation with academic institutions on future needs and the development of a training simulator. The

training focus is on long term, operational jobs, aimed at developing multi-skilled technical employees. Given that there are only 240 full-time and contract jobs at the operational phase, there are unlikely to be a significant number of new training programs. Moreover, some training would already be available locally and other training may be sufficiently specialized that it would be done externally through correspondence, job rotations, or assignments to other company facilities in Canada and abroad. The benefits for those wanting to develop training programs locally may be limited.

The Panel raised the issue of a more forward looking approach to training. If the proposed Project is to stimulate further projects, then the Panel suggests that attention should have been paid to skills upgrading based on the expectation of future projects, and not solely on assessing training for the Project at hand. The Panel believes that the long-term training responsibility should be shared by industry, governments and the education sector, and initiated well in advance of the likelihood of further projects.

### Recommendation 25

**The Panel recommends that CNSOPB place a condition on SOEP, requiring the development and implementation of a specific training plan for gas development and production workers.**

#### *Fabrication, Supply and Service Bases*

The need for a clarification of economic criteria for the location of fabrication, supply and services bases, and in particular the weighting that would be given to regional development considerations of locating these bases in smaller Nova Scotia ports was raised by the Panel and several intervenors.

SOEP has maintained that final decisions as to location of bases will be made on the basis of a "best value" determination, subject to meeting environmental requirements. Regional development considerations are not a determining factor in its decision framework. As noted above, during the Hearing, SOEP announced that jacket fabrication and other offshore facilities work had been contracted to European firms on the "best value" criterion; this leaves only decisions on the supply and service bases outstanding.

SOEP has developed general selection criteria for its supply base and pipeline coating operation. These criteria include proximity to the offshore pipeline route, a relatively level site, road and rail system access, a wharf sufficient to accommodate two large vessels and ancillary facilities such as warehousing, repair and maintenance shops and office space. Consideration will also be given to factors such as access to labour, local accommodation and suitable cranes. Finally, qualifications for the facility operator will be assessed in terms of experience, safety programs and environmental procedures. Specific criteria have not been set for the services base, although they will likely include proximity to offshore production facilities, adequate wharfage and the availability of ancillary facilities.

Some intervenors pressed for the establishment of bases in Cape Breton and Guysborough County as a way to offset the environmental and/or social impact that they saw as a result of placing pipelines and plant facilities in these areas. Other intervenors argued that the benefits would be relatively more important to disadvantaged regions than to the Halifax Metropolitan Region. During the hearing no regional development policy was articulated that might address the intervenors' concerns and SOEP did not respond to the case being made. It was evident that SOEP intends to make decisions for the locations of bases, principally on the grounds of best economic value and operational need. SOEP would therefore apply its "best value" criterion in weighing alternative proposals to select an appropriate location.

### Recommendation 26

**The Panel recommends that the Province of Nova Scotia take the lead to ensure that the selection process for service and supply bases is reviewed by the Benefits Advisory Committee (BAC). The BAC should issue a public report on the rationale for all its recommendations.**

The Panel agrees with those who argued that locating supply and services bases in centres outside of the Halifax Metropolitan Region would have the greatest relative impact. Location in an area such as the Mulgrave region or Cape Breton, where unemployment is high and business opportunities limited, is seen by local public authorities and business and labour spokespersons as a means of revitalizing these communities. Port facilities have been built in anticipation of offshore oil and gas development.

The Panel believes that directly affected communities should receive special consideration for benefits, when significant economic or environmental constraints do not dictate otherwise (such as in the case of Country Harbour). In order to encourage this approach, steps should be taken to develop a process where all parties, with legitimate roles in promoting development of the affected communities, can participate. The Panel believes that it would be appropriate, prior to SOEP taking decisions on supply and services base locations, for the selection process to be discussed by the BAC, which includes both provincial and regional representatives.

#### *Monitoring and Enforcement*

In the final analysis, the main interest should be on what level of benefits can be realized relative to what is reasonably possible. During the hearing there were at least two occasions when the specific workings of benefits plans were discussed. One was in relation to the awarding of a jackets contract to a joint venture between MMI of Dartmouth and Brown & Root of Houston. It had not been anticipated that this contract would have Canadian content. The other concerned topside modules being built in Europe and that Nova

Scotians would receive little if any of this kind of fabrication work. In response to these concerns, SOEP has stated that it is on track to meeting its predicted levels of Canada and Nova Scotia benefits. It must be recognized that debates such as these are often rooted in a confusion about the benefit planning process, about what benefits are possible and about what has been achieved. A clear description of the procurement process and anticipated results, coupled with a sound monitoring approach, could help to avoid such confusion, and the mistrust and friction that inevitably follow.

The regulatory responsibility for ensuring that SOEP delivers acceptable Canada and Nova Scotia benefits lies with the CNSOPB. The CNSOPB assesses the reasonableness of the Canadian and Nova Scotian content of the Project, monitors performance and takes whatever remedial action it deems necessary. As part of a proposed Project benefits package, SOEP has developed a principles framework that: promotes Canadian, and in particular, Nova Scotian employment; provides full and fair access to Canadians and Nova Scotians to participate in supplying goods and services; establishes a corporate office in Nova Scotia; provides Nova Scotians with first consideration in training and employment; promotes education, training, research and development; and provides first consideration to competitive Nova Scotian goods and services. A Commissioner for the CNSOPB is a Member of the Panel and has submitted an independent report to the CNSOPB. Readers are referred to that report for further information on these matters.

In addition to meeting CNSOPB regulatory requirement to commit to and report directly on benefits, SOEP established the BAC composed of senior Project representatives and stakeholder groups from trade associations, the service industry, organized labour and government agencies. The BAC's role is to review benefits programs, to assess progress and achievements, to help determine opportunities for improvement and to communicate. While the BAC was established principally as an advisory body, SOEP has subsequently agreed that outstanding issues and con-

cerns could be sent to mediation. This gives the BAC a potentially strong role in influencing SOEP decisions.

Several intervenors asked the Panel to recommend the setting of various mandatory economic requirements on SOEP. Examples of these requirements ranged from establishing specific minimum employment and procurement targets and guaranteeing jobs, to specifying communities from where the workforce should be given hiring preference or where particular activities and offices could be located. The Panel notes that the benefits planning approach under the Accord legislation, as stated in CNSOPB policy, is based solely on a proponent committing to a set of benefits principles. It therefore is flexible and permissive. It is not based on an interventionist philosophy of mandatory requirements or rigid commitments, which is the spirit of the intervenors' proposals. Therefore the Panel will not recommend an approach contrary to the legislated system which governs the form and content of SOEP's benefits plans.

#### ***Fisheries Compensation***

An offshore gas project can potentially impact fish stocks through spills or operational discharges that could kill or taint fish or through the accidental destruction of fishing gear. Compensation is a method of last resort in dealing with adverse Project impacts.

A Fisheries Liaison Committee has been created and is composed of representatives of offshore fisheries businesses. It was chaired by the Seafood Producers Association of Nova Scotia. Committee participation is open to all those with an interest in the fisheries implications of the Project. The Committee and SOEP voluntarily negotiated and signed the "SOEP-Fisheries Industries Agreement on Offshore Commercial Fisheries Issues" dated April 14, 1997. This agreement includes general compensation provisions, which remain to be elaborated through ongoing consultation. One provision calls for the development of "a program to compensate fisheries industry for any damage to gear or vessels caused by SOEP". Another provision obligates SOEP to compensate the fisheries industry for any actual

economic loss resulting from SOEP operational impacts outside a safety zone extending 500 metres from the production facilities. A third provision indemnifies the fisheries industry for any damages it might do to the pipeline and compensates the fisheries industry for any damage or loss of fishing gear. It also provides compensation for loss of fishing grounds as a result of the pipeline or any pipeline exclusion zones.

The fisheries industry asked the Panel to recommend making the agreement a condition of Project approval. The Panel is not disposed to recommend such a condition for three reasons. Firstly, the agreement has yet to be finalized and the Panel has no way of knowing what it would be recommending. Secondly, the agreement and the subsequent elaboration of a specific compensation program are the result of a voluntary approach that both parties have agreed to undertake. The imposition of an outside authority at this time seems contrary to the spirit of the agreed upon approach. Thirdly, the fisheries industry would in any event have access to compensation for portions of the offshore Project that fall under the NEB Act, which would include the offshore pipeline. In the event of Project-related damages, a legislated procedure exists whereby affected parties can seek compensation through a negotiator or arbitration committee appointed by the federal Minister of Natural Resources Canada. In addition to this process, there are other compensation mechanisms that would avoid redress to a civil court. As noted in the SOEP application, the Canada-Nova Scotia Accord Act provides a \$30 million absolute liability for any damages caused by spills or debris from or within the Project area. Finally, further protection is provided under federal fisheries legislation and the Canada Shipping Act.

#### ***Services and Infrastructure Impacts***

Availability of local facilities and services can be an important factor in determining how a project can have an economic impact on host communities. Key requirements at the construction stage include the adequacy of medical and protective services, temporary accommodation and transportation infrastructure. This does not

appear to be an issue for the affected municipalities in Guysborough County where a sufficient range and depth of basic services exists to meet the Project requirements. An exception may be the cumulative effect of a number of activities which could occur together in 1999. The SOEP gas plant, the gas liquids line and the M&NPP natural gas line are all proposed for construction at the same time. A sophisticated planning and coordination approach would be needed to ensure that adequate accommodation is available for the construction workforce and that the local road system is not overloaded or damaged.

During the operations phase, there should be minimal additional pressure on public services and facilities given the low number of new permanent jobs. The call on medical, educational and social services would typically be manageable. Indeed in disadvantaged areas such as Guysborough County, additional potential demand is often seen as positive because it can protect existing services from the threat of downsizing or closure.

Overall, the Panel believes that there appear to be sufficient basic facilities and services to absorb any contemplated additional demand.

### **Work Force Accommodation**

The availability of accommodations for the labour force constructing SOEP facilities is an issue. The construction of the natural gas plant alone would involve some 500 workers in 1999. SOEP has stated that there are few residential rental units in the plant environs and limited commercial accommodation and camp sites within a 30 to 45 minute travelling time from the proposed plant. Based on this analysis SOEP has concluded that possibly only 200 workers would be able to find accommodation in the immediate area. The other 300 would have to be housed in a construction camp that SOEP would establish at or adjacent to the natural gas plant site. The construction camp would likely be designed for 400 workers, in order to house additional construction crew who would be engaged in laying both the liquids and M&NPP pipelines. SOEP has undertaken to continue to consult with all pertinent governments

and the SCAC on its plans for the camp and to seek all requisite permission once a decision has been taken.

Approximately 200 supply and service base workers will also require accommodations in 1999. However, until the supply and service base locations are known, specific impacts cannot be addressed or assessed. The availability of temporary accommodation is one of the selection criteria that would have to be examined when choosing among possible port sites. To the degree that base workers are mariners, they are likely to be local hires and have existing accommodation. However, there could still be a need for temporary housing for any remaining workers.

SOEP estimates that 96% of the operations phase work force of 240 persons will be hired from Nova Scotia. Thus it would be expected that a high proportion of this work force would already live in the vicinity of their work or be able to commute. To the extent that there are new housing needs, there should be ample time for the local housing market to increase the supply to meet the expected additional housing demands.

The Panel believes that with proper planning and continuing consultation between SOEP, appropriate government agencies and SCAC, accommodation impacts should be mitigated.

### **Recommendation 27**

**The Panel recommends that once a decision on supply and service bases has been taken, SOEP be required to consult with pertinent government authorities on strategies for mitigating accommodation impacts, such as providing additional temporary construction camps.**

### **Archaeological and Heritage Resources**

During SOEP's public consultations and the Panel's scoping sessions, the public raised the issue of possible damage to ship wrecks from offshore pipeline construction activity. In respect of this, SOEP has stated that it carried out bathymetric and surveys of the proposed offshore pipeline corridor and that it by-passes existing shipwrecks. Based on the Nova Scotian Museum's Shipwreck data base and SOEP's research, eight wrecks were identified in the vicinity of the proposed offshore pipeline and landfall area. The closest approach, measured from the corridor centre line, was 500 metres from the Foundation Masson and 450 metres from the Finchley. It was concluded that the pipeline laying activity would not likely impact these wrecks.

Notwithstanding the above findings, SOEP has accepted its consultant's advice that if recommended by the Curator of Special Places of the Nova Scotia Museum, SOEP would have the wreck of the Finchley professionally assessed prior to construction, monitored during construction and assessed after construction. The Panel agrees that this safeguard may be necessary. Further, the Panel also sees a need for a general safeguard. Given the possibility of corridor re-routing, the Panel concluded that there should be additional consultation with the Nova Scotia Museum to determine whether further surveys are required to confirm the presence or absence of wrecks and to establish any necessary avoidance or mitigation.

The Panel also notes that for onshore construction activities, SOEP has committed to follow standard practice regarding archaeological, paleontological and heritage resources. These practices include halting construction should artifacts be uncovered, and not recommencing until professional advice has been obtained and regulatory approval given. Should an aboriginal site be uncovered, SOEP has agreed to halt work and consult directly with the aboriginal community. A more detailed discussion of standard practices in the archaeological and heritage areas is provided in the next chapter which deals with the M&NPP pipeline.

# 3

## The Maritimes and Northeast Pipeline Project

### DESCRIPTION

The Maritimes and Northeast Pipeline Project (M&NPP) proposal is to construct and operate a pipeline to ship natural gas developed by the Sable Offshore Energy Project (SOEP) to markets in the Maritimes and the northeast United States. The facilities will consist of 558 kilometres of 762 millimetre pipeline extending from the outlet point of the Goldboro Gas Plant, first in a northwesterly direction passing near New Glasgow and Tatamagouche, Nova Scotia, crossing the Nova Scotia-New Brunswick border near Tidnish. Approximately 234 kilometres of pipeline will be located in Nova Scotia.

The pipeline will traverse New Brunswick in a westerly direction passing near Moncton and Chipman. From Chipman it

will proceed in a southwesterly direction passing near Fredericton, crossing the Saint John River and proceeding to the international border near St. Stephen, New Brunswick. Approximately 324 kilometres of pipeline will be located in New Brunswick.

Included in the pipeline design are a custody transfer meter station located at the pipe inlet, three pig launchers and two receiver traps. Also included are mainline valves, located at a nominal 40 kilometre spacing. In its Application, M&NPP indicated that there would be side valves for the connection of future laterals and that additional side valves could be added after construction as required.

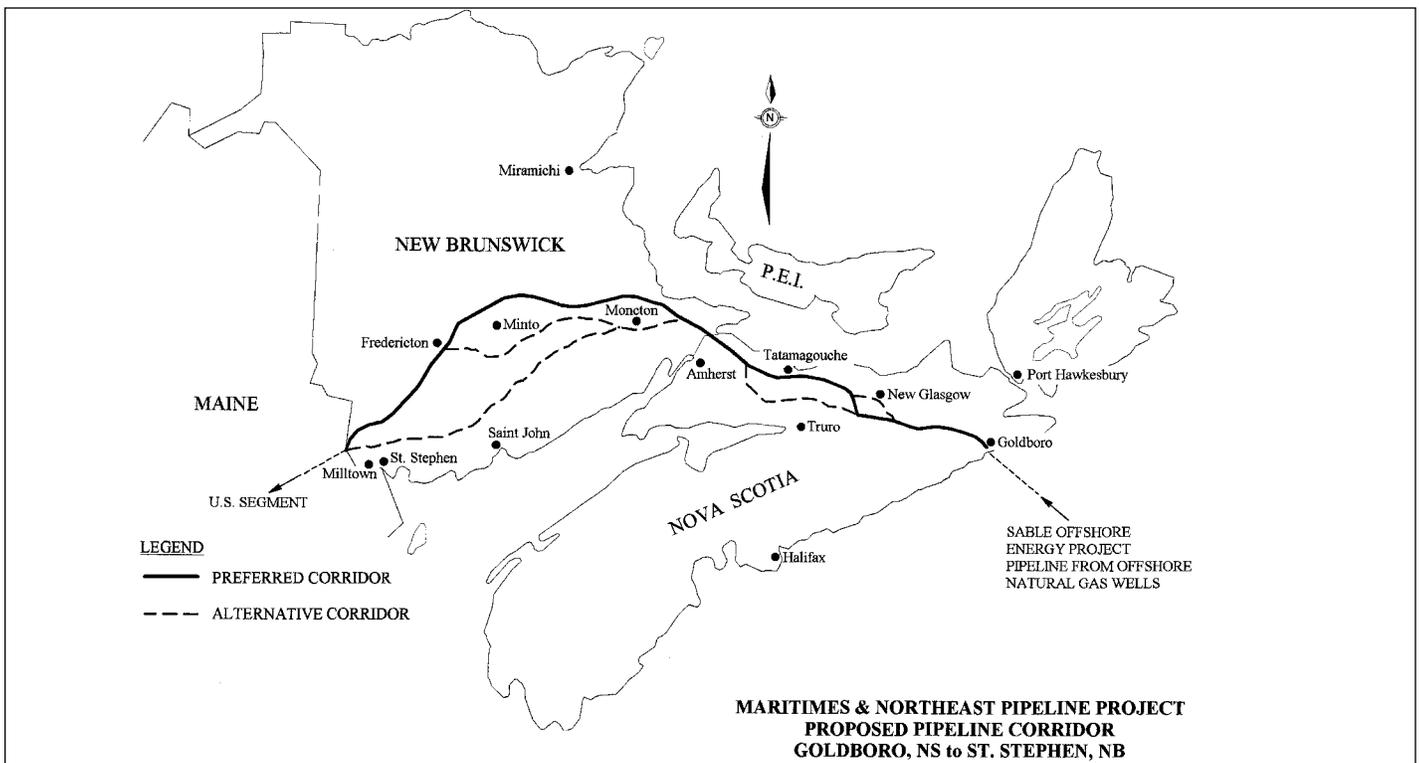
The pipeline will be operated from the Algonquin Gas control centre in Boston,

Massachusetts. The centre will provide, following expansion of its existing facilities, 24 hour-a-day monitoring of the M&NPP Supervisory Control and Data Acquisition (SCADA) system. In the event of a communication or host computer failure in Boston, the M&NPP sub-master, located at the Canadian Operations Centre in Fredericton, New Brunswick, will be capable of assuming control of the Canadian portion of the pipeline.

### PURPOSE AND NEED

M&NPP has applied for a "Certificate of Public Convenience and Necessity" pursuant to Part III of the NEB Act. The NEB when determining whether or not to recommend to the Governor in Council that a Certificate be issued to a pipeline applicant, must consider the following:

Figure 12. M&NPP Pipeline Route Map



- a) the availability of gas to the pipeline;
- b) the existence of markets actual or potential;
- c) the economic feasibility of the pipeline;
- d) financing and financial regulation matters; and
- e) any other public interest considerations that may affect, in the view of the NEB, the granting or refusing of the application.

This chapter deals with the first four of these factors in order to determine if the proposed facilities will be needed for the present and future public convenience and necessity.



Figure 13. Photograph of a Typical Mainline Valve Station

The design of the M&NPP facilities will accommodate an initial forecast of 530,000 MMBtu of peak day capacity based on signed Precedent Agreements (PAs) for 440,000 MMBtu/d for the export markets and 90,000 MMBtu/d for domestic markets. Signed PAs for domestic markets increased to 200,000 MMBtu/d, which could eventually result in a total demand of 640,000 MMBtu for peak day capacity.

### **Gas Supply**

The natural gas available from the Goldboro gas plant is projected to be at a daily average of 480,000 MMBtu, although the plant will be capable of accommodating a maximum daily output of 578,000 MMBtu.

SOEP has committed to sell the entire gas production from the first six Sable fields exclusively to M&NPP shippers arguing that this commitment is economically essential if the six SOEP gas fields are to be developed. A number of intervenors were opposed to this commitment and invoked sections of the Competition Act, R.S.C (1985) which relate to vertical integration; refusal to deal; exclusivity of tied

sales or abuse of dominant position.

A threshold level of transportation volumes undoubtedly exists below which the M&NPP pipeline would not be economically feasible, but the Panel is unable to determine that threshold. Nevertheless, the Panel will not sanction "tied sales" of SOEP gas for two reasons. The first reflects the principle that Canadians have

### **Market Based Procedure**

The National Energy Board requires that the quantity of gas to be exported under long-term export licences does not exceed the surplus remaining to satisfy the foreseeable requirements for use in Canada.

To ensure this, the NEB implemented the Market-Based Procedure (the MBP). The elements of the MBP are:

1. the marketplace should generally operate in such a way that Canadian requirements for gas will be met at fair market prices;
2. the Board will hold public hearings to consider gas export licence applications ; and
3. the Board will monitor Canadian energy usage and gas markets on an ongoing basis.

During the public hearings, the NEB evaluates whether the market is functioning well. The NEB must consider any complaints from Canadian buyers who object to the proposed export on the grounds that they have not had an opportunity to buy gas on terms and conditions, including price, similar to those of the proposed export.

The NEB does an Export Impact Assessment to determine whether a proposed export is likely to cause Canadians difficulty in meeting their energy requirements at fair market prices by assessing the impact of the proposed export on Canadian energy and gas markets. The NEB also determines whether the proposed export is in the public interest and considers any other factors that it deems relevant.

Under the MBP, the NEB has responsibility for assessing Canadian energy supply and demand as well as natural gas markets. For example it produces reports such as "Canadian Energy, Supply and Demand 1993-2010" and "Natural Gas Market Assessments" (NGMAs). These NGMAs look at shorter-term developments in gas supply, demand and prices.

The NEB also has the authority to issue short-term export orders for a period up to two years in accordance with Section 15 of the Part VI Regulations. An application for a short-term export order contains minimum information in accordance with the filing requirements of the National Energy Board Guidelines for Filing Requirements, 22 February 1995 and such applications do not require a public hearing, thus involving only the applicant and the NEB.

demonstrable access to the gas resource before an export licence may be granted, as provided for in the NEB Act, s. 118 (a) and in the NEB's "Market Based Procedure (MBP)".

The Panel believes that access by Canadians to gas produced in Canada should not be conditional on whether buyers/shippers will transport their gas on designated facilities. The Panel is of the view that access by Canadians is conditional only on the existence of supply, together with economic means of transportation.

The second reason follows from the principle that gas pipelines which transport gas for third parties should be "unbundled" and "open access". "Unbundled" pipelines means that the pipeline services must not be tied to the ownership of the commodity in any way. It is understood that M&NPP will accept gas from producers other than the SOEP consortium when other gas fields are developed. This fact does not change the SOEP and M&NPP initial understanding that the supply of SOEP gas and the pipeline services will be tied for the development and production life of the six SOEP fields.

"Open access" pipelines means that shippers willing to meet a pipeline's tolls and tariffs conditions should have access to service where it is economically feasible for the pipeline to provide service. An extension of this principle must be that a shipper should not be forced to use the services of one particular pipeline but should be able to use the pipeline of its choice to transport gas purchased at the source.

Notwithstanding the possibility that some shippers (most likely in Nova Scotia) may be motivated to "by-pass" the M&NPP pipeline, the Panel is confident that the M&NPP pipeline will be sufficiently competitive to attract and retain the transportation volumes necessary for its economic feasibility. The Panel finds that M&NPP has demonstrated sufficient gas reserves and projected production to support its proposal.

## Recommendation 28

**The Panel recommends that SOEP be prepared to sell gas to shippers at the Goldboro gas plant whether or not the shipper has entered into a Transportation Agreement with M&NPP.**

### *Security of Supply*

Potential purchasers of natural gas in the Maritimes questioned the Proponents about the dependability of gas deliverability to domestic markets. Areas of concern included planned and unplanned outages and the absence in the design of storage facilities in Canada.

The Proponents indicated that the M&NPP pipeline will be directly connected to the North American gas grid. This characteristic provides several assurances to the Canadian market that gas supply will not be interrupted. The M&NPP system is designed to be reversible, so that up to 200,000 MMBtu/d of natural gas can be physically delivered from the U.S. northeast end of the pipeline to the Canadian facilities. The U.S. portion of the pipeline interconnects near Boston, Massachusetts at a hub that receives gas from the Gulf Coast, Western Canada, the Appalachian Basin and other supply basins. This capability provides Canadian customers with supply security in the event that Sable supply is not available.

Pipeline physical flow reversibility will be utilized by M&NPP under emergency conditions. However, more commonly, paper transactions will be used to provide gas to Canadians in the event of temporary supply disruptions. Paper transactions provide for delivery of natural gas to Canadian customers without the need for physical reversal of the direction of flow in the pipeline. Paper transactions include displacements and exchanges.

Given the size of the Maritimes market compared to the U.S. northeast market, the Panel believes that Canadians would have no difficulty achieving adequate access to gas from the United States through either physical or paper means.

## Market Terms

### *displacements:*

when a marketer with capacity on both M&NPP and another pipeline, physically serves a Boston customer with non SOEP gas freeing its SOEP gas for delivery to Canadian customers; and

### *exchanges:*

when a M&NPP shipper arranges with a third party non-M&NPP shipper to make physical delivery to the former's customer located downstream, freeing its upstream capacity for Canadian customers.

## Markets

Sable-sourced gas is expected to serve incremental and displacement industrial, Local Distribution Company (LDC) marketer and power generation markets in Canada and in the U.S., displacing high, medium and low sulphur fuel oil, crude oil, electricity, domestic and imported coal, natural gas, and propane.

The main markets to be served by M&NPP are located in the Maritimes and U.S. northeast. These markets represent a mix of existing and new gas markets with high growth potential, given their current dependence on high-priced fuels and a general lack of access to gas pipeline transportation and distribution systems. This U.S. northeast market is considered to be the anchor market for SOEP and M&NPP. Today, Nova Scotia and New Brunswick do not have access to gas and rely predominantly on No. 2 and No. 6 fuel oils, coal, wood residue and electricity. Based on the National Energy Board's "1994 Energy Supply and Demand Report", total energy demand in those two provinces is forecast to grow at an average annual rate of approximately one percent between 1991 and 2010. M&NPP submitted that the construction of the SOEP and M&NPP facilities and downstream distribution systems will provide the necessary catalyst for the development and growth of these domestic markets. It is expected that as gas service becomes available, it will be the large industrials, electric generators, and established LDCs, who will likely be the first to take gas service. M&NPP noted that this kind of incremental market development is consistent with the way domestic markets have emerged around new gas pipelines in the past, notably those of TransCanada and Westcoast.

A signal that development of the domestic market is moving forward relates to LDC franchising. Both the Nova Scotia and New Brunswick governments are developing regulations governing the awarding of distribution franchises and the provision of gas distribution services. *Nova Scotia's Gas Distribution Act, 1997* was recently passed through the Nova Scotia provincial legislature. Nova Scotia has indicated that it intends to call for proposals to build laterals and associated distribution systems.

In that regard, N.S. Power has entered into a joint venture with Consumers' Gas Energy Incorporated, the parent company of Consumers' Gas, to compete for laterals and associated gas distribution rights in Nova Scotia. In New Brunswick, Irving Oil Ltd. has expressed an interest to the provincial government in distributing gas in that province.

M&NPP argued that the emergence of the Nova Scotia and New Brunswick markets can be illustrated by the fact that since filing its application, Precedent Agreements (PAs) for some 200,000 MMBtu/d of firm service capacity have been executed with three large domestic consumers.

To demonstrate the long-term nature of gas demand in the U.S. Northeast market, M&NPP relied on a forecast, prepared by the Reed Consulting Group, entitled "Assessment of the Market for Natural Gas in the Northeast United States" (the Reed Study). The Reed Study concluded that total gas demand (i.e. firm throughput, interruptible, and electric power) in the U.S. Northeast is forecast to increase from 2,700 TBtu (trillion British Thermal units) in 1997 to 3,325 TBtu in 2006, an annual average increase of 2.3 percent. Most of that growth is expected to occur in the electric power generation sector and occur in markets directly accessible off the U.S. portion of the M&NPP system.

M&NPP also foresees U.S. northeast opportunities for new market entrants in the high value, seasonal and peak services market sectors, where gas is expected to replace propane, LNG, and use of gas storage. M&NPP noted that its menu of transportation services has been designed to allow shippers to market their gas to satisfy those peaking and seasonal needs. LDC unbundling, part of the market restructuring, and the expiry of a number of existing interstate pipeline supply commitments in the year 2000, will also mean opportunities for new market entrants such as M&NPP.

The SOEP and M&NPP Proponents have emphasized that a window of opportunity exists in that market for a new market entrant but that new pipelines from other North American supply basins, also being planned for the turn of the century, make it

imperative for SOEP and M&NPP to penetrate that market without undue delay.

Starting in March/April 1996, M&NPP sought Requests for Service for capacity to be made available by the proposed facilities. As a result of these Requests for Service, M&NPP entered into PAs with domestic and export shippers totalling 640,000 MMBtu/d. In addition, Champion International and PanEnergy Power Services have executed PAs for 7,600 MMBtu/d and 100,000 MMBtu/d of OP 275 and OP 214 (offpeak) services, respectively.

The terms of the PAs vary from two to twenty years, with an average term of fifteen years, starting 1 November 1999. The PAs are subject to certain Conditions Precedent, including: receipt of all necessary Canadian and U.S. regulatory approvals for the construction and operation of the pipeline; the shipper completing the necessary supply arrangements on satisfactory terms and conditions, including price; and, the shipper being satisfied with the approved rate treatment and rate levels.

Upon satisfaction of those Conditions Precedent by a certain date (date precedent), the pipeline and the shipper are expected to finalize their arrangement for service by executing a firm transportation Service Agreement. Failure by either party to the PA to satisfy those Conditions Precedent by the date precedent could result in the termination of the PA and lead to other shippers taking up the available pipeline capacity upon execution of a firm transportation Service Agreement, or lead to M&NPP amending its proposed facilities design to more closely match the contracted capacity.

The PAs with the export shippers are tripartite agreements and provide for service on both the Canadian and U.S. sections of the M&NPP pipeline.

M&NPP has executed 20-year Backstop Precedent Agreements with Mobil Natural Gas Inc. and Imperial Oil Resources Limited for all of the throughput on the M&NPP pipeline up to 440,000 MMBtu/d that is not subject to firm transportation Service Agreements entered into by other

shippers. These Agreements take effect from the date of commencement of service, and include all capacity that might become available in the future as a result of the termination of such PAs or firm transportation Service Agreements prior to the end of the 20 years.

The effect of these Agreements is to cause the SOEP Proponents to contract for up to 440,000 MMBtu/d of the proposed 530,000 MMBtu/d of pipeline capacity for a period of twenty years, which is five years shorter than the twenty-five-year period over which the pipeline investment is proposed to be depreciated. Under these Agreements, M&NPP has an obligation to continue to actively market any unutilized capacity in order to minimize or mitigate the risk to the three participating producers. While Mobil, for example, would enter into a firm transportation Service Agreement for any capacity it is obligated to take under the Backstop Agreement, M&NPP retains the right to recall that capacity in the event it has been successful in contracting to third parties.

The Panel has considered M&NPP assessments of the domestic and export markets to be served by the proposed facilities and is satisfied that, for purposes of determining the need for those facilities, those assessments are reasonable.

The Panel accepts that it is reasonable to expect that, as happened in other parts of Canada in the past, the construction of the M&NPP pipeline, anchored by a dynamic export market and large domestic industrial gas consumers, will provide the impetus for the establishment of the necessary downstream transportation and distribution systems and the further development of the domestic market.

The Panel believes that there is a strong likelihood that the M&NPP facilities will be used and useful over the long term and that the associated demand charges will be paid, given:

- the potential for Sable-sourced gas to penetrate the Nova Scotia and New Brunswick fuel markets currently not served with gas;
- the long-term potential for

Sable-sourced gas in the U.S. northeast markets, as illustrated by the Reed Study;

- the existence of executed PAs for 640,000 MMBtu/d; and

- the commitment of the Sable producers to the M&NPP pipeline through the execution of the Backstop Precedent Agreements.

With regard to the Panel's draft recommendation that:

*"M&NPP shall file with the NEB, prior to the commencement of construction, executed, unconditional firm service agreements for the full capacity of the proposed pipeline."*

the Panel concurs with M&NPP that such a condition would frustrate its ability to proceed with construction unless the pipeline was fully subscribed. The Panel agrees that it would be more appropriate to recommend that M&NPP file, prior to the commencement of construction, the executed Backstop Precedent Agreements.

### Recommendation 29

**The Panel recommends that M&NPP be required to file with the NEB, prior to the commencement of construction, the executed Backstop Agreement.**

Figure 14. Photograph of Pipeline Construction Activity



## DESIGN OF THE PROPOSED FACILITIES

M&NPP proposes to design, install and operate the pipeline in accordance with the NEB's *Onshore Pipeline Regulations*, which specifies that the design, installation, testing and operation of a pipeline be in accordance with the applicable provisions of "CSA Z662, Oil and Gas Pipeline Systems".

Several factors are considered in determining the appropriate design for a pipeline. These include: the required capacity; the location of existing and future supply, markets and storage; physical constraints; material and installation costs; environmental and socio-economic considerations; and scheduling. The design capacity is selected in response to market demand as exhibited by signed PAs and the results of supply, market and economic analyses (both short and long-term). Once the design capacity has been selected, specific design parameters can be determined. These include pipe diameter, pressure, wall thickness and the requirements for compressor units and other pipeline related facilities.

A design issue was whether the proposed 762 millimetre pipeline, which was modified from an earlier 610 millimetre design intended for export only, would be capable of meeting foreseeable domestic needs. Other issues included whether contractual obligations would be met in the event of a supply outage from SOEP and, in the event of curtailment, whether export markets would receive preferential treatment over

domestic markets.

M&NPP indicated that the 762 millimetre design of the Canadian portion of the proposed pipeline with no compression beyond that provided by the Goldboro gas plant, was one of three designs considered. The other two designs required compressors in Canada. According to M&NPP the proposed design was selected because it provides the best balance of the lowest cost of transportation, surplus capacity and improved system reliability.

The applied-for facilities were initially designed to accommodate a peak-day capacity of 530,000 MMBtu based on signed PAs for 440,000 MMBtu/d of export markets and 90,000 MMBtu/d for domestic markets. Signed PAs for domestic markets increased, subsequently, to 200,000 MMBtu/d, resulting in a total of 640,000 MMBtu/d. In respect of surplus capacity, M&NPP indicated that, depending on where the load is dropped off, the proposed design is capable of transporting in excess of 600,000 MMBtu/d of delivery volumes, and in excess of 800,000 MMBtu/d with the addition of compression.

Intervenors expressed concerns regarding the appropriateness of the sizing of the proposed facilities and the ability to service domestic markets, noting that the average availability from SOEP will be 480,000 MMBtu/d. In response to those concerns, M&NPP indicated that customers would be able to access natural gas off the North American grid, that the applied-for facilities are capable of providing 365 day-a-year Firm Service, and that the system would be physically capable of reverse flow in the event of an interruption in supply from SOEP. M&NPP further indicated that the proposed pipeline is designed to meet forecasted requirements in the U.S. Northeast and the Canadian Maritimes while providing for future expansions to meet additional markets.

On the basis of the evidence presented, the Panel is of the view that the pipeline is appropriately sized for the requirements as supported by signed Precedent Agreements. The Panel notes that there is a likelihood of increased future domestic

demand. It recognizes that there is sufficient flexibility, with the addition of compressor units, to handle a reasonable amount of future growth. As well, the Panel accepts M&NPP's explanation that, once the pipeline is attached to the North American grid, marketing mechanisms such as back-stop agreements and the availability of gas from other sources will work to ensure that foreseeable requirements are met.

The Panel recognizes that M&NPP's pipeline is a "seed" for future development of the gas industry in the Maritimes and that, as a distribution infrastructure develops, further pipeline capacity will likely be required. However, the Panel accepts M&NPP's proposed design in respect of pipeline sizing and compression on the basis of current market requirements and reasonable projections.

In respect to a proposed Saint John Lateral, one intervenor requested a condition requiring M&NPP to file for approval a joint marketing, business development and facilities plan. This intervenor also requested that the NEB condition any approval on the filing of a work plan by M&NPP for developing both a natural gas market and a lateral timetable for communities in northern New Brunswick. Some parties expressed similar views regarding the requirement for a lateral to Saint John, and laterals in general, while others were of the opinion that laterals, not forming part of the application, were beyond the scope of the hearing.

The Panel recognizes the significance of laterals in respect of future domestic service. The Panel notes, however, that laterals do not form part of M&NPP's application and therefore the design considerations will be part of future applications and review.

M&NPP indicated that it anticipated receipt of a certificate in the early fall of 1997 and that materials procurement would commence in early 1998. Surveying and line-clearing would be carried out in the fall and winter of 1998-99, with construction of the pipeline commencing after spring run-off in May 1999 for a November 1999 in service date. M&NPP indicated that the scheduled one-

and-a half year lead time in advance of construction was reasonable to reserve mill space for a project of such magnitude. M&NPP further indicated that if approval for the Project was not received in time to serve the market in 1999, the entire development could be postponed for a number of years since the Canadian market alone could not support a project of such magnitude at this time.

M&NPP indicated that after certification, there would be detailed route hearings, land acquisition and clearing which would require more than a ten month lead time. In respect of the status of U.S. regulatory authorizations and deadlines included in Precedent Agreements, M&NPP responded that these were contract dates, set some time beyond the expected date for the receipt of approvals, to provide some room for comfort.

The Panel accepts that M&NPP's timing and schedule is reasonable for a new pipeline of the magnitude proposed and recognizing market opportunities.

M&NPP provided a gas analysis table showing the composition of the natural gas to be transported in the pipeline. The gas composition is expected to be approximately: 91.1 percent methane, 6.1 percent ethane, 2.0 percent carbon dioxide, 0.4 percent propane, 0.2 percent nitrogen and a total of 0.2 percent butanes, pentanes plus and helium. M&NPP estimates, at a specific gravity of 0.610, that the total mass of gas released to the atmosphere due to operating requirements and inadvertent leakage in one year would be less than one tonne.

M&NPP expects that in the worst case scenario, it would take from ten to fifteen minutes to detect a mainline break. The break would then be located and isolated through remote valve closures and field personnel would be dispatched in accordance with the Emergency Response Plan. M&NPP does not propose an automated leak detection system for the pipeline. Thus a natural gas leak that is too small for SCADA detection would be located by routine foot patrol, aerial patrol or a Flame Ionization Survey.

M&NPP indicated that approximately 50

tonnes of carbon dioxide will be produced for the combustion of one terajoule of natural gas. It further notes that the majority of the domestic load would displace existing sources of energy that produce more greenhouse gas emissions than natural gas. In response to intervenors' concerns regarding the potential effects of natural gas on environmental-induced illness, M&NPP responded that natural gas has been widely used throughout the world without any evidence of a general adverse impact on health.

In addition to the Emergency Response Plan, safety is also addressed in "Reference 37, Safety Instructions, of M&NPP's Construction Specifications", filed as part of the application in which responsibilities of the contractor and the company are identified, and safety precautions and work practices are discussed.

The Panel is of the opinion that M&NPP has appropriate measures in place to deal with anticipated health and safety issues.

## FINANCIAL REGULATION

### *Method of Regulation*

M&NPP indicated that it would prefer regulation on a complaint basis as provided by Group 2 status. However, it noted that it might be more appropriate to reserve judgement on the designation of the pipeline for Group 1 or Group 2 status until a hearing is held. Normally the hearing is held just prior to commencement of service.

One intervenor requested that the NEB decide now to regulate M&NPP as a Group 1 pipeline arguing that it will be important, especially in the first few years after start-up, for the NEB to maintain an active oversight of M&NPP's cost of service. This intervenor indicated that changes in cost of service, volumes as well as probable changes in M&NPP's Tariff, were the justification for the requested designation.

Although the NEB's "Memorandum of Guidance Regulation of Group 2 Companies" dated 6 December 1995 does not identify specific criteria for determining Group 1 or Group 2 status, certain

## Recommendation 30

**The Panel recommends to the NEB that Maritimes and Northeast Pipeline Management Ltd. be designated as a Group 1 Company for the purposes of regulation under the NEB Act.**

factors have been found relevant when making this determination. These include: the size of the facilities; whether the pipeline transports commodities for third parties; and whether the pipeline is regulated under traditional cost of service methodology.

The Panel is of the view that under these criteria, M&NPP should be classified as a Group 1 pipeline. M&NPP is of a size comparable to some other Group 1 pipelines under NEB jurisdiction; it is likely to transport gas for a number of third party shippers; and it has applied to be financially regulated under traditional cost of service methodology.

The Panel notes that there is no direct link between the classification of a company for regulatory purposes and the classification of a company for cost recovery purposes. The share of the NEB cost recovery charge that M&NPP will be required to pay under the NEB's *Cost Recovery Regulations* will be decided at a later date.

### *Cost of Service Methodology*

M&NPP has requested approval of a conventional cost of service methodology based on capital and operating costs forecasted over a fixed forward test year. With respect to the cost of service, M&NPP sought approval for principles which included an annual depreciation rate of four percent; income taxes calculated on a flow-through basis; and the amortization over seven years of the tax write-off associated with "Allowance for Funds Used During Construction" capitalization.

The Panel is of the view that approval of the above-mentioned principles is reasonable. The Panel notes that no intervenors provided evidence in opposition to these proposals. In the event that circumstances warrant, intervenors will have the opportunity to re-examine these principles in a future toll hearing.

## Recommendation 31

**The Panel recommends to the NEB the approval of a forward test year cost of service methodology for M&NPP.**

### *Income Tax Issue*

During final argument, one intervenor raised an issue that was not addressed during the proceeding. It requested that the NEB order that all costs deducted for tax purposes by the partners of M&NPP, before the commencement of its operations, should be reflected in its rate base and its capital structure on a tax-adjusted basis. This would take account of the fact that the partners' out-of-pocket after-tax costs are less than what they propose to record as a part of its rate base and capital structure. This intervenor stated that the principle (i.e., that partners should not be allowed to benefit from the time-value of their tax savings at the expense of shippers) had been recognized by the NEB in previous decisions regarding other companies. M&NPP noted that this issue was not addressed during the course of the hearing and that certain assumptions made in argument may not be valid.

The Panel is of the view that there was not adequate examination of this issue and that it would be appropriate to defer a finding on this matter to the future toll hearing.

### *Cost of Equity Capital*

Two positions were presented during the course of the hearing with respect to Cost of Equity. One relied on the RH-2-94 framework, to determine an appropriate common equity ratio for the company of 40 to 45 percent, but in order to minimize tolls, a 25 percent ratio was recommended. The equity ratio request was combined with a suggested 13 percent return on equity which consisted of the RH-2-94 determined rate of return of approximately 10.67 percent for 1997, an adjustment of 125 to 150 basis points to account for increased leverage and a 75 to 100 basis points adjustment to account for the requested five year fixed rate of return on equity.

The other position was based on an assumption that the business risks of the proposed pipeline were approximately equal to that of the other Group 1 gas pipelines regulated by the NEB and therefore it deserved an equity ratio of 30 percent. Nevertheless this intervenor felt that a 25 percent equity ratio could be utilized provided that the return on equity was adjusted to 11.2 percent, which reflected an adjustment to the RH-2-94 return on equity for 1997 of 10.67 percent to account for the added leverage of the capital structure. No adjustment was felt necessary to compensate for the requested fixed 5 year rate of return.

The Panel is of the view that the determination of a pipeline company's capital structure begins with an analysis of its business risks. The evidence included an examination of the business risks M&NPP would be exposed to during the operation, namely the supply risk, the markets the pipeline would serve, the contractual arrangements for gas sales, the Backstop Agreements, political and regulatory circumstances, and pipeline operating conditions. Of the several business risks, the evidence indicates that the greatest distinguishing risk factor is related to the supply of natural gas. However, certain intervenors submitted that the level of business risk was overstated, particularly because of the level of security offered by the Backstop Agreements.

The Panel concurs with the view that, on balance, and in a comparison of the proposed pipeline's business risks with that of pipelines currently regulated by the NEB, M&NPP can be viewed as having the same business risk as other Group 1 pipelines. The Panel therefore concludes that no adjustment is required in the return on equity to reflect business risk.

### **Tolls and Tariffs**

M&NPP applied for an Order of the NEB respecting Tolls and Tariffs pursuant to Part IV of the *NEB Act*, applicable to the services to be provided by the proposed facilities.

## **Recommendation 32**

**The Panel recommends to the NEB the use of a 25 percent common equity ratio by M&NPP. The Panel also recommends that the return on equity for the pipeline for the first five years of the Project be set at 13 percent.**

M&NPP requested approval of a postage stamp toll methodology which would establish uniform firm transportation service rates for all Canadian shippers, based on the pipeline's approved cost of service. In conjunction with this methodology, M&NPP also requested approval of a Lateral Policy to foster development of the Maritimes' natural gas markets.

M&NPP also filed a draft tariff which included illustrative toll schedules, general terms and conditions and pro forma transportation service agreements. M&NPP proposed to offer services which would include a 365 day firm transportation service, 151 day and 90 day firm peaking services and firm off-peak services. Interruptible service will also be available. It further indicated that it was not seeking approval of its Tariff at this time, and plans to file a copy of a revised Tariff when it seeks approval of its final fixed Tolls and Tariff (in early 1999).

### **Toll Design and Market Development**

Under the conventional cost of service methodology, there are various methods for designing rates for pipelines. Three traditional designs are postage stamp toll design, point-to-point volume-distance toll design and zonal toll design. Any of these methodologies, when properly chosen to address circumstances specific to a particular pipeline, will yield just and reasonable tolls.

M&NPP proposed a single postage stamp toll for each of the five firm transportation services it plans to offer. The proposed 365 firm transportation toll (MN365) was based on the forecasted annual cost of service and contracted capacity of the pipeline. M&NPP assumed a contracted capacity of 530,000 MMBtu/d and used that capacity for cost allocation purposes. The illustrative MN365 toll is calculated as

a single value of \$18.1116/MMBtu per month which represents a unit toll of \$0.60/MMBtu at a 100 percent load factor.

M&NPP indicated that its objective was to offer transportation tolls and service that encouraged the development of Nova Scotia and New Brunswick gas markets and that were competitive with other pipeline alternatives serving the anchor markets in the U.S. northeast.

Both SOEP and M&NPP have submitted that the U.S. northeast market was a premium market in terms of the expected value of natural gas in that market and of the existing and potential gas demand. The Proponents view the U.S. northeast market as necessary to the economic feasibility of the Sable Gas development. They also acknowledged that Sable gas would have to compete in that market with gas originating from other supply basins in North America.

M&NPP determined that the incremental cost of serving the U.S. northeast market from the Gulf Coast or the mid-continent regions was approximately US\$1.00/MMBtu. This became the market clearing price for transportation service on the M&NPP pipeline including the U.S. segment. The toll that achieved that objective was determined to be approximately \$0.60/MMBtu on the Canadian portion.

M&NPP also devised a policy with the objective of encouraging the development of natural gas markets in the Maritimes, called the Lateral Policy.

Initially, the mainline (Canada and U.S.) was designed to be a 610 millimetre diameter pipeline that would transport 440,000 MMBtu/d. This would yield a toll of approximately \$0.60/MMBtu. Subsequently, in response to requests for service from Maritimes customers, M&NPP determined that a 762 millimetre pipeline would be more cost-effective in meeting initial Canadian market estimates. With an increased diameter and an anticipated contract demand of 530,000 MMBtu/d, the mainline toll without laterals would decline to approximately \$0.52/MMBtu. Therefore, with a threshold of \$0.60/MMBtu, M&NPP established that

it could spend approximately \$1.3 million of capital for every thousand Btus per day of load that is attached to those laterals.

M&NPP offered to apply its Lateral Policy in the following manner. If a proposed lateral and the contracted demand of that lateral generated sufficient revenue (based on a test toll of \$0.60/MMBtu) to cover the annual cost of service, M&NPP would proceed to construct the lateral without any incremental contribution from the shipper. If a proposed lateral did not generate sufficient revenue to cover the cost of service, M&NPP could require a shipper contribution ("aid to construct") to cover the shortfall.

Intervenors who supported M&NPP's Lateral Policy highlighted the positive benefits which would accrue from its implementation, including greater penetration of gas markets and enhanced economic viability for M&NPP. Intervenors opposed to M&NPP's Lateral Policy argued: that it would result in a high degree of cross-subsidization; that it would be economically inefficient; that it would lessen competition for the construction of laterals; and that it would be subject to jurisdictional challenges.

The proposed postage stamp toll design was opposed by some interests in Nova Scotia, particularly those in a position to take gas close to the Goldboro gas plant. These intervenors argued that tolls should reflect the distance gas actually flowed on the pipeline. These same intervenors disagreed with the cost estimates put forward by M&NPP for building laterals in Nova Scotia, asserting they could do it less expensively and should be given the opportunity to do so.

These intervenors submitted that a point-to-point volume-distance based toll design should be approved. With this toll design, the demand charge per unit volume is proportional to the distance of transportation along the mainline pipeline. The volume component is established based on the maximum daily demand volume that the shipper is entitled to ship under its contract. The distance component is established based on the distance over which the mainline transmission service is being provided.

M&NPP argued that calculating tolls based on distance would not be a proper basis for reflecting cost causality. Without the investment necessary to build the entire pipeline system, nobody would receive gas regardless of the distance. M&NPP also defended its cost estimates for laterals as being more reliable than those provided by intervenors. Furthermore, M&NPP described the postage stamp toll methodology and the Lateral Policy as inseparable and argued that distance based tolls would not support the building of laterals necessary for the development of the Maritimes market.

As the proceeding progressed, while parties argued the merits of each of these alternative toll designs according to toll design principles, support appeared to be generally based on the location of the potential shipper. Given the strongly polarized positions of the two camps, the Panel attempted to identify, through questioning, potential toll designs which offered some middle ground. As a consequence, a Joint Position on Tolling and Laterals (Joint Position) was filed on 19 June 1997, negotiated among and supported by M&NPP, SOEP, the Province of New Brunswick and the Province of Nova Scotia. During reply argument, the Province of Nova Scotia withdrew its support for the Joint Position.

Key elements of the Joint Position relating to tolls included: support for the applied-for postage stamp toll design; a ten percent discount for Firm Service tolls to Nova Scotia delivery points for an initial eight years and a four percent discount for an additional two years; a four percent discount for Firm Service tolls to New Brunswick delivery points for an initial three years; and a provision that M&NPP would reflect any revenue deficiency associated with the discounts with an adjustment to its depreciation scheme in establishing its cost of service.

With respect to laterals, key provisions of the Joint Position included: support for M&NPP's applied for Lateral Policy; a commitment by M&NPP to develop work plans for mainline laterals to Halifax and Saint John to facilitate the in-service date of 1 November 1999; laterals for Halifax

and Saint John would be subject to federal jurisdiction; a commitment from M&NPP that future laterals could be the subject of provincial jurisdiction according to the wishes of the province; a commitment that M&NPP would develop work plans for future laterals to Cape Breton and northern New Brunswick; and a commitment from SOEP that 10,000 MMBtu/d would be made available for local distribution proposed for each province in the initial three years.

From the perspective of the Panel, a primary objective of SOEP/M&NPP is to provide access to natural gas for the Maritimes markets. In this context, the Panel is guided by the principle of ensuring the economic viability of SOEP/M&NPP while also providing a solid framework for the development of natural gas markets in the Maritimes.

The Panel is of the view that the approval of an appropriate toll design is linked to several market development factors. First, SOEP/M&NPP is a seed project, which will provide the foundation for future activity. Second, the building of laterals will encourage access and growth of natural gas markets in the Maritimes. Third, while preserving the overall economic viability of the pipeline, it is important to recognize the relative economic position of different groups of shippers.

In situations where a pipeline company transports gas for other parties, it is necessary to establish tolls which assure there is a proper balancing of the interests of the investors who provide the capital resources for the pipeline and the shippers who ultimately bear the costs. That balancing involves an apportionment of the risk, an opportunity to earn a reasonable return on capital invested and assurance that the cost burden reasonably approximates the cost of providing services.

A number of approaches are used in regulated industries to achieve this objective. The traditional cost-of-service approach to establishing tolls, which formed the basis for discussion in this hearing, is essentially a two-step process. In the first step, a determination is made of the aggregate costs the pipeline will incur to deliver

throughput in some forward year, commonly referred to as its annual cost of service or revenue requirement. The second step is to distribute these total costs among different customer classes and categories of service. This step is commonly referred to as toll design.

The resulting tolls must respect the "just and reasonable" principle in that they provide a fair opportunity for the pipeline to recover its costs and to earn a fair return on its investment while there is no undue discrimination in either the charges or the provision of services.

Because of the importance the Panel places on use of Sable gas in the Maritimes, it is inclined to look at the toll design and laterals policy as a "package". The Panel was attracted to M&NPP's postage stamp toll design methodology and Lateral Policy on the basis that it would provide a solid economic foundation for the pipeline in its early years and the greatest potential for the development of the Maritimes market through M&NPP's Lateral Policy. The Panel is also of the view that the proposed postage stamp methodology, in the circumstances of the M&NPP pipeline, is justifiable from strictly toll design principles. It recognizes that without SOEP and M&NPP and without the existence of the U.S. northeast market where a substantial portion of the SOEP production is to be transported, there would be no gas transportation economically possible, even to areas close to the Sable Gas production area. Development of the Sable reserves is only possible if sufficient volumes can be economically transported initially to an existing market.

The postage stamp toll design is also appropriate given that the pipeline will be reversible for reliability of service and will be capable of transporting gas from the U.S. grid into the M&NPP pipeline. Also, gas exchanges and/or displacements will be possible so that Canadian buyers may purchase gas from other North American hubs (including Western Canadian gas) without actual physical transmission taking place. The postage stamp toll means that any shipper at any delivery point on the pipeline will be able to effectuate these transactions without having to pay any

additional toll to the M&NPP Canadian portion of the line.

Even though the Panel is of the view that the postage stamp toll methodology is appropriate in the circumstances of the M&NPP proposal, the Panel notes that New Brunswick and Nova Scotia interests were polarized during the discussion at the hearing on toll methodology and recognizes that the simple postage stamp methodology initially proposed by M&NPP would not be acceptable to much of Nova Scotian interests.

The Panel examined the "Joint Position on Tolling and Laterals" agreement within the context of the NEB "Negotiated Settlement Guidelines". The Panel is concerned by the withdrawal of Nova Scotia's support for the Joint Position during reply argument. The Panel is of the view that the Joint Position is the best available solution which meets the basic objectives of a just and reasonable toll design, which promotes gas market development in the Maritimes and, through discounts, recognizes the Nova Scotia position that distance should be a factor in toll design. Moreover, the Panel believes that the Nova Scotia interests can be accommodated either by the services provided by M&NPP or by the option of by-passing the M&NPP pipeline.

### Recommendation 33

**The Panel recommends to the NEB that the provisions respecting toll design and laterals as contained in the "Joint Position on Tolling and Laterals" as set out in Appendix V of this Report, be approved.**

## ENVIRONMENTAL SETTING

### *Physical Environment*

The pipeline corridor traverses six physiographic regions. The Atlantic Uplands (kilometre 0 to kilometre 28) is characterized by hummocky terrain with little relief. Shallow bedrock has a tendency to impede drainage, creating bogs. Three lowlands areas are encountered over the next 207 kilometres: the Antigonish-Guysborough, the Hants-Colchester and the Cumberland-Pictou lowlands. All are part of the Maritime Plain. These areas are characterized by low undulating hills. The next 269 kilometres traverse the New Brunswick Lowlands which also exhibit similar characteristics. The remaining 55 kilometres pass through the Magaguadivic Highlands, which is a belt of relatively flat terrain lying between hills to the north and south. The terrain is undulating with variable local relief.

The predominant rock types of the uplands areas belong to the hard, metamorphic Meguma Group. Lowland areas in Nova Scotia consist of Carboniferous age sedimentary rock, while the New Brunswick Lowlands are Pennsylvanian age sedimentary rock. Gypsum sinkholes may be found in regions of irregular limestone topography.

The study area is predominantly overlain by glacial till, with particle sizes ranging from clay to boulders. Other surficial sediment types include glacial fluvial deposits as well as organic deposits and fluvial deposits along river valleys.

There are no designated groundwater protection areas in the study area. The distribution of private and public wells is yet to be determined. The water quality is considered adequate for domestic use but some problems with high iron or manganese content exist and saltwater intrusion sometimes occurs near coastal areas.

### *Terrestrial Biological Environment*

The pipeline corridor area falls within the Acadian Forest Region which is characterized by red spruce stands interspersed with balsam fir, yellow birch, sugar maple, red pine, eastern white pine and eastern hemlock. There are 57 species of mammals

native to New Brunswick and 54 to Nova Scotia. These include herbivores such as deer and moose, insectivores such as bats, carnivores such as bobcat and omnivores such as bear and fox. Bird distribution in the two provinces is largely determined by vegetative cover. The Acadian Forest Region is transitional in nature and may support a wide variety of birds at the limit of their geographic range. There are approximately 25 species of amphibians and reptiles inhabiting the two provinces, including various species of salamanders, frogs, turtles and snakes.

Sensitive and critical habitats include potential deer and moose wintering areas and environmentally sensitive/significant areas. Wintering areas have been identified along the preferred corridor and twelve environmentally sensitive areas are found in close proximity to the proposed alignment. Three areas contain significant wildlife habitat. Several areas of old growth forest are also found along the preferred corridor. There are no national or provincial parks or ecological reserves located within the preferred corridor. A red oak, old-growth forest stand at Indian Man Lake, a protected area under the *Nova Scotia Special Places Protection Act*, overlaps the northern border of the corridor.

### ***Aquatic Biological Environment***

The approximate percentages of total land surface covered by fresh water in Nova Scotia and New Brunswick are four and two respectively. Nova Scotia has an annual average precipitation of 1,300 millimetres while New Brunswick has 1,050 millimetres. Most of the watersheds in Nova Scotia tend to be small, and there are two main drainage basins within the east-west running drainage divide. New Brunswick has seven drainage basins and the preferred corridor crosses three of them.

Two hundred and twenty-nine watercourses overlap the preferred corridor. Ten lakes are located within the corridor but none extend completely across.

Atlantic salmon, brook trout and small mouth bass are considered the most important fish species in the study area. Other species expected to be present are brown trout, American shad, American eel, rainbow smelt, pickerel, and yellow perch.

Atlantic salmon resources in Nova Scotia are found in North River St. Mary's, East River St. Mary's, West Branch East River, West River of Pictou, Wallace River, River Phillip, and the Tidnish River, including the West Branch Tidnish River.

Watercourses historically supporting Atlantic salmon along the preferred corridor in New Brunswick include the Cocagne River, Saint John River, Magaguadivic River, Digdeguash River, the Little River, the Scoudouc River and the St. Croix River. Fisheries resource stocking programs have been carried out at various watercourses encountered by the corridor.



There are a total of 375 wetlands overlapping the corridor (146 in Nova Scotia and 229 in New Brunswick). These range in size from less than 0.5 hectares to approximately 60 hectares. Three wetlands in Nova Scotia and ten in New Brunswick provide significant wetland habitat. In addition there are ten Ducks Unlimited wetland management projects in the vicinity of the study area, seven in Nova Scotia and three in New Brunswick.

### ***Public Consultation***

As was the case for SOEP, concerns were expressed regarding the adequacy of the M&NPP public consultation process. M&NPP stated that since late 1995 it has implemented an extensive, thorough and open public consultation program which sought to explain the Project and its potential environmental and socio economic effects. Three rounds of open houses were

held involving more than 60 meetings and general information sessions, with 2,600 registered attendees, a number of newsletters were published and distributed and a toll-free number was set up. All potentially affected landowners in the corridor (more than 4,000) were individually notified by letter, inviting them to attend open houses to find out about the pipeline and its potential impacts.

The public was given an opportunity to comment on alternative general corridors at open houses. Feedback on specific constraints was used in selecting and defining a preferred corridor. The one kilometre preferred corridor was presented at another round of public meetings and subsequent corridor adjustments were, to a large extent, the result of this public input. M&NPP is committed to ongoing input from local landowners and public agencies to avoid potential constraints.

M&NPP stated that its public consultation program has provided the broader community, public and stakeholder groups, key government agencies and other parties with the opportunity to review the Project and to articulate their interests sufficiently early in the environmental impact assessment process. The early access allowed participants to influence the location of the preferred corridor and to provide input to the ongoing environmental and socio-economic studies.

In addition to its general consultation program, M&NPP maintained that it had extensive and productive consultations with landowner and land-based resource organizations, such as forestry and agricultural groups. These consultation activities included:

- contacting all such organizations in Nova Scotia and New Brunswick in November of 1995;
- providing information at these organizations' annual meetings;
- contacting corporate, government and utility landowners through 94 meetings and letters;
- inviting twenty-six landowner-based organizations to participate in Consultation Committees, of which fifteen took part;

- developing, together with the Consultation Committees, a Letter of Commitments to address the vast majority of landowner issues; and

- participating in some seventy meetings and discussions with the Maritimes Landowners Pipeline Association over the last year.

M&NPP believes that its public consultation program has ensured that the issues of greatest importance to those potentially impacted have been fully identified. M&NPP stated that the consultation process itself was not brought into question during the hearing, and that process has proven to be effective in identifying and resolving issues.

M&NPP testified that they intend to be responsible members of Nova Scotia and New Brunswick communities well into the future and will continue to consult all parties interested in or affected by the pipeline. The open communication process proposed by the proponent is intended to provide a full and fair opportunity to all members of the public to be aware of and have ongoing input into the construction, operations and decommissioning phases of the Project.

The Panel reviewed the M&NPP program in the context of the four questions that were asked to determine its adequacy. The Panel concluded that it was generally satisfactory and was designed to ensure extensive awareness of the proposed Project at an early stage in the planning process. One exception to this statement is in regard to dealings with aboriginal communities, which is covered in Chapter 4.

Overall, the Panel feels that the public had ample opportunity to understand the proposed Project and to raise issues.

Evidence exists to support the view that the public did influence the Project routing. No pertinent public issues were raised during the hearing process that were not identified through M&NPP's consultation program. Finally, should the Project be approved, M&NPP has committed to put in place an ongoing consultation and awareness program.

## ENVIRONMENTAL ISSUES

### *Framework for Analysis*

The potential terrestrial environmental effects of M&NPP are primarily associated with pipeline construction activities. The Panel has created a simple framework within which to discuss these matters. Initially, generic Project threats and risks to the environment will be reviewed. The likelihood of these threats and risks actually occurring depends on project planning and implementation, and the sensitivity of the environment to disturbance. Then, specific effects of Project activities on various environmental components will be assessed.

Environmental risks due to Project construction and operations can arise from several sources. Among these are physical construction methods, operational practices, air emissions, and accidents.

The environmental components at risk will vary according to the specific Project siting and to safeguards. Intervenors raised several issues of concern with respect to M&NPP. Main issues were the potential Project effects on watercourses and fish, the exposure of acid generating rock, old growth forest, habitat and cumulative effects.

### PROJECT INTERACTION WITH THE ENVIRONMENT

#### *Watercourse Sedimentation*

The M&NPP pipeline will cross 229 watercourses, ranging in size from intermittent streams to a major river. A number of these watercourses are designated as Atlantic salmon rivers. Atlantic salmon is a key environmental, recreational, heritage and commercial resource in the Maritimes. Thus it is understandable that the impact of watercourse crossings on salmon was a major issue. Specific concerns related to this issue are the destruction of fish and fish habitat, the status of studies on these impacts, and the measures to mitigate any damage.

#### *Acid Drainage*

Acid drainage may occur when rocks containing sulphide minerals are disturbed, and rock fractures are created and exposed

to air and water. Several sites along the corridor have been identified as being potentially underlain by acid producing rock formations. During pipeline construction, a trench will be excavated to a depth of two to three metres. The overburden in the identified areas of acid-producing rocks is typically greater than that depth. Therefore acid drainage will be a concern only in areas with shallow bedrock or bedrock outcrop.

#### *Accidents and Malfunctions*

Pipeline accidents and malfunctions, such as leaks, breaks, fires, or explosions may result in personal injury or fatalities as well as damage to the environment. In an effort to limit the potential for these events occurring, M&NPP will develop monitoring and contingency plans as part of its environmental management plan. The manuals will include an Emergency Procedures Manual, a Liquids Management Plan and a Construction Safety Plan. These manuals will take into consideration matters arising out of current and ongoing discussions with governments, stakeholders and community groups to ensure local needs are met.

## EFFECTS ON VALUED ENVIRONMENTAL COMPONENTS

### *Watercourse Crossings and Fish*

Intervenors appreciated that the crossing of watercourses cannot be avoided in constructing the pipeline. Therefore, they demanded failsafe ways and means to avoid the alteration and displacement of habitat, interference with fish passage, and mortality. Specifically, the release of suspended sediments into watercourses was identified as a primary concern for fish and fish habitat during all phases of watercourse crossing construction, including preparation of approaches, site preparation, trenching, installation and restoration. Studies indicate that effects on fish of sediment releases are related to the quantity of sediment released and the duration of the release. Early life stages are more sensitive to suspended solids than are adult fish, with the primary mode of impact on fish populations is through increased egg mortality, reduced egg hatch, or a reduction in success of larval emergence. The potential

impact to fish and fish habitat also includes effects on fish food organisms, which may be affected by increased levels of suspended sediments either through direct mortality, movement to another area or loss of habitat.

Intervenors suggested several measures to reduce potential impacts. A main recommendation is to restrict construction of water crossings to a mid-June to mid-September window. This window is outside the critical salmon spawning and early life stages. Nonetheless, intervenors remained concerned that M&NPP might not be able to construct all the watercourse crossings within the allotted time. They doubted that the three month schedule will be feasible if prolonged wet weather conditions are encountered. They were not reassured by M&NPP's evidence that the bulk of water crossings will take from a few hours to three days maximum, and that there will be three crews initially installing the crossings and more crews will be added as necessary. Part of their concern appears to be a lack of a specific undertaking by M&NPP that it will only construct within the agreed window.

A second measure is to limit the method of construction. Water crossings can be done using a dry, wet or directional drill method. Dry crossings are those where there is no water in a stream or where it is possible to divert water around a work site so as to isolate the water from the construction activity. A wet crossing involves construction through a flowing watercourse in accordance with a detailed plan. A directional drill involves preparing a staging site and a receiving site, boring a tunnel under the stream bottom, and pulling the pipe through the bored hole. Some intervenors insisted that all salmon rivers be considered for directional drilling. In their view, no other method will ensure that streambeds will remain undamaged. Other intervenors conceded that M&NPP can construct water crossings with minimal negative environmental damage, if it follows the mitigative measures proposed by its consultants and the environmental recommendations discussed during the hearing. Nonetheless, even these intervenors were uncomfortable because site specific crossing studies will not be available until

the detailed route stage.

Another intervenor, while acknowledging that directional drilling is not an appropriate technique for all stream crossings, requested that all rivers in New Brunswick identified as salmon rivers by the New Brunswick Department of Natural Resources and Energy, that are not listed in the Proponent's application as rivers under consideration for directional drilling, be added to this list.

A third measure is the requirement for a 'no net loss of fish habitat' policy. This policy requires the avoidance of problematic crossings and the minimization of adverse effects such as siltation. Where adverse impacts are unavoidable, there must be compensation in the form of creation of equivalent new habitat elsewhere. Any proposed new habitat will be subject to regulatory review and approval.

Lastly, intervenors insisted on effective monitoring and enforcement systems for construction activities and post-construction conditions. As part of this they recommended that site specific crossing studies be available for public review. They also see a need for third party monitoring. Monitoring and enforcement issues are addressed in the last part of this section.

M&NPP maintained that it and its consultants have a detailed understanding of the Project's impacts on streams, Atlantic salmon and other aquatic life. M&NPP stated that it is supported by its parent company, Westcoast Energy Inc., which has extensive experience in constructing and maintaining water courses in an environmentally sound manner. M&NPP has and will continue to rely on this support. It argued that its approach and the specific techniques were spelled out in its Application, in responses to information requests and in cross-examination. It asserted that wet, dry and directional drilled crossings will be carried out in an environmentally acceptable manner.

M&NPP's "General Construction Specifications and Standard Construction Drawings" detail general requirements for all watercourse crossings. Specific measures to mitigate impacts on aquatic habitat

will be quantified during the detailed routing process for the 25 metre easement. M&NPP intends to trench the pipeline across watercourses during the mid-June to mid-September window. If M&NPP is unable to construct across a watercourse within the window, it would consult with federal and provincial regulatory agencies and determine if any additional measures are required. M&NPP committed to the 'no net loss of fish habitat' policy which would ensure that no fisheries habitat will be lost at any crossing as a result of the Project. M&NPP undertook to utilize the DFO "Guide on Stream Crossings" in collecting information and in determining mitigation.

In selecting the appropriate crossing technique for each site, M&NPP will consider a number of environmental, engineering and land use factors as well as costs. M&NPP anticipated that there would be a requirement to cross 36 or 37 watercourses utilizing the wet or directional drill method. The remainder will be dry crossings. M&NPP will conduct a substrate monitoring program within the potential zone of impact 400-500 metres downstream of each completed wet watercourse crossing in order to determine the need for any habitat enhancement procedures. This program will be done in consultation with regulatory agencies.

With respect to the proposal that all salmon rivers be directionally drilled, M&NPP indicated that such a proposal fails to consider the potential drawbacks associated with directional drilling. These drawbacks may include a longer time at the watercourse, noise from the drill rig, difficulties managing drill fluids, and the potential for failure. In turn, failure can result in an increased sediment loading or the need for a wet crossing in any event, but at a less opportune time of the year.

The Panel recognizes the importance of protecting the Atlantic salmon resource, as well as other fish stock. It believes that water crossings must be done in compliance with the 'no net loss of fish habitat' policy. All parties have agreed that this policy must prevail. The Panel acknowledges M&NPP's commitment to address fisheries concerns and to consult with

federal and provincial regulatory agencies on fisheries issues. In general the Panel finds that M&NPP has provided adequate information with regard to the potential adverse environmental effects associated with watercourse crossings and the procedures to be taken to avoid or mitigate these. The Panel acknowledges the need for a thorough investigation of the most appropriate method of stream crossing. However the Panel recognizes that site specific studies remain to be prepared for the detailed route stage. If interested parties and regulators are to have sufficient time to review and comment on the studies, the studies will have to be prepared well in advance of construction.

The Panel notes that M&NPP estimated that only 36 or 37 of the 229 proposed water crossings need to be crossed utilizing the wet or directional drill methods. These crossings are likely to involve critical salmon rivers. The Panel is concerned that M&NPP has not given a specific commitment to carry out this activity within the established window, and in particular to conclude work before the September 15 date. The Panel appreciates that some slippage could occur and that, under certain circumstances and with regulatory approval, a date beyond September 15 may not create problems. However, slippage is not acceptable if it is due to inadequate scheduling and the lack of a workable contingency plan, and results in a significant adverse impact.

### **Water Quality**

Acid drainage will be a particular concern at stream crossings because bedrock outcrops are more likely to occur there and excavation will be deeper than normal. M&NPP has stated that there is potential for acid generating rock along 31 of the corridor's 558 kilometres. The likelihood is that acid generating rock will be encountered in only a small portion of the 31 kilometres. M&NPP committed to conduct geotechnical studies of these potential areas to determine the actual presence, depth and acid producing characteristics of the formation and to avoid those areas wherever possible. M&NPP has also committed to follow provincial guidelines governing disposal and treatment of acid rock. The Panel accepts M&NPP's commitment

## **Recommendation 34**

**The Panel recommends that construction plans be prepared for each watercourse crossing site in consultation with the appropriate regulatory agencies. These studies should include a consideration of all salmon rivers which will be crossed by the pipeline. The construction plans may refer to standard drawings or specifications as appropriate, but would as a minimum include consideration of erosion and sedimentation control, blasting requirements, habitat restoration and site restoration as required. The plans must be completed at least 60 days prior to construction and be provided to interested parties for comment, as well as being submitted for regulatory review.**

to undertake studies to identify the extent of acid generating bedrock and to avoid those areas wherever possible and to follow provincial guidelines governing the disposal and treatment of acid generating rock. However, it wishes to ensure that the regulatory authorities are in a position to follow up on these matters.

### **Old Growth Forest**

Old growth forests have been defined by the Nova Scotia Department of Natural Resources as forests greater than 150 years old, with the following characteristics: containing very large scattered trees, large amounts of coarse woody debris, a diverse understory and a distinct plant and animal assemblage. Old growth forest represents a small percentage of total forest cover and was considered by M&NPP as a Class 1 constraint during their corridor selection process.

Pipeline construction adjacent to or through an old growth forest could result in direct adverse effects such as increased wind, changes in temperature and exposure to sunlight. Indirect adverse effects include increased opportunities for competition or parasitism. The integrity of old growth forests can also be affected by fragmentation resulting from new the right-of-way or access roads.

## **Recommendation 35**

**The Panel recommends a condition requiring M&NPP at least 60 days prior to construction to prepare a report on the scheduling of water crossings in cooperation with appropriate regulatory authorities. The report must discuss back-up measures to resolve potential problems. The report must be available to all interested parties who request a copy.**

Furthermore, the Panel recommend that, at least 30 working days prior to the commencement of construction of the pipeline, M&NPP submit to the appropriate regulatory authorities for approval, additional information regarding the stream crossings. The additional information shall set out:

- (a) the construction designs of the crossing;
- (b) proposed duration of the crossing;
- (c) in-stream timing restrictions identified by regulatory agencies;
- (d) an erosion and sediment control plan;
- (e) the site-specific mitigative and restorative measures to be employed as a result of consultations with regulatory agencies;
- (f) if a directional drilling method is used, the detailed drilling fluid plan addressing the methods of drilling fluid containment and storage, and specific methods for disposing of and/or recycling of the drilling fluids;
- (g) if blasting is required, the blasting plan, including comments from DFO;

### Recommendation 36

(h) the evidence to demonstrate that all issues raised by regulatory agencies have been adequately addressed, including all necessary updates to the environmental assessments where deficiencies have been identified;

(i) the evidence to demonstrate that the proposed construction method and site specific mitigative and restorative measures are in compliance with federal and provincial legislation; and

(j) the status of approvals, including environmental conditions.

The Panel recommends that at least 30 days prior to the commencement of construction, M&NPP file with the NEB the results of the acid generating rock studies, including any locations which would be affected by construction, the proposed mitigation measures, monitoring requirements and the results of consultation with provincial authorities. The Panel recommends the following conditions for any approval of M&NPP that may be granted.

M&NPP shall, at least 30 working days prior to the commencement of construction of the pipeline, submit to the NEB for approval, additional information regarding the treatment method to deal with acid drainage and specific mitigative measures to be implemented at stream crossings. The additional information shall set out for each stream crossing to be affected:

(a) the name and location of the stream;

(b) the selected treatment method of the runoff water;

(c) the proposed “Canadian Water Quality Guideline” values to be adhered to;

(d) the site-specific mitigative and restorative measures to be employed as a result of consultation with regulatory agencies;

(e) the evidence to demonstrate that all issues raised by regulatory agencies and other interested parties have been adequately addressed, including all necessary updates to the environmental assessments where deficiencies have been identified; and

(f) the status of approvals, including environmental conditions.

M&NPP identified a limited amount of old growth forest within the corridor. It stated that old growth forest will be avoided to the extent possible during the selection of the 25 metre easement. Where it is not possible to avoid old growth forests, or when work must be done in close proximity, M&NPP will consult and work in concert with the relevant regulatory agencies to ensure that all relevant information and guidelines are considered during construction as well as in the development of the restoration plan for these areas. M&NPP indicated that it will be utilizing the most recent database to select the 25 metre easement, including the results of its 1997 Field Study Program which will include an old growth forest survey.

The Panel acknowledges M&NPP's commitment to further delineate old growth forests within the corridor and to avoid those areas to the greatest extent possible. The Panel views as necessary M&NPP's commitment to continue consultation with appropriate provincial resource managers and regulatory agencies to ensure that the environmental protection plan incorporates the most up-to-date techniques relevant to old growth forest protection.

#### *Habitat*

The habitat along most of the preferred corridor can be characterized as alternating softwood and hardwood stands interspersed with areas of silviculture and agriculture. The potential impacts on wildlife which may result from the construction and operation of the proposed facilities, include habitat loss and fragmentation, sensory disturbance and interference with daily or seasonal movements.

M&NPP stated that its ecosystem-based approach to environmental assessment is consistent with the approach recommended by the Nova Scotia Department of Natural Resources and the New Brunswick Department of Natural Resources and Energy, and recommended by the Canadian Environmental Assessment Agency in its “Responsible Authorities Guide”. M&NPP also stated that the approach will ensure that critical habitats are protected, which will therefore protect wildlife and rare plant populations.

M&NPP indicated that one of their fundamental routing principles was to maximize the use of and proximity to existing access roads. By choosing to route the pipeline through areas that have been previously disturbed, it was M&NPP's opinion that the potential for fragmentation of large expanses of wildlife habitat would be minimized. This approach would also serve to minimize the amount of clearing required for the right-of-way and associated access roads.

M&NPP considered the needs of mammals, birds, herpetiles, invertebrates and plant species of special status and identified areas where they might be found. These are shown on the Constraints Maps which were filed in support of the Application. M&NPP has scheduled additional follow-up studies to ensure that the 25 metre easement avoids the critical habitats for these species as much as possible, and that the proposed mitigation strategies are appropriate.

Wetlands were identified as a Class 1 constraint, which reflects their importance as productive biological habitats and the fact that they are becoming increasingly threatened. M&NPP stated that it intends to avoid wetlands where possible and to ensure no net loss of wetland function. M&NPP will conduct a wetland survey using the "Wetland Evaluation Guide" prepared by the Canadian Wildlife Service. This will ensure that wetland functions are clearly defined, and that if any wetlands are affected, then rehabilitation will take place to the level existing prior to construction.

The Project may possibly affect five environmentally significant areas (ESAs) that are located within or on the edge of the preferred corridor. It is also possible that the Project could significantly effect the red oak, old growth forest stand at Indian Man Lake, which is protected under the *Nova Scotia Special Places Protection Act*. There is also an area along Little River, west of Minto, New Brunswick, which is currently being considered by the New Brunswick Department of Natural Resources and Environment for protection under the *Crown Lands and Forests Act*. The Little River area is also notable since

it contains two rare plant species, is part of a deer wintering area and is located in an area with acid generating rock potential. Intervenor recommended that this area be avoided. M&NPP stated that its preliminary 25 metre easement will avoid this area, in recognition of ESAs as a Class 1 constraint which must be avoided if at all possible. Existing corridors will be utilized whenever possible, to minimize the impact on protected or candidate protected areas.

The Panel acknowledges M&NPP's commitment to further identify and avoid sensitive or significant habitats and protected places to the greatest extent possible, during the detailed-route selection process, and to consult with appropriate resource agencies on an ongoing basis. It does, however, see a need for generic conditions, given that detailed site specific studies have not yet been completed and that new or different environmental issues may emerge.

## INSPECTION AND MONITORING

As indicated previously, intervenors are concerned with the extent of Project monitoring and enforcement. In this regard, M&NPP will complete an Environmental Protection Plan (EPP). The EPP will discuss specific environmental mitigation measures and engineering practices to be employed during construction. It will also detail various monitoring programs to be initiated. Input into the EPP will be sought from government agencies, stakeholder groups, interested parties and landowners.

M&NPP stated that environmental compliance monitoring during construction will be supervised by qualified and appropriately trained environmental inspectors appointed by and responsible to M&NPP. The environmental inspectors will be on-site during construction to ensure that environmental protection commitments made to landowners, regulatory agencies and other groups are implemented and that applicable regulations and standard M&NPP specifications are adhered to. Environmental inspectors will advise construction personnel on environmental matters, conduct soil, water and biological

## Recommendation 37

**To confirm that specific issues have been adequately addressed, the Panel recommends that, at least six months prior to the commencement of any construction activity requiring regulatory approval, M&NPP submit to the NEB for approval the final Environmental Protection Plan. Details of the proposed specific route for the pipeline should also be filed at that time, and shall include:**

**(a) the results of all pre-construction surveys to identify special status species/habitat along the proposed corridor, including specific measures to be implemented;**

**(b) an environmental issues list identifying all relevant effects of the selected route; and**

**(c) the associated mitigation measures to render those environmental effects insignificant.**

**To ensure that post-construction environmental issues have not arisen, the Panel also recommends that the Proponents file with the NEB a post-construction environmental report within six months of the in-service date for the Project. The post-construction environmental report shall set out the environmental issues that have arisen and shall:**

**(a) indicate the issues resolved as well as unresolved; and**

**(b) describe the measures M&NPP proposes to take in respect of the unresolved issues.**

sampling and oversee all environmental matters pertaining to construction. Environmental inspectors will also bring to the attention of M&NPP any activity which may cause adverse environmental effects and any activities which do not meet environment protection commitments. Inspectors will prepare a daily written report documenting the implementation status of environmental commitments. Information recorded in the daily reports will be incorporated into the post-construction monitoring reports filed with regulatory authorities.

M&NPP stated that the objective of its EEMProgram is to assess the accuracy of any predictions made in its Environmental Report concerning environmental impacts. Photographic and written records will be made of conditions on and adjacent to the pipeline easement at various times during and after construction. A visual examination of the environmental features along the pipeline route will help identify potential problem areas. Aerial observations and ground surveys will be used, and where necessary, air, land, and water sampling programs will be developed to monitor site conditions. If problems are noted, site-specific rehabilitation programs will be established. These programs will be based on information obtained from baseline sampling programs and any controlled on-site experiments.

It was suggested that M&NPP adopt the recently introduced ISO 14000 (1996) Environmental Management Program. It was also suggested that third party or independent inspectors be used to verify environmental compliance. M&NPP stated that the environmental programs that they currently have in place, exceed the requirements of the ISO 14000 Standard and that its programs are tailored to the specific activities of M&NPP.

M&NPP also stated that third party verification under ISO 14000 requires the examination of a project management system to assess how it complies with five very basic principles. The management plans of M&NPP currently exceed this test. There is no audit requirement under ISO 14000 to determine whether the plans are appropriate for the tasks being undertaken or

that the information that is being generated reflects the true concerns that need to be addressed. The standard deals with procedures only. M&NPP maintains that equivalent procedures are in place and working well. M&NPP sees any imposition of ISO 14000 as retrograde. It will simply add cost with no benefit to the environment, the public interest or to M&NPP.

The Panel accepts M&NPP's position that its environmental program is consistent with or exceeds the ISO 14000 standard and finds that it is not necessary to specifically impose the implementation of that standard.

The Panel acknowledges M&NPP's commitments to environmental inspection and monitoring and that each of these programs will be detailed in the M&NPP EPP. However, the Panel has two recommendations on consultation and monitoring.

M&NPP indicated that where failure of erosion and sediment control measures occur, an environmental inspector will take immediate steps to correct the failure and reestablish control. The inspector will then monitor the area adjacent to the failure, and ensure that any damage is rectified as soon as conditions permit.

M&NPP stated that if a spill of hazardous materials occurs, the environmental inspector and contractor will be guided by the "Spills Management Specification No. 38" contained in the "General Construction Specifications", which requires notification of the appropriate provincial authority. Where appropriate, M&NPP will initiate a soil and water monitoring program in the area of the spill. Specific sampling protocols will be determined on an individual event basis by an environmental inspector in consultation with M&NPP's Environmental Affairs Department and applicable regulatory agencies.

### Recommendation 38

**The Panel recommends that M&NPP develop the Environmental Protection Plan in consultation with government agencies, stakeholder groups, interested parties and landowners.**

**The Panel also recommends that the NEB set a condition requiring M&NPP to implement an environmental compliance and monitoring program which would include the filing of post construction environmental reports to address Project-related environmental issues.**

M&NPP also stated that an environmental inspector will monitor work site activities and conditions on a daily basis to identify problem areas that might become a fire hazard. Where areas of concern are identified, the inspector will immediately provide verbal notification to the M&NPP which will in turn notify the contractor that corrective action is required. The inspector will also monitor the placement and adequacy of fire suppression equipment.

M&NPP will establish ongoing environmental training programs once the pipelines facilities are in service. Operating personnel will be briefed on standard operating procedures for environmental protection. There will be employee training on environmental awareness, spill handling and reporting clean-up procedures, waste management, easement maintenance activities and hazardous material handling.

M&NPP advised that the greatest potential risk to the pipeline is by third party encroachment. M&NPP identified a number of measures which should reduce the potential for accidents due to such encroachments. These measures include: structural considerations such as increased depth of pipeline burial in areas where heavy equipment and vehicles may cross the easement; easement warning markers at road, railway and water course crossings; a call-before-you-dig program; and periodic aerial and routine foot patrols of the easement.

M&NPP noted a greater potential for pipeline damage to occur in areas where there is a significant depression caused by subsidence. M&NPP has identified an area along the preferred corridor which contains evaporites and has the potential to develop sinkholes. Further geotechnical testing will be conducted to assess that potential.

M&NPP referred to its "Safety and Reliability Technical Report" dated January 1997 to demonstrate that the proposed facilities are a safe way of transmitting gas from Goldboro to St. Stephen, and that any risks are well within limits generally considered to be acceptable.

M&NPP has begun to develop a comprehensive initiative as a part of its Emergency Response Plan. A 1-800 number will be available 24 hours a day for the public and the Emergency Call Centre will have bilingual capability.

The Panel finds as adequate the commitment by M&NPP to design, construct and operate the proposed facilities to meet CSA standards, to use modern materials and techniques, and to ensure employee awareness. It finds that these measures will provide the best mitigation for prevention of accidents and malfunctions. The Panel acknowledges that M&NPP is committed to development specific manuals to detail construction, operation and emergency response procedures. The Panel is of the view that it is unlikely that any significant adverse environmental effects will emerge as a result of malfunctions and accidents associated with the Project, if proper mitigative measures are in effect.

### Recommendation 39

**The Panel recommends that the operations, emergency response and environmental protection manuals be developed in consultation with relevant agencies, stakeholders and the public and be filed with the NEB as a condition of any approval.**

### DECOMMISSIONING AND ABANDONMENT OF FACILITIES

M&NPP indicated that its facilities have been designed and will be constructed, operated and maintained to provide safe and efficient service for 25 years or more. Eventually the facilities will need to be decommissioned or abandoned. M&NPP stated the decommissioning and abandonment of facilities will be carried out in a safe and efficient manner through the use of appropriate technology. It will ensure that all regulatory requirements and codes will be met. Decommissioning and abandonment plans will be developed after consulting with regulatory authorities and will include a consideration of environmental and socio-economic issues.

M&NPP stated that to protect the public and the environment, aboveground facilities such as valves and metering devices will be removed during abandonment. Sites will meet regulatory standards and will be left clean and safe. Ground water and/or soils testing could be undertaken to ensure that the site is free of contamination. If contamination is discovered, the site will be restored in accordance with applicable standards.

Removing below-ground pipe will result in environmental effects similar to those resulting from the construction process. To minimize impacts they indicated that pipeline will generally be left in the ground and disconnected from any operating facilities. After filling the pipe with an inert medium, such as nitrogen, it will be sealed and cathodically protected to keep the pipe from corroding. Following abandonment, lands affected by the pipeline can be used as they were originally intended.

However, the use of heavy equipment will continue to be limited in order to maintain pipeline integrity.

The Panel agrees with M&NPP's commitment to develop a decommissioning and abandonment plan in accordance with current standards, codes and regulations, and in consultation with regulatory authorities. The Panel finds that M&NPP's proposal for decommissioning and abandoning the facilities will ensure that no significant adverse environmental effects result from the decommissioning and abandonment of the proposed facilities.

#### *Cumulative Effects*

M&NPP explained that its approach to cumulative effects assessment for its Project involved scoping, assessment and consideration of a monitoring program. Scoping was used to identify VECs which were then considered in the assessment of impacts and in the selection of temporal and spatial boundaries.

M&NPP identified as VECs of concern: air quality, groundwater, raptors, deer, species of special status, sensitive/critical wildlife habitat, mature coniferous forest, environmentally significant areas, aquatic habitat and fish, wetland/wildlife habitat, ongoing management initiatives, archaeological resources, land use, local and provincial economies, agricultural land, renewable resources, and non renewable resources. The objective of M&NPP's analysis was to determine the status of the VECs, how previous or present projects may have affected the VECs, and the nature of the effects from proposed and future projects.

The status of the VECs was described in the "Environmental and Socio-Economic Impact Assessment Study Report" (Study Report) which also included a consideration of linkages or pathways between Project activities and the environment. M&NPP stated that the assessment of cumulative effects is based on experience and current knowledge of similar projects which have been carried out in New Brunswick, Nova Scotia and elsewhere. The cumulative effects assessment considered the one kilometre corridor in the context of a 25 metre easement which will be selected to minimize environmental effects.

The potential impacts on VECs were documented in the Study Report. After considering the relationship between Project-related effects and those from other activities, M&NPP determined that the areas of concern related to cumulative effects are air quality, wildlife habitat alteration, interference with wildlife movement and fisheries.

M&NPP also noted that air quality is regularly monitored in various locations by the provincial governments. It states that within the preferred corridor there is no concern with the ground level concentrations for the air quality parameters measured

Particulates from equipment exhaust represent a Project-related emission. M&NPP stated that smoke and exhaust emissions will be of low magnitude, localized and short-term. On a local scale, dust from easement preparation, ditching, backfilling and clean-up operations may affect air quality during construction, although the use of dust suppressants will minimize the impact. Other fugitive emissions generated during construction may include smoke from slash burning. However, M&NPP intends to chip and grind slash.

During operations, fugitive emissions could be associated with pipeline blow-down and venting of pneumatic devices. These emissions will occur in small quantities and will be rapidly dispersed to non-detectable levels. It is M&NPP's position that significant adverse effects are unlikely to occur.

M&NPP stated that the majority of present habitat disturbance is due to forestry operations, while mining and roadway development also contribute to localized habitat loss. Habitat alteration will be restricted to the non-cultivated areas encountered by the pipeline easement. M&NPP indicated that the majority of Project-related effects on wildlife will be additive to those from other land uses. The easement in non-cultivated areas will be reclaimed to a stable grass/legume mix and will be allowed to recolonize to native vegetation, excluding deep-rooted trees. Its position is that the majority of the Project's physical effects should be assimilated within three years.

Exceptions will include the permanent above-ground facilities such as valve sites.

M&NPP considered how clearing of the easement could interfere with wildlife movement. Its position is that within two to three years of cutting, vegetative growth will reestablish sufficiently to provide suitable cover for wildlife even in areas adjacent to forestry harvesting and that the 25 metre easement should not be a significant barrier to wildlife movement.

M&NPP noted that current land use practices could be contributing to low water flow rates and high levels of contaminants which in turn can be affecting the productive capacity of some of the streams in the project area. Pipeline construction and operation impacts will be short-term in nature. Potential effects will be largely related to sediment introductions into streams from instream activities or poor initial reclamation of the easement on approach slopes or stream banks. M&NPP stated that water quality effects from pipeline development primarily represent short-term additive effects to those aquatic impacts associated with forestry, agriculture and mining operations and residential wastewater. M&NPP testified that adverse habitat modifications at water course crossings will be corrected during clean-up by utilizing specified restoration techniques to comply with the 'no net loss of fish habitat' policy. M&NPP takes the position that the pipeline-related impacts on fisheries, including the effects of any blasting, would be assimilated by the aquatic system within one or two years and will not represent long term additive effects to the VECs.

M&NPP identified and considered a number of projects with strong likelihood of proceeding in the study area. The projects identified include the SOEP NGL pipeline, lateral pipelines related to M&NPP and the proposed Trans-Canada Highway in New Brunswick. M&NPP examined concerns resulting from the proposed NGL pipeline which will parallel its pipeline for an estimated seven kilometres. The concerns include: air quality, ground water quality, stream crossings, loss of habitat and socio-economic effects. M&NPP stated that identification and implementation of Project specific mitigative measures

described in each of the EIAs will make it very unlikely that significant adverse cumulative effects will occur.

M&NPP considered the impact of future laterals which bridge the main transmission line and markets in the region. The laterals will have a smaller diameter than the mainline, but will give rise to similar environmental concerns. All proposed laterals will undergo environmental assessment similar to that undertaken for the Project. M&NPP states that it is not likely that significant adverse cumulative impacts will occur, given the assessment process, spacing of the lines, assimilation of environmental effects within a three year time frame, and the implementation of the appropriate mitigative measures.

The section of the proposed Trans-Canada Highway between Longs Creek and Salisbury, New Brunswick could parallel the proposed pipeline, particularly with respect to the crossing of the Saint John River. The proposed Trans-Canada Highway was the subject of an environmental impact assessment under the New Brunswick EIA regulations. During the Hearing, M&NPP committed to apply mitigation such that the potential for significant impacts would be low. Having considered the planned level of mitigation for the construction of the Trans-Canada Highway section, including the Saint John River crossing, and the mitigation measures recommended for M&NPP, it is M&NPP's position that it is unlikely that significant adverse cumulative effects will occur.

M&NPP will design and implement a monitoring program to verify the accuracy of the environmental assessment predictions for cumulative effects. It will also determine the effectiveness of mitigation measures designed to reduce and/or eliminate those effects.

Environment Canada recommended that M&NPP conduct an assessment of the cumulative effects of crossing 229 streams. M&NPP's response was that there must be an overlap between two effects before there can be a cumulative effect and that there is no evidence that any of the effects of individual stream crossings will interact.

The Panel feels that M&NPP has provided adequate information in regard to the overall cumulative environmental effects likely to result from the Project in combination with other projects or activities that have been or will be carried out. The Panel believes that there is a potential for a cumulative effect of the 229 stream crossings on the population of Atlantic salmon, particularly when added to other adverse effects. M&NPP has identified mitigation measures in regard to the likely cumulative effects. The Panel notes that M&NPP's approach is one in which cumulative effects will be integrated with environmental effects.

The Panel finds that there are a variety of regulations, policies, guidelines and objectives which are utilized to provide a measure of control to development. The Panel also appreciates that there has been considerable discussion, cooperation and consultation among federal and provincial resource management and regulatory agencies, stakeholders, and the public, in the planning of M&NPP. That interaction has facilitated the consideration of potential cumulative environmental effects between the Project and other past, present, and likely future development.

Based on the information provided, existing resource management provisions and with the implementation of the proposed mitigation measures and the Panel's earlier recommendations, the Panel is of the view that the Project is not likely to result in significant adverse cumulative environmental effects.

## LAND MATTERS

### *Land Acquisition*

M&NPP indicated that the construction of the pipeline will require negotiation and acquisition of land rights, including easements, temporary work room, fee simple lands and access rights for the approximately 558 kilometres of pipeline and ancillary facilities. M&NPP is proposing a 25 metre wide permanent easement which will be located within the preferred corridor. At the close of the Hearing, M&NPP was still in the process of delineating the 25 metre easement and obtaining options for those areas.

During the Hearing, M&NPP filed a sample of its *section 87 Notice* required by the *NEB Act*. The purpose of the Notice is to ensure that potentially affected landowners and tenants are informed of proposed pipeline activity in advance of an offer to acquire land rights, and that they are in possession of information necessary to properly exercise their rights. The Notice must provide several kinds of information: identification and description of the lands required; details of the basis for and the amount of compensation; description of detailed route approval procedures; and procedures for compensation negotiation and arbitration should no agreements be reached.

Further to the filing of the *Section 87 Notice*, M&NPP provided samples of an option agreement and an easement agreement for Nova Scotia and New Brunswick. As well, it filed a copy of its *section 34(1)(a) and (b) Notices*. Those Notices require approval of the NEB and are served and published to initiate the detailed route stage (second stage) if a certificate is granted, and if a detailed route hearing appears necessary.

Several property owners raised the concern that the presence of a pipeline might devalue property or raise insurance rates. In response to a Panel information request on these matters, M&NPP stated that evidence from elsewhere in Canada suggested that property value or insurance liability would not generally be adversely affected. It noted that any site-specific situations which affected property value will be addressed in the negotiations for the easement and/or damages. Should there be no agreement on fair compensation then an affected party could apply for negotiation and/or arbitration to the federal Minister of Natural Resources Canada.

Based on the above, the Panel is assured that the legal requirements will be met and that affected parties will be fully informed of their rights prior to signing either an option or easement agreement. It notes that M&NPP has accepted legal liability for damages caused by the construction, operation and maintenance of its pipeline and that it is required to indemnify affected parties for all damages caused by pipeline operations.

### *Pipeline Route Selection*

M&NPP applied an accepted, standard process in route determination and selection. The process involved delineating the study area, determining alternative corridors as well as alternative general routes within the preferred corridors, and selecting a preferred corridor. The study area was defined by delineating a band of land from the probable offshore pipeline landfall area to the U. S. link area. This band represented the shortest possible distance for the proposed pipeline. Within this band several general corridors were chosen based on analyses of constraints identified from 1:250,000 scale maps. These general corridors were selected to avoid areas where mitigation was not possible, or where there were sensitive environmental areas or construction limitations.

The general corridors were presented and discussed at a series of public open houses. Feedback was received on the specific constraints that should be used in defining a preferred corridor. The constraints checklist included productive agriculture and tree nursery lands, aquatic resources, wetlands, sensitive wildlife areas, tourist and recreation areas, archaeological and heritage sites, and major industrial and institutional infrastructure. Constraints also included those features that pose construction difficulties, such as bedrock and acid generating rock, steep slopes, unstable terrain and wide water bodies.

Based on these considerations, a preliminary preferred corridor was chosen. This one kilometre wide pipeline corridor was subjected to further refinement by a separate project group who examined alternatives to the preliminary proposed route and recommended certain adjustments. The recommended adjustments were further assessed and changes to the route made as appropriate. The results were presented at public open houses and to various government agencies. Several minor adjustments were proposed by interested parties and subject to further analysis including aerial surveillance. Six adjustments were made to the preliminary preferred route on the basis of this exercise. This resulted in the preferred corridor applied for in M&NPP's Application.

Subsequently, M&NPP has submitted supplemental information for adjustments to this corridor. These revisions have arisen out of ongoing consultations and a process of route refinements aimed at reducing environmental and construction concerns. Five adjustments to corridor boundaries have been proposed and consultation with potentially affected landowners is being undertaken.

During the Hearing, intervenors' main routing concerns dealt with the extent to which the preferred route made use of existing linear corridors to reduce the impact on new lands, and the appropriateness of the northern versus southern alternatives for the Moncton to St. Stephen route. The use of shared corridors is discussed in the next section on land use conflicts. The appropriateness of the northern versus southern corridor from the Moncton area to St. Stephen is covered in this section.

M&NPP was closely questioned on the reasons for selecting the northern route, given that the southern route is shorter and closer to the major natural gas market in the Saint John region. M&NPP maintained that the northern route was optimal in several regards. It was optimal from a market perspective as it could potentially serve a broader geographic area, once laterals were taken into consideration. From an environmental standpoint the northern route was preferred because it limited the use of agricultural land and avoided problems with soil structure and tile drainage areas that would be faced along other routes. As well, there were fewer and less difficult river crossings. It also possessed flatter topography and the least bedrock, thus reducing overall construction costs and the risk of construction delays. Finally, the northern route went primarily through Crown lands and fewer easements need to be negotiated.

The Panel is of the view that M&NPP carried out a thorough and participatory corridor selection process to arrive at the preferred route. The Panel notes that objections to the preferred route were tested at the hearing, in so far as the objections were based on relevant routing constraints. The Panel accepts M&NPP's rationale for its choice of the northern route over

the southern route.

The Panel appreciates that there may well be unique, local considerations in addition to the constraints that have been used to define an acceptable one kilometre corridor. Should the Project be approved, affected parties with concerns about the location of the 25 metre detailed route within the corridor would have the opportunity to request a detailed route hearing for particular sections of the proposed right-of-way.

#### *Land Use Conflicts*

Intervenors raised potential land use conflict issues from several perspectives. Three main issues are dealt with here. One issue is the potential for the pipeline route to fragment habitat and create edge effects, thus adversely affecting environmentally sensitive special areas and wilderness areas. A second land use issue is the potential for adverse impacts on forestry operations. The third is the issue of whether or not the construction of a new right-of-way will significantly enhance access to wilderness and special areas that are in need of protection.

#### *Special Environmental Areas*

A potential was identified for various kinds of environmental damage arising from the siting of the proposed route, such as the fragmentation of natural lands, expanded edge effects and increased access to wild lands. Intervenors testified that in places, the pipeline could cut through unique or old growth forests and cross critical wetlands. They proposed that the pipeline route be selected not only to avoid or minimize damage to already designated special environmental or protected areas, but as well to prevent the reduction of options for adding protected areas in the future.

Underlying these concerns was the belief that M&NPP had not sufficiently utilized existing right-of ways in determining a preferred route. Intervenors maintained that if the pipeline followed existing utility, rail, and highway routes, as they proposed, adverse impacts would be better avoided or minimized.

M&NPP stated that it had specifically adopted the use of existing corridors as a

major planning principle. The primary corridor selection criteria was to follow forestry access roads. Other utility corridors were not necessarily appropriate choices because of settlements bordering them (roadways), the paralleling of rivers (railways) or the crossing of rugged terrain (electrical lines). Moreover, M&NPP stated that through ground-truthing of its proposed routes and consultation with the public and regulatory authorities, impacts on sensitive environmental areas had been avoided or minimized. It maintained that there is an inadequate basis on the record for rejecting its preferred route, and that the proposed intervenors' potential alternatives are either flawed or unproven.

The Panel is of the opinion that the planning process for the applied-for corridor took into account the concerns raised by the public. At the outset, the corridor planning process considered a wide range of factors, and prominent among these were environmental considerations. Consultations were held with provincial resource agencies in regard to constraint mapping of sensitive areas, and the views of officials on areas to avoid were taken into account. Similarly intervenors representing environmental interests were supportive of the constraint mapping approach that M&NPP had taken. The public had opportunities at several stages to comment on the various possible routes, and the preferred route was generally seen as the best from a public perspective. There were specific sites where environmental sensitivities remained at issue following public review, and M&NPP responded to these concerns by further modifications to the proposed route.

#### **Recommendation 40**

**The Panel recommends that the appropriate regulatory authorities ensure that M&NPP take all reasonable steps to avoid fragmenting natural and forested areas. The Panel recommends that the fragmentation of natural and forested areas be included in the M&NPP Issues List. This will require consideration and follow-up on steps to be taken at the detailed route design and construction stages.**

The Panel believes that M&NPP's planning approach and its commitment to use existing access roads, apply provincial forestry management guidelines and undertake further studies at the detailed route stage will serve to avoid or mitigate significant adverse impacts on unique or old growth forests and wetlands. The Panel sees this approach and the associated commitments as appropriate. The Panel does not share the view that the proposed route would significantly enhance access in the majority of areas along the proposed pipeline, because of the already existing, extensive network of forestry roads.

The call for a condition restricting the proposed pipeline from areas that might be designated as special places in the future is not logical. In order to contemplate such a condition, evidence would be required that there is an ongoing planning process that would within a reasonable time period result in such designations. There is no evidence of this beyond a reported policy agreement by governments to complete ecologically representative protected area systems. The stated commitment is general in nature and provides no specific time frame. Accordingly, the Panel can make no recommendation in this matter.

### **Access**

There is a common view that the pipeline will increase access to land along the right-of-way. The points in discussion are how to limit and monitor this access, and who should be responsible for decision-making and enforcement. Environmental intervenors feel that the responsibility falls to the Proponents to place controls and warning/information signage along the right-of-way, ban certain types of access outright (such as the use of motorized recreational vehicles), monitor access to the right-of-way and have a policy to prosecute those causing damage. However, intervenors also suggested that the Proponents make available the public portion of the easement for use as a hiking trail whenever possible. They also recommended a study of all potential access impacts on the right-of-way, based on an assumption of unrestricted access, and a condition requiring the proponent to take responsibility for access-related impacts.

Some landowners saw access control as primarily a matter for agreement between themselves and M&NPP. The kinds of controls used, if any, and other restrictions will be negotiated. M&NPP agreed with this view and stated that these matters will be discussed with individual landowners at the easement negotiation stage. M&NPP's Letter of Commitments, dated March 13, 1997, gives an undertaking to cooperate with landowners and planning authorities to evaluate any surface use of the easement.

The Panel finds merit in the position of the landowners and M&NPP. To do otherwise would be to suggest that the Panel sanctions the expropriation of landowners' rights. The Panel notes that this approach does not prevent landowners from restricting trespass by recreational vehicles or governments from establishing hiking trails. The Panel also notes that M&NPP will be responsible for monitoring all impacts on the easement.

In the matter of the recommendation that M&NPP prepare a study of all possible access-related impacts, the Panel points out that this would be an impossible task. The availability and kinds of off road vehicles have changed dramatically in the last two decades and it would not be possible to predict what changes the future might bring, even if it made sense to do so in terms of a mitigation plan.

### **Forests and Forestry**

Some 97 percent of the M&NPP pipeline will be routed through forested areas where the most common land uses are pulp and saw mill operations. Nova Scotia's international exports of forest products amounted to \$427 million in 1994. The equivalent 1995 figure for New Brunswick was \$2,244 million or 42 percent of total provincial exports. Thus the forest industry's interests are of vital significance and a major factor to be considered in assessing Project impacts across and along the pipeline right-of-way.

One potential conflict is the economic impact of the wood fibre lost to the forest industry at a time when there has been concern with the long-term sustainable yield and fibre shortage to mills. This

could amount to some 5,125 cubic metres annually, which admittedly is a minute fraction of the harvested forest resources in the aggregate. However there could be instances of significant impact on individual landowners or licensees. To the extent that this would occur, resolution would come down to compensation for landowners or forestry licensees on the basis of the present and future value of the forest product on the right-of-way. M&NPP provided details of its compensation approach and undertakings in its Letter of Commitments. The Panel sees the Letter of Commitments as a positive step to ensure fair and consistent treatment of affected parties. It notes that compensation is primarily a matter for private negotiation and beyond the mandate of the Panel. Where a settlement cannot be reached through negotiation, redress can then be sought through a negotiator or arbitration committee appointed by the federal Minister of Natural Resources Canada.

A second, more contentious matter, is the ability of a forestry operator to efficiently harvest and transport wood in the face of crossing restrictions over the pipeline right-of-way. It is evident that there will be some restrictions on the movement of forestry equipment between haul roads and harvest sites, in order to ensure the integrity and safety of the pipeline. Intervenors are concerned with how great the restrictions will be and the possible costs that they might incur as a result of the restrictions. Their bottom line is to seek a guarantee that the economics of forestry operations will not be adversely affected.

M&NPP's position is that the types and weight of equipment that can cross a right-of-way depend on site-specific ground conditions and the type of operations involved. In normal circumstances, pick up trucks and farm machinery can cross over anywhere without restriction. Other equipment such as a skidder will require a site specific evaluation. To handle these cases M&NPP undertook to install at the time of construction at least one permanent heavy vehicle crossing per parcel of land when required for logging operations.

Depending on the circumstances additional crossings could be installed. M&NPP will

work with landowners and forestry licensees to make reasonable, cost effective and mutually satisfactory arrangements regarding access. M&NPP would pay for the installation of approved crossings.

Notwithstanding these commitments, one intervenor asked for a certificate condition in respect of procedures to minimize pipeline disruptions of forestry operations. The Panel does not see a need for this degree of control.

It is satisfied that M&NPP's undertakings will resolve most if not all crossing issues. Where undertakings have not been met, a landowner or licensee does have recourse to ask the NEB to intervene.

A question of how to guarantee compliance arises with the imposition of crossing controls. A concern is that some forestry workers might not be aware of requirements. M&NPP proposes to resolve the concern through the mutual planning of crossings, the placement of signage or windrows where permitted, annual public awareness programs, pipeline information markers, and regular aerial monitoring. The Panel is satisfied that the proposed approach would reduce non-compliance.

Lastly, the issue of continued uses on the right-of-way was raised by landowners. M&NPP does not object to the growth of bushes and small, shallow-rooted trees on the right-of-way, if this does not interfere with either the safety or maintenance of the pipeline. The kinds of permitted uses can include fruit and Christmas trees. It will also allow the planting of bushes for visual screening. However, there is a requirement for a six metre wide strip clear of trees. These arrangements will be made at the time that an easement is being negotiated.

## **M&NPP SOCIO-ECONOMIC EFFECTS**

### ***Methodology***

At a technical level, intervenors questioned the input-output methodology used by M&NPP to arrive at its benefits estimates, as they did for SOEP. Based on the evidence, the Panel judges M&NPP's methodology for estimating benefits to be adequate. There is no requirement to further

model socio-economic impacts. However there was an additional issue with the local hire assumption used by M&NPP.

M&NPP initially assumed 30 percent local hire for Project construction. In response to Panel and intervenor information requests it subsequently revised the estimated local hire upwards to 77 percent. M&NPP stated that the 30 percent figure had been based on the false assumption that many of the required skills would be unavailable due to limited pipeline construction experience in the Atlantic Provinces. Closer analysis showed that local clearing services could provide almost 100 percent of this need, that contracts could reasonably specify high levels of local hire for teamsters, heavy equipment operators and welders, and that training programs could be initiated to qualify local labour for jobs on the Project. M&NPP has assigned a high level of confidence to attaining the 77 percent figure. The adoption of the 77 percent local hire figure might be seen to have an upwards impact on the benefits estimates contained in the Application. However, the Application estimates already appear to reflect a local hire proportion that is significantly above the initial 30 percent local hire assumption. The Panel feels that for the purpose of this review that the current estimates provide a reasonable figure for planning purposes.

### ***Economic Benefits***

The construction of the M&NPP pipeline and associated facilities will cost some \$544 million and create 5,000 direct and indirect jobs in the construction phase. An estimated 35 percent of expenditures will be made outside of Canada. Within Canada, 38 percent of expenditures (\$135 million) will occur in New Brunswick and 27 percent (\$98 million) will be made in Nova Scotia.

M&NPP did not give an estimate of the person-years generated by Project. Instead it provided data on the number of jobs that will be created. Construction jobs will be short term, and last only as long as it takes for right-of-way clearing and pipeline construction. An estimated 1,200 direct jobs and 380 indirect jobs will be created in New Brunswick, and 720 direct and 300

indirect jobs in Nova Scotia. The bulk of employment and expenditures will occur in the spring and summer 1999 construction seasons, adding to the peak activity of the SOEP onshore Project. There will be a smaller employment and expenditure peak in the fall of 1998 when the right-of-way will be cleared. Thus the economic benefits will largely be realized over a short period of time.

The Project operational phase will bring a much lower level of direct benefits than the construction phase. Full-time employment opportunities will total five jobs at Fredericton, and three at Stellarton. Annual operations expenditures are estimated to add \$1.25 and \$0.8 million to the New Brunswick and Nova Scotia economies, respectively. These are relatively minor amounts. The main direct economic benefits will be annual revenues from property taxes, income taxes and corporate taxes, which are estimated at \$7.8 million for Nova Scotia and \$9.4 million for New Brunswick.

The Panel is of the view that M&NPP's direct economic impact will not be large relative to the overall size of the provincial economies. Notwithstanding, pipeline and facilities construction in 1999 will have a noticeable impact locally and provincially. In the long run, the main benefits will likely be access to gas to improve the competitiveness of existing industries, a new energy source and the creation of new industries, as was discussed previously.

Finally, one additional local benefits issue was raised that deserves comment. The New Brunswick government questioned M&NPP on the possibility of locating particular pipeline operations in New Brunswick to increase local employment and expenditure benefits. New Brunswick maintained that there were no technical or operational reasons why the gas control centre could not be located in Fredericton and the mainline compressor station near St. Stephen. New Brunswick specifically asked in its Argument that the Panel recommend conditions to this effect. In its reply, M&NPP argued that locating the gas control centre in Fredericton would add appreciably to costs. It argued as well that if the compressor station was in Canada,

the associated costs would have to form part of the Canadian rate base. Moreover, such a change would require system redesign and could impact upon the regulatory approval schedule, particularly in the United States.

The Panel appreciates the desire of New Brunswick to maximize benefits. However, decisions on facilities design are based on a host of factors, local benefits being but one, albeit an important one. The Panel believes that the additional benefits to the Maritimes would be at the price of added operational costs or difficulties that others would have to bear, and therefore will not recommend such conditions.

### **Training**

M&NPP does not view a training program as a necessary requirement to ensure local hiring success. It believes that a number of pipeline construction jobs will not require specific pipeline construction skills. Instead, related experience as equipment operators, truck drivers or labourers will be sufficient. Moreover, M&NPP expects experienced pipeline workers, originally from the Maritimes, to want to return home, which could provide a nucleus of experienced construction workers. Nonetheless, M&NPP will work with unions, colleges and provincial governments to identify possible training areas and, if necessary, workers would be trained.

The Panel notes M&NPP's support in principle to training. However, it also notes M&NPP's expectation that there will be sufficient available Maritimes' workers with appropriate skills and thus training may not be a priority. As a result, the Panel believes that any training programs are likely to be modest in number and scope and will be directed to developing general construction skills. The Panel maintains that the kinds of training under consideration for this Project should not be planned in isolation. Rather it should be planned in the context of general skills training for all economic development requirements, including M&NPP and further potential development of gas infrastructure.

## **Recommendation 41**

**The Panel recommends that M&NPP consult with the Provinces of New Brunswick and Nova Scotia on a monitoring approach for employment, training and procurement, and that an agreed approach be included as a condition of any Project approval.**

### **Monitoring and Enforcement**

The Panel suggests for M&NPP, as it did previously for SOEP, that the important question is how much of a difference the Project will make to the New Brunswick and Nova Scotia economies if predicted benefits are realized. This line of reason calls for an assessment of what benefits principles should be applied and how best to monitor the level of benefits attainment. In response to a Panel information request, M&NPP identified seven benefits principles, which can be summarized as follows: maximizing local hiring where expertise is available; holding business opportunity workshops for local goods and services suppliers; meeting with government agencies and business associations to discuss appropriate contracting and procurement strategy; soliciting information on local products and services that could be required in the Project; holding local trade fairs to identify contracting/procurement strategy; maintaining local business database; and working with others to identify beneficial training programs.

The Panel believes that these principles do provide a basis for initiating specific benefit enhancing activities. The principles would provide an advisory/monitoring committee with a framework to discuss benefits actions and attainments and provide feedback to M&NPP on benefits results and allow recommendations with regard to corrective action. In response to a possible condition relating to the development of a socio-economic monitoring program in consultation with the Provinces of Nova Scotia and New Brunswick, M&NPP stated that a qualitative approach might be possible.

### **Services and Infrastructure**

A potential cost of any pipeline project is the negative impact that the construction activity could have on local services, facilities and infrastructure. The anticipated 1,920 Project workers will inevitably place added demands on accommodations, medical services, recreation and protective services, among others. The pipeline will be built in three separate sections or "spreads" by three separate crews each comprising between 500 and 630 workers each depending on the length of the spread and the type of topography expected. The impacts will be felt at various times and in various communities as the main pipeline construction progresses along the route over a six month period from May through early October 1999. There will be noticeable but less intensive activity as a result of pre-construction surveying and easement clearance activities occurring from the fall of 1998 through the winter of 1999.

The shipment of heavy equipment, such as large pipe and materials may create congestion on local roadways. The extent this impact depends in part on the availability of an adequate roadway infrastructure, relative to the additional demands. Equally important is how well a proponent plans its transport activities and adheres to practices and procedures that avoid and mitigate potential negative consequences.

Similar adverse consequences are less likely during Project operations. The only identified potential adverse impacts for the Project will be on emergency services training and coordination activities.

The availability of sufficient accommodation for construction crews is an issue, particularly if there are to be sufficient commercial accommodations available to meet the needs of regular customers and tourists. M&NPP has analyzed the supply of accommodation along the proposed route and concluded that it is sufficient except in Guysborough County. To deal with this shortage, SOEP and M&NPP are discussing a plan for joint use of a construction camp. As an added assurance that commercial accommodation would not be overburdened, and to increase local benefits, M&NPP has undertaken to develop a Room and Board Directory of private

accommodations. To encourage the use of these private accommodations, workers would be provided with a bus pick up and drop off service. If the planned approach is followed, the Panel believes that any significant adverse impacts should be avoided, and to the extent that the innovative private accommodation approach is available and utilized there should be positive benefits.

M&NPP evaluated medical services at county and community levels. A basic level of medical services appears to be generally available in close proximity to the project area. Moreover, its contractors will maintain ambulances and trained personnel on site. The Panel does not foresee a potential for significant adverse effects given the level of basic medical services available and the contractors' requirement to provide the first line of response.

The possible need for fire services at both the construction and operations stage was identified as an issue. During the construction phase, M&NPP will take the lead in dealing with any emergency. Its contractors will maintain a complement of fire suppression equipment and trained staff on site. Local fire departments will be called upon should a fire extend beyond the control of the construction crew. For the operations phase, M&NPP states that there may be a potentially significant adverse impact on local volunteer fire services if their support is required. Consequently, M&NPP has committed to use recognized experts to study and define training and any specialized equipment needs. M&NPP will pay for training programs, but not the trainees' time. M&NPP will develop an emergency response plan in consultation with local, provincial and federal authorities. Given the assessment and commitments of M&NPP, the Panel concludes that any potential significant impact on local fire services would be mitigated. The Panel believes that there is no need for a recommendation in this regard.

The capacity of the existing road network and the consequences of construction for local users was identified as an issue. In respect of the onshore portion of its Project, SOEP stated that traffic associated with construction may be the most noticeable impact on community infrastructure.

## Recommendation 42

**The Panel recommends that the appropriate regulatory authorities ensure that the Proponents, at least six months prior to construction, submit a traffic study for the Goldboro area to the Province of Nova Scotia, the Municipality of the District of Guysborough and the NEB.**

The Proponents have studied local roadway capacity, matters of traffic congestion and safety. M&NPP concluded that the situation is generally manageable through control measures such as the spacing and timing of traffic, the use of appropriate marshalling yards and the bussing of work crews to construction sites. The Proponents see Project-related impacts on the roadways as generally insignificant if the recommended control measures are followed and there is compliance with established regulations.

One exception to this will be the cumulative effect of the M&NPP pipeline and the Goldboro gas plant being constructed at the same time. The road system in this area is limited to narrow secondary routes through undulating and winding topography. The Proponents recognize a potential problem, and have undertaken to commission a logistics study that will identify significant adverse traffic effects and mitigative measures. However, the time frame for completing the report has not been tied down.

The Proponents have also expressed their intent to repair damage from construction activity (such as rutting, potholing, soft shoulder damage, etc.). The Panel sees this as a standard construction practice.

### *Archaeological and Heritage Resources*

The need to avoid or mitigate adverse archaeological or heritage impacts was raised by several intervenors, and in particular with respect to the safeguarding of aboriginal sites. M&NPP acknowledged the general principle of the need for safeguards. As to specifics, it has undertaken to follow appropriate archaeological and heritage practices in consultation and cooperation with provincial authorities and in accordance with provincial regulations and guidelines.

Among the specific steps that M&NPP has committed to undertake to avoid, monitor, protect and conserve archaeological and heritage resources are: avoidance of known burials and cemeteries, aboriginal sites, and heritage structures; carrying out additional research and fieldwork to identify all potential sites in the final easements; under the supervision of a qualified archaeologist, monitoring high potential sites during construction to ensure recognition, assessment and recording of uncovered artifacts, and the taking of appropriate action; developing objectives and protocols for monitoring sites and artifact recovery in consultation with applicable regulatory agencies; developing worker awareness programs on the nature, scope and responsibilities regarding heritage resources; identifying and protecting sensitive heritage areas in the field, under the direction of an archaeologist; and considering sites of significant heritage value for commemoration.

As well as cooperating with and meeting the requirements of provincial regulators, M&NPP is consulting with aboriginal groups on a protocol for handling archaeological and heritage issues, concerns and resources and the selection of the detailed route. It also plans to inform the aboriginal community of the archaeological field program for the detailed route survey, and would encourage aboriginal representatives to accompany the survey crews. M&NPP has given a guarantee to avoid situations where aboriginal sites are disturbed without consultation with the affected community.

Based on these assurances, the Panel is satisfied with M&NPP's undertakings in regard to archaeological and heritage matters.



# 4

## Matters Common to Both SOEP & M&NPP

### ALTERNATIVES TO THE PROJECT

Considerable argument was expressed by the parties to the Review concerning the methodological approach that the Panel should use in assessing alternative means of carrying out the Projects, and alternatives to the Projects.

With respect to the matter of alternative means of carrying out the Projects, the Panel has concluded that an alternative means of carrying out the Projects must consist of alternatives that are within the scope and control of the Proponents of the Project under review. Both the phraseology and structure of the *Canadian Environmental Assessment Act*, as well as common sense, lend themselves to this conclusion. In the Review of the Projects, no feasible alternative means of carrying out the Projects became evident through the information base developed in the record of these proceedings, and therefore the Panel has exercised its discretion not to pursue the matter of alternative means any further.

However the issue of alternatives to the Projects became a much more substantial issue in the course of these proceedings. Early in the proceedings the Panel took active steps to ensure that evidence would be available to it concerning alternatives to the Projects by stipulating that it would consider the socio-economics of a "northern route" for a Sable pipeline project. Evidence was adduced by TQM and others with respect to a pipeline project from Country Harbour to Quebec, with onward connections to pipeline systems in the United States of America through the proposed PNGTS pipeline.

In addition to a northern route alternative, an intervention and evidence was provided

by Tatham Offshore Inc., which proposed to construct a subsea pipeline between a point in Canada, offshore of the Province of Newfoundland and Labrador, to a point in the United States, by traversing the Scotian Shelf and thereby accessing Sable gas. Finally, Seafloor Structures Ltd. intervened and proposed the construction of an artificial island as an LNG tanker terminal, for the purpose of transporting liquefied natural gas between Canada and points on the continent of Europe.

The Panel rejected arguments that an alternative to the Project must consist of a functionally different method of developing and transporting Sable gas. The Panel decided that the meaning of the word "alternatives", in the context in which it is placed in the *Canadian Environmental Assessment Act*, incorporated any feasible different method for the development of the Sable fields, and the transportation of Sable gas, as well as the option of leaving the gas *in situ* without development of the resource.

Integrating alternatives to the Project into the review process posed its own challenges, in particular the question of how far the Panel's consideration could constitute an effective proxy for an *ab initio* environmental assessment of alternatives to the Projects under review. Given that the focus of this review is the Projects that were identified in the Project descriptions provided to the Panel by the governments of Canada and Nova Scotia, the Panel considered the evidence concerning the Projects under review to determine if they posed significant adverse environmental risks after appropriate mitigation, and to evaluate their socio-economic effects.

Having reached the conclusion that the Projects under review do not pose significant adverse environmental impacts after

taking into account appropriate mitigation, and that the socio-economic effects are favourable, the Panel considered that the specific legislation governing the Review of the Projects did not require it to go further to make specific findings of fact, or to conduct a comparative environmental assessment, with respect to the alternatives to the Projects under review.

However, the Panel considers that the evidence with respect to the alternatives disclosed that the TQM, Tatham Offshore and Seafloor Structures alternatives are potentially viable projects, which could be the subject of their own reviews under appropriate environmental assessment statutes.

A further consideration for the Panel was the question of a delay in the preparation and delivery of our report in order to permit an environmental assessment of alternatives to SOEP and M&NPP.

The Panel has examined the *Canadian Environmental Assessment Act* and the *Nova Scotia Environment Act* and determined that there is no legal obligation imposed by those Acts upon the Panel requiring it to defer the release of its report for any reason, where the panel has determined that sufficient evidence exists for the discharge of its mandate.

Finally, the Panel considered whether the principle of procedural fairness required it to delay issuance of its report in order to conduct a comparative environmental assessment of the alternatives to the Projects under review. Many legal cases were cited to the Panel reflecting the application of the general principle of procedural fairness to particular fact situations. The Panel believes that it has satisfied its obligations in this regard through the 56 day hearing convened to examine the SOEP and M&NPP applications, including evidence submitted with respect to alterna-

tives to the Projects. In view of this, the Panel has concluded that it would be inappropriate to delay the issuance of its report in order to embark upon multiple environmental assessments of potential alternatives.

## PRICE TRANSPARENCY

Price transparency was defined by the M&NPP's witness as being the "...availability of pricing information and, to the extent necessary, information about the terms and conditions under which that price is offered."

The issue of price transparency arose out of concern whether domestic gas purchasers had the ability to satisfy themselves that the terms and conditions, including price, of the Sable-sourced gas were no less favourable than those being offered to a U.S. purchaser under both short-term export orders and long-term export licences. Access to competitively-priced gas was considered important given that many Maritimes industries are in competition with U.S. industries who have, or will have, access to multiple gas sources, gas suppliers and gas pipelines.

Intervenors pointed out that, while the Market-Based Procedure (MBP) used in the issuance of long term export licences provides for the opportunity for price discovery through the review of filed export gas sales contracts and provides for the opportunity to file complaints under the MBP's "Complaints Procedure", no such mechanism exists with respect to the issuance of short-term export orders. This was considered relevant since it was expected that some of the Sable supply would be exported under short-term orders and thus, not be subject to the same level of public scrutiny as would be the case with the issuance of long-term export licences.

Intervenors generally believe that the conditions of a competitive market associated with the Sable supply are lacking. Specifically, they felt that there is an absence of an established domestic market, a large number of buyers and sellers, price transparency, and an absence of the opportunity for price discovery. Intervenors are

concerned that gas production will be highly concentrated among a small number of sellers (i.e. the Sable producers or marketers), who will have significant market power.

While generally acknowledging the Proponents' willingness to sell gas at the outlet of the gas plant at a price which yielded a netback to the producer which would not be greater than the netback price derived from an export sale, under similar terms and conditions, intervenors made several recommendations which it was felt would ensure price transparency and allow for the determination as to whether the domestic market was in fact being offered the Sable-sourced gas under similar terms and conditions, including price, as were being offered to the export market. Those recommendations are as follows:

(1) Condition the SOEP facilities approval to require the implementation of an after-the fact disclosure of all SOEP export sales arrangements in the month following the month of delivery. This disclosure would continue to occur until such time as there are a sufficient number of buyers and sellers and there is sufficient price transparency through the operation of a marketplace. In the event such disclosure resulted in a complaint, recourse could be sought through the NEB.

(2) Condition the SOEP facilities approval to require the confidential filing with the provinces of Nova Scotia and New Brunswick of all domestic and export gas sales contracts.

(3) Condition the M&NPP's facilities approval to require the Project sponsors to satisfy the NEB that all gas, above the minimum amount required to be sold into the U.S. market to justify the construction of the pipeline, be specifically available to the domestic markets on terms and conditions, including price, no less favourable than those being offered to consumers in the U.S. export market.

(4) Extend the NEB's MBP to all export sales associated with the Sable supply so that there is full disclosure of all gas export sales arrangements, including those under short-term export orders.

(5) Condition facilities approval upon demonstrating, prior to the commencement of construction, that firm domestic gas sales arrangements were in place for a significant portion of the 90,000 MMBtu/d domestic design load.

(6) Direct the SOEP sponsors to implement a posting-type of mechanism for sales at Goldboro under which the individual producers would publish a price or series of prices, along with standard terms and conditions, at which the producers would be willing to sell the Sable-sourced supply to any potential domestic or export buyer.

M&NPP objected to several of these recommendations. Specifically, it noted that the NEB already has the authority to require the filing of all gas contracts at any time it so chooses. It submitted that, while the U.S. northeast has been identified as the anchor market, there has been no pre-set allocation of the Sable supply and that the marketplace will be determined by those who place the highest value on the Sable supply.

M&NPP also disagreed with the intervenors' position that the market for the Sable supply would be dominated by a few participants resulting in a "distorted market" requiring some type of NEB oversight. In that regard, M&NPP submitted that the NEB already provides continuing oversight of the Canadian and U.S. energy markets and periodically publishes reports dealing with the dynamics of those markets such as the "Natural Gas Market Assessments" and "Supply and Demand Reports". In addition it noted that the NEB already monitors export volumes and prices for exports under short term export orders and under long-term export licence, in aggregate, by export point. M&NPP argued that such monitoring would simply be extended to include the St. Stephen export point. It noted that Canadian consumers already have access to relevant pricing information through the gas price transparency prevalent in the North American marketplace. It concluded that should the NEB determine that the marketplace was not functioning properly, or should it be in receipt of a consumer complaint, the NEB could take the necessary corrective action at that time.

### Recommendation 43

**The Panel recommends that the governments of Canada, Nova Scotia and New Brunswick explore mechanisms for monitoring gas prices which would allow negotiations of prices in the market to occur, but which would assure parties that the results of those negotiations would not be disadvantageous to Canadian buyers. The price monitoring committee formed by the signatory governments to the October 31, 1985 Agreement on Natural Gas Prices and Markets might serve as a useful model.**

The Panel shares the concerns of intervenors that, in the absence of a fully-functioning Maritimes gas market associated with the Sable supply, the opportunity for price discovery is lacking. The Panel is similarly concerned that this will create uncertainty for prospective domestic gas purchasers as to whether the domestic gas market will be offered the Sable-sourced supply under similar terms and conditions, including price, as will be offered to the export market.

Given this lack of price transparency and given the importance of this energy resource to the future economic development of Atlantic Canada, industries' ability to be competitive in North American markets, and the region's energy future in general, the Panel believes that some form of price discovery should be accorded future buyers of this resource.

### HEALTH EFFECTS

The Panel is responsible for examining how the construction and operation of facilities would affect the health of Project workers and parties residing near facilities. Potential direct Project health impacts could arise out of chemical use, air emissions, radioactivity, water contamination, noise and the presence of organometallics. Intervenors want assurance that adverse health impacts will be avoided. Some intervenors claimed that SOEP is either unaware of the issues or unwilling to deal with them.

The Proponents maintained that they are aware of the potential health issues and all of the associated regulatory requirements. In the Hearing, they committed to going beyond the threshold of simply meeting regulatory requirements by continually measuring health risk exposure and seeking ways to further reduce exposure levels below the required limits.

In respect of chemical use, the Proponents stated that material safety data sheets had been compiled and occupational exposure limits will be enforced. Specifically, personnel will be trained in the safe use of chemicals and be certificated to do so; pesticides will not be used as a normal part of operations; dioxins and furans will not be used; and biocides will be used with suitable treatment, in limited circumstances related to hydrostatic testing.

Air emissions can arise from both normal operations and upset conditions. Avoidance of operational emissions is a matter of adherence to appropriate codes and standards, proper design, and regulatory requirements. The Proponents have changed the design of the Goldboro gas plant to eliminate the possibility of BTEX emissions, even though monitoring has not detected discernable BTEX in the source gas. There will be instances of emissions due to upset conditions, but it is not expected that these emissions would exceed legal limits and workers will be trained to deal with these in a safe manner. (This topic is covered in greater detail in Chapter 2 under Atmospheric Emissions.)

### Recommendation 44

**The Panel recommends that the CNSOPB, Nova Scotia, New Brunswick and the NEB work together to set common standards and an integrated gas emissions monitoring process.**

SOEP identified a low probability of radioactivity (NORM), based on sampling to date. In the event of the occurrence of radioactive materials, SOEP stated that routine safety measures are in place for workers to isolate, secure and remove such substances.

Water contamination is an issue that could affect those living near production facilities. SOEP and M&NPP are aware of this issue, particularly regarding the impact of acid rock on domestic water supply, and has committed to avoid acid rock in water supply areas where possible. Both will undertake mitigative measures whenever problems arise. In addition, hydrostatic testing will be done such that any contaminated water is recovered and treated to the required regulatory standard, prior to release or disposal.

Noise is a potential health issue and SOEP is committed to staying within established noise guidelines. Further discussion on this topic and recommendations set by the Panel can be found in Chapters 2 and 3. There is no indication based on standard gas analysis techniques that organometallics are present in the source gas. Nonetheless, for safety reasons, SOEP's plan to install a molecular sieve unit to remove any organomercury, should it occur.

Based on the above, the Panel is assured that the Proponents have designed an adequate system to avoid or mitigate health effects. Further, the Proponents have committed to policies, procedures and training programs to mitigate any risks that might arise.

The one area of concern for the Panel is the possibility of adverse BTEX emissions from the Thebaud platform and the gas liquids facilities. There does not appear to be the same level of design control commitment for these facilities as for the Goldboro plant.

## ABORIGINAL ISSUES

Three main areas of concern were raised by aboriginal representatives. The first concern is the alleged inadequacy of the public participation process as it pertains to aboriginal peoples. The second issue deals with an alleged failure of the environmental and socio-economic assessments to take into account potential impacts on aboriginal peoples. Related to this issue was the need for compensation programs and for benefits such as aboriginal employment opportunities. Finally, there was the overarching issue of the manner and extent to which the Panel and government agencies must exercise a fiduciary responsibility to protect traditional land uses and resources.

Early and meaningful public consultation is a fundamental objective of the environmental assessment process. Concern was expressed that the Proponents' consultation process with aboriginal people was inadequate. As a result aboriginal representatives did not feel that aboriginal concerns and issues had been properly or adequately taken into consideration in the Proponents' environmental assessments. A concern was also expressed that government agencies had not generally intervened with the Proponents to ensure that due regard be given to aboriginal issues.

The early public notification phase for the Projects was primarily aimed at government authorities and the public most directly affected. However, certain special interest groups, such as the fisheries industry, were also consulted. Since the Project did not directly impinge on reserve lands and areas that were the subject of claims negotiations, the Proponents did not initially target aboriginal communities as special interest parties, as they had done for other interest groups. In final Argument the Proponents stated that they were admittedly "slow off the mark" in dealing with First Nations. The Panel believes that this delay was regrettable.

From the outset, the public participation program that should have ensured that consultation was carried out with the main aboriginal organizations and the communities that they represented. The proposed gas production and transportation indus-

tries are new to the Maritimes and so there is a particular onus on the part of the Proponents to communicate effectively with all potentially impacted parties. SOEP has as a principle, "to strive to establish good, long-term relationships with the communities with whom we interact" and this was clearly not met in its initial way of dealing with the aboriginal community.

Direct, face-to-face contact with aboriginal communities at the Project outset would likely have gone a long way toward alleviating aboriginal peoples' concerns, and avoided mistrust and misunderstanding. The Proponents have belatedly recognized this. Consultations have been initiated and have achieved positive results. For example, SOEP has agreed to avoid situations where, if an aboriginal archaeological site was uncovered, work on the site would continue in the absence of consultation with affected parties. Work will be halted pending consultation. The Proponents have also agreed along with aboriginal representatives to review specific environmental mitigation procedures. Discussions are underway between the Proponents and aboriginal representatives with respect to a protocol or agreement on future consultation, particularly for areas such as land use, rare and medicinal plants and archaeological resources. During Argument, two of the three aboriginal intervenors expressed satisfaction with the progress made to date. The Panel feels strongly that the best approach to achieve effective communications is through a written protocol or agreement that spells out responsibilities and roles for the cooperative study, the monitoring of potential impacts, and the development of appropriate mitigation, when required. Notwithstanding, the Panel would stress that any approach must be cost effective, efficient and timely.

The second issue was that specific Project impacts on aboriginal land use were not studied and hence are unknown. The Proponents maintained that their assessment processes gave careful consideration to all potential environmental and socio-economic impacts. They feel that the weight of the assessment evidence suggests that any adverse impacts would be minimal, temporary and/or mitigable, and thus

### Recommendation 45

**The Panel recommends that the appropriate regulatory authorities condition their approvals to require the Proponents to submit a written protocol or agreement spelling out Proponent Aboriginal roles and responsibilities for cooperation in studies and monitoring.**

not qualify as significant adverse impacts. The Proponents noted that these findings apply to all those potentially affected, including aboriginal people. Moreover, additional studies will be prepared at the detailed route planning stage, which will include studies of rare and medicinal plants, soils, archaeology and geotechnical matters, among others. Based on these studies, measures will be taken to avoid or mitigate site specific adverse impacts along the detailed route. Potential impacts on aboriginal interests will be further defined and dealt with in this context.

The Panel observes that aboriginal people may have special insights on particular cultural, social, economic and environmental impacts of a project and on traditional ways to mitigate these. Such insights would best be incorporated at the detailed field work stage, and tested as required during the construction phase. There should be ample opportunity for both parties to develop concrete, effective and feasible ways to achieve this under the umbrella of a protocol or agreement.

The availability of compensation for damages to aboriginal interests was also raised. Two mechanisms are now in place to resolve compensation claims. Project-related damages to aboriginal commercial fishers would be available under the SOEP-Fisheries compensation agreement that is being negotiated between SOEP and the fisheries industry. In the event of Project-related damages to non-commercial hunting, fishing or gathering activities, a legislated procedure exists whereby affected parties can seek compensation through a negotiator or arbitration committee appointed by the Federal Minister of Natural Resources Canada. Aboriginal spokespersons suggested two other alternatives. These are a specific compensation

program or a set of compensation criteria, both of which would be tailored to offset specific or unique impacts on the aboriginal community. To the extent that such additional compensation mechanisms are deemed necessary, these alternatives would have to be negotiated as an independent matter between the two parties. The Panel takes no position as to which, the existing or proposed approaches to compensation, would be best.

Aboriginal employment opportunities are an issue that was raised as a possible positive Project impact. In response, SOEP stated its commitment to remove barriers and provide training and other opportunities for all disadvantaged groups. In this regard, SOEP undertook to discuss directly with aboriginal representatives ways and means to enhance employment opportunities. It also suggested aboriginal participation on the Benefits Advisory Committee as an avenue to create or maximize aboriginal employment opportunities. The Panel believes that participation on the BAC would afford aboriginal representatives with a monitoring role, and would represent a significant opportunity. Should aboriginal people wish to participate in BAC, careful consideration should be given to how best to represent their collective interest through the BAC mechanism.

Finally, the matter of the Crown's obligation with respect to fiduciary rights was put forward by aboriginal groups as a central issue. Fiduciary rights relate to the legal obligation of the Crown to the aboriginal people including obligations to manage properly lands and other resources held in trust for aboriginal people. Typically, this obligation would apply where a government authority is responsible for administering reserve lands for a particular aboriginal band. The position taken by certain aboriginal intervenors was that the fiduciary role is more general in application than this, and covers all Crown lands and applies to both on and off reserve aboriginal people. In this view, all aboriginal people have a legal interest in any Project-related adverse impact on wildlife, fish, plants and heritage resources on Crown lands.

The federal Department of Justice, on behalf of DFO and DOE, argued that the Panel as a quasi-judicial body does not have fiduciary responsibilities. The Department of Justice also argued that there was no evidence on the record that would permit the Panel to decide on the existence, content and fulfilment of fiduciary responsibilities by other government authorities. Further, it was noted that aboriginal parties had access to and participated fully in the Panel proceedings and had not made any case to show any specific adverse effects of the Project on aboriginal use of Crown lands.

The Panel sees the general interpretation of the fiduciary obligations of government agencies as a legal matter, which is beyond its specific mandate. However, it believes that the Panel protected the rights of all parties by ensuring a fair, objective and unbiased public hearing process.

## RURAL QUALITY OF LIFE

During the scoping sessions, certain intervenors expressed concerns that a pipeline would detract from the rural quality of life and should be denied on that basis. The main concerns centred on matters of safety, adverse wildlife impacts, intrusions by outsiders, and the physical appearance of the right-of-way. The Panel appreciates the high value that rural residents place on their lifestyle, and the fear that the pipeline could undermine this lifestyle. However, the Panel is not convinced that a properly designed, constructed and maintained pipeline would have the significant adverse effects that some intervenors fear.

Wildlife impacts were assessed in the Application and through cross-examination. To the extent that there might be adverse wildlife impacts, these are expected to be minor, temporary and mitigated to a level of insignificance. Increased intrusion by outsiders is a possibility, although agreement has been reached to build barriers where requested by landowners and to place appropriate signage. As well, most of the right-of-way will be in areas already accessible through forestry roads and as well as passing through Crown lands to which the public now has a right of access. As to the physical appearance of the right-

of-way, there is agreement that except for a six metre strip centred on the pipeline, the rest of the easement area could be replanted with bushes and small, shallow rooted trees. This would provide for both visual screening and support wildlife.

While the Panel shares the view that rural areas should be as natural as possible, it recognizes that existing settlement already compromises that status to some extent. Roads have been built and utilities installed. Land is cleared for housing and other activities. There is already a human footprint on the lands through which the pipeline will pass. It is a judgement call as to how much wider, longer or deeper the footprint will be with new pipelines. The Panel believes that with proper planning, construction and maintenance the change in the footprint will still be acceptable.

Landowners, tenants and other affected parties living along or near a pipeline have a procedural recourse if they feel that they have suffered measurable damage from pipeline activity or they believe that compensation for easement rights is inadequate. As discussed in several earlier sections, they can apply for a negotiator or an arbitration committee through the federal Minister of Natural Resources Canada.

## CONCLUSION

The Panel concludes that SOEP and M&NPP are not likely to cause significant adverse environmental effects, provided that appropriate mitigation identified in the course of the review proceedings is applied to both Projects and that the Panel's recommendations are followed and implemented. As well, the Panel concludes that the socio-economic outcomes are favourable for the Maritimes and Canada.

### Recommendation 46

**The Panel recommends that the appropriate regulatory authorities proceed with all necessary approvals for SOEP and M&NPP without further delay.**



# Recommendations

## RECOMMENDATION 1

The Panel recommends the following conditions for any approval of the Offshore Pipeline that may be granted.

The Proponents shall submit to the National Energy Board, for review, at least one hundred and eighty (180) days prior to the commencement of installation:

- (a) the pipeline design data and the final pipeline design, including, but not limited to:
  - (i) the final Offshore Pipeline Design Basis Memorandum;
  - (ii) detailed materials specifications;
  - (iii) any relevant supporting design studies;
  - (iv) limits of unacceptable spans found during installation, testing and operation, and mitigation measures to be used if an unacceptable span was to develop; and
  - (v) construction schematics.
- (b) a list of the regulations, standards, codes and specifications used in the design, construction and operation of the pipeline from the Thebaud platform to the Goldboro gas plant, indicating the date of issue;
- (c) reports providing results and supporting data from any geotechnical field investigations for the evaluation of:
  - (i) the potential for slope instability;
  - (ii) the geotechnical and geological hazards and geothermal regimes which may be encountered during installation and operation of the facilities; and
  - (iii) the special designs and measures required to safeguard the pipeline.
- (d) the pipeline route, detailed on appropriate scale maps, indicating all seabed, geotechnical and other features to a sufficient depth and resolution.

The Proponents shall not start any pipeline installation activity until the final pipeline design has been approved by the National Energy Board.

Unless the National Energy Board otherwise directs, the Proponents shall submit, at least thirty (30) days prior to the commencement of construction, a detailed construction schedule. The Proponents shall provide the National Energy Board and all other appropriate regulatory authorities with regular updates on the progress of construction activities and with any changes in the schedule as construction progresses.

The Proponents shall submit to the National Energy Board, for review, at least thirty (30) days prior to the commencement of construction, all construction manuals, including:

- (a) a pipe laying and pipe trenching manual (including, but not limited to, other pipeline construction activities such as pipeline stabilization or anchoring);
- (b) a construction safety manual (containing appropriate procedures for the reporting of any incidents to the NEB);
- (c) a pipeline emergency response procedures manual; and

- (d) all other manuals relevant to construction, installation and operation of the subsea gathering line from the Thebaud Platform to the Goldboro Gas Plant.

Unless the National Energy Board otherwise directs, the Proponents shall, during construction, for audit purposes, maintain at each construction site a copy of the welding procedures and non destructive testing procedures used on the Project together with all supporting documentation.

The Proponents shall file with the National Energy Board, no later than one hundred and eighty (180) days after completion of the pipe laying, an as-laid pipeline survey report and maps.

The Proponents shall submit to the National Energy Board, for review, at least thirty (30) days prior to "Leave to Open", an operation and maintenance manual including, but not limited to, inspection and remedial correction procedures for seabed movements causing spanning.

If the National Energy Board determines that the pipeline design assumptions, relative to the pipeline burial, pipeline stability and seabed changes, cannot be confirmed, the Proponents shall submit to the National Energy Board, for review, at least one hundred and eighty (180) days prior to "Leave to Open", a pipeline in-place monitoring program. This program shall include all the inspection procedures and schedules, and criteria that will initiate specific inspection and remedial action procedures (such as storm conditions and limiting span lengths). This program will also identify all equipment required on-site or near-site for remedial action procedures, as well as any such equipment that has to be brought from remote locations. The program shall include the procedures for reporting incidents to the National Energy Board.

The Certificate for the subsea pipeline facilities shall be issued to and held by Mobil Oil Canada Ltd. pending the establishment of the legal operating entity for SOEP. Upon establishment of that legal entity, the Proponents shall apply for permission to transfer the Certificate so that the pipeline facilities, in respect of which the Certificate is issued, shall be held and operated by that entity.

The Panel recommends that unless the National Energy Board otherwise directs, any certificate issued should expire on 31 December 2000, unless the construction and installation of the offshore pipeline facilities has commenced by that date.

## RECOMMENDATION 2

The Panel recommends the following conditions for any approval of the gas plant that may be granted.

The Proponents shall cause the gas plant facilities to be designed, manufactured, located, constructed and installed in accordance with those specifications, drawings, and other information set forth in the application, or as otherwise adduced in evidence by the Proponents before the Panel, except as varied in accordance with paragraph 1(b) hereof.

At least thirty (30) days prior to the commencement of any relevant construction activities, the Proponents shall submit to the National Energy Board, for review, an abbreviated design information package of the gas plant containing:

- (a) process flow diagrams, with temperatures, pressures, mass balances and capacity, as well as the energy requirements of compressors, heaters and turbo-expanders;
- (b) piping and instrumentation diagrams for all plant systems; and
- (c) the codes, standards, and material specifications, to be used for all major equipment and piping;

Design and specification changes shall be tabled for review and consideration by the National Energy Board at least 30 days prior to implementation.

The Proponents shall design, fabricate and install all components of the gas plant in accordance with applicable codes and standards in the Province of Nova Scotia.

The Proponents shall, at least ninety (90) days prior to the proposed date for the commencement of construction of the gas plant authorized by any order issued, file with the National Energy Board for its review:

- (a) the procedures for project quality assurance and quality control in the design, fabrication and construction of the gas plant, including audit and corrective action procedures; and
- (b) the construction pressure piping and pressure vessel, non-destructive and pressure testing program including audit and corrective action procedures.

The Proponents shall review with regulatory authorities the results of all plant Hazard and Operability Studies (HAZOP) within thirty (30) days of the completion of the studies. The Goldboro Gas Plant HAZOP review shall occur at least thirty (30) working days before final design is completed;

The Proponents shall, at least sixty (60) days prior to the commencement of construction, file with the National Energy Board a detailed construction schedule or schedules identifying all major construction activities and shall notify the National Energy Board of any modifications to the schedule or schedules at least ten (10) days before they occur; and

The Proponents shall prepare and submit for approval to the National Energy Board a construction safety manual pursuant to section 26 of the *Onshore Pipeline Regulations*.

The Proponents shall, prior to applying for "Leave to Open" for any segment of the gas processing facilities authorized by any Order issued, file with the National Energy Board for its review:

- (a) a detailed explanation of the programs for monitoring internal and external conditions of the pressure retaining equipment in the gas plant, having particular regard to those parts of the gas plant with the potential to cause danger to the employees, the public and the environment; and
- (b) a detailed training program based, at least in part, on the plant's process hazard analysis, wherein competency of the employees can be verified before assignment of the task.

The Proponents shall at least sixty (60) days prior to turn-over or commissioning of any gas plant equipment, submit for to the National Energy Board for review:

- (a) the turn-over, commissioning and start-up procedures and schedules for all plant equipment, including information regarding the number of persons on site during each of the commissioning and start-up procedures; and
- (b) the turn-over, or commissioning safety management policies and procedures, showing how the safety of all employees and the public will be ensured during the commissioning phases of the gas plant.

The Proponents shall submit to the National Energy Board for approval, at least sixty (60) days prior to commencing plant operations:

- (a) an Operations and Maintenance Manual pursuant to section 48 Part VII of the *Onshore Pipeline Regulations* which shall include all the safe work procedures required to maintain, commission, start-up, operate and shutdown all equipment in, and associated with, the gas plant;
- (b) a gas plant specific emergency response procedures manual; and
- (c) contingency plans for hydrocarbon releases to the atmosphere within the gas plant and related facilities.

Any certificate issued shall expire on 31 December 2000 unless the construction and installation of the Goldboro gas plant has commenced by that date.

The operators of the Goldboro gas plant shall ensure that the plant is operated within the environmental codes and standards approved or adopted by the Province of Nova Scotia.

The operators of the Goldboro gas plant shall at least once per quarter, with at least 24 hours notice, allow representatives of the Nova Scotia Department of the Environment, if necessary, to inspect, audit, or verify calibration of those metering measuring and sample collection devices.

The operators of the Goldboro gas plant shall ensure that all modifications, repairs and expansions regulated by the Canada Labour Code conform to the applicable codes or standards that are approved or adopted by the Province of Nova Scotia.

### RECOMMENDATION 3

The Panel recommends to the National Energy Board that the SOEP operating entity be designated as a Group 2 Company for the purposes of regulation under the NEB Act. The Panel also recommends that SOEP be required to keep its book of accounts pursuant to the code of accounts prescribed in the *Uniform Accounting Regulations* and to file audited annual financial statements.

### RECOMMENDATION 4

The Panel recommends that the appropriate regulatory authorities ensure that the Proponents:

- a) develop a statistically and scientifically valid Environmental Effects Monitoring program to ensure that mitigative measures are effective and to confirm predicted environmental effects with respect to discharges of drilling wastes and produced water including sublethal effects of produced water, flocculation of waste and the creation of chlorinated hydrocarbons within the 500 metre radius of the drilling platforms;
- b) further explore the alternatives to the use of OBMs and commit to considering and implementing the most environmentally and geotechnically sound options when available;
- c) consider and implement new waste treatment during the lifetime of the Project which is proven to be environmentally and technically superior to the initial methodology;
- d) explore alternative techniques other than chlorination for treatment of liquid domestic wastes from the Project facilities, prior to their release into the marine environment; and
- e) in conjunction with compliance monitoring requirements for the disposal of hydrostatic test water for the off shore pipelines, at least 30 working days prior to the commencement of any hydrostatic testing portion of the Project, submit to the appropriate regulatory authorities for approval detailed information regarding hydrostatic testing including:
  - (i) the source selected for hydrostatic test water;
  - (ii) the location of the hydrostatic test water;
  - (iii) the type and quantity of antioxidant to be used, including a justification for selecting this particular antioxidant;
  - (iv) site-specific mitigative and restorative measures to be employed as a result of consultations with regulatory agencies; and
  - (v) evidence to demonstrate that all issues raised by regulatory agencies have been adequately addressed, including all necessary updates to the environmental assessments where deficiencies have been identified.

### RECOMMENDATION 5

The Panel recommends that at least 60 working days prior to the commencement of construction of the nearshore pipeline in Betty's Cove, the Proponents submit to the appropriate regulatory authorities for approval, additional information regarding the proposed specific routes of the subsea pipeline and the specific installation method for the landfall point. The additional information shall set out:

- (a) the results of the sediment sampling program along the specific route into Betty's Cove;

- b) an underwater habitat assessment along the specific route into Betty's Cove;**
- (c) an environmental issues list identifying all relevant effects of the selected route on marine biological Valued Environmental Components;**
- (d) the associated mitigation measures to render those environmental effects insignificant; and**
- (e) the details on the selected installation method for the landfall point.**

#### **RECOMMENDATION 6**

**The Panel recommends that the appropriate regulatory authorities ensure that the Proponents conduct a minimum of one full year of baseline water and sediment quality monitoring prior to any trenching activity in Country Harbour. Furthermore, that the results of this program and those of the sediment modelling study for Country Harbour be reviewed by both the SOEP-Fisheries Liaison Committee and the Department of Fisheries and Oceans, and any issues raised be addressed prior to commencement of trenching activity.**

#### **RECOMMENDATION 7**

**The Panel recommends that, to adequately assess the potential for impacts of tainting on the fishing industry, the appropriate regulatory authorities ensure that the Proponents include a taint test as part of their Environmental Effects Monitoring (EEM) program.**

#### **RECOMMENDATION 8**

**The Panel recommends that the appropriate regulatory authorities ensure that the Proponents remove Country Harbour from consideration for base sites, and that the final selections be made as expeditiously as possible.**

#### **RECOMMENDATION 9**

**The Panel recommends that the appropriate regulatory authorities ensure that the Proponents undertake the following: design and implement an acoustic monitoring program to measure noise (source) levels of Project activities, transmission losses in the Project area, and received levels in key locations, such as the Gully and nearby Logan Canyon. This should be done by, or under the direction of, an experienced third party, as part of their Environmental Effects Monitoring program planned for the Project.**

#### **RECOMMENDATION 10**

**The Panel recommends that the appropriate regulatory authorities ensure that the Proponents, to the extent possible, conduct pipeline laying activity at Country Harbour and Country Island outside the mid-May to mid-August nesting season, particularly until the appropriate baseline data has been collected and analyzed on roseate tern population in this area.**

#### **RECOMMENDATION 11**

**The Panel recommends that the appropriate regulatory authorities ensure that, at least six months prior to the commencement of any fabrication or construction activity, the Proponents submit the Code of Practice to protect the Gully, as part of their final Environmental Protection Plan. The Code should include details on proposed Environmental Effects Monitoring (EEM) programs and mitigation procedures, as they specifically relate to the Gully and be in accordance with the requirements of the appropriate regulatory authority relevant to the activity. To obtain the baseline data necessary for EEM programs, the Proponents should initiate or contribute to basic physical-biological oceanographic research in the Gully.**

## RECOMMENDATION 12

The Panel recommends that the appropriate regulatory authorities ensure that, at least six months prior to the commencement of any fabrication or construction, the Proponents submit the Code of Practice to protect Sable Island, as part of its final Environmental Protection Plan. The plan must include details on proposed Environmental Effects Monitoring programs and mitigation procedures, as they specifically relate to Sable Island and be in accordance with the requirements of the appropriate regulatory authority relevant to the activity.

## RECOMMENDATION 13

The Panel recommends that the appropriate regulatory authorities ensure that the Proponents collect, analyze, and report data pertaining to storm and extreme events. The Panel recommends that the Proponents comply with the Conductivity - Temperature - Depth (CTD) profile provision of the Physical Guidelines.

## RECOMMENDATION 14

The Panel recommends that the Proponents submit to DFO, as expeditiously as possible, all information relevant to impacts on navigation including; drill sites, standby vessel base locations and potential traffic patterns.

## RECOMMENDATION 15

With respect to Environmental Effects Monitoring programs for offshore facilities, the Panel recommends that at least six months prior to the commencement of any fabrication or construction activity requiring regulatory approval, in accordance with the requirements of the appropriate regulatory authority relevant to the activity, the Proponents shall submit to those authorities the final Environmental Protection Plan, which shall include or address the following factors:

- (a) Environmental Policy;
- (b) Standards and codes of practice, including the Code of Practice to protect Sable Island and the Gully;
- (c) Mitigation/operating procedures (construction, drilling, production, decommissioning and abandonment);
- (d) Environmental education, training and orientation procedures/programs;
- (e) Chain of command (mechanisms for environmental decision making);
- (f) Environmental Effects Monitoring practices and reporting, including detailed information on every monitoring program included in or referred to in its Application, in its Undertakings made to other government agencies, and in commitments made by the Proponents in evidence before the Joint Review Panel;
- (g) Environmental Compliance Monitoring practices and reporting;
- (h) Reference Laws, Regulations, Guidelines, Licences, Permits and Approvals;
- (i) Waste Management Plan;
- (j) Atmospheric Release Management Plan;
- (k) Effluent Release Management Plan;
- (l) Accidental Discharge Contingency Plan, including spill prevention methodology;

- (m) Relevant contractual commitments, including special environmental clauses;
- (n) Environmental inspection and audit procedures;
- (o) Special conservation plans, where appropriate; and
- (p) Environmental Management Continuous Improvement.;

The Proponents shall file with the appropriate regulatory authorities a post-construction environmental report within six months of the in-service date. The post-construction environmental report shall set out the environmental issues that have arisen and shall:

- (a) indicate the issues which are resolved and unresolved; and
- (b) describe the measures SOEP proposes to take with respect to the unresolved issues;

The Proponents establish, with regard to waste discharges in the offshore marine environment, criteria for tolerance of contamination at the platform site, in relation to recognized Maximum Acceptable Effects Levels (MAELS), in consultation with CNSOPB, before drilling commences;

The Proponents shall, based on consultations within SEEMAG and with respect to specific VECs, :

- (a) examine the potential impacts of produced water and the potential to cause tainting in identified VECs;
- (b) monitor the accumulation and movement of drill wastes around the platforms closest to the Gully; and
- (c) monitor traffic and noise-related Project effects on marine mammals, particularly the northern bottlenose whale.

#### RECOMMENDATION 16

The Panel recommends that the appropriate regulatory authorities ensure that the Proponents prepare detailed Contingency Plans (as part of the Environmental Protection Plan) which focus on spill prevention and response, and strategies for cleaning up the marine and terrestrial environments. These plans should be submitted prior to the commencement of any fabrication or construction activity requiring regulatory approval in accordance with the requirements of the appropriate regulatory authority relevant to the activity.

#### RECOMMENDATION 17

The Panel recommends that the Proponents commit to empowering their Environmental Inspectors with the authority to terminate any onshore pipeline construction activities which impact negatively on fish and fish habitat.

#### RECOMMENDATION 18

The Panel recommends the following conditions for any approval of the NGL pipeline that may be granted.

The Proponents shall submit to the appropriate regulatory authority at least six months prior to the commencement of any fabrication or construction activity, the details of the proposed specific route for the NGL pipeline, and shall include:

- (a) the results of all pre-construction surveys to identify special status species/habitat along the proposed corridor, including specific measures to be implemented;
- (b) an environmental issues list identifying all relevant effects of the selected route; and
- (c) the associated mitigation measures to render those environmental effects insignificant.

The Proponents shall, at least 30 working days prior to the commencement of construction of the NGL pipeline, submit to the appropriate regulatory authorities for approval, additional information regarding the stream crossings. The additional information shall set out:

- (a) construction designs of the crossing;
- (b) proposed duration of the crossing;
- (c) in-stream timing restrictions identified by regulatory agencies;
- (d) erosion and sediment control plan;
- (e) site-specific mitigative and restorative measures to be employed as a result of consultations with regulatory agencies;
- (f) if a directional drilling method is used, the detailed drilling fluid plan addressing the methods of drilling fluid containment and storage, and specific methods for disposing of and/or recycling of the drilling fluids;
- (g) if blasting is required, the blasting plan, including comments from the Department of Fisheries and Oceans;
- (h) evidence to demonstrate that all issues raised by regulatory agencies have been adequately addressed, including all necessary updates to the environmental assessments where deficiencies have been identified;
- (i) evidence to demonstrate that the proposed construction method and site specific mitigative and restorative measures are in compliance with federal and provincial legislation; and
- (j) a wet-weather shut-down policy; and,
- (k) the status of approvals, including environmental conditions.

The Proponents shall also, at least 30 working days prior to the commencement of construction of the NGL pipeline, submit to the appropriate regulatory authorities for approval, additional information regarding the treatment method to deal with acid drainage and specific mitigative measures to be implemented at stream crossings. The additional information shall set out for each stream crossing to be affected:

- (a) name and location of the stream;
- (b) the selected treatment method of the runoff water;
- (c) the proposed “Canadian Water Quality Guideline” values for specific use to be adhered to;
- (d) site-specific mitigative and restorative measures to be employed as a result of consultations with regulatory agencies;
- (e) evidence to demonstrate that all issues raised by regulatory agencies and other interested parties have been adequately addressed, including all necessary updates to the environmental assessments where deficiencies have been identified; and
- (f) status of approvals, including environmental conditions.

The Proponents file with the appropriate regulatory authorities a post-construction environmental report within six months of the in-service date for the SOEP Project. The post-construction environmental report shall set out the environmental issues that have arisen and shall:

- (a) indicate the issues resolved and those unresolved; and
- (b) describe the measures SOEP proposes to take in respect of the unresolved issues.

#### **RECOMMENDATION 19**

The Panel recommends that SOEP, at least 30 working days prior to the commencement of construction for the crossing of the Strait of Canso, submit to the appropriate regulatory authorities for approval, additional information regarding this crossing. The additional information shall set out the following:

- (a) proposed duration of the crossing;
- (b) watercourse timing restrictions identified by regulatory agencies;
- (c) site-specific mitigative and restorative measures to be employed as a result of consultations with regulatory agencies;
- (d) if blasting is required, the blasting plan, including comments from the Department of Fisheries and Oceans;
- (e) evidence to demonstrate, in the form of a risk assessment, that the proposed construction method and site-specific mitigative and restorative measures are in compliance with federal and provincial legislation;
- (f) status of approvals, including environmental conditions; and
- (g) the complete set of sediment data for all measured contaminants obtained during the 30 and 31 May 1997 sampling program for the Strait of Canso.

#### **RECOMMENDATION 20**

The Panel recommends that the Proponents, at least 30 days prior to the commencement of NGL pipeline construction, the results of the field program identifying possible locations of acid generating bedrock and the proposed methods of avoiding disturbing those areas.

#### **RECOMMENDATION 21**

The Panel recommends that SOEP revisit its use of the upper limit of the Nova Scotia Noise Guidelines as the design criteria for the Goldboro gas plant. The Panel further recommends, as part of any regulatory approval, a condition that requires the Proponents to carry out regular noise monitoring at the natural gas plant, and that SOEP add plant noise to its Environmental Issues List.

#### **RECOMMENDATION 22**

The Panel recommends that the Province of Nova Scotia examine options for an industrial strategy that would include hydro-carbon-based development. Given its stated commitment to future Nova Scotia development, SOEP should be expected to provide input to this process.

#### **RECOMMENDATION 23**

The Panel recommends a comprehensive research program that examines and designs ways and means to enhance local skills and business opportunities and to prepare Nova Scotia for further offshore development. The Panel recommends that SOEP work closely with the federal and Nova Scotia governments and other key stakeholders to examine the need for research in these respects, and set an appropriate direction for research and development programs.

#### **RECOMMENDATION 24**

The Panel recommends that prior to any construction, SOEP provide the CNSOPB with a plan that details the employment and training review process and the specific mitigative measures to respond to unsatisfactory performance on the part of its contractors.

#### **RECOMMENDATION 25**

The Panel recommends that CNSOPB place a condition on SOEP, requiring the development and implementation of a specific training plan for gas development and production workers.

#### **RECOMMENDATION 26**

The Panel recommends that the Province of Nova Scotia take the lead to ensure that the selection process for service and supply bases is reviewed by the Benefits Advisory Committee (BAC). The BAC should issue a public report on the rationale for all its recommendations.

#### **RECOMMENDATION 27**

The Panel recommends that once a decision on supply and service bases has been taken, SOEP be required to consult with pertinent government authorities on strategies for mitigating accommodation impacts, such as providing additional temporary construction camps.

#### **RECOMMENDATION 28**

The Panel recommends that SOEP be prepared to sell gas to shippers at the Goldboro gas plant whether or not the shipper has entered into a Transportation Agreement with M&NPP.

#### **RECOMMENDATION 29**

The Panel recommends that M&NPP be required to file with the NEB, prior to the commencement of construction, the executed Backstop Agreement.

#### **RECOMMENDATION 30**

The Panel recommends to the NEB that Maritimes and Northeast Pipeline Management Ltd. be designated as a Group 1 Company for the purposes of regulation under the NEB Act.

#### **RECOMMENDATION 31**

The Panel recommends to the NEB the approval of a forward test year cost of service methodology for M&NPP.

#### **RECOMMENDATION 32**

The Panel recommends to the NEB the use of a 25 percent common equity ratio by M&NPP. The Panel also recommends that the return on equity for the pipeline for the first five years of the Project be set at 13 percent.

#### **RECOMMENDATION 33**

The Panel recommends to the NEB that the provisions respecting toll design and laterals as contained in the "Joint Position on Tolling and Laterals" as set out in Appendix V of this Report, be approved.

#### RECOMMENDATION 34

The Panel recommends that construction plans be prepared for each watercourse crossing site in consultation with the appropriate regulatory agencies. These studies should include a consideration of all salmon rivers which will be crossed by the pipeline. The construction plans may refer to standard drawings or specifications as appropriate, but would as a minimum include consideration of erosion and sedimentation control, blasting requirements, habitat restoration and site restoration as required. The plans must be completed at least 60 days prior to construction and be provided to interested parties for comment, as well as being submitted for regulatory review.

#### RECOMMENDATION 35

The Panel recommends a condition requiring M&NPP at least 60 days prior to construction to prepare a report on the scheduling of water crossings in cooperation with appropriate regulatory authorities. The report must discuss back-up measures to resolve potential problems. The report must be available to all interested parties who request a copy.

Furthermore, the Panel recommend that, at least 30 working days prior to the commencement of construction of the pipeline, M&NPP submit to the appropriate regulatory authorities for approval, additional information regarding the stream crossings. The additional information shall set out:

- (a) the construction designs of the crossing;
- (b) proposed duration of the crossing;
- (c) in-stream timing restrictions identified by regulatory agencies;
- (d) an erosion and sediment control plan;
- (e) the site-specific mitigative and restorative measures to be employed as a result of consultations with regulatory agencies;
- (f) if a directional drilling method is used, the detailed drilling fluid plan addressing the methods of drilling fluid containment and storage, and specific methods for disposing of and/or recycling of the drilling fluids;
- (g) if blasting is required, the blasting plan, including comments from DFO;
- (h) the evidence to demonstrate that all issues raised by regulatory agencies have been adequately addressed, including all necessary updates to the environmental assessments where deficiencies have been identified;
- (i) the evidence to demonstrate that the proposed construction method and site specific mitigative and restorative measures are in compliance with federal and provincial legislation; and
- (j) the status of approvals, including environmental conditions.

#### RECOMMENDATION 36

The Panel recommends that at least 30 days prior to the commencement of construction, M&NPP file with the NEB the results of the acid generating rock studies, including any locations which would be affected by construction, the proposed mitigation measures, monitoring requirements and the results of consultation with provincial authorities.

The Panel recommends the following conditions for any approval of M&NPP that may be granted.

M&NPP shall, at least 30 working days prior to the commencement of construction of the pipeline, submit to the NEB for approval, additional information regarding the treatment method to deal with acid drainage and specific mitigative measures to be implemented at stream crossings. The additional information shall set out for each stream crossing to be affected:

- (a) the name and location of the stream;
- (b) the selected treatment method of the runoff water;
- (c) the proposed “Canadian Water Quality Guideline” values to be adhered to;
- (d) the site-specific mitigative and restorative measures to be employed as a result of consultation with regulatory agencies;
- (e) the evidence to demonstrate that all issues raised by regulatory agencies and other interested parties have been adequately addressed, including all necessary updates to the environmental assessments where deficiencies have been identified; and
- (f) the status of approvals, including environmental conditions.

#### **RECOMMENDATION 37**

To confirm that specific issues have been adequately addressed, the Panel recommends that, at least six months prior to the commencement of any construction activity requiring regulatory approval, M&NPP submit to the NEB for approval the final Environmental Protection Plan. Details of the proposed specific route for the pipeline should also be filed at that time, and shall include:

- (a) the results of all pre-construction surveys to identify special status species/habitat along the proposed corridor, including specific measures to be implemented;
- (b) an environmental issues list identifying all relevant effects of the selected route; and
- (c) the associated mitigation measures to render those environmental effects insignificant.

To ensure that post-construction environmental issues have not arisen, the Panel also recommends that the Proponents file with the NEB a post-construction environmental report within six months of the in-service date for the Project. The post-construction environmental report shall set out the environmental issues that have arisen and shall:

- (a) indicate the issues resolved as well as unresolved; and
- (b) describe the measures M&NPP proposes to take in respect of the unresolved issues.

#### **RECOMMENDATION 38**

The Panel recommends that M&NPP develop the Environmental Protection Plan in consultation with government agencies, stakeholder groups, interested parties and landowners.

The Panel also recommends that the NEB set a condition requiring M&NPP to implement an environmental compliance and monitoring program which would include the filing of post construction environmental reports to address Project-related environmental issues.

#### **RECOMMENDATION 39**

The Panel recommends that the operations, emergency response and environmental protection manuals be developed in consultation with relevant agencies, stakeholders and the public and be filed with the NEB as a condition of any approval.

#### **RECOMMENDATION 40**

The Panel recommends that the appropriate regulatory authorities ensure that M&NPP take all reasonable steps to avoid fragmenting natural and forested areas. The Panel recommends that the fragmentation of natural and forested areas be included in the M&NPP Issues List. This will require consideration and follow-up on steps to be taken at the detailed route design and construction stages.

#### **RECOMMENDATION 41**

The Panel recommends that M&NPP consult with the Provinces of New Brunswick and Nova Scotia on a monitoring approach for employment, training and procurement, and that an agreed approach be included as a condition of any Project approval .

#### **RECOMMENDATION 42**

The Panel recommends that the appropriate regulatory authorities ensure that the Proponents, at least six months prior to construction, submit a traffic study for the Goldboro area to the Province of Nova Scotia, the Municipality of the District of Guysborough and the NEB.

#### **RECOMMENDATION 43**

The Panel recommends that the governments of Canada, Nova Scotia and New Brunswick explore mechanisms for monitoring gas prices which would allow negotiations of prices in the market to occur, but which would assure parties that the results of those negotiations would not be disadvantageous to Canadian buyers. The price monitoring committee formed by the signatory governments to the October 31, 1985 Agreement on Natural Gas Prices and Markets might serve as a useful model.

#### **RECOMMENDATION 44**

The Panel recommends that the CNSOPB, Nova Scotia, New Brunswick and the NEB work together to set common standards and an integrated gas emissions monitoring process.

#### **RECOMMENDATION 45**

The Panel recommends that the appropriate regulatory authorities condition their approvals to require the Proponents to submit a written protocol or agreement spelling out Proponent Aboriginal roles and responsibilities for cooperation in studies and monitoring.

#### **RECOMMENDATION 46**

The Panel recommends that the appropriate regulatory authorities proceed with all necessary approvals for SOEP and M&NPP without further delay.



# Acknowledgements

The Panel wishes to express its sincere appreciation to a variety of individuals who contributed in various ways to the Joint Review Process.

We thank Noel Keeley and Marc Bolduc for the highly efficient production of 56 daily transcripts which collectively exceeded 12,000 pages.

We appreciate the efforts of National Energy Board staff members who provided strong support from the first scoping session up to the completion of the report: Christine Beauchemin, Ron Broadhead, Geoff Crew, Gord Daw, Boris DeJonge, Nancy Dubois, Claudine Dutil Berry, Jim Fox, Guy Hamel, Lillian Handelman, Caroline Healy, Brian Kelly, Ibrahim Konuk, Phil Kube, Lynda Lo, Jim McComiskey, Peter Noonan, Bill Ostafichuk, Lily Parr, Steve Pierce, Hans Pols, Deborah Steel and John Stewart.

The Panel also wishes to extend special thanks to its Secretariat and Halifax support staff: Bob Bailey, Millie Mason and Derek Walker.

Finally, it is with great pleasure that we acknowledge the very able assistance of Edward Sampson, Public and Community Affairs, and Bruce Young our Project Manager.



*Robert O. Fournier*

Robert Fournier  
Chairman

*K. W. Vollman*

K. W. Vollman  
Member

*John I. Sears*

John Sears  
Member

*A. Côté-Verhaaf*

A. Côté-Verhaaf  
Member

*Jessie L. Davies*

Jessie Davies  
Member



# Appendix I

## Agreement for a Joint Public Review of the Proposed Sable Gas Projects

Original signed by:

\_\_\_\_\_  
The Honourable Sergio Marchi  
Minister of the Environment  
Government of Canada

\_\_\_\_\_  
Date

\_\_\_\_\_  
Witness

Original signed by:

\_\_\_\_\_  
The Honourable A. Anne McLellan  
Minister of Natural Resources  
Government of Canada

\_\_\_\_\_  
Date

\_\_\_\_\_  
Witness

Original signed by:

\_\_\_\_\_  
Honourable F. Wayne Adams  
Minister of the Environment  
Province of Nova Scotia

\_\_\_\_\_  
Date

\_\_\_\_\_  
Witness

Original signed by:

\_\_\_\_\_  
Honourable Eleanor Norrie  
Minister of Natural Resources  
Province of Nova Scotia

\_\_\_\_\_  
Date

\_\_\_\_\_  
Witness

Original signed by:

\_\_\_\_\_  
R. Priddle, Chairman  
National Energy Board

\_\_\_\_\_  
Date

\_\_\_\_\_  
Witness

Original signed by:

\_\_\_\_\_  
J.E. Dickey  
Acting Chief Executive Officer  
Canada-Nova Scotia Offshore Petroleum Board

\_\_\_\_\_  
Date

\_\_\_\_\_  
Witness

## **1. PREAMBLE**

### **WHEREAS**

Mobil Oil Canada Properties (Mobil), Shell Canada Limited (Shell) and other Offshore Project participants are proposing an offshore natural gas development from several offshore gas fields in the vicinity of Sable Island offshore Nova Scotia. The proposal consists of a number of components including drilling, production and operating activities offshore and construction, processing and transportation of gas and liquids onshore,

### **WHEREAS**

Westcoast Energy and/or other Onshore Project participants are proposing a Project to transport natural gas from the gas processing plant proposed by Mobil, Shell, et al through Nova Scotia and New Brunswick to possible domestic markets and to markets in the northeastern part of the United States,

### **WHEREAS**

The Governments of Canada and Nova Scotia have environmental assessment responsibilities for the Onshore Project and the Offshore Project under the Canadian Environmental Assessment Act and the Nova Scotia Environment Act,

### **WHEREAS**

The National Energy Board has environmental assessment responsibilities under the Canadian Environmental Assessment Act and under the National Energy Board Act,

### **WHEREAS**

The Canada-Nova Scotia Offshore Petroleum Board has environmental assessment responsibilities under the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act and the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation (Nova Scotia) Act and wishes to undertake a public Review in relation to the proposed Development Plan, Canada Nova Scotia Benefits Plan, environmental impacts and socio-economic issues and any other plans specifically required by the Canada-Nova Scotia Offshore Petroleum Board respecting the Offshore Project, and

### **WHEREAS**

The environmental assessment processes of Canada and Nova Scotia allow the responsible ministers to enter into agreements for joint environmental assessment reviews and the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act and the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation (Nova Scotia) Act provide authority for the Canada-Nova Scotia Offshore Petroleum Board to enter into agreements for joint environmental assessment reviews.

### **THEREFORE**

The Parties to this agreement undertake to conduct a joint public Review for the environmental assessment of the Projects as described in the Project Description with the objective of harmonizing environmental assessment requirements to avoid delay, duplication and overlap, while ensuring that the responsibilities and requirements of each jurisdiction are respected.

It is further agreed that the joint public Review will also provide the forum for (a) the collection and examination of environmental evidence and to hear argument on the Environmental Effects of the Projects for use in subsequent deliberations and decisions on the applications which will occur in the NEB regulatory process, and (b) the Commissioner to make available for public distribution the Development Application and for the Commissioner to collect information in relation to the Development Application for use in subsequent deliberations and recommendations to the Canada-Nova Scotia Offshore Petroleum Board.

## 2. DEFINITIONS

"Accord Acts" means the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act, the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation (Nova Scotia) Act, and any regulations passed thereunder; « lois de l'Accord »

"CNSOPB" means the Canada-Nova Scotia Offshore Petroleum Board;  
« OCNEHE »

"Commissioner" means the commissioner appointed pursuant to subsection 5.2 of this agreement to conduct a Review of the Development Application;  
« commissaire »

"Development Application" includes a Development Plan, a Canada-Nova Scotia Benefits Plan, an environmental impact statement, a socio-economic impact statement and any other information prescribed by the CNSOPB with regard to the Offshore Project; « demande de mise en valeur »

"Environment" means the components of the earth and includes

- (a) land, water, air and all layers of the atmosphere,
- (b) all organic and inorganic matter and living organisms,
- (c) the interacting natural systems that include components referred to in paragraphs (a) and (b), and
- (d) the socio-economic, health, cultural and other items referred to in the definition of Environmental Effect; «environnement»

"Environmental Effect" means:

- a) any change that a Project may cause in the environment, including any effect on socio-economic conditions, on health, on physical and cultural heritage, on the current use of lands and resources for traditional purposes by aboriginal persons, or on any structure, site or thing including that of historical, archaeological, paleontological or architectural significance, and
- b) any change to a Project that may be caused by the environment; « effets environnementaux »

"Environment Ministers" means Ministers of the Environment for Canada and Nova Scotia; «ministres environnementaux»

"Environmental Impact Statement" means a document completed by the proponent of a Project and containing an analysis of the Environmental Effects that are likely to result from the Project; « étude d'impact environnemental »

"Follow-up Program" means a program for :

- i) verifying the accuracy of the environmental assessment of the Project, and
- ii) determining the effectiveness of any measures taken to Mitigate the adverse Environmental Effects of the Project; « programme de suivi ».

"Letter of Comment" means a letter as referred to in s. 30 of the 1995 National Energy Board Rules of Practice and Procedure and for the purpose of item 13 of Schedule I means an unsworn written or oral submission that comments on the project, that describes the nature of that submittor's interest in the project and provides any relevant information explaining or supporting the submittor's comments. It does not give the submittor an intervenor status in the Review so the submittor cannot cross-examine witnesses or present final argument. Similarly, the submittor of a "Letter of Comment" is not subject to cross examination; « lettre de commentaires »

"Mitigate" means to eliminate, reduce or control the adverse Environmental Effects of the Project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or other means; « mesures d'atténuation »

"NEB" means the National Energy Board; « ONE »

"NEB panel" means, for the purposes of this agreement, the two permanent members of the National Energy Board and the temporary member of the National Energy Board appointed to the Panel pursuant to subsection 5.2 of this agreement; « membres de l'ONE »

"Offshore Project" means the proposal by Mobil Oil Canada Properties (Mobil), Shell Canada Limited (Shell) and other Offshore Project participants for an offshore natural gas development from several offshore gas fields in the vicinity of Sable Island offshore Nova Scotia. The proposal consists of a number of components including drilling, production and operating activities offshore and construction, processing and transportation of gas and liquids onshore. The Offshore Project includes any works, undertakings or activities referred to in the Project Description; « projet extracôtier »

"Onshore Project" means the proposal to transport natural gas from the Offshore Project to markets in the United States and Canada by Westcoast Energy Inc. and/or other onshore participants to transport natural gas from the outlet of the gas processing plant through Nova Scotia and New Brunswick to the Canada-United States border, to supply possible domestic markets and markets in the northeastern part of the United States. The Onshore Project includes any work, undertaking or activity referred to in the Project Description; « projet côtier et infracôtier »

"Panel" means the five (5) person environmental assessment Panel to be appointed pursuant to subsection 5.2 of this agreement; « commission »

"Parties" means the signatories to this agreement; « parties »

"Project" means the Offshore Project or the Onshore Project; « projet »

"Project Description" means the description referred to in item 2 of Schedule I to this agreement; « description du projet »

"Projects" means the Offshore Project and the Onshore Project; « projets »

"Responsible Authority" has the same meaning as set out in section 2 of the Canadian Environmental Assessment Act; « autorité responsable »

"Review" means the review procedures referred to subsections 3.2 to 3.5 inclusive and includes the oral public hearing held by the Panel on the environmental assessment of a Project; « examen »

### 3. PURPOSE OF THE AGREEMENT

- Purpose
- 3.1 The primary purpose of this agreement is to co-ordinate the environmental assessment requirements of the Parties by providing for a Review of the Environmental Effects likely to result from the Projects.
  - 3.2 The Review will meet the requirements under the Canadian Environmental Assessment Act respecting the joint establishment of a review panel.
  - 3.3 The Review will meet the environmental assessment requirements of the Nova Scotia Environment Act.
  - 3.4 The Review will meet the NEB requirements under the National Energy Board Act and Regulations so that the NEB panel may hear evidence and argument on the Environmental Effects of the Projects.
  - 3.5 The Review will meet the requirements of the CNSOPB and the Commissioner under the Accord Acts and more specifically, will enable:
    - (a) the CNSOPB to require the proponent of the Offshore Project to submit and make available for public distribution a Development Application, and
    - (b) the Commissioner to collect information for use in subsequent deliberations and recommendations to the CNSOPB regarding a Development Application.

### 4. PANEL TERMS OF REFERENCE

- 4.1 The Panel shall conduct its Review of the Environmental Effects of the projects in accordance with the Terms of Reference appended as Schedule I to this Agreement.

### 5. CONSTITUTION AND POWERS OF THE PANEL

- Panel Membership
- 5.1 Persons appointed to the Panel shall be unbiased, free from any conflict of interest relative to the Project, have knowledge or experience relevant to its anticipated Environmental Effects, and have the powers provided for in section 35 of the Canadian Environmental Assessment Act.
  - 5.2 The Panel shall consist of five (5) members for the Review of the Projects:
    - (a) two (2) members shall be permanent members of the NEB;
    - (b) one member shall satisfy the eligibility requirements for a temporary member of the NEB and shall be jointly nominated by the Environment Ministers, the CNSOPB and the Chairman of the NEB. A request shall be made to the Minister of Natural Resources to recommend to the Governor in Council the appointment of that proposed member as a temporary member of the NEB. Should that proposed member's appointment as a temporary member of the NEB be confirmed, that member shall be appointed to the Panel by the Environment Ministers;
    - (c) one member shall be jointly appointed by the Environment Ministers and the CNSOPB. For the Offshore Project only, the member jointly appointed under this paragraph will also be acting as a Commissioner pursuant to the Accord Acts, and
    - (d) one member shall be jointly appointed by the Environment Ministers.

Replacing a Member	5.3 Should there be a need to replace a member of the Panel, the new member will be appointed pursuant to the procedures described in 5.2.
Chairperson	5.4 The member appointed pursuant to paragraph 5.2(b) shall be the Panel chairperson.
NEB Evidence	5.5 During the Review, the Panel will hear evidence and argument on the Environmental Effects of the Projects as necessary for subsequent deliberations and decisions by the NEB Panel under the NEB regulatory process.
NEB Regulatory Process	5.6 The NEB panel will, as early as possible following completion of the Panel’s hearing on each Project, continue with its hearing on the balance of the application under the NEB Act, in conformity with the procedures and requirements under that Act and the Regulations.
CNSOPB Regulatory Process	5.7 The Panel will, during the Review of the Offshore Project, collect information for use in the Commissioner’s subsequent deliberations and recommendations to the CNSOPB regarding the Development Application with the exception of the Environmental Effects which shall be addressed by the Panel and reported thereon in accordance with item 14 of Schedule I to this agreement.

## 6 REPORTING AND DECISION MAKING

Reporting Requirements	6.1 Following the Review of a Project, a report pursuant to item 14 of Schedule I to this agreement will be submitted to the Parties.  6.2 Concurrent with the completion of the Review of the Offshore Project, the Commissioner shall also report to the CNSOPB and make recommendations with respect to the Development Application, with the exception of the Environmental Effects reporting completed by the Panel in accordance with item 14 of Schedule I to this agreement.
Decision Making	6.3 On completion of the Review of a Project, the Parties and the Responsible Authorities will assume their environmental assessment decision-making responsibilities in connection with the Project and will ensure that their environmental assessment decisions are made in a timely fashion with the objective of announcing these decisions in a coordinated manner and not later than sixty (60) days following release of the Panel report.

## 7. ADMINISTRATIVE MATTERS

Panel Secretariat	7.1 Secretariat duties and support to the Panel will be provided by the Parties in accordance with an agreement to be developed by assigned officials.  7.2 Advice and guidance on information and filing requirements may be provided to the proponents by an interim secretariat established by the Parties in anticipation of the appointment of the Panel.  7.3 The Panel secretariat will conduct an information program to advise the public of the Review process and the opportunities available for public involvement. Budget  7.4 Prior to the appointment of the Panel, the Parties will prepare a budget for the Review described in this agreement.
Costs	7.5 Costs associated with the Review will be shared among the Parties in accordance with an agreement developed by their assigned officials.

## 8. OTHER

Public Registry	8.1 A public registry for the Review shall be established and maintained in accordance with the requirements of the Canadian Environmental Assessment Act and the Nova Scotia Environment Act.
Participant Assistance	8.2 Participant assistance will be provided through the existing program of the Canadian Environmental Assessment Act.
Announcement of Review	8.3 The Review will be announced in a manner which accommodates the requirements of the Parties.
Release of the Agreement	8.4 This agreement, including the terms of reference for the Review, shall be made available to the public before the commencement of the hearings conducted by the Panel.
Participation by Government Officials	8.5 Nothing in this agreement should be construed as restricting participation in the Review by federal or provincial government departments or agencies.
Release of Panel Report	8.6 Following receipt by the Parties, the Panel report for each Project will be released in a coordinated and timely manner on behalf of the Parties by the Environment Ministers of jurisdictions with environmental assessment decision-making responsibilities for that Project.
Announcements	8.7 The Parties or their designates will coordinate any announcements regarding the matters addressed in this agreement.
Amendment or Termination of the Agreement	8.8 The terms and provisions of this agreement may be amended by the written approval of all Parties. 8.9 In the event of a dispute between the Parties, a minimum of thirty (30) days will be allowed to resolve the dispute. If an acceptable resolution cannot be reached, the affected Party(ies) may, prior to the commencement of hearings, withdraw from this Agreement with a minimum of seven (7) days written notice to the other Parties. Parties may not withdraw from this Agreement following the commencement of hearings.
Approval of Offshore Project	8.10 Should the Offshore Project be approved, such approval should not be construed as constituting an approval of the Onshore Project to transport the natural gas to market.

**SCHEDULE I**  
**(Subsection 4.1 of the Agreement)**

**ENVIRONMENTAL ASSESSMENT PANEL TERMS OF REFERENCE**

- General 1 The Panel will conduct a Review of the Environmental Effects of the Projects based on the Project Description.
- Scope of the Review 2 The Project Description for the Review by the Panel will be submitted by the Environment Ministers after consultation with the other Parties.
- 2.1 The Panel will include in its Review of the Projects, consideration of the factors determined by the Environment Ministers after consultation with the other Parties and identified in Appendix I.
- Components of the Review 3 The Panel will conduct its Review in a manner which shall promote and facilitate public participation.
- 4 The Review procedures will be set by the Panel and shall include the NEB Rules of Practice and Procedure as varied by the NEB panel. The Rules of Practice and Procedure, as varied, will be published before the commencement of hearings.
- 5 The Panel will gather all documentary evidence it requires for the conduct of its Review. This includes but is not necessarily limited to an Environmental Impact Statement and supporting documents which contain:
- (a) information on the Project;
  - (b) existing and new technical, environmental or other information relevant to the Review;
  - (c) for the Offshore Project, information in response to the recommendations of the Sable Island Environmental Assessment Panel and the Socio-Economic Review Panel following their Reviews of the Venture Development Project (1983);
  - (d) supplementary information including a description of any proponent-initiated public consultation program, its nature and scope, issues identified, commitments made and outstanding issues;
  - (e) proposed work plans of the proponent(s) and terms of reference or guidelines relating to the preparation of an Environmental Impact Statement for the consideration of the Panel; and
  - (f) all necessary regulatory information required by the NEB panel and the Commissioner.
- 6 The Panel will require the proponent to distribute the information referred to in item 5 for examination and comment by the public and other stakeholders to determine whether additional information should be provided before the convening of the Panel hearing. This information will be made available for public examination and comment for a period of not less than thirty (30) days and not more than sixty (60) days. Comments made by the public or other stakeholders pursuant to this item shall be filed in writing with the Panel.
- 7 During the public examination period described in item 6, the Panel may hold Scoping Meetings and Information Sessions with the public, other stakeholders and the proponent to assist the Panel, the NEB panel and, in the case of the Offshore Project only, the Commissioner, in formulating issues that should be considered in the Review. The location of any such meetings will be determined by the Panel.
- 8 Written comments received pursuant to item 6 will be immediately provided to the proponent by the Panel. The proponent will, as appropriate, provide to the Panel its response to the received comments not later than fifteen (15) days following completion of the period for public examination and comment.

9 Should the Panel, the NEB panel or, in the case of the Offshore Project only, the Commissioner, identify deficiencies after reviewing the information referred to in item 5 and in consideration of any comments received from the public, other stakeholders or the proponent pursuant to items 6, 7 and 8, additional information may be requested from the proponent. Any request for additional information shall be issued within thirty (30) days following the expiry of the period for public examination and comment described in item 6 or thirty (30) days following receipt of written comments from the proponent as described in item 8, whichever occurs later.

10 The Panel will schedule and announce the start of its public hearing on a Project once the Panel, the NEB panel and, in the case of the Offshore Project only, the Commissioner, are satisfied that sufficient information has been provided. A minimum of thirty (30) days public notice will be provided prior to the start of the Panel hearing.

11 Prior to the commencement of the hearing and pursuant to the NEB Rules of Practice and Procedure, a written process may be held whereby the proponent may ask questions to the intervenors on their written evidence and the intervenors may ask questions to the proponent or other intervenors on their written evidence.

12 The Panel will hold its hearing in locations determined by the Panel within the area likely to be affected by the Project or in any area reasonably close to the area where the Project is proposed to be carried out.

13 The public will be invited to participate in all Panel hearings. The Review Procedures will allow the hearings to be conducted under the following two types of approaches:

(a) for smaller communities, structured but informal hearings in the traditional manner of environmental assessment by review panels to allow residents of those communities to make their views and opinions known to the Panel. The NEB panel will treat the information obtained during these hearings as oral "Letters of Comment"; and

(b) for major population centre(s), formal environmental assessment hearings dealing with:

- (i) a broad range of environmental issues of interest to the general public and government departments and agencies, and
- (ii) specific environmental issues identified by the Panel and the NEB panel.

14 The Panel will prepare and submit to the Parties a report on its conclusions and recommendations regarding the nature and significance of the Environmental Effects of a Project, including any Mitigation measures and Follow up Program, and the comments received from the public. The Panel will provide in the report its rationale for any such conclusions and recommendations. The report will be submitted at the earliest possible time with the objective of not exceeding two hundred and seventy (270) days following receipt of the information referred to in item 5 of this Schedule. The report of the Panel will satisfy official language requirements.

15 Notwithstanding subsection 6.2 of this agreement, the Commissioner shall, in the case of the Offshore Project, report to the CNSOPB within two-hundred and seventy (270) days of receipt of the Development Application in accordance with the requirements of the Accord Acts.

16 The Panel may secure the services of independent specialists who are not members of the Secretariat or the staff of the government departments, agencies or Boards participating in the development, establishment or operation of the review. These independent specialists may be retained to provide information, assistance and advice on scientific and technical issues. The names of any such specialists retained and their advice to the Panel will be made public. Independent specialists retained by the Panel may be requested to appear before the Panel.

## (Item 2.1 of Schedule I)

### **SABLE GAS PROJECTS FACTORS TO BE CONSIDERED FOR THE REVIEWS**

The Environment Ministers after consultation with the other Parties have determined that the following factors are to be taken into consideration by the Panel for its Reviews of the Projects:

1. Project description throughout its life cycle (construction, operation, decommissioning, and abandonment),
2. Purpose of the Projects,
3. Need for the Projects,
4. Alternatives to the Projects,
5. Alternative means of carrying out the Projects that are technically and economically feasible and the Environmental Effects of any such alternative means,
6. The temporal and spatial boundaries of the study area(s),
7. The environment, including the socio-economic environment, which may reasonably be expected to be affected by the Projects,
8. The Environmental Effects of the Projects, including the Environmental Effects of malfunctions or accidents that may occur in connection with the Projects and any cumulative Environmental Effects that are likely to result from the Projects in combination with other projects or activities that have been or will be carried out ,
9. The significance of the Environmental Effects referred to in item 8,
10. The socio-economic effects of the Projects,
11. Measures, including contingency and compensation measures as appropriate, that are technically and economically feasible and that would Mitigate any significant adverse Environmental Effects of the Projects,
12. Follow-up and monitoring programs including the rationale for such programs,
13. The capacity of renewable resources that are likely to be significantly affected by the Projects to meet the needs of the present and those of the future,
14. Residual adverse effects and their significance,
15. Comments from the public and government agencies, and
16. The proponents' commitment to the content of their Environmental Assessment Documents.

# Appendix II

## Biographies of Panel Members

**Dr. Robert Fournier** is Professor of Oceanography, Executive Director of Ocean Studies and Associate Vice - President (Research & International Relations) at Dalhousie University. He is a former member of the National Advisory Board on Science and Technology, the Science Council of Canada and he is the former Chair of the Nova Scotia Council of Applied Sciences and Technology. Dr. Fournier also chaired the Halifax Harbour Task Force and was a member of the Northern Cod Review Panel.

**Jessie L Davies** is the Director of the Environment and Sustainable Development Research Centre at the University of New Brunswick (UNB). Ms Davies has been involved in environmental planning and assessment both as a teacher and a consultant to government and industry. Ms Davies has acted as project manager or coordinator for a wide range of industrial and infrastructure projects in Atlantic Canada including the Northumberland Strait. Ms Davies is the incoming President of the Nature Trust of New Brunswick.

**Dr. John T. Sears** is a retired Professor of Business Administration and Academic Vice - President (retired) at Saint Francis Xavier University ( St. F.X.) . Dr. Sears has had a long and distinguished academic career in the fields of Business Administration . Dr. Sears has been Chair or member of many Review Committees including Nova Scotia Voluntary Planning and the Nova Scotia Board of Commissioners of Public Utilities.

**Mme Anita Côté-Verhaaf** is a member of the National Energy Board. Following graduation in economics from the University of Montreal ( MSc. ) Mme Anita Côté-Verhaaf held senior economist and regulatory - advisory positions in the private sector prior to her appointment as a Board Member in 1989.

**Kenneth W. Vollman** is currently Vice Chairman of the National Energy Board and the Administrator of the Northern Pipeline Agency. He is a graduate of the University of Saskatchewan ( BSc. and MSc. ) Prior to his appointment as a Board Member, Mr. Vollman held several senior engineering staff positions with the National Energy Board. Mr. Vollman is a member of the Association of Professional Engineers of Alberta .



# Appendix III

## PROJECT DESCRIPTIONS PROVIDED BY THE MINISTERS OF ENVIRONMENT FOR CANADA AND THE PROVINCE OF NOVA SCOTIA

### DESCRIPTION OF OFFSHORE PROJECT

The Ministers of the Environment for Nova Scotia and Canada have submitted the following description of the Offshore Project to the Joint Review Panel pursuant to section 2 of the Terms of Reference:

The basic components of the preferred development plan for the Sable Offshore Energy Project are:

- the phased development of six offshore natural gas fields in the general proximity of Sable Island: Venture, Thebaud, North Triumph, South Venture, Alma and Glenelg;
- a central production and processing facility at Thebaud to support production from the Thebaud field wells and provide central dehydration facilities for removal of dissolved water. Gas from the five satellite fields will be gathered through three-phase (gas, hydrocarbon liquids and water/monoethylene glycol) interfield flowlines;
- normally unmanned offshore platforms at the five satellite fields to gather production from the wells, and remove produced water;
- a two-phase (gas and hydrocarbon liquids) main subsea production gathering line to landfall in the Country Harbour area, Nova Scotia;
- an onshore liquids slugcatcher in the Country Harbour area;
- an onshore gas processing plant in the Country Harbour area to condition the gas to achieve sales gas specifications and recover the natural gas liquids;

- a buried onshore Natural Gas Liquids (NGL) pipeline for the transportation of natural gas liquids from the gas plant to Point Tupper, Nova Scotia;
- natural gas liquids processing and shipping facilities at Point Tupper to separate the hydrocarbon liquids into stabilized condensate and a liquefied petroleum gas (LPG) mix. The LPG may be further processed to yield propane and butane;
- the shipment by road tanker, rail tanker or barge of LPGs, or separate propane and butane products;
- the shipment of stabilized condensate from an existing marine terminal at Point Tupper, Nova Scotia; and,
- other aspects as described in Volume 3 and other parts of the submissions made by the Sable Offshore Energy Project proponents.

### DESCRIPTION OF ONSHORE PROJECT

The Ministers of the Environment for Nova Scotia and Canada have submitted the following description of the Onshore Project to the Joint Review Panel pursuant to section 2 of the Terms of Reference:

The project referred to the Panel for public review is that described by the proponent's application and generally summarized as follows:

Maritime and Northeast Pipeline Management Ltd. have submitted a proposal for a pipeline project to ship natural gas developed by the Sable Offshore Energy Project ("SOEP") to markets in the Maritimes and the United States. The Maritime and Northeast Pipeline Project

("the M&NPP") will interconnect with the tailgate of the SOEP gas processing plant to be located near Country Harbour, Nova Scotia. The facilities will consist of 558 kilometres ("km") of 762 millimetre ("mm") O.D. (NPS 30) pipeline extending from the Country Harbour area, first in a northwesterly direction passing near New Glasgow and Tatamagouche, Nova Scotia crossing the Nova Scotia New Brunswick border near Tidnish. Approximately 234 km of pipeline will be located in Nova Scotia.

The pipeline will traverse New Brunswick in a westerly direction passing near Moncton and Chipman. From Chipman it will proceed in a southwesterly direction passing near Fredericton, to the international border near St. Stephen, New Brunswick. Approximately 324 km of pipeline will be located in New Brunswick.

A custody transfer station, consisting of 762 mm inlet and outlet piping, gas filtration, measurement, quality monitoring and a control building, will be located near the SOEP gas plant. There will be main line valves (MLV) at a nominal 40 km spacing along the pipeline. Small 4 m<sup>2</sup> pre-fabricated buildings will be located at each MLV and launchers and/or retrievers will be located at two MLV locations. Necessary access roads, power and communications lines, as well as any other pipeline-related details contained in the submission will be included.



# Appendix IV

## Revised List of Issues

Note: The following revised list of issues are in addition to the factors listed in the Agreement for a Joint Public Review of the Proposed Sable Gas Projects, Appendix I.

1. The effects of the offshore production and pipeline facilities on the environment and the use of the environment, and the effects of the environment on those facilities, including, but not limited to:

- The general effects of drilling and production waste discharges, such as drilling muds, drill cuttings especially if oiled, produced water, produced sand, etc. on marine resources including benthic communities, fish, sea birds and marine mammals.
- The exposure of fish to hydrocarbons from oil spills or routine discharges that may cause tainting or the perception of tainting thereby adversely affecting their marketability.
- The resuspension of seafloor sediments during construction of the offshore pipeline and its effects on habitat.
- The potential disruption/damage to the local aquaculture industry related to construction of the offshore pipeline in the landfall area.
- The effects of underwater noise on marine mammals.
- Harmful alteration or destruction of fish habitat during construction of offshore facilities.
- Loss, destruction or damage to archeological or heritage resources during construction of facilities.

- Exclusion zones around the offshore facilities precluding the entry of vessel traffic including fishing boats.

- The effects of increased traffic (including vessels and aircraft) on marine mammals, especially northern bottlenose whales.

- The potential impacts to navigation.

2. The effects of the gas plant, liquids line and Point Tupper processing facilities on the environment and the use of the environment, and the effects of the environment on those facilities, including but not limited to:

- Groundwater and soil contamination, waste disposal, and air emissions, and general effects on water quality;
- Destruction of wildlife habitat/ destruction of forest resources.
- Harmful alteration or destruction of fish habitat during water crossings by the liquids line.
- The environmental and socio-economic effects of atmospheric noise from the gas plant and gas liquids plant.
- Loss, destruction or damage to archeological or heritage resources during construction of facilities.
- Conflicts with existing land use in the plant area and liquids line route.

3. The effects of the onshore pipeline on the terrestrial and aquatic environments in Nova Scotia and New Brunswick and on the use of the environment, including but not limited to:

- The sedimentation of watercourses during pipeline crossings.

- Loss, destruction or damage to archeological or heritage resources during construction of facilities.

- Conflicts with existing land use along the pipeline route.

- Destruction of or damage to wildlife habitat.

4. The effects of accidents or malfunctions that may occur in connection with the project, including pipeline ruptures and spills.

5. The cumulative environmental effects that are likely to result from the Projects in combination with other projects or activities that have been or will be carried out.

6. The protection of areas of special significance, including the Gully and Sable Island.

7. The location of a base (or bases) for standby and supply vessels.

8. The Canada and Nova Scotia employment and procurement benefits and how they will be reported.

9. Compensation plans for damage and loss of access related to offshore facilities and operations.

10. Land acquisition for the onshore facilities.

11. Accommodation and services for the work force during the construction phases for both the onshore and offshore projects.

12. The training of regional and local workforces.

13. Inspection and monitoring of construction and operating activities.
14. The economic benefits to Canada and the provinces of Nova Scotia and New Brunswick.
15. The effects of the Projects on the quality of life and on the current use of lands and resources for traditional purposes by aboriginal persons.
16. The economic feasibility of the project having regard to, among other things, the likelihood that the facilities will be used at a reasonable level over their economic life and that the associated tolls will be paid.
17. The Proponents' plans to provide natural gas in the Nova Scotia and New Brunswick markets during the lifetime of the project.
18. The outlook for the long-term demand for natural gas in the proposed markets.
19. The appropriateness of the location of the proposed facilities.
20. The appropriateness of the design of the proposed facilities.
21. The appropriate tolls, toll methodology and tolling principles.
22. The appropriate method of toll and tariff regulation.
23. The appropriate terms and conditions to be included in any certificate which may be issued by the National Energy Board.
24. The decommissioning and abandonment of offshore and onshore facilities.

# Appendix V

## **Joint Position on Tolling and Laterals among: Province of Nova Scotia, Province of New Brunswick, Sable Offshore Energy Project and Maritimes & Northeast Pipeline**

This agreement among the Province of Nova Scotia, the Province of New Brunswick, Sable Offshore Energy Project (SOEP) and Maritimes & Northeast Pipeline (M&NP), represents the good faith efforts of all parties to find a solution to the conflicting toll recommendations submitted to the Joint Review Panel. Implicit in this Joint Position is a recognition of the significant value and importance of the timely development of both Sable natural gas and M&NP to the economic development of the Provinces.

### ***Tolls***

Subject to the qualifications outlined below, the signatories confirm their agreement with M&NP's applied-for postage stamp tolling structure as presented to the Joint Review Panel. In order to provide both Nova Scotia and New Brunswick with lower rates to help develop the Canadian market, M&NP agrees to discount firm service tolls to delivery points located in Nova Scotia by ten (10%) percent for the initial eight (8) years and four (4%) percent for each of the next succeeding two (2) years. M&NP further agrees to discount firm service tolls to delivery points located in New Brunswick by four (4%) percent for the initial three (3) years. It is agreed that M&NP will reflect any revenue deficiency associated with the discounts in an adjustment to its depreciation.

### ***Laterals***

Subject to the qualifications outlined below, the signatories confirm their agreement with M&NP's applied-for lateral policy as presented to the Joint Review Panel. M&NP commits to develop work plans for mainline laterals to Halifax and Saint John, consistent with its lateral policy, to facilitate in-service dates of November, 1999 assuming appropriate market support. M&NP will apply, at the appropriate time, to the NEB for regulatory approval of these laterals. M&NP further commits to develop work plans for laterals to Cape Breton and northern New Brunswick for future in-service dates as demand reaches an economic threshold. While the Halifax and Saint John mainline laterals will be subject to federal jurisdiction, M&NP agrees that the construction, ownership and operations of any future laterals may be the subject of provincial jurisdiction should a provincial government prefer that M&NP not construct, own or operate further laterals within the province.

In order to facilitate early service to local communities in Nova Scotia and New Brunswick, the SOEP Producers undertake to keep available for contracting by local distribution companies on commercially acceptable terms and conditions, 10,000 MMBtu/day of gas for each province (total of 20,000 MMBtu/day) for a period of the initial three (3) years. M&NP will continue its efforts to identify, develop and serve markets in New Brunswick and Nova Scotia.

### ***Timing and Support***

New Brunswick and Nova Scotia recognize the additional risk borne by M&NP pursuant to this Joint Position and agree to support M&NP in achieving all federal regulatory approvals, without delay, and further agree to support M&NP in achieving, without delay, the necessary federal Governor-in-Council approvals.

The signatories agree that should the Joint Panel not adopt this joint position each signatory will support its own recommendations with respect to tolls and laterals as previously advanced at the hearing.

**Agreed and confirmed on this 19th day of June, 1997.**



# Appendix VI

## National Energy Board

### Ruling on Comparative Hearings and Deferral of Decision-Making

This document provides the decision on the issue of comparative hearings and deferred decision making, which was argued during final argument in the Joint Public Review of the Sable Gas Projects.

#### Deferral or Delay of The National Energy Board Decision

Some parties argued that the NEB should not issue a decision with respect to the certification of the M&NPP pipeline until such time as competing applications made by Tatham Offshore Inc. and TQM Pipeline could be filed, heard and be ready for decision. In effect, those parties argued that the Board had a duty to hold a comparative hearing of these Projects.

In putting forward this argument parties tended to focus on two aspects of the issue. Firstly, it was asserted that the American *Ashbacker Doctrine*, which arose in the context of statutory powers exercised in that country on the basis of the public convenience and necessity test, applied to the Board's consideration of the matters in the cases before it. Secondly, it was argued that the general principles of fairness and natural justice required a quasi-judicial body like the Board to provide a comparative hearing of the proposal before it and any alternative proposals.

#### (a) The Public Convenience and Necessity Test

Section 52 of the *National Energy Board Act* is the operative section in respect of the applications filed by both SOEP and M&NPP, and was important in connection with the question of comparative hearings because of the presence of the test of present and future public convenience and necessity, the same test which underpins the American *Ashbacker Doctrine*. Section 52 states:

The Board may, subject to the approval of the Governor in Council, issue a certificate in respect of a pipeline if the Board is satisfied that the pipeline is and will be required by the present and future public convenience and necessity and, in considering an application for a certificate, the Board shall have regard to all considerations that appear to it to be relevant, and may have regard to the following:

- (a) the availability of oil or gas to the pipeline;
- (b) the existence of markets, actual or potential;
- (c) the economic feasibility of the pipeline;
- (d) the financial responsibility and financial structure of the applicant, the methods of financing the pipeline and the extent to which Canadians will have an opportunity of participating in the financing, engineering and construction of the pipeline; and
- (e) any public interest that in the Board's opinion may be affected by the granting or the refusing of the application.

The French version of section 52 states as follows:

Sous réserve de l'agrément du gouverneur en conseil, l'Office peut, s'il est convaincu de son caractère d'utilité publique, tant pour le présent que pour le futur, délivrer un certificat à l'égard d'un pipeline; ce faisant, il tient compte de tous les facteurs qu'il estime pertinents, et notamment de ce qui suit:

- a) l'approvisionnement du pipeline en

pétrole, gaz ou autre produit,

- b) l'existence de marchés, réels ou potentiels;
- c) la faisabilité économique du pipeline;
- d) la responsabilité et la structure financières du demandeur et les méthodes de financement du pipeline ainsi que la mesure dans laquelle les Canadiens auront la possibilité de participer au financement, à l'ingénierie ainsi qu'à la construction du pipeline;
- e) les conséquences sur l'intérêt public que peut à son avis, avoir sa décision.

In *Union Gas Co. of Canada v Sydenham Gas & Petroleum Co. Ltd.* (1957), 7 DLR (2d) 65, [1957] SCR 185, 75 CRTC 1 the Supreme Court of Canada construed the phrase "public convenience and necessity". Justice Rand stated in that case:

It was argued, and it seems to have been the view of the Court [of Appeal], that the determination of public convenience and necessity was itself a question of fact, but with that I am unable to agree: it is not an objective existence to be ascertained; the determination is the formulation of an opinion, in this case, the opinion of the Board only.

In the subsequent case of *Memorial Gardens Ass'n (Canada) Ltd. v Colwood Cemetery Co. et al* (1958), 13 DLR (2d) 97, [1958] SCR 353, 76 CRTC 319 Justice Abbott, speaking for the Supreme Court said:

As this Court held in the *Union Gas* case the question whether public convenience and necessity requires a certain action is not one of fact. It is predominantly the formulation of an opin-

ion. Facts must, of course, be established to justify a decision by the Commission but that decision is one which cannot be made without a substantial exercise of administrative discretion. In delegating this administrative discretion to the Commission the Legislature has delegated to that body the responsibility of deciding in the public interest, the need and desirability of additional cemetery facilities, and in reaching that decision the degree of need and of desirability is left to the discretion of the Commission.

When such an opinion has been formulated, an appeals court will not substitute its own opinion for the opinion of the regulator. As Chief Justice Kerwin stated in the *Union Gas* case:

The Court of Appeal apparently considered that it had power to substitute its opinion for that of the Board treating the question of public convenience and necessity as a question of fact. I am unable to agree with that view.

Thus, it has been held that the test of present and future public convenience and necessity is primarily a matter of reasoned opinion, based upon an appropriate factual basis, that is within the sole discretion of the regulatory body. In the context of the GH-6-96 proceeding, a number of parties cited the *Ashbacker doctrine* for the proposition that the Board must conduct a comparative hearing of both the TQM and M&NPP applications before rendering a decision on either application.

The case authority cited in support of that proposition was the judgment of the Supreme Court of the United States in *Ashbacker Radio Corp. v Federal Communications Commission* 326 U.S. 327 (1945). In that case, the Federal Communications Commission of the United States had before it an application for a radio broadcasting licence at Grand Rapids, Michigan, as well as a second application for a radio broadcasting licence at Muskegon, Michigan. Both applications sought to use the same frequency and both communities were in sufficient geographical proximity to each other to ensure a conflict in the radio spectrum if both appli-

cations were successful. The FCC found that both applications were actually exclusive and, pursuant to the procedure laid down in the U.S. statute, it applied the public convenience and necessity test and granted the Grand Rapids application through a non-hearing procedure. The Commission then set the remaining Muskegon application down for a hearing. The unsuccessful applicant sought judicial review of the FCC decision.

In the Supreme Court of the United States Justice Douglas said of the Commission's actions that:

It is thus plain that s. 309(a) not only gives the Commission authority to grant licences without a hearing, but also gives applicants a right to a hearing before their applications are denied. We do not think it is enough to say that the power of the Commission to issue a license on a finding of public interest, convenience or necessity supports its grant of one of two mutually exclusive applications without a hearing of the other. For if the grant of one effectively precludes the other, the statutory right to a hearing which Congress has accorded applicants before denial of their applications becomes an empty thing. We think that is the case here.

In *Aeronautical Radio Inc. v Federal Communications Commission* 928 F.2d 428 (1991) the U.S. Court of Appeals for the District of Columbia succinctly summed up the *Ashbacker Doctrine* in the following terms:

*Ashbacker* involved the interplay between sections 309(a) and 309(e) when two mutually exclusive and bona fide applications are simultaneously pending before the Commission. The Court recognized that, in such cases, a section 309(a) grant of an application without a hearing results in an approval of the application granted and a rejection of all pending applications with which it is mutually exclusive. Thus, the causal link between the grant of one application without a hearing and the de facto denial of another prior to hearing is central to the *Ashbacker* holding.

However, in *Reuters Limited v Federal Communications Commission* 781 F.2d 946 (1985) Justice Starr of the U.S. Court of Appeals for the District of Columbia Circuit stated: "Ashbacker's teaching applies not to prospective applicants, but only to parties whose applications have been declared mutually exclusive."

*Ashbacker* has been cited in one Canadian case; *Re Wah Shing Television & Partners Limited Partnership and Chinavision Canada Corp.*, [1984] 48 O.R. (2d) 166 (Ont. H.C.). That case involved a decision of the CRTC to licence a television station in Toronto to broadcast in the Chinese language, although the test which had to be applied by the regulator in that case was not the public convenience and necessity test. An unsuccessful applicant sought leave to appeal the Commission's decision to the Federal Court of Appeal and, in the interim, applied to the Ontario High Court of Justice for an interlocutory injunction to prevent *Chinavision* from commencing to broadcast. One of the grounds for seeking the injunction was that a comparative hearing before the CRTC was a procedural requirement under the principles of natural justice. Justice Holland stated:

The submission of *Wah Shing* is that the very method of structuring and arranging the hearings giving rise to these proceedings, including the recognition that the parties to this were in competition, require that the commission comment upon the respective components in each application, giving its reasons for its conclusion that *Chinavision* was the best applicant. Strong reliance was placed upon decisions of the United States' courts in *Ashbacker Radio Corp v Federal Communications Commission*; *Johnston Broadcasting Co. v Federal Communications Commission (Beach Intervenor)*; and *Plains Radio Broadcasting Co v Federal Communications Comm.(Lubbock County Broadcasting Co., Intervenor)*.

....

Where, as here, there are two competing and mutually exclusive applications, it may be seen to be logical and just that

fairness and natural justice require comparison. In the present case, then, I find that there is a substantial issue to be determined on this and upon whether the record discloses that Wah Shing's conduct relieved the commission from so doing.

For that, and for other reasons, Justice Holland granted the interlocutory injunction. However, leave to appeal from his order was granted and the interlocutory injunction stayed by the Divisional Court. Given the circumstances of the *Wah Shing case*, it would appear that the *Ashbacker doctrine* has not been incorporated into Canadian law.

In *Re Association for Public Broadcasting in British Columbia and Canadian Radio-television and Telecommunications Commission et al* (1980), 115 DLR (3d) 73 (FCA) a broadcast licence holder was undergoing a corporate restructuring at the same time that its licence came up for renewal. A prospective new applicant sought to have a competing application for the service submitted and heard by the CRTC. The Commission heard a motion to that effect and denied the request for a comparative hearing. On appeal, the Court said:

The appellant's further submission was that since a new license, under the Ellis application, was required to be issued, any person seeking the licence had the right to apply therefor at a public hearing. In its view, moreover, the Commission was not entitled to issue the new licence without and until giving notice to all interested parties that applications would be received for such a licence, all of the applications therefor had been dealt with by the Commission. I do not agree. Aside entirely from the fact that no application has ever been submitted by the Appellant, it having only expressed to the Commission the desire to submit one, the only duty on the Commission in connection with the issuance of a licence or the revocation of an existing one, is to hold a public hearing as required by s. 19 for the purpose of ensuring that the broadcasting policy enunciated by the Act is adhered to,

part of which policy is to ensure continuity of and quality of service.

In this case the Commission gave notice of a public hearing on the Ellis application, granted the appellant intervener status which gave it the right to make submissions in respect thereof, held the public hearing at which it heard the submissions of the appellant that no decision should be made on the application until it had disposed of the proposed application by the appellant and in its decision dealt with both the Ellis application and appellant's preliminary motion.

Thus, where the CRTC refused to hold a comparative hearing in circumstances where there was an application before it, and the prospect of another application being filed with respect to the same matter at a subsequent point in time, an error did not result. A similar outcome occurred in *Re Capital Cable Co-Operative and Canadian Radio-television and Telecommunications Commission and Victoria Cablevision Ltd.* (1976), 29 C.P.R. (2d) 111 (FCA). The Federal Court of Appeal said "We have not been persuaded ... that, in the circumstances of this case, the C.R.T.C. had the legal duty to hear the respondent's application for a licence before disposing of the appellant's application for renewal of its own licence."

Likewise, the Board has not been persuaded that an *Ashbacker*-type principle applies, in the circumstances of this case, to require it to extend its hearing of the SOEP/M&NPP applications in order to conduct a comparative hearing of applications which either have been or were to be filed after the hearing of the SOEP/M&NPP applications has been completed.

Finally, it ought to be noted that the Board heard arguments which suggested that approval of one of the projects could preclude other projects from coming to fruition. Essentially, it was asserted that the supply underpinning the existing project was limited and could be entirely taken up, in sequence, by SOEP and M&NPP, although there was evidence that additional Scotian Shelf resources could be

developed in the future.

The economics of pipeline construction also suggested to some of the parties that the first certificated pipeline would occupy the field and thus inhibit any new entrants into the pipeline industry in the Maritimes region, at least until new gas fields could be brought into production. There was evidence that the TQM group sought to enter into satisfactory commercial arrangements with the proponents of SOEP but were unsuccessful in that endeavour. The prominent position of the proponents was further enhanced or exacerbated, depending on the perspective of the parties, by the interrelationships between the proponents of SOEP and those backing M&NPP.

At this point in time, it is not possible to discern the pace of future development of the Sable fields or which companies may be involved, and what arrangements may be made with respect to the transportation of gas from future exploitation of Scotian Shelf resources. The evidence was simply too speculative for the Board to conclude that mutual exclusivity exists between the SOEP/M&NE applications and other proposed projects, on the basis of resource limitations or the economics of pipeline construction.

#### **(b) Applicability of General Principles of Natural Justice or Procedural Fairness**

The NEB does not have a practice of hearing section 52 or section 58 applications on a comparative basis. In 1992, the NEB denied a request to hold a comparative hearing in respect of proposals by Altamont pipeline and Pacific Gas and Transmission, and the Canadian counterparts of each, to ship natural gas from Canada to the United States. The only clear example of the use of a comparative hearing in the NEB context involved the selection of a Canadian component of the Alaska Natural Gas Transmission System in late 1970s. The Alaskan pipeline was the subject of a bilateral treaty between Canada and the United States and that treaty was incorporated into Canadian law through the Northern Pipeline Act. Canada, through the NEB, held a comparative hearing to determine which proposal

should be selected to build the Canadian component of the pipeline.

A number of parties referred us to past NEB decisions which dealt with the public interest aspects of the Board's jurisdiction. While considerations of the public interest imbue almost every aspect of the NEB's activities, there is neither a correlation between the public interest and the procedural right to a comparative hearing nor a public interest reason in the circumstances of this case to warrant a comparative hearing. Such a correlation would have to be specified in express statutory language, which Parliament has not chosen to do.

The cases of *Attorney General of Manitoba v NEB*, [1974] 2 F.C. 502 (FCTD); *Nakina v Canadian National Railway Company*, [1986] F.C. 426 (FCA) ; *Board of Education of the Indian Head School Division No. 19 v Knight*, [1990] 1 SCR 653; *Irvine v Restrictive Trade Practices Commission*, [1987] 1 SCR 181; *The Grand Council of the Crees (of Quebec) v Attorney General of Canada*, [1994] 1 SCR 159; *Cardinal v Director of Kent Institution*, [1985] 2 SCR 643; *International Association of Machinists & Aerospace Workers, Lodge 2309 v Canada Labour Relations Board*, (1988) 33 Admin. L.R. 227; *R v Alberta Labour Relations Board* (1983), 27 Alta. L.R. (2d) 338; *Syndicat des employés professionnels de l'Université v Université du Québec à Trois-Rivières*, [1993] 1 SCR 471; *St. Boniface Residents Association Inc. v The City of Winnipeg et al*, [1990] 3 SCR 1170; *Reference Re Canada Assistance Plan (B.C.)*, [1991] 2 SCR 526; *Attorney General of Hong Kong v Ng Yuen Shiu*, [1983] 2 A.C. 629 (P.C.); *Attorney General of Manitoba v Metropolitan Stores (MTS) Ltd.*, [1987] 1 SCR 110; *Industrial Gas Users Association v National Energy Board* (1990), 33 FTR 218 (FCTD); *Canada (Attorney General) v Canada (Commissioner of the Inquiry on the Blood System*, [1996] 3 F.C. 259 (FCTD); *The Canadian Red Cross Society v The Honourable Horace Krever* (FCA unreported January 17, 1997, A-600-96); *United Steelworkers of America, Local 9332*, [1995] 2 SCR 97; *Attorney General of Quebec and Keable v Attorney General of Canada*, [1979] 1 SCR 218; *Re Royal*

*Commission into Metropolitan Toronto Police Practices and Ashton* (1975), 64 DLR 477 (Ont. H.C.); *The Corporation of the Township of Innisfil v The Corporation of the Township of Vespra*, [1981] 2 SCR 145; *Jefferies v New Zealand Dairy Production and Marketing Board*, [1966] 3 All E.R. 863 (P.C.); *Société pour vaincre la Pollution v Canada (Minister of the Environment)* (1996), 22 CELR (N.S.) 64 and *Committee for Justice and Liberty v NEB*, 68 DLR (3d) 716 (SCC) were all cited to us and address, for the most part, the principles of natural justice, procedural fairness and quasi judicial proceedings. However, none of those cases, in the Board's view, could be taken as authority for the proposition that the Board is under an obligation to conduct a comparative hearing in the circumstances of this particular case.

What the NEB is required to do in a hearing of this nature is to act in good faith and to listen fairly to both sides. In the absence of any duty to hold a comparative hearing, the issue resolves itself into a matter of discretion. In this instance the Applicants have prepared and filed section 52 applications seeking certificates for new pipelines. Two intervenors proposed to build other pipelines which would be under the jurisdiction of the Board, while another intervenor proposed the construction of an LNG terminal which would not be under the Board's jurisdiction. In this situation, the Board must balance the equities between the parties. Having allowed all intervenors, including the proponents of other pipeline projects, an opportunity to test the application made by M&NPP in a very lengthy hearing, as the Board was required to do under the principles of natural justice, would it be appropriate in the circumstances to withhold a decision on the merits of either, or both of the section 52 applications, until one or all of the intervenors promoting competitive projects were each in a position to also submit and seek any necessary regulatory approvals?

Having given the matter careful thought, the Board is of the view that it would be inappropriate to withhold its decision in respect of the section 52 applications filed by SOEP and M&NPP, or the M&NPP application alone, in order to permit the

section 52 applications filed or anticipated to be filed by TQM and Tatham Offshore to be considered in other section 52 proceedings. Delay in the issuance of our decision with respect to the SOEP and M&NPP applications would be commercially prejudicial to the proponents of those projects. The SOEP and M&NPP cases have been heard and the proponents of those projects are entitled to a decision from this Board with respect to their applications.

Delay may also violate the common law, as counsel for the proponents attempted to demonstrate in argument. Counsel for SOEP/M&NPP have cited two learned authorities on the subject; S.A. de Smith (Evans) *De Smith's Judicial Review of Administrative Action* and Sir William Wade *Administrative Law*, both of which are leading texts on the subject of administrative law in the Commonwealth. In *De Smith's* it is said:

One begins with the elementary proposition that courts and tribunals have a duty to determine cases within their jurisdiction and properly brought before them, and that courts, tribunals and administrative bodies in general have a duty to exercise their statutory discretions one way or the other when circumstances calling for the exercise of those discretions arise. Wrongful refusal to exercise jurisdiction or discretion in such circumstances is a breach of duty redressible by an order of mandamus.

In connection with the work of statutory bodies De Smith states:

Mandamus lies to secure the performance of a public duty, in the performance of which the applicant has a sufficient legal interest. The applicant must show that he has demanded performance of the duty and that performance has been refused by the authority obliged to discharge it.

The learned author Wade is of the same view, stating; "Delay in performing a legal duty may also amount to an abuse which the law will remedy." Indeed, counsel for the proponents went so far as to rely on *Magna Carta*, as authority for the principle that delay in administrative proceedings is not permissible.

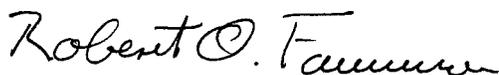
For all of these reasons, the Board has decided that its duty in these circumstances requires it to issue its decision as promptly as the circumstances of these applications permit and this ruling is issued so that all parties will be aware of the views of the Board in connection with this subject.



K. W. Vollman  
Presiding Member



A. Côté-Verhaaf  
Member



Robert Fournier  
Member



## Abbreviations

ABM	alternate-base mud
BAT	best available technology
BAC	Benefits Advisory Committee
BTEX	benzene, toluene, ethylbenzene and xylene
CA	certifying authority
CEAA	Canadian Environmental Assessment Act
CNSOPB	Canada-Nova Scotia Offshore Petroleum Board
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSA	Canadian Standards Association
CTS	candidate target species
DFO	Department of Fisheries and Oceans
EEM	environmental effects monitoring
EMP	environmental management plan
EPP	environmental protection plan
FEED	Front End Engineering Design
GESAMP	Group of Experts on the Scientific Aspects of Marine Pollution
HAZOP	hazardous operations
LDC	Local Distribution Company
MAELS	maximum acceptable effects levels
M&NE	Maritimes and Northeast Pipeline Inc.
M&NPP	Maritimes and Northeast Pipeline Project
MBP	market-based procedures
NEB	National Energy Board
NGL	natural gas liquids
NORM	naturally-occurring radioactive materials
NSEMRCB	Nova Scotia Energy and Mineral Resource Conservation Board
OBM	oil-base mud
PA	precedent agreement
PCB	polychlorinated biphenol
PSP	paralytic shellfish poisoning
SBM	synthetic-base mud
SCAC	Sable Community Advisory Committee
SDL	Significant Discovery Licence
SFLC	SOEP-Fisheries Liaison Committee
SEEMAG	SOEP Environmental Effects Monitoring Advisory Group
SOEP	Sable Offshore Energy Project
TQM	Trans Québec and Maritime Pipeline Inc.



# Glossary

<b>Accord Acts</b>	The legislation governing the exploration for and the exploitation of offshore hydrocarbon resources off Nova Scotia; specifically, the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act and the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation (Nova Scotia) Act.
<b>Agreement</b>	The Agreement for a Joint Public Review of the Proposed Sable Gas Projects.
<b>Backhaul</b>	The "notional transport" of natural gas by displacement against the flow of a single pipeline, so that the natural gas is redelivered upstream of its point of receipt.
<b>Benthic</b>	The portion of the aquatic environment inhabited by organisms that live permanently in or on various bottom substrates, i.e. the benthos.
<b>Benthos:</b>	Refer to Benthic.
<b>Biomass</b>	The total weight of all the organisms, or of a designated group of organisms, in a given area.
<b>Candidate Monitoring Species</b>	A species of organism which would serve as an ideal indicator of possible effects of an industrial development within a given study area.
<b>Candidate Target Species</b>	A species, that by reason of its location, discreteness and behavioral patterns may be especially vulnerable to potential impacts from an external source of disturbance.
<b>Certifying Authority</b>	A private organization that reviews and audits the design, construction, operation and abandonment of offshore exploration and production facilities; may issue a Certificate of Fitness under CNSOPB regulations, in respect of those facilities.
<b>Displacement</b>	In pipeline transportation, the substitution of a source of natural gas at one point for another source of natural gas at another point. Through displacement, natural gas can be transported by backhaul or exchange.
<b>Ecosystem</b>	An ecological unit consisting of both the biotic (living) and nonliving (abiotic) environment that interact within a given area.
<b>Exchange</b>	Transportation of natural gas by displacement over two separate pipelines, each of which takes and retains gas contractually allocated to the other.
<b>Fragmentation</b>	The reduction of large habitats into smaller areas through development.

<b>GH-6-96</b>	The NEB Hearing Order in respect of the Sable Offshore Energy Project and the Maritimes and Northeast Pipeline Project.
<b>Goldenville Formation</b>	A rock formation containing acid-generating rock, found in the Meguma Group
<b>Greenhouse Gas</b>	A trace gas in the atmosphere which is transparent to solar short wave radiation but selectively absorbs and subsequently emits thermal long wave radiation. The effect of these gases in the atmosphere is to allow the transmission of incoming solar radiation to the earth's surface which warms and emits thermal energy to the atmosphere. Greenhouse gases absorb this energy, re-emit some of it back to the earth's surface thereby producing a warming which is known as the greenhouse effect.
<b>Halifax Formation</b>	A bedrock formation containing acid-generating rock, found in the Meguma Group.
<b>Impacts Assessment Matrix</b>	A tool used in environmental assessment. A matrix is prepared of factors affected by a proposed development versus the various stages of said development, for the evaluation of the degree of observable and measurable response of a population, individual or abiotic factor to that external source of disturbance.
<b>Lateral Policy</b>	M&NP's policy with respect to fees and construction of additional pipeline facilities.
<b>LC50</b>	The concentration of a toxicant necessary to kill 50 percent of the test organisms in a standard time period (typically, after 96 hour exposure).
<b>LDC unbundling</b>	The separation pipeline costs into discreet components, such as gathering, transportation, storage, and sales, by a local distribution company.
<b>Meguma</b>	Meguma Group rocks contain sulphides of pyrite, chalcopyrite, arsenopyrite, sphalerite, and galena. They occur as crystals disseminated within the host rock or, more commonly, along quartz veins; commonly the source of acid generation.
<b>MN365</b>	M&NPP's proposed 365-day firm transportation service.
<b>OP214</b>	M&NPP's proposed firm off-peak service offered for 214 days.
<b>pH</b>	A measure of the alkalinity or acidity of a solution, related to hydrogen ion concentration, pH 7.0 being neutral.
<b>Phytoplankton</b>	The plant form of plankton; the basic synthesizers of organic material through photosynthesis; serve as food for zooplankton and other members of aquatic food chains.
<b>Plankton</b>	Passively drifting or weakly swimming organisms in marine and freshwater. The plant forms of plankton are phytoplankton and the animal forms are zooplankton.

<b>Precedent Agreements</b>	A binding transportation service agreement which sets forth the terms and conditions, including the conditions precedent, upon which the service is offered to the Applicant. A signed Precedent Agreement is normally evidence of a firm commitment by a shipper to contract for transportation service with the pipeline.
<b>point-to-point toll design</b>	Rates are allocated to each delivery point on a pipeline based on the volume delivered and the distance covered from the start of the pipeline.
<b>postage stamp toll design</b>	Rates charged are the same regardless of distance of haul on a pipeline.
<b>Reed Study</b>	A study titled "Assessment of the Market for Natural Gas in the Northeast United States"
<b>Riparian Zone</b>	The habitat bordering a lake or a river.
<b>Right-of-way</b>	The legal right of passage over both public and privately owned land; also the way or a rea over which the right exists.
<b>RH-2-94</b>	The NEB Hearing Order in respect of the 1994 Multi-Pipeline Cost of Capital Proceeding.
<b>The Gully</b>	A major submarine canyon indenting the seaward edge of the Scotian Shelf, which separates Banquereau and Sable Island Banks; 11 km wide at its narrowest point and over 914 m deep at its southernmost extremity.
<b>Tidal current</b>	A water current generated during the changing of tides. Like the tides themselves, tidal currents generated in harbours or bays change direction with the earth's rotation.
<b>toll</b>	Price for gas transportation services on a pipeline.
<b>Water column</b>	Term referring to the surface, mid depth and bottom layers of a marine or fresh body of water; the vertical dimension of a body of water.
<b>Water mass</b>	A body of water usually identified by characteristic salinity and temperature properties or chemical content, and normally consisting of a mixture of two or more water types (i.e. seawater of a specific temperature and salinity).
<b>Zonal toll design</b>	Rates are the same within a specified area based on the volume of gas delivered and the distance covered to each zone.
<b>Zooplankton</b>	The animal forms of plankton, varying in size from microscopic (such as copepods, crustacean larvae) to macroscopic (such as fish eggs and larvae).