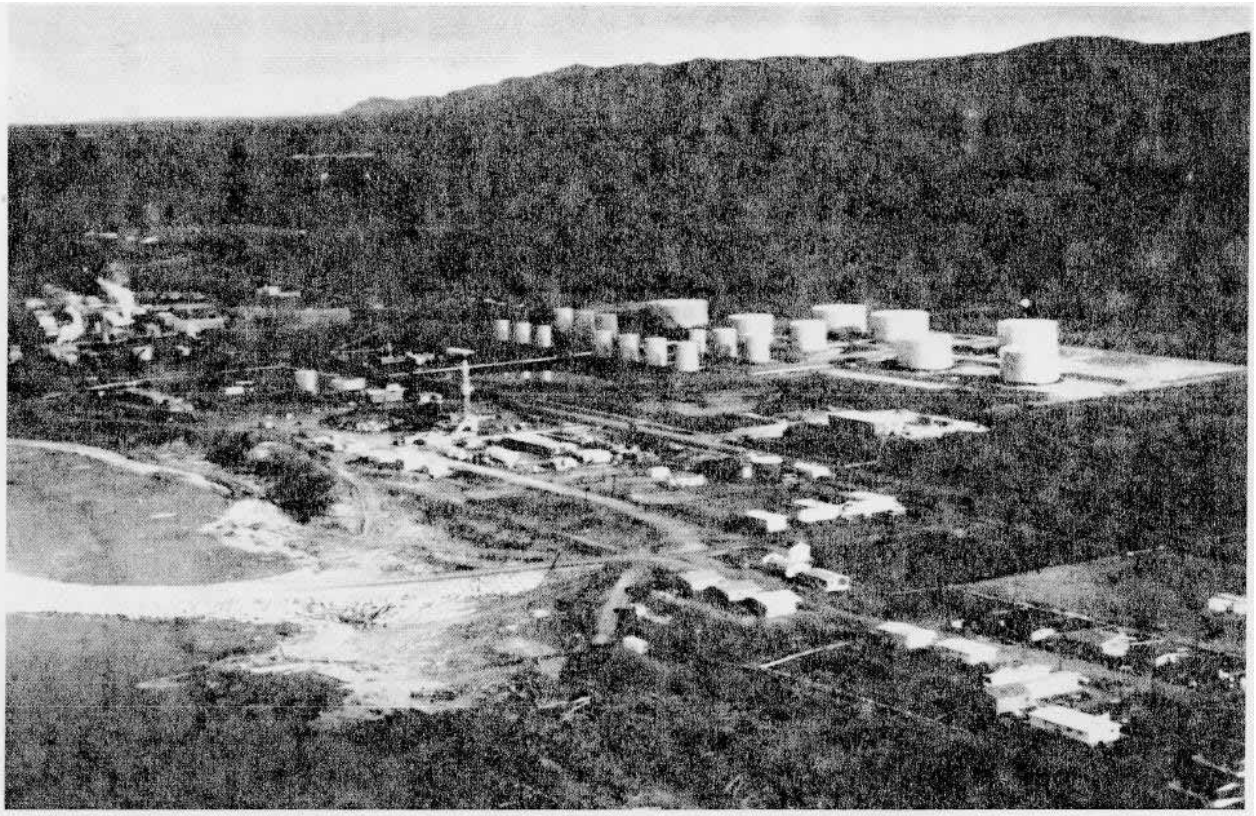
Norman Wells Oilfield Development and Pipeline Project

Report of
the Environmental
Assessment Panel



Norman Wells—Esso Facilities

JANUARY 1981

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Government of Canada
Gouvernement du Canada

Environmental Assessment Review
Examen des évaluations environnementales

Hull, Quebec
K1A 0H3

The Honourable John Roberts, P.C., M.P.
Minister of the Environment
Ottawa, Ontario
K1A 0H3

Dear Minister:

In accordance with the Federal Environmental Assessment and Review Process, the Environmental Assessment Panel on the Norman Wells Project has completed a review of this two-part project. We are pleased to submit this report for your consideration.

The review has led to the conclusion that before the Norman Wells Project can be built within acceptable limits of environmental and socio-economic impact, important deficiencies in the Proponents' planning and in the preparedness of government need to be rectified. The Panel therefore recommends that the project not be proceeded with until 1982 at the earliest, in order that these deficiencies can be dealt with.

Sincerely yours,

Patrick Duffy

Patrick Duffy
Chairman
Norman Wells Project
Environmental Assessment Panel

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EXECUTIVE SUMMARY

The Mackenzie River and Bear Rock at Fort Norman, N.W.T.

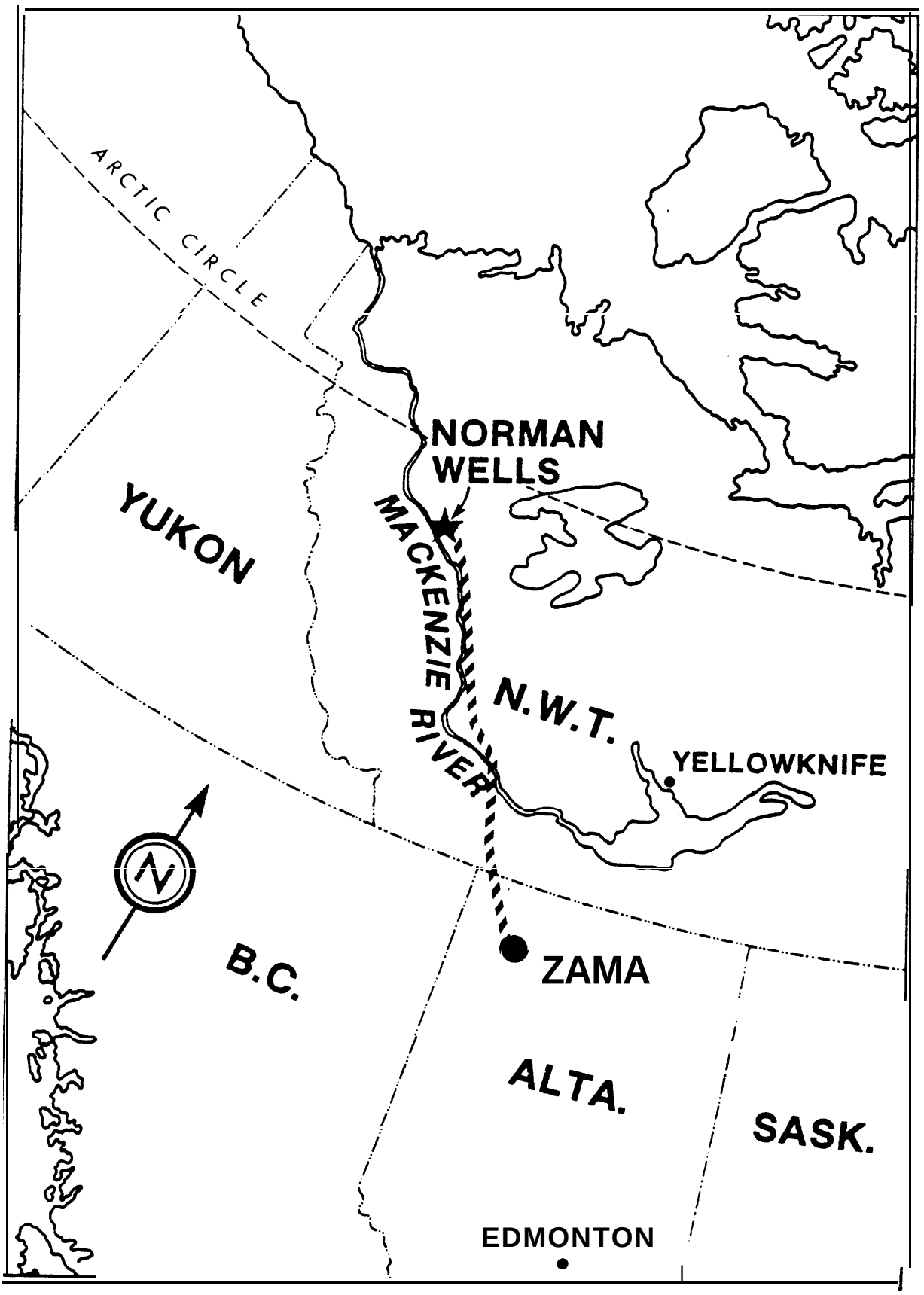


Fig. 1 Regional Perspective
Norman Wells Oilfield Expansion and Pipeline Project

EXECUTIVE SUMMARY

The Norman Wells Environmental Assessment Panel has reviewed the proposal by Esso Resources Canada Ltd.- and Interprovincial Pipe Lines (N.W.) Ltd. to expand oilfield production at Norman Wells, N.W.T. and to construct a 324 mm diameter pipeline from there to Zama, Alberta. Oilfield development would include construction of six artificial islands in the Mackenzie River and the 866 km pipeline would transport crude oil and natural gas liquids to markets in southern Canada.

The Proponents issued an Environmental Impact Statement (EIS) in April 1980. The EIS and additional information requested by the Panel served as the body of information for the review of the Project.

The Panel sought comments on the proposed project from the public and from technical reviewers. In August, 1980, the Panel held public meetings in 12 communities in the project area. The Panel considered issues relating to the rationale for the project, the potential impacts of both the physical environment on the project and the project on the physical and human environment, government preparedness and project monitoring. After carefully considering the information presented, the Panel reached a number of conclusions and made recommendations which are contained in this report.

The Panel's review of the project has led to the conclusion that before the Norman Wells Oilfield Expansion and Pipeline Project can be built within acceptable limits of environmental and socio-economic impact, important deficiencies in the Proponents' planning and in the preparedness of government need to be -rectified. This conclusion has led the Panel to recommend that the project not be proceeded with until 1982 at the earliest, in order that these deficiencies can be dealt with.

Esso's oil field development plan at Norman Wells presents a number of unique technical questions. The Panel reviewed potential problems associated with the construction of artificial islands in the Mackenzie River, fisheries and wildlife concerns relating to island construction and drilling operations, oilspill prevention and counter-measures, toxic substances, air emissions, water use and drilling waste disposal. In the Panel's opinion, additional time is required by Esso Resources Canada Ltd. to solve potential problems of scour around the artificial islands, filter cloth deterioration, contingency planning for oil-spills in ice-covered and ice-infested water, oil-leak detection capability, as well as storage, transportation and disposal of toxic and hazardous materials, including contaminated drilling wastes.

The proposed IPL pipeline is in the zone of discontinuous permafrost from Norman Wells to Zama. The Panel concluded that IPL's thermal analysis raises questions of pipeline integrity and right-of-way stability and the Panel has made recommendations for priority research in this subject. The Panel has also made recommendations on planning of river crossings, contingency planning in karst terrain, revegetation and erosion control, and on pipeline routing in the vicinity of native communities.

The Panel's assessment of economic and social issues concentrated on the concerns of the residents and organizations in the project area and the concerns of government agencies at the federal, territorial and local levels. The Panel concluded that the project will provide a needed economic stimulus to the Mackenzie

Valley. The recommendations are intended to be carried out in a way to support this conclusion and, in particular, to insure that economic benefits are realized through local employment and business opportunities.

The project impacts on society can be made to be within acceptable limits and the Panel recommendations are aimed at minimizing social disruption. The Panel has concluded that a 1982 start-up on the project could provide time for undertakings on inflationary effects on the economy, wage differentials, a data base for social and health care services, co-operation between the Proponents and government, and adjustment of government priorities to put programs and staff in place.

The report considers but does not recommend on two over-riding political issues which have a major influence on the project, namely the Dene Land Settlement question and resource revenue-sharing between governments.

In its assessment of the project in relation to the Indian people of northwestern Alberta, the Panel recommended that the Department of Indian Affairs and Northern Development should take the initiative in identifying the agencies to address terms and conditions put forward by the Dene Tha Band, and in co-ordinating the response to them.

Fort Norman, N.W.T.

CHAPTER 1

PROJECT PROPOSAL AND REGIONAL SETTING

Fort Good Hope on the Mackenzie River

Norman Wells—The and the Mackenzie River

1.1 INTRODUCTION

On February 1, 1980, the Department of Indian Affairs and Northern Development referred the Norman Wells Oilfield and Pipeline Project to the Federal Environmental Assessment Review Office for a formal public review. The project is a proposal by Esso Resources Canada Ltd. and Interprovincial Pipe Lines (NW) Ltd. (henceforth called Esso and IPL) to expand oilfield production facilities at Norman Wells and to construct an 866 km long pipeline[1] to carry crude oil and natural gas liquids (NGL) from Norman Wells to join with existing pipeline facilities at Zama, Alberta.

BACKGROUND

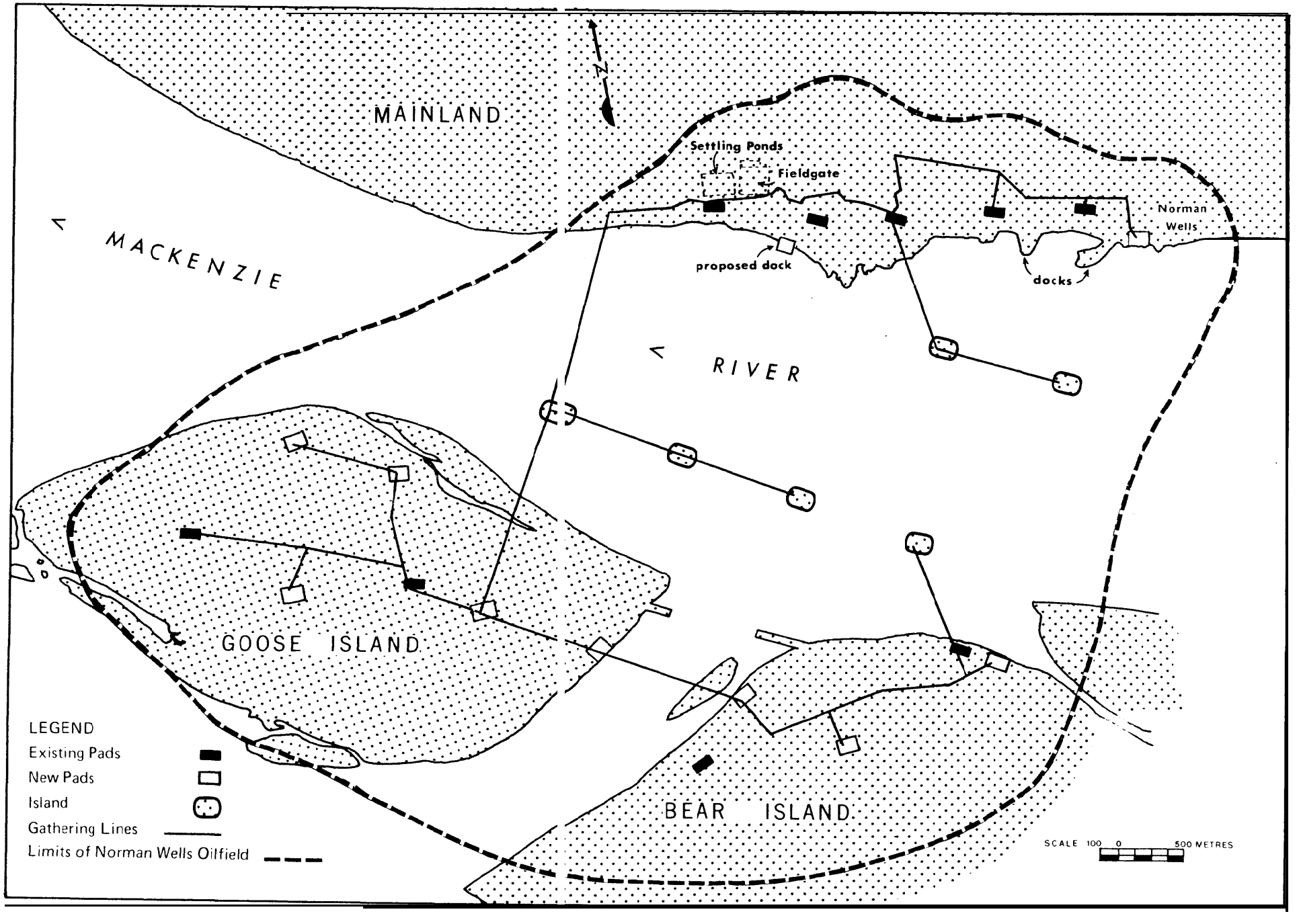
Along the Mackenzie River, natural oil seeps were observed by Alexander Mackenzie in 1789 and were reported by native people prior to 1920, at which time Imperial Oil Limited drilled the Norman Wells discovery Jell. Early production was about 100 m^5/d until the oilfield was expanded to serve the American armed forces in Alaska during World War II. This was the Can01 Project, which included the construction of a 10 cm-diameter surface oil pipeline from Norman Wells to Whitehorse in 1943-44. In 1945 the pipeline was abandoned. Since then production at Norman Wells has been maintained at about 500 m^3/d.

In 1974 Canadian Arctic Gas and Foothills Pipelines Ltd. tabled competing proposals for pipelines from the Arctic coast south along the Mackenzie Valley and into Alberta. The 1.22 m diameter Canadian Arctic Gas line was to carry gas from Prudhoe Bay, Alaska across the northern Yukon to the Mackenzie Valley and south to the United States. The Foothills' application was for a 1.07 m-diameter pipeline from the Mackenzie Delta to southern markets. Both proposals for large-diameter chilled pipelines were reviewed by Mr. Justice T.R. Berger in the Mackenzie Valley Pipeline Inquiry. The 1977 Berger Report to the Government of Canada concluded that even though it was environmentally possible to establish an energy corridor and build a pipeline in the Mackenzie Valley, the social impacts would have serious effects on the people there. A ten-year moratorium on development was recommended to allow for settlement of native land claims, assessment of frontier reserves, and the establishment of programs and institutions to permit comprehensive land use planning and orderly development. The Berger Report was received but not endorsed by the Government of Canada. Later it was decided that neither the Canadian Arctic Gas nor the Foothills proposal would be proceeded with in the Mackenzie Valley. Later in 1977, a decision was taken to build a large-diameter gas pipeline along the Alaska tiighway from Alaska to Alberta and the USA.

About the time the Berger Report was released the 1300 km-long, 1.22 m-diameter Trans-Alaska Oil Pipeline began moving oil from Prudhoe Bay to Valdez, Alaska. At the time, it was the largest oil pipeline to be built on permafrost. Conventional buried pipeline construction could not be used in ice-rich permafrost terrain because of the risks of thawing of ground ice resulting in pipeline subsidence and rupture. One half of the pipeline was elevated above ground to reduce the danger of thaw-settlement. In other areas the pipeline was buried in permafrost using special design techniques to eliminate risks of subsidence.

The proposed Norman Wells Oilfield Expansion and Pipeline Project is not of the same physical scale as the Trans-Alaska Pipeline or the Mackenzie Valley gas pipeline proposals. However it does represent an opportunity to incorporate useful design and construction experience of these other projects.

1. A Metric-Imperial Conversion Table is in Appendix I.


MAINLAND
N
Settling Ponds
Fieldgate
Norman Wells
proposed dock
docks
MACKENZIE
RIVER
GOOSE ISLAND
BEAR ISLAND
LEGEND
Existing Pads
New Pads
Island
Gathering Lines
Limits of Norman Wells Oilfield
SCALE 100 0 500 METRES

1.2 NORMAN WELLS OILFIELD EXPANSION

Esso has proposed a secondary recovery project for the entire field at Norman Wells to increase production rates from the current level of 500 m^3/d to 4 000 m^3/d. Initiation of an oilfield reservoir waterflood scheme is expected to result in the increased recovery of more than 42% of the original oil-in-place compared to 17% recovery if present techniques are employed. Facilities required for this purpose include 200 new oil and water injection wells, six artificial islands to serve as drilling platforms in the Mackenzie River, facilities for an oil gathering system, and a central processing plant (the fieldgate) on the mainland to condition oil for pipeline transmission.

Since 60 percent of the reservoir is under the Mackenzie River, six artificial islands are proposed to give access to that portion of the reservoir. Each island will have a working surface ot 80 by 45 m with a one-metre high dyke surrounding the surface area. The islands will be earthfill structures composed of a sand core protected by filtercloth overlaid with three layers of limestone rock rip- rap of increasing size.

A pipeline gathering system will carry oil production from the islands and land-based wells to the fieldgate. The fieldgate will contain equipment for water disposal, gas processing, fresh water injection, and electrical power generation.

1.3 PIPELINE CONSTRUCTION

IPL proposes to construct the 866 km long pipeline to transport the increased production of crude oil and natural gas liquids from Norman Wells to markets in the south. The 324 mm diameter line would be buried along its entire length and would have a capacity of approximately 5 000 m^3 of product per day. It would carry products at near ground temperature because the oil has a low viscosity and will flow at a low temperature. This reduces the potential for problems of thaw settlement which are associated with warm oil pipelines in permafrost. With additional pumping capacity at each station, pumping capability could be doubled.

The proposed pipeline route begins at Norman Wells and follows the east side of the Mackenzie River to a crossing point upstream of Fort Simpson and then southeast to the Zama terminal of the Rainbow pipeline in north-west Alberta. Where possible the pipeline will follow existing rights-of-way and cutlines where the land has been disturbed by previous clearing. Three pumping stations will be required and these will be located near Norman Wells, Wrigley, and Fort Simpson. In addition several temporary wharves, stockpile sites and service roads need to be built.

IPL proposes to construct the pipeline during two consecutive winter seasons. The major river crossings would be completed during the summer seasons.

1.4 REGIONAL SETTING

Norman Wells is located on the east shore of the Mackenzie River, 145 km south of the Arctic Circle and 685 km northwest of Yellowknite (Figure 1). As the site of the only producing oilfield in Canada north of 60°N latitude, Norman Wells is unlike other settlements on the Mackenzie River. It originated as the result of the oilfield development rather than as a fur trading post. At present the population of 360 is predominantly non-native. Most workers are employed at the Esso refinery and in transportation-related occupations.

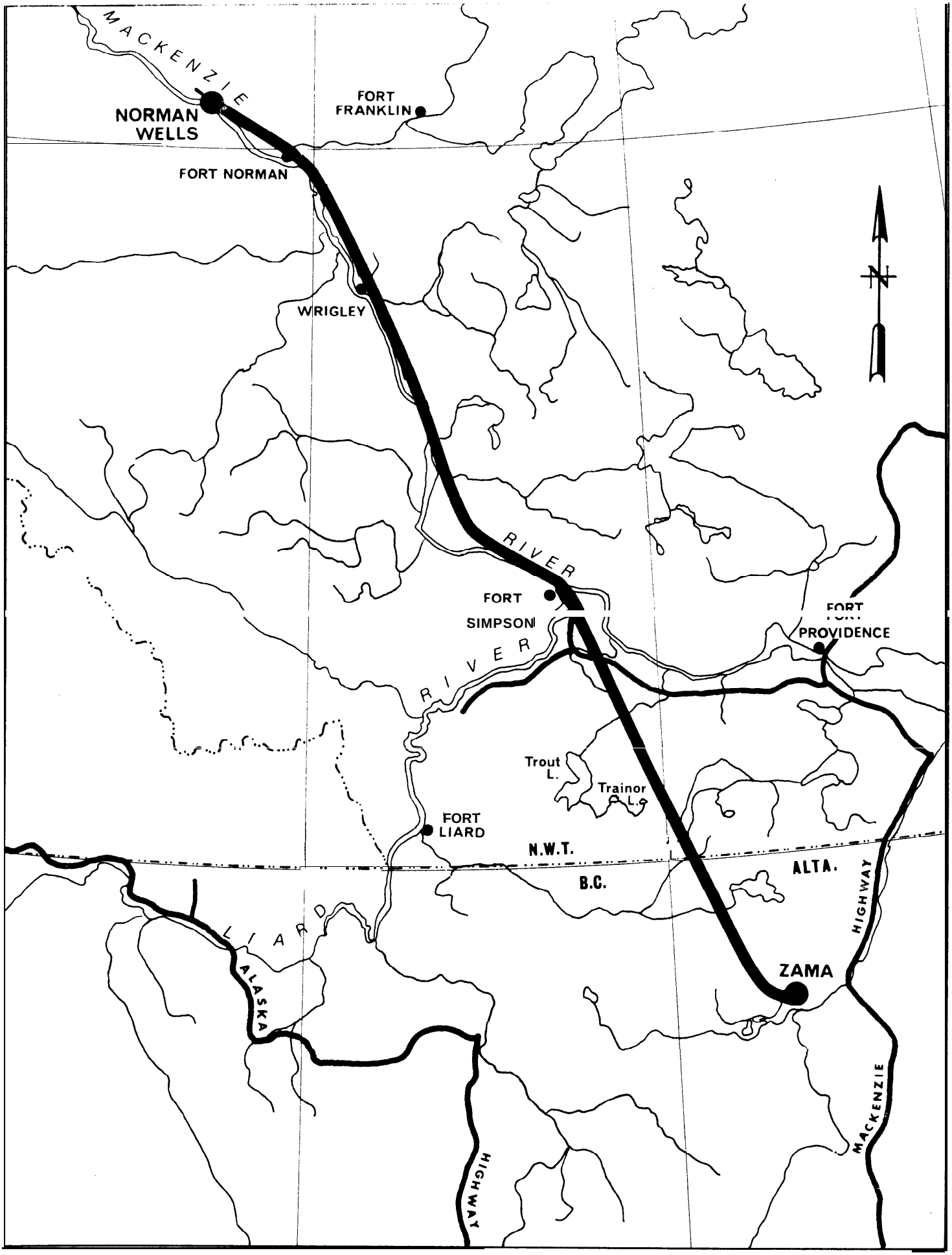


Fig. 3 Proposed Pipeline Route

The proposed oilfield expansion and fieldgate facilities are to be situated on the mainland adjacent to the community of Norman Wells, and on nearby Goose and Bear Islands, and the artificial islands in the Mackenzie River. When the project is completed, the permanent population of Norman Wells is expected to grow by about 160 to 200 persons.

Where the pipeline route parallels the Mackenzie Valley past the settlements of Fort Norman, Wrigley and Fort Simpson, it follows a relatively narrow corridor between the Franklin Mountains and the Mackenzie River. The terrain is characterized by river terraces cut in glacial till and lake clays, with tributary rivers flowing in steep-sided valleys. The corridor is covered partly by muskeg and partly by coniferous forest.

South of Willowlake River, the pipeline route cats across rolling country to the Mackenzie River crossing near Fort Simpson. In this section there are extensive areas of organic soils, particularly near the Mackenzie River. South of the Mackenzie River, organic terrain is again predominant, and the forest is interrupted by numerous bogs.

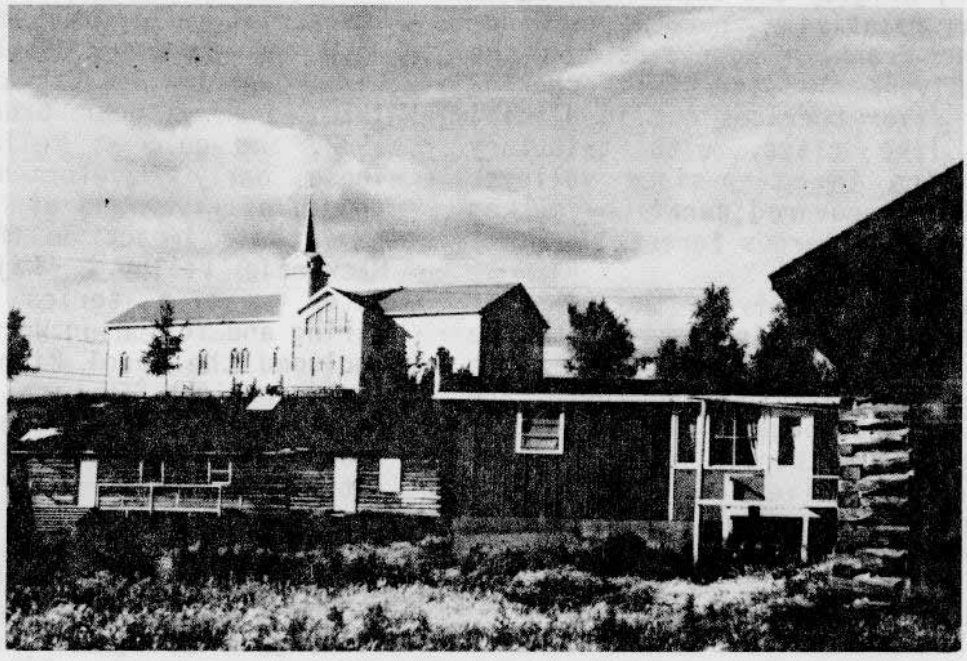
Man in the Mackenzie Valley

The Dene of the Mackenzie Valley have practised a hunting and gathering way of life for at least 5,000 years according to archaeological evidence. Today the importance of these traditional activitics in many settlements is measured in terms of cultural identity, the level of subsistence and cash flow.

The early contacts with Europeans and Canadians came during the turn of the 19th century. Explorers such as Alexander Mackenzie were agents of the fur trading companies seeking to expand access to the rich furs of the Northwest. By the late 1800's the focus of the fur trade was in the Mackenzie Valley. In turn the establishment of permanent trading posts and the expansion of Anglican and Roman Catholic rnissionary activities contributed to the growth of new settlements in the region as the Dene began to settle near them.

Industrial development of the area began with the discovery of lead and zinc at Pine Point in 1898 oil at Norman Wells in 1920, uranium near Great Bear Lake in 1932, and gold at Yellowknife in 1934. These early developments followed by growth of river and air traffic began to have their impact on the people of the Mackenzie Valley. Major changes came later with a series of developments during and following World War II. These included the Canol Pipeline Project and airstrips, the DEW Line, building Inuvik, construction of the Mackenzie Highway, and widespread petroleum exploration activity.

At the native villages of Fort Norman (population 280) and Wrigley (population 215) the people are largely dependent on hunting, trappiny and fishing as a way of life. Fort Simpson (population 1000) is located at the confluence of the Liard and Mackenzie Rivers. It is the oldest continuously occupied settlement on the Mackenzie River. Today it is a transportation centre, being the northern terminus of the Mackenzie Highway and with major airline services. Fort Simpson serves as a base for mineral exploration in the area and as the departure point for Nahanni National Park.



Fort Norman, N.W.T.

CHAPTER 2

THE REVIEW PROCESS

Bill Pierce and Mike Arnett at the Proponents table at Public Meeting in Wrigley, N. W.T.

Outside the Community Hall at Fort Norman during a break in the Public Meetings

2.1 INTRODUCTION

The federal Environmental Assessment and Review Process (EARP) was established in 1973 as a means of determining adverse environmental effects of federal projects, programs and activities while they are still in the conceptual or early planning stages. The Minister of the Environment, through the Government Organization Act of 1979, is given the responsibility of assuring that new federal initiatives are assessed for potential adverse effects on the quality of the natural environment.

Federal departments and agencies, aided by screening guidelines, are initially responsible for the assessment of the project and the significance of environmental impacts. As the Department of Indian Affairs and Northern Development is responsible for land use and administration in the Northwest Territories and for native affairs in Alberta, the Department determined that the proposed Norman Wells Oilfield and Pipeline should be formally reviewed, because of the potential for major significant impacts. The project was therefore referred to the Federal Environmental Assessment Review Office in February 1980. Following the referral, an Environmental Assessment Panel was appointed to review the environmental and socio-economic aspects of the project proposal.

By May 1980, the following Panel was assembled to review and evaluate the project:

Mr. Wayne Bryant, Yellowknife, N.W.T.

Dr. Patrick Duffy (Chirman), Hull, Quebec

Mr. Alan Heginbottom, Ottawa, Ontario

Mr. Arthur Look, Fort Providence, N.W.T.

Dr. John Stager, Vancouver, B.C.

Biographies of the Panel Members are given in Appendix II.

The Panel was assisted throughout' the review by the Panel Secretary, Mr. Robert Greyell.

2.2 THE ENVIRONMENTAL IMPACT STATEMENT

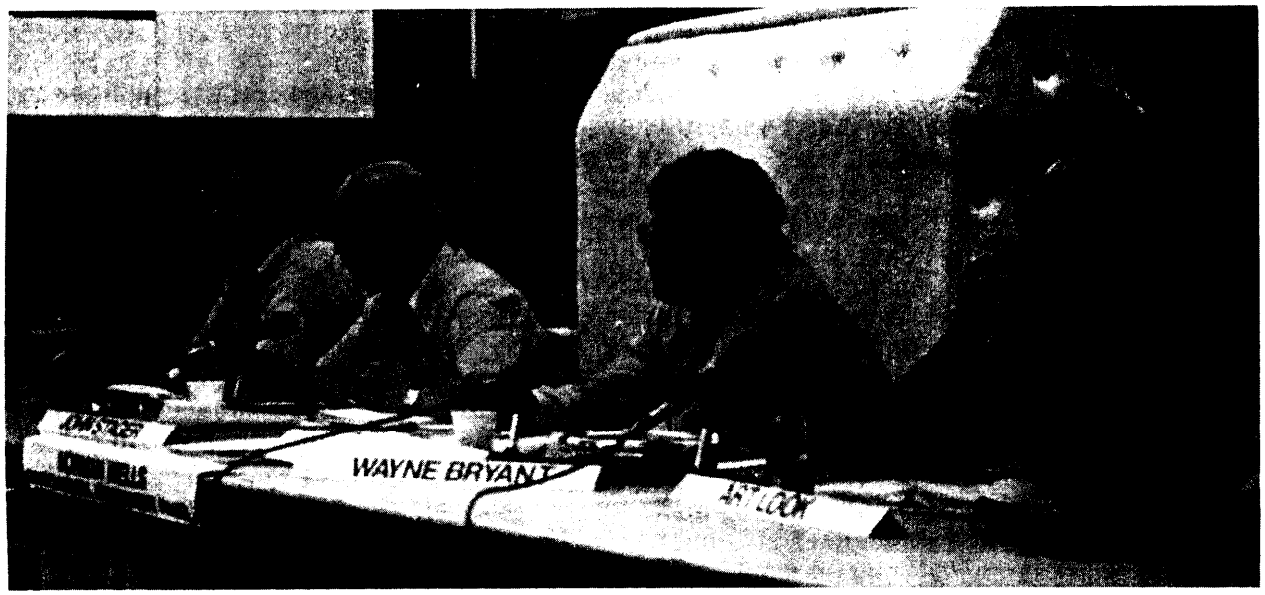
The Proponents (Esso and IPL) submitted a joint Environmental Impact Statement (CIS) to the Panel in early April, 1980. This was before the Panel formation was completed. Because of this the Panel chose not to issue guidelines for the preparation of an EIS. Instead the Panel decided to review the EIS and then issue requests for additional information where the CIS was found to be incomplete. During the review period (May-September, 1980) four requests for additional information were issued by the Panel.

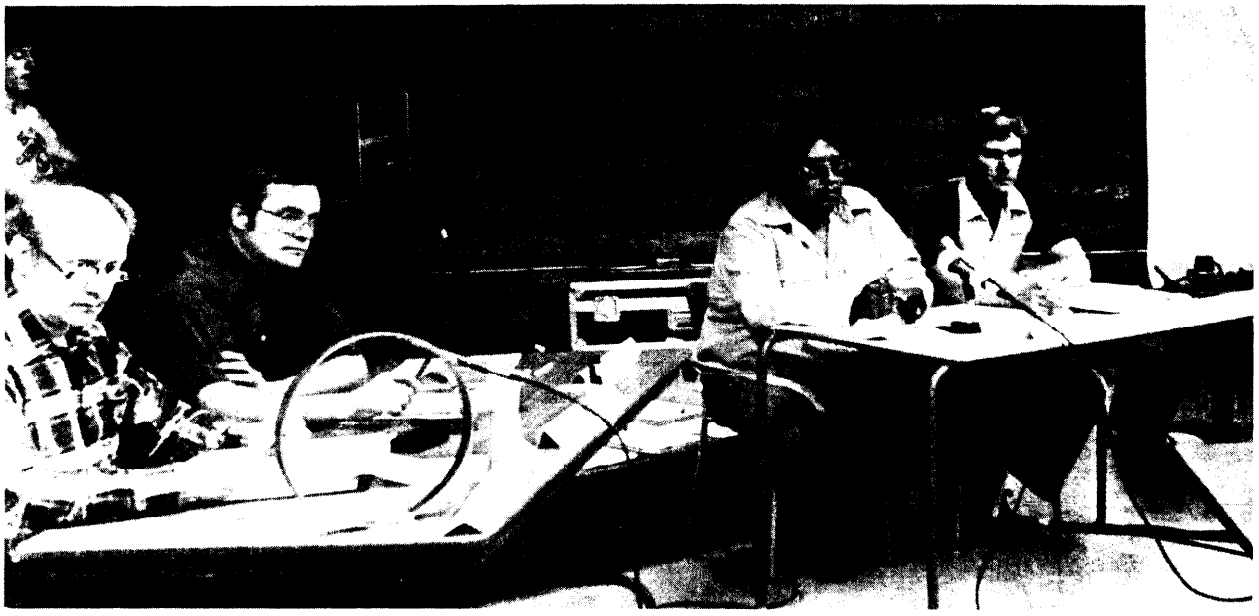
In April, 1980 the CIS was distributed to Federal and GNWT agencies, public libraries in N.W.T., Calgary, and Edmonton, band and settlement offices in the project area, and in the Yellowknife and Hay River areas. In addition, newspaper advertisements were placed to announce the review schedule and the availability of the EIS in community libraries and other locations.

The CIS consisted of four volumes:

Volume 1 - Overview Summary
Volume 2 - EIS Oilfield Development
Volume 3 (A,B,C) - EIS Pipeline Project
Volume 4 - Regional Socio-Economic Impact Assessment

These documents and 15 supporting consultant reports were the main information documents that were assessed by the Panel alony with briefs and interventions received at the public mectinys.


WAYNE BRYANT



2.3 THE REVIEW OF THE PROPOSAL

After the distribution of the EIS in April, the Panel arranged for a four-month long public review period. During this period the Panel received several briefs and submissions all of which were distributed to interested parties prior to the community and technical meetings. A complete list of the submissions is given in Appendix IV.

The material addressed in the EIS and background documents is technically complex. Therefore, the Panel retained a small number of professional advisors from government agencies and consulting firms. The role of the advisors was to review the EIS and its supporting documentation and then to present the Panel and the public meetings with appraisals of the information.

2.3.1 Community Visits and Information Programs

To explain the scope of the project to the public, the Proponents made community visits and distributed literature on employment and business opportunities, project benefits and construction techniques. Advertising programs and orientation tours at Norman Wells were also carried out for the public and the media.

After the release of the EIS, Panel staff undertook a public information program for communities near the proposed project. The Panel staff developed and distributed information on the review process with the purpose of assisting the public to intervene in the review. Prior to holding the public meetings, Panel members and staff visited the Mackenzie Valley communities and High Level, Alberta at least once. During these visits the EIS was distributed and meetings were held in band and settlement offices. Advertisements were placed in local newspapers, a mailing program was carried out, media announcements were made, and notices were posted to announce the times and locations of public meetings. In addition the Panel inspected the pipeline route from the air and visited the facilities at Norman Wells.

2.3.2 Public Meetings

The public meetings were part of the review process and provided a forum for interested persons to comment on the CIS and to express views on the project. Thus the Panel obtained further important information on potential impacts. Two weeks of community meetings were held followed by a week of technical meetings in Yellowknife and one additional community meeting in High Level, Alberta. In all, the Panel conducted public meetings in twelve communities as follows:

August 11	Fort Norman
August 12	Norman Wells
August 13	Fort Good Hope
August 14	Fort Franklin
August 15	Wrigley
August 17	Hay River - Band Office
August 18	Hay River - Connunity Centre
August 19	Fort Providence
August 20	Fort Simpson - Band Meeting
August 21	Fort Simpson - Community Centre
August 22	Fort Rae
August 24	Detah Village
August 25	Yellowknife
September 1	Iii gh Level, Alberta

In a number of the communities, local interpreters provided translation in the native language of the community (either Slavey or Dog Rib).

'Technical meetings were held in Yellowknife from August 25 - 29, 1980. For

Panel members Alan Hegtnbottom and John Stager during a break in the Public Meetings.

Fort Good Hope residents at the Public Meeting.

these sessions a scheduled agenda of issues was prepared and circulated prior to the meetings (Appendix V). The agenda was adjusted by the addition of two morning sessions in order to maintain the meetings schedule.

In all, over 140 presentations were heard by the Panel. Transcripts of the proceedings (2100 pages) were produced and may be obtained through the Panel Secretary.

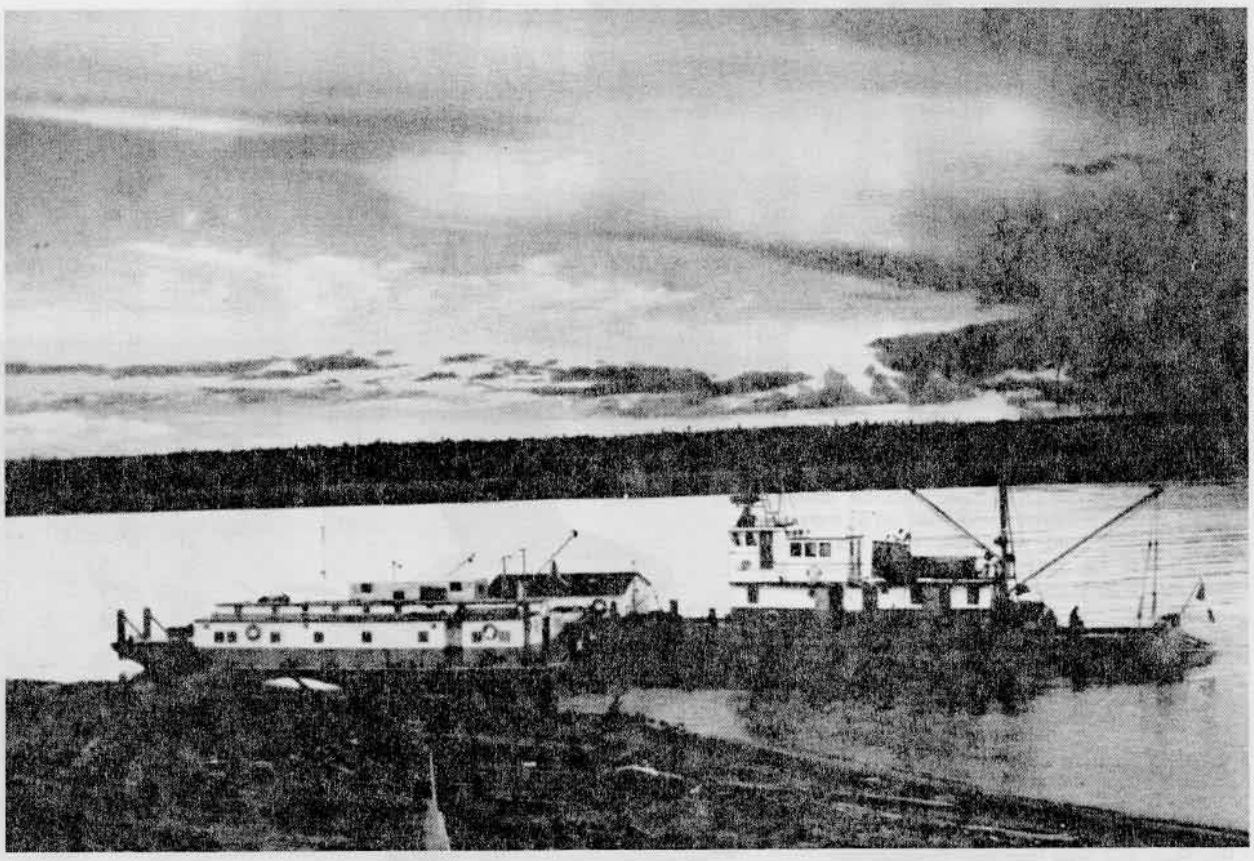
Fort Rae, N.T.W. on the North Arm of Great Slave Lake.

Herb Norwegian
Dene Nation Vice President

Jim Antoine
Chief, Fort Simpson,
N.W.T.

CHAPTER 3

POLITICAL ISSUES



Public Works Canada tug and barges on the Mackenzie River at Fort Norman.

Panel Chairman, Pat Duffy, talks with Dene Nation Vice President, Herb Norwegian

"We believe the question of Federal-Territorial sharing of resource revenue to be a matter for negotiated agreement on the basis of all existing and potential non-renewable resource developments in the Territories rather than on an Individual project basis; and, therefore, that this project should not be delayed or placed under any moratorium on account of those negotiations.

We submit that the questions of aboriginal rights and Native land claims are matters for negotiated, just settlement simultaneously with the orderly progress of development in the Northwest Territories, in order that the North not be further crippled economically by the necessarily lengthy process of achieving such settlement."

Frances Hasey
Hay River and Area Economic Development Corporation.

Bill Pierce discusses the pipeline with Francis Hasey of the Hay River and Area Economic Development Corporation.

3.0 POLITICAL ISSUES

Throughout the public meetings and from written interventions, two over-riding issues were repeatedly brought to the Panel's attention, namely Dene land settlement and revenue-sharing between the GNWT and the Federal Government. These issues are of major importance to the people of the region and relate to the environmental and socio-economic matters which are treated in this report. Ultimately the issues of land settlement and revenue-sharing may be resolved through the political process. Therefore the Panel will not make recommendations on these matters, but rather describe them in relation to the other issues raised during the review.

3.1 DENE LAND SETTLEMENT

At most public meetings a representative of the Dene Nation stated the Dene policy position that there should be no development before a land settlement is obtained in the western NWT. In each community, the band chiefs and councillors reinforced this position. Reference was made to the Berger Report of 1977, which recommended a lo-year moratorium in pipeline construction to provide time for a land settlement and other considerations. While the Government of Canada did not adopt this recommendation, the Dene have perceived it as government policy. At the public meetings there were expressions of contusion and annoyance because the Norman Wells pipeline was proposed before the lo-year period had expired.

Up to the present the Federal Government and the Dene Nation have made little progress towards a land settlement. At the public meetings, the Dene called for time to negotiate an agreement on the land settlement question, after which development projects would have a frame of reference for consideration. In this context the scale of the Norman Wells project was not an issue. The issue was a land settlement which will give the Dene some control over the. lands and resources in the western NWT. Because of the preoccupation with land settlement, the Dene did not examine or speak of the EIS, and consequently their environmental concerns were expressed without a full understanding of the Proponents' plans. It was only at High Level, Alberta, when the Dene Tha Band made its presentation, that reference was made to the EIS.

The NWT Metis Association did not present a brief to the Panel. The subject of land claims was addressed by many individuals who gave their views to the Panel at every community meeting. The advice ranged from strong support to outright disagreement with the Dene Nation policy. Nevertheless, there was widespread agreement that a settlement was necessary. Requests for a prompt resolution of this problem also came in statements from elected members of the GNWT. It was made clear that until the process of negotiation is commenced and shows promise of success, the land settlement question will be a major barrier to beckoning economic growth in the Mackenzie Valley.

3.2 REVENUE-SHARING

With existing agreements and statutes, most of the revenues from the proposed Norman Wells Project would accrue to the Federal Government and to the Proponents; only a small part of the revenues would go to the GNWT. It is estimated that the oil production will displace about $8 billion of foreign oil imports between 1984 and 2008. The Proponents estimate that the project would gross roughly $250 million dollars per year at world oil prices. The Federal Government will receive roughly $172 million dollars per year from a one-third equity in the

project, corporate income taxes and royalties. By comparison, the estimated return to the GNWT from taxation is $6 million dollars per year or about 3% of the sum received by the Federal Government.

The public review of this project was the first to deal with the question of natural resource revenue-sharing between the GNWT and the Federal Government. Northern political leaders, civil servants, and the public stressed concern about the largest share of government revenue from the exploitation of natural resources flowing to the federal treasury.

The GNWT held that a better revenue-sharing arrangement from this project would enable the government to meet its obligations with greater independence by developing and delivering service programs to communities impacted by the project and, at the same time, maintain its present programs without jeopardizing their existing effectiveness. It was apparent also that most northerners seek a larger share of resource revenues from this and future developments to provide increased benefits and greater autonomy for their government. The Panel believes that the GNWT needs an early and timely infusion of cash to serve project-related requirements.

The analogy with provincial ownership of resources provided the background against which proposals for a ditterent sharing arrangement were made. At this time the issue of revenue-sharing is complex because of the future political course of the GNWT in response to such developments as the Drury Report and land settlement negotiations.

The Panel concluded that the Norman Wells project was drawn into the revenue-sharing debate because the review was coincident with other initiatives for political change. It is the view of the Panel that the project should be separated from the political questions. Therefore, the Panel suggests that the Minister of Indian Affairs and Northern Development consider the establishment of a trust fund for the revenue that tne Federal Government would receive from both partial ownership in the Norman Wells oil resource, and the taxable income it would generate through existing statutes. The trust fund would then become part of the political decision-making process rather than the project.

Chiefs and tnterpreter at the Public Meeting in Fort Rae N.W.T.

Gabe Hardisty
Chief, Wrigley, N.W T

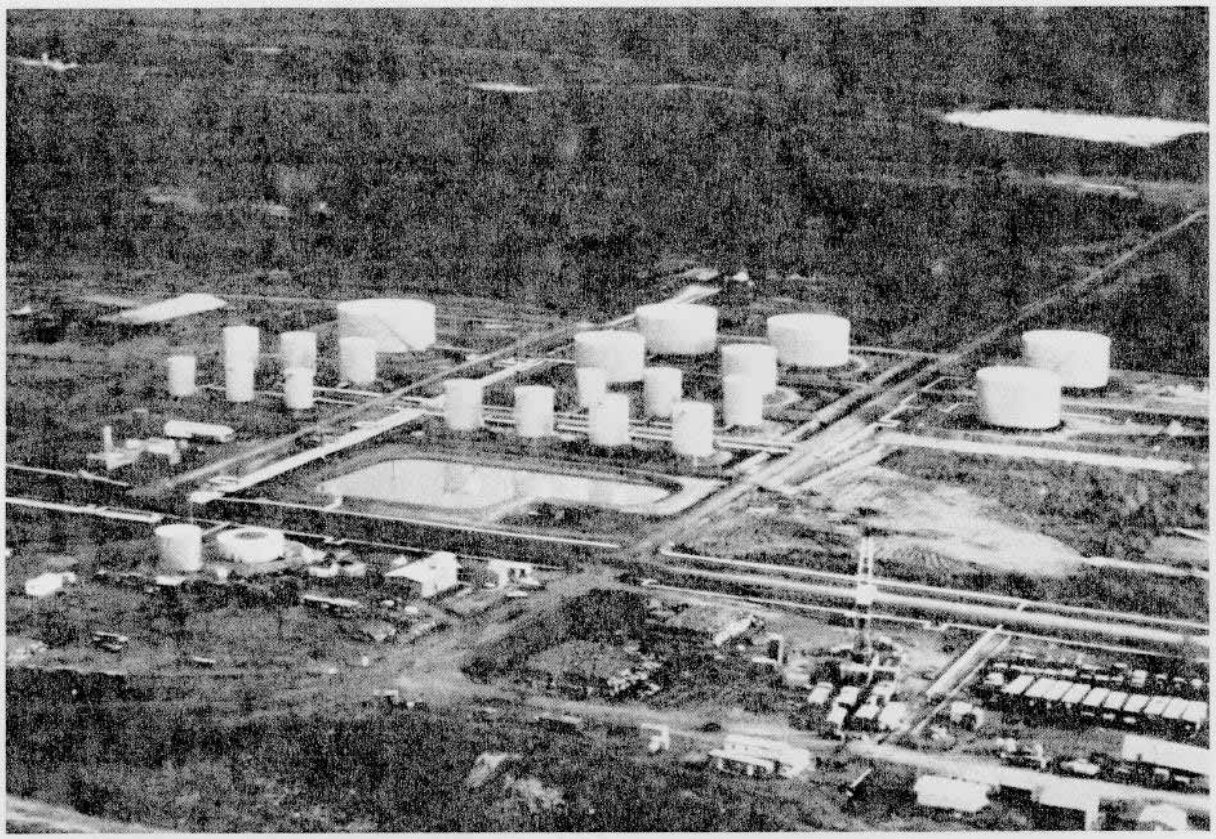
Frank T'Seleie
Chief, Fort Good Hope, N.W.T.

"You are saying land claims are not settled yet. Our rights have to be recognized first then we sit down with Esso Resources and negotiate anything. This is our land, our resources, that they are planning to take out of here. So we are not claiming this land. This is our land it is a struggle for our rights to be recognized, is what it is."

Frank Tseleie
Chief
Fort Good Hope, NWT

CHAPTER 4

ENVIRONMENT AND ENGINEERING



Esso lank farm and fieldgate facility at Normarl Wells, N.W.TI

4.0 ENVIRONMENT AND ENGINEERING

This chapter addresses specific environmental concerns which relate to the integrity and environmental adequacy of the project.

The Panel regards some problems as significant and has chosen to make recommendations on them. Other problems are less serious and can be resolved by good engineering practices and monitoring.

4.1 ALTERNATIVES TO THE PROPOSED PROJECT

Proponents of projects are expected to consider and describe various alternatives to their proposals, including different modes, locations, methods and timing. The EIS for this project contained only very brief discussions of alternatives. More information was made available however, in response to written questions from the Panel.

4.1.1 Alternative Scenarios

During the technical meetings, alternate scenarios for development of the Norman Wells oilfield and the implications for the cost and availability of fuel products in the Mackenzie Valley were discussed. The alternate scenarios were:

(i) staged development of the oilfield, with and without a crude oil pipeline;

(ii) expansion of the Norman Wells refinery, or construction of a new refinery elsewhere in the Mackenzie Valley, such as Hay River or Fort Simpson;

(iii) movement of refined products by pipeline or by barge; and

(iv) a large diameter oil pipeline from the Beaufort Sea or Arctic Islands, or both, which would also carry Norman Wells crude oil and NGL.

Factors considered in the discussion included a possible review of the oil production potential of the lower Mackenzie Valley and Beaufort Sea areas, the effects of a highway from southern Canada into Norman Wells and the need for subsidized fuels.

From the perspective of the Proponents, none of the alternatives could be shown to be as financially and technically efficient as the method proposed. The rate of crude oil production necessary to support the cost of providing access to the portion of the oilfield lying beneath the Mackenzie River is 1 600 m^3/d to 2 000 m^3/d over the current refinery capacity. Furthermore, the market needs are such that selected products would still have to be imported from Alberta. Thus, the crude oil pipeline to Zama, Alberta, is inseparable from the oilfield expansion. Without an expanded market the oil reserves under the river cannot be economically recovered, and surplus oil and natural gas fractions would continue to be burned off and so wasted.

The present Norman Wells refinery is important in this scenario. Esso plans to continue its operation for the foreseeable future. Without expansion of the oilfield the refinery can operate until the mid-1990's, after which insufficient crude oil will be available. However, with the oilfield expansion, the life of the refinery could be prolonged well past the year 2000.

4.1.2 Oilfield Development

The second volume of the EIS describes the continuation of the present operation as the only alternative for the proposed development of the Norman Wells pool. Given the concern for the construction of the artificial islands and the integrity of those islands and associated production facilities, the Panel requested that the Proponents provide additional information on alternative methods of developing the oilfield. Esso subsequently described four alternate methods which would not require artificial island construction. These are:

(i) natural solution gas drive depletion;

(ii) flank water flooding;

(iii) gas injection, and;

(iv) horizontal wells drilled from the mainland and existing, natural islands.

All were judged to be less effective, less efficient, and subject to undesirable technical risks. This conclusion was also reached by a petroleum consulting firm from whom the Panel sought advice. The Panel concurs that Esso has selected the most logical alternative from an energy recovery perspective.

4.1.3 Pipeline Alternatives: Routing

The route planned by IPL is very similar to ones proposed by Canadian Arctic Gas Pipeline Ltd. and Foothills Pipe Lines Ltd. Three major route alternatives were discussed during the public meetings. A route along the west bank of the Mackenzie River was suggested, so as to remove the pipeline from the vicinity of the settlements of Fort Norman and Wrigley. However, a review of this alternative showed the route to be less favourable because of poor access and numerous difficult river crossings of flashy, flood-prone streams.

Another route to the east of the Franklin Mountains was judged to be unsuitable because of the distance from the Mackenzie River and highway and because new right-of-way access routes to that country would open areas that are otherwise undisturbed by industrial activities.

The third alternative proposed would have the pipeline follow the Mackenzie Highway east from Fort Simpson to Enterprise and south alongside the highway and the Great Slave Lake Railway into Alberta. This alternative was rejected by IPL because it would require some 150 km of additional pipeline and the construction of an additional pumping station, at a considerable increase in capital costs.

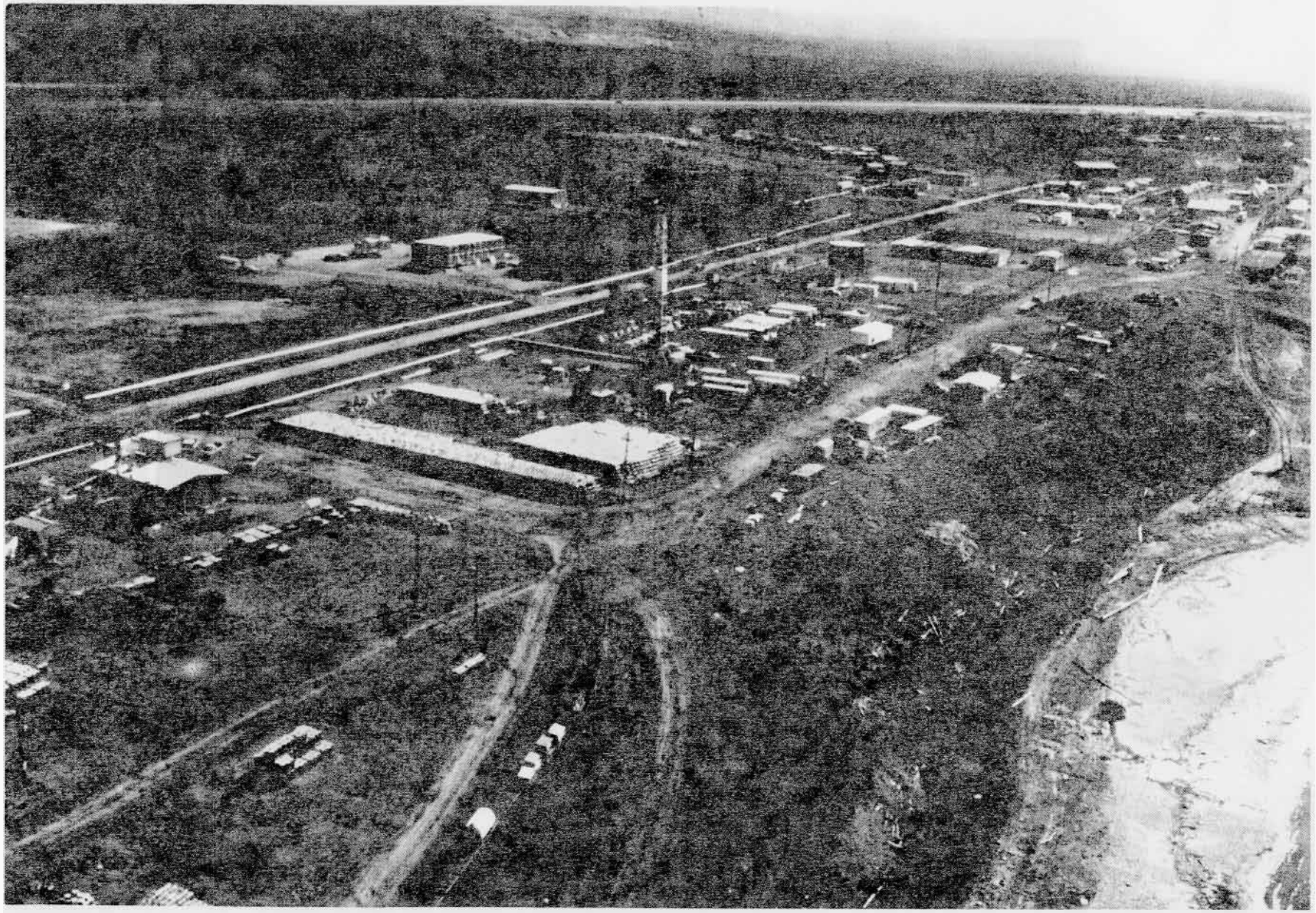
On the basis of the information presented at the meetings, the Panel is satisfied that no major route alternatives are available which would further reduce the potential environmental impacts.

On a local scale, the Panel recommends that minor alternative routings be investigated so as to move the pipeline further east from the settlements of Fort Norman and Wrigley.

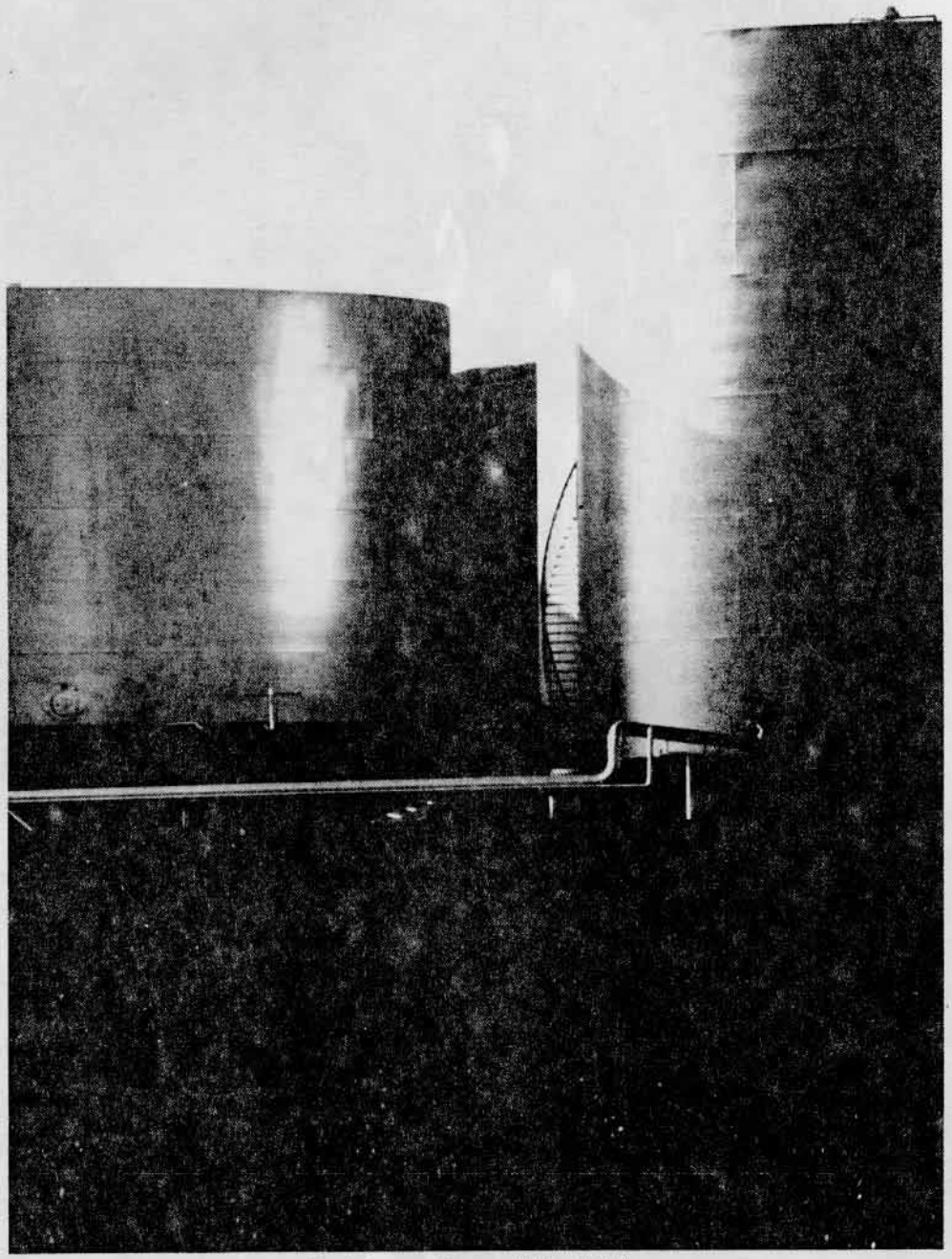
Construction Mode and Schedule

Several alternative modes of oil transportation were discussed during the review of the project. These included barging, trucking, different forms of pipeline, and combinations of these alternatives.

None could be shown to be as efficient or cost-effective as the pipeline proposed by IPL. The single buried pipeline is preferred to dual pipelines and above-ground pipelines for technical and cost reasons.



Norman Wells—View on the Facilities



Tank storage, Norman Wells, N.W.T.

IPL plans to build most of the pipeline during the winter months. This will avoid problems with wet or sensitive terrain and is now the normal pipeline construction practice for northern Alberta. The possibility of summer pipeline construction was discussed, but the Panel recommends that summer construction should be permitted only in areas where it can be clearly demonstrated that there would be no greater impact than winter construction in the same area.

4.2 PHYSICAL ENVIRONMENT AND ENGINEERING CONCERNS

During both the technical and the community meetings, the Panel received considerable comment on matters pertaining to the engineering of the project and its interaction with the physical environment. Those concerns which the Panel considered to be significant are discussed in this section.

4.2.1 Geotechnical Concerns, Pipeline Intesritv and Permafrost

The proposed pipeline route is entirely in the zone of discontinuous permafrost. At the public meetings questions were raised on permafrost distribution, ground ice, frost heave, thaw settlement, control of drainage and erosion, construction timing and climatic change. These topics relate to the long-term stability of the pipe once it is in the ground. The Panel is concerned over the interaction of the pipeline and the ground in which it is buried.

Pipeline Integrity

IPL proposes to bury the pipeline for its full length with a minimum thickness of one metre of soil above the pipe. The pipe will therefore be buried in the active layer of the ground, and for much of its length it will overlie permafrost. Since the pipeline is being designed to operate at ground temperature, the temperature regime of the pipeline is expected to follow that of the surrounding ground.

Both the steel of the pipe and the oil inside are thermally conductive media, and the moving oil can be expected to conduct heat or cold along the pipeline. For instance, the oil could be cooled in extensive areas of frozen ground and in turn cause freezing of unfrozen ground further along the pipeline. If a supply of moisture is available, heaving of the pipe may develop. Likewise, areas of frozen ground downstream of extensive areas of unfrozen ground could be warmed to the point that thawing and settlement of the ground and pipe could take place. Should thawing of ice-rich soil beneath the pipe develop, and the pipeline subside, even deeper thaw and continued pipe settlement may occur.

IPL has forecast and designed for a maxium thaw settlement of 1 to 1.2 m. tiowever, the Panel was informed that in addition the effects of right-of-way preparation for the pipeline route and other ground surface changes, such as loss of vegetation due to forest fires, could compound the situation and settlements of several meters might be expected. Thaw of frozen ground may also result in loosening of the soil such that the pipe would be inadequately supported, and could be deformed, particularly at bends. Alternatively, repeated freezing and thawing of the active layer around the pipe could result in the pipe being jacked up or lifted out of the ground. Movement of the pipe may result in its deformation, so that it cannot be operated safely.

In the EIS, IPL has provided only a very cursory analysis of the thermal regime of

the ground, of the proposed pipeline, and of their probable interaction over the service life of the pipeline. The Panel is of the opinion that this brief analysis is insufficient for an adequate evaluation of the likelihood of any of these problems developing, or of their possible magnitude.

The Panel was informed that slight changes in climate, particularly temperature, could cause significant changes in the nature and distribution of permafrost. In the subarctic regions of the northern hemisphere, a warming of two to three Celsius degrees could develop in the next 30 to 50 years. Therefore the thermal analysis should take into account a warming or a cooling of several Celsius degrees.

The Panel recommends that before the Project is authorized, the Proponent undertake and publish the results of a more detailed thermal analysis. This analysis should model the behaviour of the pipe in a variety of situations, including cleared and uncleared areas, deep organic soils, frozen and unfrozen ground at different temperatures and the effects of one terrain or permafrost type upon others farther down the pipeline. The analysis should cover the service life of the pipeline, and should take into account the possibility of climatic change over time, particularly air temperatures.

Right-of-Way Stability

Where possible IPL proposes to use existing clearings or disturbed land and rights-of-way for the pipeline route. From Norman Wells to Fort Simpson, approximately 60 per cent of the route will use existing cleared lines, including the abandoned route of the Canadian National Telecommunications telephone line. South of Fort Simpson, about 10 per cent of the route will follow existing seismic lines.

The Panel learned that there may be problems with the general stability of the pipeline right-of-way and surroundings. Slope failures and subsidence due to land clearing or excavation could affect the right-of-way and threaten the integrity of the pipeline. Frost heave or thaw settlement on the right-of-way could change surface and subsurface water drainage. This could result in flows of water along or across the right-of-way causing erosion and the deposition of sediment on land or in water bodies. In other cases, water may be ponded on the ground surface along or adjacent to the right-of-way. This could result in continued thawing of the ground and, in some cases, the development of thermokarst terrain.

A special problem may develop in the area southeast of Fort Simpson. This region is characterized by an extensive mosaic of peat plateaux containing permafrost, and wet fens without permafrost, with a surface relief of about one metre. Considerable thaw-settlement may take place in the peat plateau areas, and therefore provision must be made for differential movement of the pipe.

If thaw settlement or erosion disrupt the ground along the right-of-way, then there is potential for environmental disturbance during restoration by the pipeline operator. If there is serious failure of the pipeline or the right-of-way, repairs will be made on an urgent basis, and possibly at a difficult season of the year. Vehicle movement or engineering activity along the right-of-way during the thaw season may be unavoidable and considerable terrain damage may result. The Panel recommends that detailed and environmentally acceptable plans for the maintenance of the right-of-way and for

the repair of pipeline failures be prepared prior to commissioning of the pipeline.

It will be important to control surface erosion on the pipeline right-of-way, at man-camps, facilities sites, and on access roads. Re-seeding of suitable vegetation cover and reliable erosion control plans are called for. The Panel learned that the Proponents have such plans but that the specifics of species composition, seeding rates, and schedules have not been determined.

The terrain in the project area and along the pipeline route is mainly flat or gently sloping and, given ordinary precautions, the revegetation operations should be effective. However in steep terrain, as at stream and river crossings and in the vicinity of Bear Rock near the Great Bear River, special precautions will be required to minimize erosion on the pipeline right-of-way. This is especially important where thermal degradation and channelling of water in the right-of-way is a risk.

The Panel recommends that terms and conditions for the project spell out a requirement for a revegetation and erosion control program using species, techniques and schedules shown to be adequate for the task.

Karst Terrain

A special geotechnical problem may exist in the vicinity of Bear Rock. This is an area of limestone and other soluble rocks which has developed karst landforms in steep rugged terrain with caves and caverns, and variable thicknesses of overburden. The sinkholes near Vermilion Creek indicate the presence of caverns, the roofs of which have collapsed. The presence of a karst area poses three risks with regard to the pipeline:

(i) intersection of a cavern during ditch excavation;

(ii) collapse of the right-of-way into an underlying cavern; and

(iii) problems related to anomalous underground drainage.

Collapse of the right-of-way could lead to pipeline rupture, and the anomalous drainage could cause problems in containing and cleaning up an oil spill. IPL has an ongoing field program to investigate the risks posed by potential caves in the limestone.

The above geotechnical problems are well documented, and it appears that IPL is aware of them. In some cases, valid remedial measures are known to exist. For others, avoidance is the best approach.

The Panel recommends that in developing oilspill prevention and contingency plans, IPL make special provisions for this area of limestone terrain.

Recommendation

Experience has shown that in many areas, but particularly in the field of transportation, savings of costs and effort during design and construction have led to persistent maintenance problems during operation. All of the problems discussed in this section are susceptible to this failing. The objective is a reliable pipeline, laid in a stable right-of-way, with no significant problems left to be solved during operation and maintenance. In achieving this objective, the design philosophy of the Proponent is of great importance.

The Panel recommends that IPL design, plan and construct the pipeline so as to minimize the need for extensive maintenance or unscheduled repair activities.

4.2.2 Water Crossings

Two types of water crossings are required for the construction of this project, those between the natural and artificial islands in the Mackenzie River and the mainland at Norman Wells, and the stream and river crossings of the main pipeline along the route to Zama, Alberta.

While it would appear that there are no major technical problems with the crossings of the oilfield gathering-line system, the Panel was advised of potential local scour. All will be buried in scour resistant materials; either in bedrock or in stiff clay under river bed sands.

Some aspects of the water crossings along the oil pipeline present more important questions. First, the locations of the river crossings had not been decided at the time of the public meetings. Intervenors said that the final locations should be chosen to facilitate the containment and clean-up of oil spills and to minimize impacts of construction upon traditional fishing sites. Accordingly, the Panel recommends that river crossings be located so as to minimize overall environmental disruption.

Secondly, the timing of crossing construction is important, particularly with regard to the larger river and stream crossings. The major river crossings (the Great Bear and the Mackenzie) are to be built in the most appropriate season to minimize effects on migrating fish. Minor crossings (some 65 have been identified) will be built in winter as part of the general pipeline contruction, following normal pipelining practice for northern Alberta.

The Panel learned that there are five intermediate size crossings. The EIS is deficient in information on both the construction plans for these water crossings and on the fisheries information for evaluation of potential impacts. They should be constructed at seasons which will not adversely affect fish spawning beds or migrating fish. With these points in mind the Panel recommends that the construction plans and schedules for these streams be reevaluated by IPL in cooperation with Department of Fisheries and Oceans to ensure that impacts on fish and other aquatic organisms are minimized.

IPL informed the Panel that consideration is being given to the use of a directional boring technique for the construction of some river crossings, notably the Mackenzie River crossing upstream of Fort Simpson. This could minimize impacts and disturbance on the stability of the bed and banks of the river, impacts on aquatic life, and the need for particular timing of construction.

4.2.3 Island Construction

The most technically innovative feature of the project is the construction of six islands on the Mackenzie River to serve as drilling and production platforms for the oil field expansion. While the concept of man-made islands as a drilling and production platform is not unique, their successful construction and operation in a fast flowing northern river has yet to be demonstrated anywhere in the world. At the public meetings the Panel and a number of intervenors paid considerable attention to concerns related to the design, construction and maintenance of the islands. These concerns are as follows:

(i) alternatives to islands in developing the oilfield;

(ii) impediments to river navigation during and after construction of the islands;

(iii) entrainment of fish during the dredging phase of island construction;

(iv) overtopping of the islands by flood or ice;

(v) island integrity and stability;

(vi) life of the filter cloth component of the island construction;

(vii) ice jams due to artificial islands; and

(viii) the reduced river cross sectional area caused by the islands.

For the most part, Esso responded in depth to the concerns raised. In the matter of alternatives to the islands, the Panel is satisfied that the island concept is the most suitable one from an energy recovery point of view and that Esso did thoroughly investigate other alternatives. The Ministry of Transport and the Northern Transportation Company Limited advised the Panel that there should be no future navigational problems in the river because of the artificial islands. This is provided that the island construction conforms to the regulations and requirements of the Navigable Waters Protection Act.

With regard to dredging, the Panel is of the opinion that with continuous monitoring during dredging, the quantity of fish likely to be entrained by the dredge can be minimized.

Intervenors questioned the design criterion for the surface elevation of the islands, i.e. 54 m above sea level. The concern was if the islands were covered by flood water and/or ice this would threaten the integrity of the islands and the oil well facilities. Esso responded to these concerns by stating that the specification of 54 m is based upon:

(i) maximum water elevation in a 100 year flood predicted at 51 m; and

(ii) examination of ice damage on 225-year old trees in the project area showing no damage above 52.5 m.

In addition a 1 m high dyke will be built on the perimeter of the island to increase the available free board. To reduce ice pile-up on the islands, Esso intends to build a berm on the upstream sloping side so that any pile-up will develop at the berm and not on top of the islands. The Panel concluded that Esso has satisfactorily addressed the concerns about overtopping by water or ice.

The Panel reviewed the effects of ice jamming on the islands and concluded that ice jams would not endanger the integrity of the artificial islands and facilities. These islands will, however, create additional jams further upstream. In this respect, there were no significant environmental concerns identified.

Esso stated that the safety and integrity of the artificial islands is ensured by a conservative design approach. The Panel believes that the design of the islands is based on sound engineering practice but there are still problems requiring resolution before approval is given.

First, the Panel finds that Esso has not satisfactorily taken into account the effect and magnitude of scour around an artificial island. Intervenors from the Department of the Environment advised that extensive scour would cause gradual collapse of the islands' protective

riprap with subsequent subsidence and damage. Esso intends to carry out an annual monitoring program to determine the extent of scour and necessary remedial measures. However, the Panel was not advised how this monitoring would take place and how the problem would be corrected. The Department of the Environment recommended that local scour be fully evaluated by means of a model study of the Mackenzie River in order to be certain of the structural safety of the gathering lines and integrity of the islands. The Panel recommends that Esso implement such a study which would include the monitoring and repair procedures. The results of this work should be reviewed by government before the island construction is authorized.

The second problem has to do with the use of filter cloth in the design of the islands. Filter cloth (used to contain the sand in the island core) could be damaged or ripped due to the movement and settlement of rip-rap material, which might lead to erosion and subsidence of the island. Esso is aware of this risk and is undertaking studies to determine if there is an alternative to the filter cloth which would be less susceptible to damage. The Panel recommends that these studies be actively pursued with the objective of finding a material that will ensure that no significant erosion of the islands can occur.

The Panel further recommends that final approval for the construction and operation of the islands should not be given until the river scour and filter cloth questions have been satisfactorily resolved.

42.4 Related Structures and Activities

Eesides the artificial islands, oilfield development, and the processing plant, several other facilities and structures are planned for this project. These include: three pump stations, each utilizing an area of one hectare of land; four remote maintenance depots and eight major stockpile sites located on the pipeline route; a new permanent dock on the mainland at Norman Wells; three microwave towers; several concrete weight manufacturing plants; two mobile work-camps of 30-man capacity and three portable mainline camps of 320-man capacity; a total of about 30 km of permanent and temporary access roads and an undetermined number of borrow pits.

Information was not available on site-specific aspects of the design and final location of many of these facilities. The Panel concluded that potential major environmental impacts would not occur provided that:

(i) facilities are located on existing cleared areas, where possible;

(ii) the number and length of temporary and permanent access roads is kept to a minimum by utilizing winter roads;

(iii) the right-of-way is used for access and storage; and

(iv) refuse cleanup, land rehabilitation and revegetation are carried out promptly at all construction sites.

4.3 BIOLOGICAL ENVIRONMENT AND THE LAND

Many submissions at the public meetings indicated a strong concern about the implications of pipeline and oilfield activities on the land and wildlife of the Mackenzie Valley. The Panel regards some of these concerns as significant and has chosen to make recommendations on them. Others can be resolved using good engineering practice, appropriate for the region and the season of activity.

4.3.1 Fisheries and Wildlife

The Panel was told by the Department of Fisheries and Oceans that there is a large amount of useful data on the aquatic resources of the Mackenzie Valley, and that, even though this information is available, it was not adequately treated in the EIS. The Panel recommends that the Proponents consult with the Department of Fisheries and Oceans to address any outstanding concerns and demonstrate in their construction timing and techniques that they have properly used the available information and addressed the concerns.

Additionally, the Panel recommends that further site specific studies be undertaken to determine final alignment for river crossings and, that monitoring of dredging operations and construction at stream crossings be carried out to prevent or minimize impacts on fish and the aquatic environment.

Concerns over impacts to wildlife focussed on the pipeline effects on distribution and accessibility of game species and on nesting sites of endangered raptors. In addition, expanded oilfield development raised concerns about waterfowl staging and feeding areas on the natural islands of the Mackenzie River near Norman Wells.

There is a lack of current data on wildlife distribution, habitat, and behavior in the project area, and the level of use by hunters and trappers. The Panel was not advised on the importance and magnitude of project-related impacts on wildlife populations and on hunting and trapping returns. The Panel recommends that IPL undertake baseline studies on hunted and trapped species to provide information aimed at both the assessment of the impact of the pipeline construction and operation on wildlife, and the development of mitigation measures. An adequate winter game survey should be done in early 1981 with additional monitoring of behavior, availability of game, and impact on trapping returns during the construction and operation phases.

The Norman Wells section of the Mackenzie River harbors important habitat for resting, staging, mating and feeding for waterfowl populations enroute to northern nesting sites. Esso has recommended mitigative measures to reduce the impact on waterfowl during migration. The Panel recommends that construction and drilling activity on the islands stop during the peak spring migration period that normally lasts one to two weeks and that helicopter access to the islands be restricted to only essential needs. Furthermore, no earth material or vegetative cover should be removed from known staging areas.

In the event of a major oilspill during spring or fall migration, aircraft hazing and scare devices will be required to deter waterfowl from landing in the contaminated area. The Panel recommends that Esso develop a plan specifying the necessary equipment and procedures to keep large populations of waterfowl away from an oilspill site.

4.32 Forests and Wildfires

Wildfires are a part of the northern ecology in the project area. Recently, fire damage to trapping and hunting areas and to timberlands has been extensive. This has drawn attention to the potential for fire damage to the proposed oil pipeline and the right-of-way. The Panel learned that IPL will probably depend on the government fire prevention and suppression organization to protect the area around the pipeline from wildfire. Where ground fires occur near the pipe, IPL expects to assume responsibility for fire control.

"The proposed Project is premature because of the need for land use planning. Planning must include all interested parties and planning must develop from consensus. Evidence of the desirability of consensus is our Mackenzie Delta Contingency Plan which was attempted without general understanding and support and failed. The inevitable conclusion is that such plans must include all Northerners from the beginning."

Norman Simmons
Department of Renewable Resources
GNWT

"If such a land use plan was in effect before we came along and if this land use plan had considered where the cold oil line should be and what the best place for it would be, it would be my assumption that the land use plan would incorporate that right-of-way which our consultants have picked."

Bill Pearce
Interprovincial Pipe Line (NW) Ltd.

"I am going to just add, Mr. Chairman, I think it is reasonable to guess that on our part the proponent is aware of these (previous studies) considering what is at stake both from the environmental point of view and the Companies' point of view, it is reasonable to guess that the Companies are aware of problem areas and aware of what further studies are needed.

It is disturbing to me that a project of this magnitude has got to this point in the regulatory process and we are left essentially still assuming and guessing.

In my opinion, it should have been in the EIS."

Jeff Stein
Department of Fisheries & Oceans

The Panel recommends that government and IPL fire control responsibilities be clarified prior to commencement of construction and operation of the pipeline. It is further recommended that the government fire control program be augmented to provide protection to the pipeline and, at the same time, that there be no decrease in protection services to other sectors, such as highways, settlements and traplines.

With respect to potential forest losses from the project, the Panel learned that there will be minimal creation of new right-of-way for the pipeline. Existing telephone and seismic lines will be utilized along the route. Losses of merchantable timber are not expected to be significant. Where cutting is required, the Panel recommends that slash from the right-of-way clearing operation be piled and burned on the right-of-way during the winter.

4.4 OILSPILL PREVENTION AND COUNTERMEASURES

The threat of a continuing oil blowout was raised a number of times in the community and technical meetings. The "worst case" scenario would be a blowout occurring at an artificial island during the spring break-up or fall freeze-up periods. Current technology in controlling such a spill in a large ice-infested, fast-flowing river is quite limited. The Panel is not satisfied with the oil spill prevention and countermeasures put forward by Esso.

The Panel recommends that Esso be required to undertake an accelerated research and technology program on oilspill countermeasures and equipment to deal with oilspills into or under ice-covered and ice-infested river waters. The program should include solutions to current problems of detecting and tracking oil in and under ice, and the recovery of oil from the Mackenzie River under all ice conditions. This program should be in place before expanded production begins at Norman Wells.

At the technical meetings significant concerns were raised on the capability of Esso and IPL to monitor leaks in the oil gathering lines of the oilfield and in the main pipeline. Esso advised the Panel that leak detection on the gathering system using the best available technology would result in detection accurate within the range of $\pm 3\%$. Such a loss without detection for the oilfield project would be 70 m^3/d. The volume of gas/oil mixtures is difficult to measure accurately. However, the Panel learned at the technical meetings that the Soviet Union has developed technology to accurately measure gas/oil mixtures to $\pm 0.5\%$. IPL advised that instrumentation would be installed on the main pipeline to detect leaks in the range of $\pm 0.5\%$. Higher accuracy is possible because of the properties of the fluids being measured.

The Panel has concluded that a potential undetected loss of 3% from the Norman Wells oilfield is environmentally unacceptable. It is recommended that Esso investigate, design and install a more accurate leak detection system that would be consistent with the detection levels of the main pipeline.

Up to the time of the public meetings the Proponents had not finalized oilspill contingency plans for the project. Even though Esso has developed oilspill scenarios and countermeasures that could be implemented, there is an important need for a detailed contingency plan to be in place prior to the drilling phase of the project and prior to construction of the pipeline. Such a plan is essential for this project to proceed in an environmentally acceptable manner.

The Panel recommends that contingency plans for both the construction and operational phases of the project (oilfield expansion and pipeline) be developed, tested, evaluated and approved by the responsible government authorities prior to the start of construction. These plans should be readily available and understood by all key construction and operational personnel. The plan should be designed so that it would serve not only as a principal reactive tool but as a preventive one as well.

4.5 TOXIC SUBSTANCES AND AIR EMISSIONS

The Panel learned that the Proponents have not specifically identified and described all of the types and quantities of potentially toxic and hazardous chemicals that would be required for the project and how those materials will be handled and disposed of. Up to sixteen different chemicals may be required by Esso for oil well stimulation and production operations. These include chlorine to prevent biological growth in the wells, hydrochloric acid for stimulating production from a carbonate reservoir, polyvinyl alcohol for further well stimulation, and radioactive tritium for use as a reservoir tracer. Esso has indicated that none of these chemicals will enter the environment unless there is an accidental spill or rupture. The Panel has noted that in 1980, two large acid spills into the Mackenzie River occurred while barging to Norman Wells. Thus, there is a risk of chemicals entering the environment.

From the limited information provided, it is evident that the Proponents do not have adequate contingency plans or procedures for the handling, storage, transportation, and disposal of toxic and hazardous materials. The Panel recommends that such plans and procedures be in place prior to the commencement of the project.

The Panel was advised by the Department of Environment that Esso did not adequately consider the environmental impact of air-borne emissions from the oilfield development project. Esso has stated that air quality would be improved once the new facility is in operation. This observation was made without supporting data or analysis. The Panel believes that Esso has been premature in arriving at this conclusion and therefore concurs with the points raised by the Department of Environment.

Accordingly, the Panel recommends that Esso commence a monitoring program for ground level concentrations of air emissions in the Norman Wells area and that this monitoring continue during the course of the project.

4.6 WATER USE AND EFFLUENT DISPOSAL

Esso has stated that large volumes of water (a maximum of 6400 m^3/d) will be required for the water flooding activity at Norman Wells. The Panel has found no evidence that this withdrawal would have a significant impact on the Mackenzie River. Esso has stated that used water from the oilfield which is contaminated with oil will all be reinjected into the reservoir and will not be discharged to the Mackenzie River. From an environmental perspective, this is the preferred method.

Water is also necessary for domestic purposes, process and cooling water, and pipeline testing. Such use should not pose any measurable impact on the water resources of the project area.

Intervenors questioned the use of methanol and water temperature changes during hydrostatic testing procedures for the pipeline. IPL stated that neither methanol nor any other chemicals will be used in testing. However, hydrostatic testing water will be heated to a maximum of 36°C

to prevent freezing during the tests. Owing to the relatively small amount of water required in each test (1250 m^3), the discharge of the warm water to the surrounding environment should not pose a significant problem.

For the oilfield expansion, Esso intends to drill approximately 200 wells. For each well, an average of 700 m^3 of drilling waste and 37 m^3 of cuttings would be generated. For the wells drilled from the artificial islands, Esso plans to dispose of the oil-free wastes directly into the Mackenzie River. The estimated quantity of waste fluids involved would be 56 000 m^3. From the evidence presented to the Panel by Esso and the intervenors, the Panel has concluded that this plan of direct disposal to the river is not environmentally acceptable. Esso has failed to provide any substantial evidence that this procedure would not be harmful to the environment and has failed to describe how clean waste would be segregated from oil contaminated drilling wastes. Moreover, the Panel is concerned that if this activity were to be allowed, it would set a precedent for the discharge of industrial wastes into the Mackenzie River, Canada's last large unpolluted waterway.

The Panel recommends that no drilling wastes other than mixtures of water and bentonite be allowed to enter the Mackenzie River and that land disposal and treatment sites be identified and developed.

4.7 ARCHAEOLOGY

The Panel received a written intervention from the Archaeological Survey of Canada expressing concerns with IPL's lack of detailed information on the archaeological resources that may be disturbed or lost. IPL intends to undertake a comprehensive survey of the cleared right-of-way before trenching and laying of pipe. In addition a staff archaeologist will be on site during construction to assess any archaeological finds that may be discovered. It is the view of the Panel that IPL has satisfactorily addressed the issues raised.

The Panel recommends that the responsible Federal and NWTG agencies further review the details of IPL's proposed archaeological program and monitor the potential impact of this project on the archaeological resources along the pipeline route.

4.8 ASSOCIATED PROJECTS

During the public meetings, intervenors stated that approval of the Norman Wells project would act as a catalyst for more and larger developments in the Mackenzie Valley. The Panel is of the opinion that Esso and IPL have not adequately addressed this subject. For instance the oil pipeline from Norman Wells to Alberta will probably accelerate exploration and development of oilfields along the route. There is also the possibility of future looping of the oil line, completion of the Mackenzie Highway to Norman Wells, hydroelectric power generation, major base metal mining and coal development, and large diameter gas and oil lines being constructed along the Mackenzie Valley. The Panel learned that Esso and IPL have not had discussions with other energy developers with interests in the region concerning possible future oil transportation systems. Because of the lack of information and an adequate planning structure the Panel was unable to assess and evaluate the potential environmental impacts and interaction of this project with other possible resource developments in the Mackenzie Valley.

4.9 ENVIRONMENTAL IMPACT MANAGEMENT

Following the development of terms and conditions, the impact management process for this project should itself be monitored and evaluated. By comparing the actual impacts of the project with the predicted impacts, important experience in impact evaluation and management can be obtained. Published case histories would aid in transferring the knowledge and experience gained in the management of this project to other, larger pipelines which may be built in northern Canada. The Panel recommends that this evaluation of the impact management process be carried out with sufficient resources to support it. These resources should be provided by the Federal Government. The actual work could be undertaken in consultation with the GNWT by the Department of the Environment, the Department of Indian Affairs and Northern Development or by a non-government agency under contract to one of those departments.

Environmental Concerns at the Community Meetings

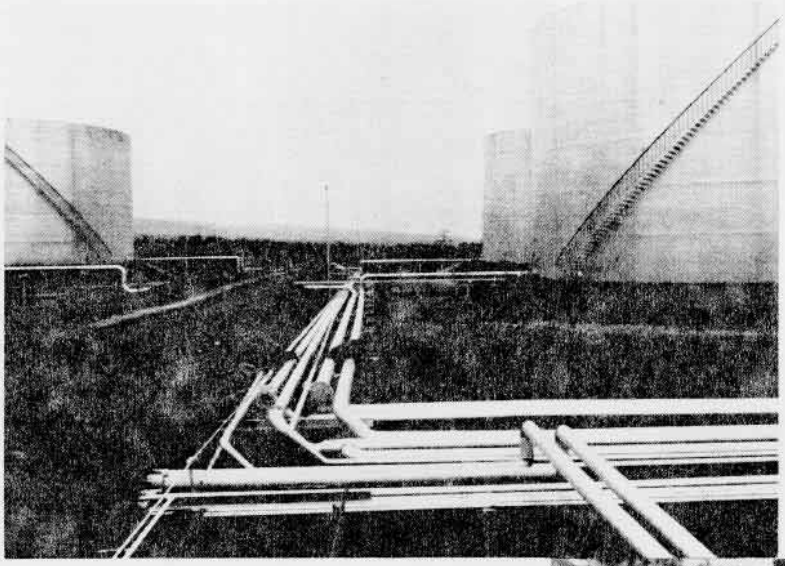
Many speakers at community meetings in the smaller settlements, whether in favour of the project or opposed to it, expressed concern for environmental protection and the prevention of pollution. Some spoke from personal experience having seen oiled waterfowl, broken pipelines and spilled oil, or having tasted oil-tainted fish. All the intervenors indicated a wish for the protection of land, water, forests and wildlife.

In contrast to this, speakers at community meetings in Hay River and Yellowknife tended to assume that adequate environmental protection would be provided. They regarded the project as environmentally sound, and foresaw no problems provided standard terms and conditions are applied.

It is clear that people who live close to the land perceive the project as being potentially harmful. Throughout the meetings, the Panel found a general lack of understanding of the project and its effects on the natural environment, of the Proponents' proposed mitigation measures and of the relationship of this project to other developments in the region. Because of this the Panel recommends that an effective, on-going public information program be established with the objective of responding to the concerns of the residents of the Mackenzie Valley. This program should be organized and funded jointly by the Proponents and both the Federal Government and GNWT and should use a wide variety of approaches and communications media. Provision should be made for feedback of questions, concerns and information from the communities. The Panel learned of the Alaska Oil Pipeline Impact Centre at Fairbanks. There local citizens managed the Centre with funds from government and industry. The Panel believes that this is a potentially useful model for the Norman Wells project.

CHAPTER 5

ECONOMY AND SOCIETY



5.0 ECONOMY AND SOCIETY

At the request of the Department of Indian Affairs and Northern Development the Panel extended its assessment to include economic and social issues. The Panel sought advice on how the residents of the Valley felt about the project and what steps might be taken to improve the consequences of such a development. Chapter 5 deals with the important economic and social issues which stem from the proposed project and which were discussed at the public meetings.

5.1 ECONOMIC ISSUES

The Norman Wells Project proposal was reviewed mainly in the regional context. While the Panel did note implications to the national economic setting, most of its attention was devoted to the effects of the development on the Mackenzie Valley economy.

5.1.1 The Norman Wells Project in the National Setting

The Panel noted the importance of the Norman Wells project to the Canadian economy. As proposed it would deliver an additional 3 500 m^3/d per day of petroleum to the Canadian market. It has been estimated that the projected production of 4 000 m^3/d would bring roughly $250 000 000 per year at current world prices. This would have the effect of contributing to a net reduction of foreign oil imports and would be consistent with the present national energy policy according to the Department of Energy, Mines and Resources.

It is noted that the projected Canadian content is high with roughly 95% of the construction and materials purchased in Canada and 98% of the operating costs benefiting Canadian business.

Apart from this observation the Panel did not assess the project in a national context, because this is the role of the National Energy Board.

5.1.2 Regional Economic Issues

At the present time the economy in the western NWT is stalled with underemployment and slow business activity in many sectors. The five main economic issues which were brought to the Panel's attention follow from this situation.

There are two issues which affect the economy and which are indirectly related to the proposed project. First, the GNWT presented strong arguments for altering the resource revenue-sharing arrangements between the Territorial and the Federal governments. Second, the Dene Nation urged that the project be delayed until a land settlement is substantially complete. Both issues have political implications as noted in Chapter 3 of this report.

The third issue is a primary need for regional planning to accomodate the project. In spite of recommendations made in the past and some attempts to make progress, there is not yet a comprehensive resource and land use plan for the project area. Even a preliminary document would give a focus and a framework for the orderly development of the project and subsequent undertakings. The absence of a land use plan has raised concern and doubts as to how the potential effects of development can be predicted and dealt with.

On the fourth issue Mackenzie Valley residents questioned how the development of Norman Wells oil and gas could bring price advantages to local consumers and how security of fuel supplies could be assured in the future.

The fifth issue is preference for northern hire and tendering to northern business so that economic benefits accrue to the NWT and do not flow out of the region. The Panel noted that the overall employment potential from the two-part project is not large. However the opportunities to add hundreds of man-years to the local wage economy are particularly important, given the slow economic pace at present. In this regard several suggestions regarding local labor and northern business were urged upon the Panel.

While there was wide support, for the proposed project from the business community, local governments, and some intervenors, the support was qualified by the recognition that these regional economic issues require priority attention in planning the project.

The Panel has concluded that to maximize benefits to the North and to give the economy encouragement and stability, the following items need to be undertaken:

(i) A review and restructuring of sharing of project-related revenues.

(ii) Initiation of land settlement negotiations and substantial progress made.

(iii) Preparation and implementation of a land and resource plan for the project area to accommodate this project and others that may follow.

(iv) Development of a policy and public information on oil products pricing and assurance of oil supplies for northern consumers.

(v) Specific priorities must be developed for the employment of northerners. A cooperative plan needs to be drawn up by the Proponents, GNWT, and the Federal Department of Employment and Immigration.

(vi) The development of equitable tendering opportunities for northern businesses and the development of policies to stimulate the growth of these businesses.

These issues are discussed further elsewhere in this Chapter and in Chapters 3 and 7 of this report.

5.1.3 Effects on the Regional Economy

The potential effects of the Norman Wells Project on the regional economy are difficult to determine because of a lack-of information on the existing wage economy and the lack of a model or baseline against which to measure change. However, briefs to the Panel did make it clear that there will be some positive benefits for some northerners, but that there may be negative effects on others.

In monetary terms the following figures illustrate the scope of the project. In 1979 dollars, the total capital cost is estimated to be $600 million. Construction wages paid for the oilfield development are forecast at $89 million, while those for the pipeline will be $39 million. Annual wages for project operations at Norman Wells are expected to be $4.7 million and for the pipeline operation $1.2 million. As a comparison of scale, the GNWT expenditures for 1979 were $290 million. The figures for project expenditures do not include the additional revenues that would be generated' by regional supply and service industries. Since it is impossible to determine the amount of cash from the project uhat will stay in the North, or the portion of wages paid out that will

circulate within the northern economy, a net dollar value on the economic benefit to the region cannot be estimated.

The Panel has determined that there are three potential negative economic effects to the project:

(i) risk of "Boom and Bust" situation;

(ii) increased inflation; and

(iii) disruption of traditional economic pursuits.

The "Boom and Bust" situation was raised by intervenors in the business communities of Norman Wells, Fort Simpson, Hay River and Yellowknife. The project will stimulate new economic growth in the Mackenzie Valley bringing a much needed positive economic thrust to a stagnant and uncertain business climate. However, during construction the influx of cash from wages and purchase of goods and services could overheat the regional economy, inflate prices and over-accelerate the development of local services. If the Norman Wells project is not followed by other major industrial developments, a "Bust" situation could develop. The Panel was informed of the Alaskan oil pipeline experience and it was noted that even allowing for differences in scale, the risk is present in the Mackenzie Valley. Therefore, to minimize this effect the Panel recommends that the Proponents liaise with government and prepare an assessment and strategies for meeting the inflationary effects of the project. This should be done before commencement of the project is authorized.

Additionally government must take immediate steps to assess the impact that the Norman Wells Project would have on future resource development and transportation initiatives in the Mackenzie Valley. Once approved, the project will link the welfare of the region more closely to resource development, and will impose on government a special responsibility to protect Valley residents from postproject depression and its economic and social consequences.

Inflationary wage differentials represent the second negative economic effect. New work opportunities for northern people at higher wages may draw workers away from existing employment in government and the private sector. This could disrupt existing government and business services because of an inflationary rise in salaries and wages. The Panel recommends that the planning and monitoring authorities in the GNWT work with the Proponents to conduct a study of the consequences of project-related wage differentials and then prepare to deal with related employment problems which might affect northerners already employed in the region. The information should be publicly available so that private agencies and governments have an opportunity to prepare and plan for potential employment problems.

A third concern is that new work opportunities will be attractive to northerners who are presently engaged in hunting and trapping. Active trappers in the area would welcome additional employment to maintain trapping activities. Some individuals may choose to withdraw temporarily from trapping; others may work part-time at both activities. After the construction phase is completed, employment will decline and some workers may return to trapping for a living. Experience has shown that temporary absence from trapping leaves some trappers without adequate equipment or funds to resume trapping. The Panel recommends that the GNWT broaden its program of assistance to trappers who seek to become re-established in trapping after a period of wage employment on the project.

". ..there are certainly some very key issues as far as the Government of the Northwest Territories is concerned related to revenue-sharing and the settlement of claims and other issues which we consider to be very key.

We feel strongly on these issues, and we feel that it is not a problem for the proponents themselves, but it is going to be for Ottawa and ourselves; we feel very strongly that we must get a satisfactory solution to these problems."

Larry Elkin
Department of Local Government
GNWT

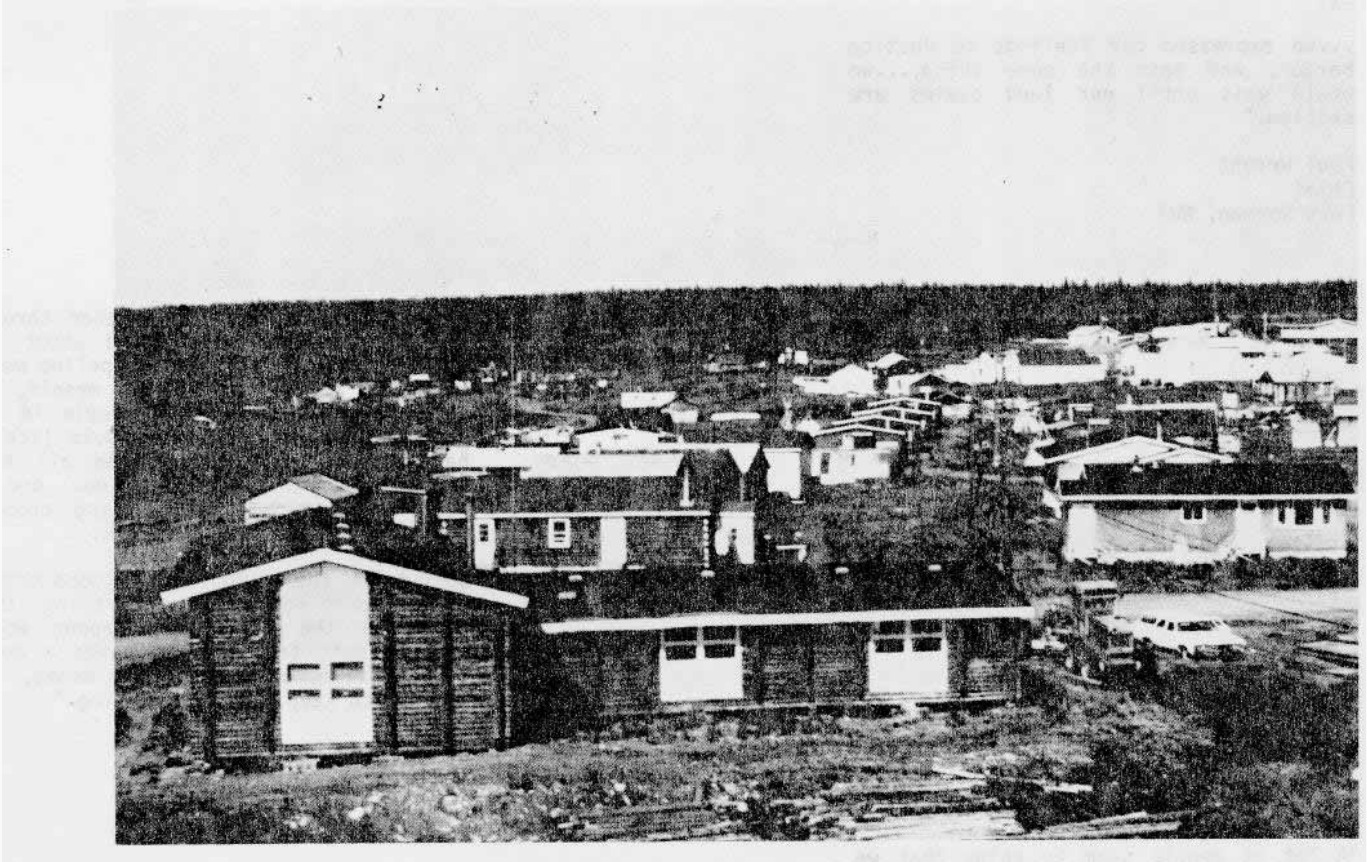
"The national energy policy, as referred to in the EMR brief, omits any reference to the future needs of Northerners or for that matter the future needs of Southern Canadians. It is not concerned with other land uses such as land claim settlements; it is not concerned with timeliness of this Project or how the Project may contribute or detract from developing a conservation ethic.

Surely a national energy policy as separate from an EMR policy must have goal beyond immediate extraction and transportation of a non-renewable resource in the North to the South."

Carson Templeton
Winnipeg

". ..it is my contention that the price the people of the north will pay for a deliberate position of no development is greater by many factors than the social risks of controlled development."

J.R. Witty
Manpower Development Division
Department of Economic Development and Tourism.



Fort Franklin. N.W.T. on the shore of Great Bear Lake

"All afternoon and tonight I have listened to all the points mentioned. It is a great issue that we are talking about. When there is a big issue like this being discussed you should take it seriously.

A project like this is a big project. We, as Dene, feel we have already stated in our previous meetings where we said that we would wait until our land claims are settled. This is what we are going by.

. ..we expressed our feelings to Justice Berger, and said the same thing,...we would wait until our land claims are settled."

Paul Wright
Chief
Fort Norman, NWT

"... it is about time you pushed through the pipeline and never mind about all this arguing. I think the pipeline would be a good thing, not only for myself, but there are a lot of young people in the Mackenzie River Valley who would like to have some money, rather than all this talking that they are doing now; and it would benefit a lot of young people. Young people have to have work.

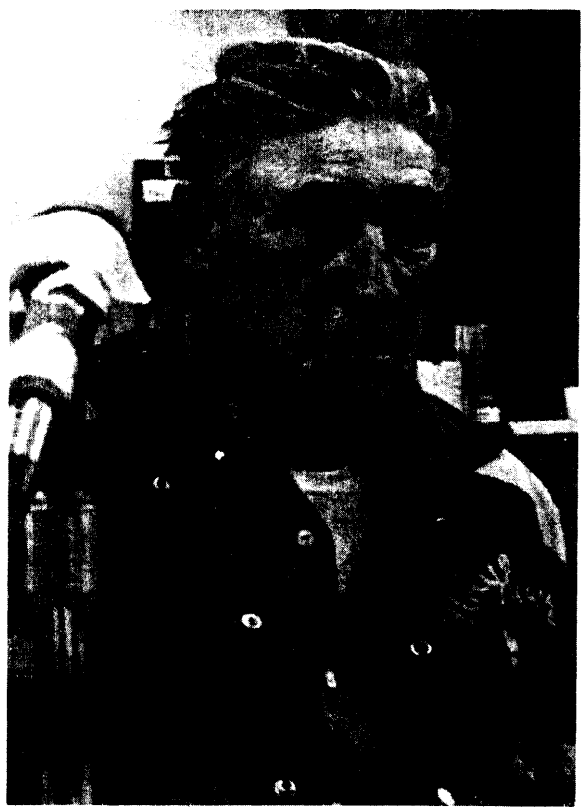
So I think the pipeline is a good thing. If you don't do this type of thing, then otherwise the full-time trapper would have to quit trapping; it takes a great deal of time, a lot of time, money, gas and oil to keep a skidoo running."

Archie Lennie
Fort Norman, NWT

"A lot of people seem to think that we are against development. That is not so. We know that eventually, one of these days we will have to get into development of the resources that the land of the Native people hold; but some of the areas, like land claims, have to be resolved in our minds.

So it seems that we are dead against development, but if we knew where we stood as far as the Government was concerned, we would be open."

Joachim Bonnetrouge
Chief
Fort Providence



5.1.4 Employment and Business Opportunities

Several decades of change have made the need for cash a central part of the lives of most valley residents. The increase in population, both by natural increase and in-migration, has produced a capacity and requirement for gainful employment beyond the opportunities which presently exist. Employment and business opportunities are needed to stimulate the regional economy. The Panel sought and obtained advice on how this project would affect local participation and northern preference.

Employment

There is a clear need to increase job opportunities in the Mackenzie Valley. Young people are leaving school with increasingly higher qualifications and expectations, and many unemployed persons are seeking training and jobs in the wage economy. The fact remains that most northerners would prefer to work in the North and not to have to move to southern Canada to find employment.

The Panel heard from government agencies responsible for employment and for the consequences of unemployment. It is apparent that a monthly average of 525 construction jobs and 120 permanent jobs at Norman wells and 29 permanent pipeline jobs represents an important employment package. Additional jobs in service industries and government agencies supporting the project would also add significantly to employment. Apart from direct employment, there will be substantial associated benefits to the service industries, supply companies, construction contractors and manufacturers. Even though peak employment will be temporary during construction, the benefits from wage employment will be welcomed by many potential workers and businesses in the north.

Several interventions stressed the need for local hiring and northern employment priority for residents of the NWT to protect against the in-migration of southern workers. In this regard, the definition of a northerner was the subject of much discussion. The Panel concluded that the GNWT definition of a northern resident as any person that has resided in the NWT for one year or more is appropriate. The Panel recognizes that the basis for a northern preference policy is to reduce unemployment in the region. It was noted that the project Proponents are aware of the importance of recruiting in the project area. In this regard the Panel recommends that labour recruitment take place close to the work sites.

Some intervenors were concerned that unions may control the delivery of labour, and that union regulations could foreclose opportunities to local workers. Esso noted that unionized contractors would likely construct the main processing plant at Norman Wells, although unions would not be involved in drilling operations, field development and operating phases. IPL advised that until the contract is let, it would not be known if a unionized pipeline contractor would build the main pipeline. Nevertheless, both Proponents confirmed that in cases of union contracts, access to jobs would take account of the skills and interests of workers in the project area. The Panel recommends that agreements with unionized contractors should be drawn up to accommodate this goal, as a first priority.

Business Opportunities

The business community in the region strongly supports the project. Each intervenor with business interests stressed the need for economic expansion and stability, and called for a mechanism to give equal opportunity to northern

businesses in the tendering process. Northern businesses are not large enterprises and southern firms may have a competitive advantage in many situations. Northern business is confident in its ability to deliver goods and services, but contracts for the project should be tendered in portions of a size that northern businesses can compete equitably. The Proponents are aware of the need to divide jobs on major assignments into manageable portions. The Panel recommends that this be an essential undertaking if benefits to northern businesses are to be realized.

Bonding requirements are of concern to contractors in the north. Some contractors are small compared to southern competitors and could not post large bonds if required to do so. This could deny entry to the tendering process. The Proponents have indicated that in some cases they will waive the need for bonding. The Panel concluded that this measure is adequate and should result in increased work for some northern businesses.

Most northern contractors operate non-union businesses, and the requirements of union contracts could deny their participation. At Norman Wells, Esso will act as the general contractor and intends to tender some work from non-union subcontractors and businesses. IPL gave assurances that local non-union businesses would find opportunities to bid on work apart from the main contract which may or may not be unionized. The Panel recommends that the Proponents make every effort to insure that some contracts are tendered to non-union, northern business.

5.1.5 Programs to Assist the Regional Economy

The Panel learned that training and upgrading programs and a project-related public information program are not sufficiently developed to permit adequate benefits to flow to the economy.

First, the training and upgrading programs of the GNWT and of industry need to be focussed on the proposed project. For example there will be a need for skilled and semi-skilled workers in mechanical trades, drilling, welding, carpentry, equipment operation, communications, as well as in service and business offices employing stenographers, clerks and accountants. At present, there are few skilled northerners who are trained for work on the Project. Even though the lead time for training may be short, the Panel recommends that the GNWT and the Fort Smith Vocational and Higher Education Centre work together with the Proponents to assure that the results of project-related training efforts are maximized. The Panel has concluded that this collaboration is essential to achieve an upgrading of regional skills in the oil industry and pipeline trades, not only for this project but also for new industrial initiatives in other parts of the NWT.

The Panel was advised that Esso has made important progress in training workers on the job at Norman Wells. At present there are 30 to 40 full-time employees on programs related to the proposed oilfield development. This on-site training has the advantages of practical experience, a wage income and rotational shifts allowing the trainee to maintain contact with the home environment. These factors ease the transition, with some life style changes, from unskilled to skilled work employment. The Panel recommends that the on-site training programs of the Proponents become an integral part of the construction and operation phase of the project.

IPL informed the Panel that because of the short pipeline construction period (two 90-day periods in two winter seasons) and the skilled labour requirements, most workers will be brought in from the south. However such work as clearing and preparing of the right-of-way could be done by local residents. Given the possible lead times on this project, the Panel recommends that the GNWT and IPL make use of the existing or modified employment training schemes such as Hire North, so that as many local workers are involved in the pipeline construction and operational activities as is practicable. Skills developed on this pipeline project will be useful in other similar developments in the north.

Secondly, a public information program needs to be developed and maintained throughout the approval, planning, construction and operation phases of this project. The Panel noted that there was a general lack of knowledge of the proposed project, particularly in Mackenzie Valley communities. This is partly due to the complex nature of the subject matter and volume of material in the environmental impact statement and supporting documents. The Panel was advised that the EIS was not reviewed thoroughly in any native community except that of the Dene Tha Band near High Level, Alberta. If the project is to go ahead, it will be necessary now to develop an effective public information program which emphasizes the job situation and business opportunities and which provides advice to counter unwarranted enthusiasm and anticipation. The Panel recommends that the GNWT and the Federal Government work with the Proponents to provide effective information to assist local employment and business.

5.1.6 Effects Upon Government Services

The proposed project has raised the concern of many departments of the federal, NWT, and local governments because of potential impacts of additional work loads and increased demands on existing environmental, technical, economic, and social programs. New responsibilities, increased work loads and higher costs will impact government agencies as they respond to the project. Some new programs will have to be mounted and others augmented.

The time for planning and preparation is very short and governments will be required to respond promptly once a decision is made to proceed with the project. Furthermore, the workload will increase sharply during construction while the operating phase will continue over several years.

For the social and economic issues the GNWT and the Federal Government are clearly in the spotlight and certain departments will require some additional staff and funding. The Panel suggests that there are at least four options available for government departments to meet the new responsibilities:

(i) second staff from one level of government to the other;

(ii) increase the public service temporarily in some cases and permanently in others,

(iii) purchase expertise in planning, managerial and technical skills where necessary; and

(iv) redirect existing resources and programs into others which are related to the Norman Wells project.

Because the project will require substantial effort at the beginning, the Panel recommends that all of these options be seriously considered.

Several government programs will have additional requirements imposed by the project, Briefs at public meetings pointed to the need for additional mental health services, housing, school facilities, increased policing, and alcohol program development. The Panel recommends that project-related requirements not be allowed to displace existing government programs and responsibilities and that government agencies be provided with resources necessary to meet the demands from both the project and existing programs.

The Panel has concluded that in certain specific areas, the costs of incremental programs and services could be borne by the Proponents. Both Proponents have acknowledged that company employees will receive medical services and recreational facilities and programs at company expense. However, the added costs for the new infrastructure such as roads, communications, quarry development, and building lot preparation (Norman Wells) could be borne in whole or in part by the Proponents. This matter should be studied in the early planning stage of the project and government agencies and the Proponents should determine whether such arrangements are necessary and negotiable. In addition the construction plans for temporary structures and physical facilities should be reviewed to determine if there is potential for use by community or local government agencies after the construction period. The Panel has concluded that these are appropriate strategies to pursue and therefore recommends them.

Finally, in concluding that these requirements for government services will surely impact on government department budgets, the Panel recommends that realistic financing be assured and in place so that adequate programs exist for planning and servicing the project and the needs of the northern residents.

5.1.7 Effects on Transportation and Communications Facilities

The proposed project will bring an increase in the use of transportation and communication facilities. The major concern brought before the Panel was that the present services to communities should not be overtaxed to the point where project requirements would displace requirements of other users.

Transportation

The barge system on the Mackenzie River was upgraded in anticipation of the gas pipeline development proposed several years ago. The system now has excess capacity and the Northern Transportation Company Ltd. has confirmed that project-related shipments can be made without interfering with existing barge services.

The Mackenzie Highway between Enterprise, NWT and Fort Simpson and the highway between Hay River and Enterprise will experience increased truck traffic during the construction phases of the project. Project supply and camp movements will generate traffic peaks, especially during winter construction periods. For example, it is anticipated that there will be an average of one truck passage every half hour at a given point enroute. Camp convoys may last for 2 to 3 weeks at the beginning and at the end of the construction season. In addition there will be increased light vehicle traffic associated with supervision and deliveries. All of this will have an effect upon road conditions and maintenance schedules and costs. The Panel recommends that the Proponents and the Federal and GNWT Departments of Public Works prepare plans to ensure that the normal truck and passenger vehicle traffic are not displaced and that the quality of the road and driving conditions are preserved and even enhanced, by highway upgrading in some cases and paving in others.

The project may stimulate demand for the extension of the Mackenzie Highway north to Norman Wells. Pipeline surveillance and maintenance would be facilitated if this were done, and community interest in the road extension may grow. The Panel recommends that the Federal and GNWT Departments of Public Works plan for the possibility of extension of the Mackenzie Highway to Norman Wells should the project increase demand.

Air traffic will increase, particularly between Yellowknife, Fort Simpson and Norman Wells. Construction labour for the pipeline will be moved by commercial carriers using extra flights at the beginning and the end of the 90-day construction periods and at a Christmas rotation. The carrier expects this to occur without disruption of normal service. There will also be added air travel by the rotational work scheme planned for the Norman Wells oilfield construction project and operation. Forecasts of this traffic are required. Since there is a risk of overloading existing commercial air services which presently have limited capacity, the Panel recommends that the appropriate regulatory authority monitor the licensing conditions governing commercial air service to Mackenzie Valley communities so that there will not be a decrease in commercial air service to other northern residents because of project demands.

Communication

Communication links are vital to widely separated Mackenzie Valley communities which are distant from regional centres. The project will require dedicated and reliable communication facilities and these needs may invade the capacities presently in place. The pipeline phase calls for expanded mobile and microwave service from the station at Hay River. The Proponents are presently working with Northwestel to prepare for the needed expansion. Demands for additional service and capacity may result from extra traffic by government agencies and other private users requiring increased communications in direct or indirect response to the project. The Panel recommends that steps be taken to identify all project-related communication needs and to provide an adequate communications system so that there is no reduction of present services.

5.2 SOCIAL CONCERNS

The roots of the Mackenzie Valley society are found both in the native land-based economy and culture, and in the intruded industrial and urban lifestyle and value system of southern Canada. Because of the intrusion, conflict, change and compromise have been imposed on the native people. The result is that in economic and material terms, they are at a disadvantage. Furthermore, they are disproportionately represented in the statistics on medical, mental health, and social problems. The Norman Wells pipeline project is an addition to the intrusion of the industrial and urban system that brings further change and raises social concerns in the native society. Planning and control of the Norman Wells project must work to assign more of the economic benefits and fewer of the social costs to these people.

Until now the native society has been constrained by government programs in education, health and housing and by the lack of opportunity to work in wage employment. Native leaders and the native people have been left little or no decision-making, and with some exceptions, neither the land-based lifestyle nor the wage economy has produced an adequate economic return for native

people. Recently, and for the first time, the native people have begun developing important options for themselves through their own organizations. Now, the Norman Wells project represents a new economic proposal that has potential to bring some economic gain to members of the native society.

The white society in the region expects to see social change come from the project. Most white northerners regard the project in positive terms and they link this economic opportunity to their social betterment. They also recognize that social disbenefits can occur particularly in relation to the effects of a transient population that will come to the region.

The Panel urges that this project be planned in a way that economic opportunity is used for the betterment of all people who choose to participate in it. New tax revenues to government will afford the opportunity to strengthen social programs to deal with problems of the individuals and the communities in the area. This is only one way that benefits can be made to flow to residents in the project area.

52.1 The Dual Society

Intervenors in native communities told the Panel of the cultural importance of the land and of the traditional life based on hunting, fishing and trapping and that it is becoming increasingly difficult to depend on these activities as the sole means of earning a living in the North. Thus the dual society seeks to live partly in the wage economy and partly on the land. Many, but not all of the native people seek this divided life, and certain white northerners do likewise.

The proposed project both increases the pressure and offers opportunities to this society in transition. The Panel was made aware of two potential effects on social conditions:

(i) the effects on the native society of a temporary and long-term increase in numbers of white residents; and

(ii) the effects of new economic opportunity upon the native people.

The impact of the transient white residents will be felt first in the construction of the pipeline and the oilfield development. During operations, an increased white population will remain in the larger centres of Norman Wells, and to a lesser extent, Fort Simpson and Hay River.

Native intervenors are concerned about an imported workforce working on the pipeline and at Norman Wells. Workers could arrive without an understanding of northern people and their land-based economy and lifestyle. In short there is a fear of further disruption of the native society in the Mackenzie Valley.

Because of this concern, the Panel recommends that the Proponents take responsibility for providing an orientation program for all incoming southern workers. The objective would be to instil an understanding of northern working conditions, including the physical and biological environment and the northern society and its value system. The program should stress the importance of the land to the native people and their culture and economy. The Panel believes that such a program would remove or reduce unfavorable contact or conflicts between the project and the nearby communities.

On the pipeline, many of the required facilities will need concentrations of worker activity, both large and small, which will be potentially disruptive to land-based activities of native people. The project plan in the EIS describes the many physical features of the project, but does not assess the potential impacts of concentrations of activity on the normal native way of life near the right-of-way. The Panel recommends that detailed planning and location of main work camps and work sites for the pipeline be determined in consultation with nearby community leaders.

The Panel further recommends that temporary camps be operated as self-contained units. The Proponents should take measures to provide comprehensive recreation facilities for free-time activities and should deny casual access to camp facilities except in cases of emergency. The Proponents and contractors will be responsible for security and on-site conduct of camp personnel.

The oilfield and fieldgate development will be in one place at Norman Wells. The Panel is concerned about a significant increase in population during and after construction and the resulting effects on the present community infrastructure and population. In the proposed three-year construction period at Norman Wells, 400 to 500 workers will be present during at least 12 months of the time. The workforce will peak at 600 for one summer. The Panel is satisfied that Esso is adequately prepared to provide the physical facilities for this increase in population. Norman Wells intervenors advised that the present community would not experience significant social pressure from work camps. Greater concern was expressed about preparing for the permanent increase of over 160 to 200 new residents who are to live in Norman Wells once the project is operational. This represents a 60% increase in population. To accommodate this increase, planning for Norman Wells must deal with camp sites and buildings, serviced permanent housing, sewer and water, roads, quarry development, and all other physical requirements. Similar plans for social services in education, health, recreation and law and order should also be in place before the project is proceeded with.

The Panel recommends that project-related community facilities which are to be built by Esso be planned to have lasting benefit to the community. For instance, Esso should contribute to new recreational facilities to accommodate the influx of new residents to Norman Wells.

Fort Simpson and Hay River are two other communities which will experience significantly increased work and numbers of people, mainly during pipeline construction. Although the impacts may be less than at Norman Wells, the Panel recommends that all aspects of project development which affect Fort Simpson and Hay River be planned and carried out in close cooperation with local authorities in those communities.

The second potential effect of the 'project on social conditions has to do with the effects of new economic opportunity on the native people. For many northerners the workplace will be a new experience. An orientation program would assist northerners to become adjusted to life in the camps and at the worksite. Orientation programs will be necessary to describe the project organization, workers' responsibilities, safety and teamwork. The Proponents should provide this type of orientation. Some workers may experience substantial and continuing cash earnings for the first time. It may be possible for the Proponents or government to prepare literature to be used (on a voluntary basis) to understand management of personal finances.

The Panel recommends that the Proponents provide orientation programs for new local workers, and that the Proponents or government provide literature and advice about the wage economy and in management of personal finances; such literature to be used on a voluntary basis. The Panel further recommends that community advisors, government departments and the Proponents collaborate in planning and monitoring these orientation programs.

5.2.2 The Project and Northerners Living on the Land

The Dene people living in the Mackenzie Valley include status and non-status Indians and Metis. These people have a common bond in an attachment to the land and resources of the area. That is why the natives in the Mackenzie Valley have stressed that a land settlement must be achieved before resource development can be considered in the area.

The construction and operation of the Norman Wells Pipeline will lead to land along the right-of-way being alienated and altered. The project could result in loss of assets, property and livelihood for Dene and white people who now use this land. There is a responsibility to provide for compensation to hunters and trappers whose livelihood will be affected by such losses. This responsibility could be a condition of the issuing of the land use permit by the Department of Indian Affairs and Northern Development.

The Panel understands that compensation for such losses is a relatively new concept. An important factor in this issue is that baseline data is not completely available on hunting and trapping operations in and near the pipeline route. Therefore there may be difficulty in interpreting and settling claims for compensation. The pursuit of a settlement in court with legal aid may be beyond the means of some Dene and white hunters and trappers.

The prospects of oilfield employment on a part-time basis appealed to some Dene and white intervenors at the public meetings. This would require a rotation schedule of a certain number of weeks at work followed by time off at home. This would avoid some of the turnover in work force and also relevant unnecessary relocation of families. Esso has already moved to increase work opportunities for people from the outlying communities by instituting rotational work schedules in which two weeks of work are followed by two weeks back in the settlements. Thus workers are able to participate in both the wage economy, and in hunting, fishing and trapping. Esso intends to continue and expand the rotational plan at Norman Wells during the development and operation of the project.

The Panel recommends the rotational work arrangement and the careful monitoring of results. Esso should be prepared to introduce flexibility into the scheme if adequate performance is maintained and, in the interests of increasing the work option to local people, Esso should be prepared to extend the system geographically as needed. As well, efforts should be made to minimize transportation delays to and from the worksite in order to protect the workers' time off.

5.2.3 Social Benefits and Social Costs

Benefits

The social benefits of the project will develop from increased economic opportunity and stability, income from employment and an increase in community, social and business services. These should bring improvements in housing, nutrition, clothing and recreational opportunities.

"Therefore it is our concern that if the project were to go according to the timetable now established that despite the best of intentions Interprovincial may have a few difficulties in implementing some of the policies to which it subscribes.

The greatest amount of concern in this area pertains to the preparation of such things as detailed training programmes, manpower delivery schedules, the preparation in ample advance time of the kinds of things which the Territorial Government and the Canada Manpower Commission need to fulfil1 their end of the bargain in trying to meet the Government responsibilities of helping provide local labour who might be interested in working on this project."

Sheila Meldrum
Department of Indian Affairs & Northern Development.

"I would suggest to the proponents that they seriously examine the idea of "dry" camps, that alcohol use be discussed during pre-employment interviews, that recreation activities and facilities be included in the work area and that some controls be established regarding the social interaction between the wor..ers and the residents of a conunity. This latter arrangement should be worked out with the corrrnunity councils."

Ron Crossley
Deputy Minister
Health and Social Services
GNWT

For individuals who choose to work on the project, family life and well-being could be more rewarding over the longer term. At present there is a high level of dependency on welfare support in the project area. This is necessary to maintain a basic living standard and without development, there will be increased dependence on this form of support. Opportunities to work would help to reverse the trend for some valley residents.

costs

The project will bring with it worker immigration and relocation, cross-cultural pressures, more work and cash and more choice for individual activity. Some real benefits will flow from this but there will also be a potential increase in social problems. The NWT Mental Health Association referred to serious social problems which developed in Alaska during construction of the Trans-Alaska Oil Pipeline Project and which could be experienced in the Mackenzie Valley in spite of the difference in scale between the two projects. Some problems which were cited are escalation of family breakdown, juvenile crime, child neglect, suicide, homicide, racial tension, and venereal and other communicable diseases. There are, of course, Federal and GNWT agencies with responsibility for preventing and alleviating such problems. However, information on the types and levels of current and projected social problems is not available. Therefore, the Panel recommends that Federal and Territorial government agencies responsible for social and health matters prepare an adequate data base against which project-related impacts can be identified and measured, and that these agencies move promptly to minimize or remove anticipated problems by applying mitigative measures.

The Panel further recommends that before the project begins, these agencies predict the needs in social and health services by developing plans for staff increments, for improvement of programs and delivery and for both preventive and mitigative action.

The Panel learned that the most serious social problems in the region are a consequence of misuse of alcohol. This has a profound effect upon family and community life in the Mackenzie Valley. Increased crime, violence, personal injury, accident, and mortality are rooted in heavy alcohol consumption. Intervenors at the public meetings emphasized that increased wages, and more government liquor outlets and drinking establishments can only lead to increased social degradation in the project area. Spokesmen for the native people were especially concerned about this problem. The ill effects are close at hand and readily observable. All native communities have held alcohol workshops and the GNWT has an active public education program. In addition, several communities have voted to ban alcohol from local outlets.

The Panel recommends that GNWT agencies and local community leaders review liquor distribution practices to determine if licensing hours, rationed buying, or other limiting conditions could be put in place as a measure to control liquor accessibility, and to determine if these or other measures are necessary and practicable.

The Panel was made aware of NWT public education alcohol awareness programs and commends these and other rehabilitative programs. The Panel recommends that these programs be adequately staffed and funded to meet project-related requirements.

5.3 MANAGING SOCIAL AND ECONOMIC IMPACTS

5.3.1 The Need for Goals and Planning

The Panel noted that there is a need for a policy statement of socio-economic goals and objectives for the western NWT. Such a statement should include reference to planning of land use and natural resources, employment and business development, social and welfare assistance, community planning, and the transportation network. The statement is necessary as a basis for overall planning of both socio-economic and natural resource development programs in the project area. Both the policy statement and the planning should be prepared in consultation with residents of the Mackenzie Valley in order that their aspirations for the kind of future they want will be considered. If such a statement and regional plan had been in place prior to the review of the Norman Wells project, a more rigorous and effective assessment of the project would have ensued.

The Panel recommends that a policy statement of socio-economic goals and objectives be prepared for the western NWT and that a comprehensive plan be prepared by the GNWT to serve as a framework for specific socio-economic and natural resource development programs associated with the project.

5.3.2 Government Preparation for the Project

Private development initiatives such as the Norman Wells project are subject to laws, ordinances and regulations of the Federal and Territorial governments. However, government planning arrangements for the Norman Wells Project are apparently not in place for the project such that overlapping responsibilities and duplication are avoided and inter-agency coordination is facilitated.

A principal concern of the Panel is the lack of government preparedness and planning needed to administer the project within the time frames proposed by the Proponents. Several intervenors at the public meetings asked questions such as:

(i) Who in government would be responsible for managing the social and economic aspects of the project?

(ii) What agency will regulate construction and operation of the project to minimize environmental degradation?

(iii) What planning programs are needed and are in place?

The Panel learned from Territorial Government representatives that some key agencies are presently quite unprepared for the project. Requests were made for additional time to staff offices, to obtain essential baseline information, to prepare a land use plan for the project area and to upgrade current staff and programs to cope with project monitoring and control. The Panel has concluded that the GNWT and Federal Government will require some essential lead time to prepare for the project.

The Panel also learned of the need for coordination of project-related activities by agencies of the Federal and Territorial governments and local settlement and band councils. At present there is no unit or office to monitor and report on technical, social, economic and planning aspects by different government agencies. The Panel has concluded that such a coordinating unit should be in place before the project commences. The unit should be organized with responsi-

bility to provide the public in the project area with regular and comprehensive information on the progress of the project.

5.3.3 Government-Proponent Liaison

The Panel learned that there are several areas in which the Proponents will rely on government programs and services in the course of the Norman Wells project. Examples are in manpower training and employment, housing and education, and in road and highway maintenance. Apparently a comprehensive liaison between the Proponents and government has not yet been formed. The Panel recommends that an on-going consultative program be established and maintained at the initiative of the GNWT, and include such Federal agencies as required. The purpose of this program would be to predict, identify and deal with opportunities and issues raised by the project and requiring cooperative action by government and the Proponents.

5.3.4 The Role of Community Advice

Communication between the Proponents and the settlements affected by the project has at least two benefits: first, residents acquire an understanding of the project and are better able to anticipate the proposed developments and second, the Proponents will receive advice about community needs, potential impacts and mitigative measures all of which should be taken into account as the project proceeds. The Panel believes that the greatest potential changes will be felt in the native communities because they are not large and their society is less directly oriented to an industrial/wage economy. However, all of the communities in the region will be exposed to some economic opportunities, and experience some increased transient or in-migration population pressure. Therefore continuous liaison between the project Proponents and the communities is essential.

In preparing for the expansion of the oilfield and the building of the pipeline, the Proponents have held a series of information meetings in the smaller communities. However government agencies have, with some exceptions, not visited communities for the express purpose of disseminating information on the project and obtaining feedback from residents.

The Panel recommends that liaison between the communities in the project area and the Proponents should be formally organized and should begin immediately. Community consultation is necessary not only in pre-construction planning and the construction phases, but also in the first few years of the operation of the project. Each community should be encouraged to identify a person or committee for this purpose, and GNWT participation should also be assured.

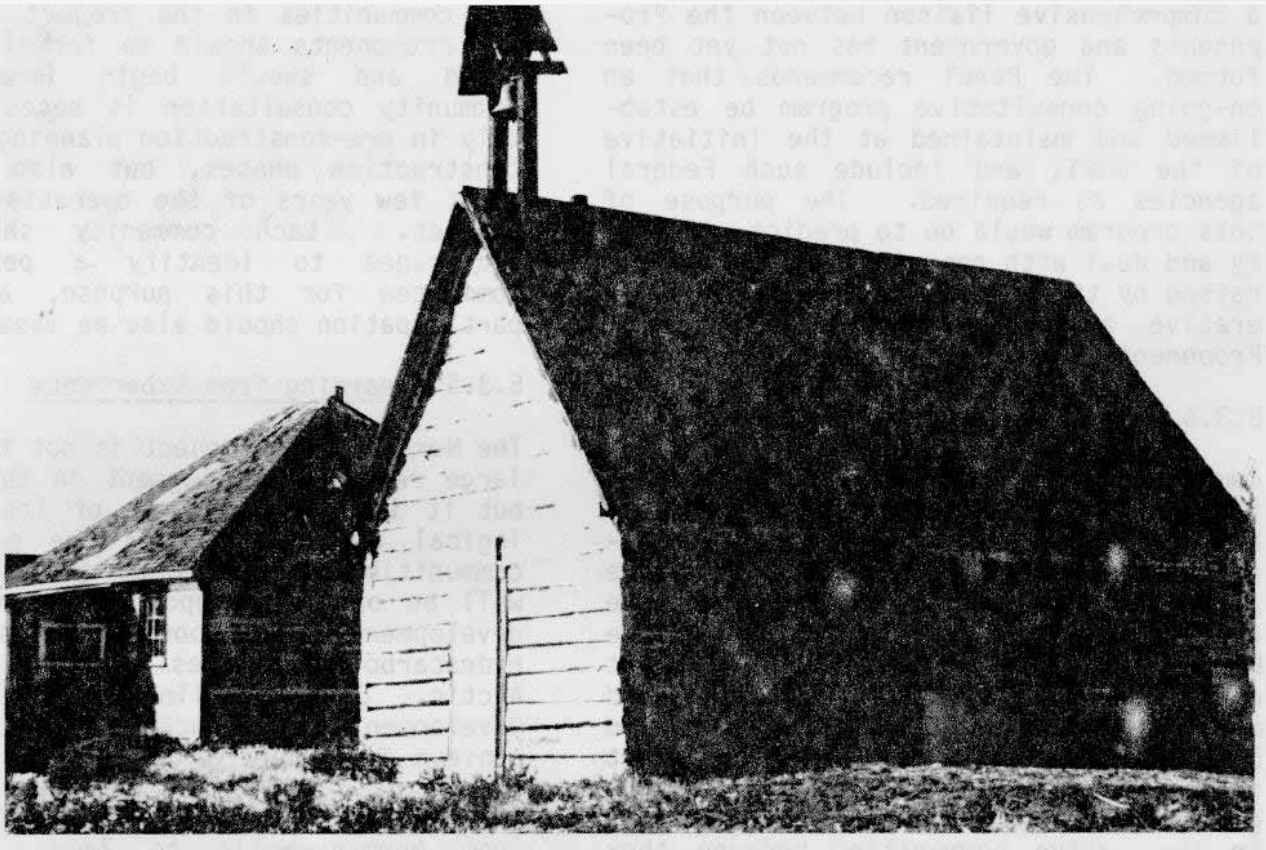
5.3.5 Learning from Experience

The Norman Wells Project is not the first large resource development in the North, but it is unique because of its technological requirements and the number of communities that will be affected. It will be one more important step in the development of transportation systems and hydrocarbon resources in the western Arctic. Other pipelines may follow and development in the Mackenzie Valley could achieve a substantial momentum.

The building of the 324 mm diameter line from Norman Wells to Zama, Alberta, represents a scale of investment and construction which will not result in the magnitude of impacts expected along the proposed Alaska Highway Gas Pipeline. However, some impacts are bound to occur and this project represents an opportunity to study and monitor the social,

economic and environmental consequences at an acceptable level of risk. Recognizing that some impacts will not be immediately apparent, the Panel has concluded that certain programs of monitoring and research should continue throughout the life of the project.

If this is done then the capacity to make informed decisions on future pipeline proposals will be substantially improved.



Fort Norman, N.W.T.

CHAPTER 6

NORTHWESTERN ALBERTA

Field bending of pipe during winter pipeline construction near Manning, Alberta.

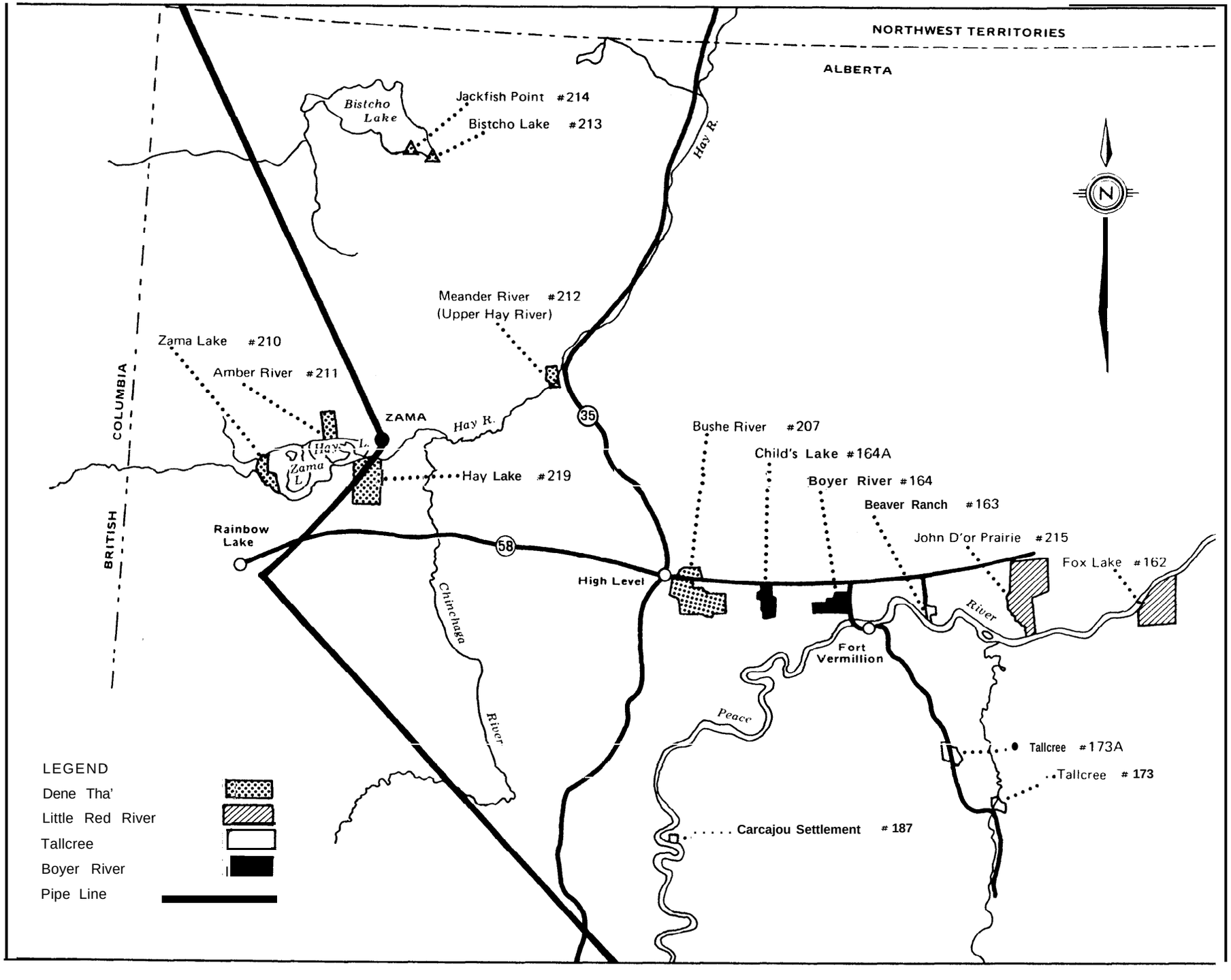


Fig. 4 Northwestern Alberta

6.1 INTRODUCTION

In July 1980 the Panel was requested by the Department of Indian Affairs and Northern Development to review the portion of the pipeline proposal in northwestern Alberta as it relates to the Indian people. Of the four Indian Bands and fifteen reservations in the High Level District, the Dene Tha Band will be most directly affected by the project. Unlike the Dene people in the NWT, the Dene Tha are Treaty Indians who live on five of their seven reserves in the Hay Lakes, Zama Lake, Meander River and High Level areas.

Prior to oil and gas discoveries in the Rainbow Lake/Zama region the Dene Tha lived in relative isolation. The Panel was informed that despite 15 to 20 years of oil industry exploration and production in the area, there are very few positive benefits which have flowed to the native people. Instead there has been an increase in alcoholism, unemployment and welfare dependency.

6.2 CONCERNS OF THE NATIVE PEOPLE

The Dene Tha Band is very aware of its past experience with oil development. After reviewing the EIS it expressed strong feelings and concerns at the public meeting held at High Level, Alberta.

Some of the concerns were similar to those raised in the NWT. The Panel was told about the importance of the land and resource harvesting to the native people and of the need for compensation to hunters and trappers for losses incurred as a result of the pipeline project. The importance of training, gainful employment and new business opportunities was stressed as well.

Three agencies have a major responsibility for the pipeline in Alberta:

(i) Alberta Government

(ii) National Energy Board

(iii) Department of Indian Affairs and Northern Development (DIAND)

The Panel is not aware of an environmental or socio-economic review of the project by the Government of Alberta.

DIAND is the agency which has responsibility for the needs and aspirations of reserve Indians in Alberta. Therefore the Panel concluded that DIAND should carefully review concerns of the Dene Tha Band and then take the necessary initiatives to assist the Band in dealing with impact mitigation and in maximizing benefits for its members.

The Dene Tha Band declared that there are 25 terms and conditions which must be met to gain its support for the pipeline project. These terms and conditions need to be reviewed by the Proponents and by government agencies.

After a review of the Dene Tha brief, the Panel is of the opinion that the following questions raised by the terms and conditions should be addressed and resolved by IPL.

(i) Compensation to individual hunters and trappers affected by the project.

(ii) Limited vehicle access in and around Dene Tha reserves and restricted use of private vehicles by project employees.

(iii) Employee possession of firearms, and hunting and trapping in the project area.

(iv) The use and sale of alcohol or drugs in camps.

(v) The implications of a unionized project on native participation.

(vi) On the job employee orientation programs for both Indians and non-Indians.

Unemployment among the region's native people is high. It was noted by the Indian and Inuit Affairs Program of DIAND that the EIS did not adequately address employment and business opportunities for the Indian people of northwestern Alberta. In this regard the Dene Tha have requested the allocation of 35% of the employment and business opportunities on the entire pipeline project. The Panel suggests that the Dene Tha request should be limited to that portion of the project which is in northwestern Alberta. Where equipment and expertise are available locally, IPL or its contractors should give every reasonable consideration to recruiting and contracting in the project area.

The Panel has decided that the remaining questions raised by the terms and conditions of the Dene Tha should be taken up by government agencies. The Panel noted requests for manpower training, career education, counselling and an alcoholism program for the Dene Tha. A number of federal and provincial agencies must be involved in implementing an action plan to deal with these requests. The Panel recommends that the Department of Indian Affairs and Northern Development take the initiative in identifying the agencies to address the terms and conditions raised by the Dene Tha Band, and in coordinating the responses to them.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

In its review of this project the Panel has arrived at several conclusions in this report, and only the most important ones will be repeated here.

Main Conclusion

Before the Norman Wells Oilfield Expansion and Pipeline Project can be built within acceptable limits of environmental and socio-economic impact, the following important deficiencies in the Proponents' planning and in the preparedness of governments need to be rectified. The Panel has concluded this work could be done in time to start work on the project in 1982. The reasons for this overall conclusion are given below and specific recommendations on them are given in the following section of this chapter.

Environmental

1. Esso should undertake a model study of local scour on the artificial islands at Norman Wells to determine the potential for scour, the level of monitoring required, and the development of remedial or contingency measures.

2. Esso should study the alternatives to the filter cloth design on the artificial islands to ensure that erosion of the artificial islands is minimized.

3. Esso should undertake an accelerated research and technology development program on oilspill countermeasures and for equipment to deal with oilspills into or under ice-covered or ice-infested river waters.

4. Esso and IPL should develop a detailed oilspill and toxic and hazardous materials contingency plan which should be in place prior to the start of drilling from artificial islands and construction of the pipeline. This plan should include provision for a more accurate oil-leak detection system for the oilfield project. The contingency plans should cover the construction and operational phases of the oilfield and pipeline project. The plans should be developed, tested, evaluated and approved by the responsible government agency prior to the start of construction.

5. IPL should carry out and publish the results of a detailed thermal analysis of the pipeline in different terrain types in different seasons. The objective of the study is to understand the potential for thaw settlement and frost heave, ponding of water, and erosion of the pipeline ditch as well as ultimate repair and rehabilitation requirements.

Economic and Social

The principal economic conclusion of the Panel is that the project will provide a needed economic stimulus to the Mackenzie Valley, and the recommendations are intended to insure that economic benefits, particularly for local employment and business opportunities are realized.

Although the social effects of the Norman Wells project are less easy to forecast with accuracy, the Panel concluded that the impact on society can be made to be within acceptable limits. The nature of the social effects will not be different from the effects caused by accelerated oil exploration programs of the past decade in the Mackenzie Valley and the Beaufort Sea areas. The scale of the construction phase would not be much different than activity now experienced

Mackenzie Delta and Tuktoyaktuk although in this case, all the ents from Fort Good Hope south involved. The recommendations of port are aimed at anticipating, ng for, and minimizing social on.

nel has concluded that a 1982 p on the project could provide assess the situation and carry ecessary economic and social kings on such items as inflation- ects on the economy, wage differ- a data base for social and care services, cooperation between oponents and government, and ent of government priorities to grams and staff in place. Certain ndations of this report specify and other items which could be on in the next year, in anticipa- a 1982 start-up.

o and IPL should prepare and mit plans to show that for all ject jobs in the NWT, they will eavor to maximize local hiring.

o and IPL should prepare and nit plans to show that for all tracts for work in the NWT, equal ortunity to tender on the work be given to northern busi- es.

should prepare and submit plans wing a detailed review of the eline route with emphasis on route nges to minimize project-related ects on the lives and activities the native people in the Mackenzie ey and in Alberta.

naximize benefits to the North and give the economy encouragement and bility, the following need to be rtaken:

(i) A review of sharing of project-related revenues.

(ii) Initiation of land settlement negotiations and substantial progress made.

(iii) Preparation and implementation of a land and resource plan for the project area to accommodate this project and others that may follow.

(iv) Development of a policy and public information on oil products pricing and assurance of oil supplies for northern consumers.

(v) Development of specific priorities for the employment of northerners. A cooperative plan needs to be drawn up by the Proponents, GNWT, and the Federal Department of Employment and Immigration.

(vi) The development of equitable tendering opportunities for northern businesses and the development of policies to stimulate the growth of these businesses.

Government Preparedness

1. DIAND should take the lead in preparing a preliminary land use plan for the Mackenzie Valley to provide a framework in which the proposed project can be planned and evaluated.

2. The GNWT should move promptly to insure that adequate staff and resources are available to accommodate the Norman Wells project. The coordination of Territorial and Federal Government programs should be assured.

3. A public information program needs to be planned and carried out expeditiously in order to inform residents and workers about the project and its potential impacts and mitigation measures, and also to obtain the advice of Mackenzie Valley residents for the purposes of planning and decision making. An impact information centre should be developed similar to the Alaska Oil Pipeline centre at Fairbanks. The program should be under the leadership of the GNWT with local workers carrying out the on-site work.

7.2 RECOMMENDATIONS

ENVIRONMENT AND ENGINEERING

Pipeline Alternatives

1. It is recommended that IPL investigate minor alternative routings to keep the pipeline further east from the settlements of Fort Norman and Wrigley.

Geotechnical Concerns, Pipeline Integrity and Permafrost

2. It is recommended that pipeline summer construction be permitted only in areas where it can be clearly demonstrated that there would be no greater impact than winter construction in the same area.

3. It is further recommended that, before the project is authorized, IPL undertake and publish a more detailed thermal analysis of the pipeline to predict more accurately the behavior of the pipe in a variety of terrain and temperature regimes. The analysis should cover the possibility of climatic change over the life of the project.

4. It is recommended that detailed and environmentally acceptable plans for the maintenance of the right-of-way and for the repair of pipeline failures be prepared prior to commissioning of the pipeline.

5. It is recommended that terms and conditions for the pipeline project spell out requirements for a revegetation and erosion control program using species, techniques and schedules shown to be adequate for the task.

6. It is recommended that in developing oilspill prevention and contingency plans, IPL make special provisions for the karst terrain near Bear Rock.

7. It is recommended that IPL design, plan, and construct the pipeline so as to minimize the need for extensive maintenance or unscheduled repair activities.

Water Crossings

8. It is recommended that river crossings be located so as to minimize overall environmental disruption.

9. It is recommended that the construction plans and schedules for intermediate sized crossings be re-evaluated by IPL in cooperation with the Department of Fisheries and Oceans to ensure that impacts on fish and other aquatic organisms are minimized.

Island Construction

10. It is recommended that Esso carry out a model study to fully evaluate local scour at the artificial islands in order to be certain of the structural safety of the pipelines and integrity

of the islands. The study should include monitoring and remedial repair procedures. The results should be reviewed by government before the island construction is authorized.

11. It is further recommended that studies on alternatives to filter cloth protection be carried out to find a material that will ensure that no significant erosion of the islands will occur. Results should be reviewed by government before construction of the islands is authorized.

Fisheries and Wildlife

12. It is recommended that the Proponents consult with the Department of Fisheries and Oceans to address any outstanding fisheries concerns and demonstrate in their construction timing and techniques that they have used the available information and addressed the concerns.

13. It is recommended that further site specific studies be undertaken to determine final alignment for river crossings to prevent or minimize impacts on fish and the aquatic environment.

14. It is recommended that IPL undertake baseline studies on hunted and trapped species to provide information aimed at both the assessment of the impact of the pipeline construction and operation on wildlife, and the development of mitigation measures.

15. It is recommended that construction and drilling activity on the islands stop during the peak spring waterfowl migration period that normally lasts one to two weeks, and that helicopter access to the islands be restricted to only essential needs.

16. It is recommended that Esso develop a plan specifying the necessary equipment and procedures to keep large populations of waterfowl away from an oilspill site.

Forests and Wildfires

17. It is recommended that government and IPL fire control responsibilities be clarified prior to commencement of construction and operation of the pipeline. It is further recommended that the government fire control program be augmented to provide protection to the pipeline and, at the same time, that there be no decrease in protection services to other sectors, such as highways, settlements and traplines.

18. It is recommended that slash from the right-of-way clearing operation be piled and burned on the right-of-way during the winter.

Oilspills Prevention and Countermeasures

19. It is recommended that Esso undertake an accelerated research and technology development program on equipment and procedures to deal with oilspills into or under ice-covered and ice-infested river waters. This program should be in place before expanded production begins at Norman Wells.

20. It is recommended that Esso investigate, design and install a more accurate oil-leak detection system at Norman Wells, one that would be consistent with the detection levels of the IPL pipeline to Zama.

21. It is recommended that Esso and IPL develop, test, and evaluate contingency plans for the construction and operation of both the oilfield expansion and pipeline projects and that these plans be revierred and approved by government prior to the start of construction.

Toxic Substances and Air Emissions

22. It is recommended that Esso prepare contingency plans with methods and procedures for handling, storage, transportation and disposal of all toxic and hazardous materials and that such plans be in place prior to the commencement of the project.

23. It is recommended that Esso commence a monitoring program for ground level concentrations of air emissions in the Norman Wells area and that this monitoring continue throughout the life of the project.

Water Use and Effluent Disposal

24. It is recommended that no* drilling wastes other than mixtures of water and bentonite be allowed to enter the Mackenzie River and that land disposal and treatment sites be identified and developed.

Archaeology

25. It is recommended that the responsible Federal and GNWT agencies further review the details of IPL's proposed archaeological program, and monitor the potential impact of this project on the archaeological resources along the pipeline route.

Environmental Impact Management

26. It is recommended that, in consultation with the GNWT, the Department of Environment, DIAND or a contracted non-government agency carry out an evaluation of the impact management process in order to improve on impact evaluation and mitigation on the Norman Wells and future projects.

27. It is recommended that the GNWT and Federal Government work with the Proponents to establish an effective and ongoing public information program to respond to concerns of Mackenzie Valley residents.

ECONOMY AND SOCIETY

Effects on the Regional Economy

28. It is recommended that prior to project authorization the Proponents 1 iaise with government and prepare an assessment of the predicted inflationary effects of the project.

29. It is recommended that planning and monitoring authorities in the GNWT work with the Proponents to conduct a study of the consequences of project-related wage differentials which might affect northerners already employed in the region and then prepare to deal with related employment problems.

30. It is recommended that the GNWT broaden its program of assistance to trappers who seek to become re-established in trapping after a period of wage employment on the project.

Employment and Business Opportunities

31. It is recommended that labour recruitment take place close to the work sites.

32. It is recommended that Esso and IPL specify in any agreements with union

contractors that access to jobs, as a first priority, take into account the skills and interests of workers in the project area.

33. It is recommended that contracts for the project be tendered in portions of a size that northern businesses can compete equitably.

34. It is recommended that the Proponents make every effort to insure that some contracts are tendered to non-union, northern businesses.

Programs to Assist the Regional Economy

35. It is recommended that the GNWT and the Fort Smith Vocational and Higher Education Centre work together with the Proponents to assure that the results of project-related training efforts are maximized.

36. It is recorrrnended that the on-site training programs of the Proponents become an integral part of the construction and operation phases of the project.

37. It is recorrmended that the GNWT and IPL make use of the existing or modified employment training plans such as Hire North, so that as many local workers are involved in the pipeline construction and operational activities as is practicable.

38. It is recommended that the GNWT and Federal Government work with the Proponents to provide effective public information on the job situation and business opportunities, in order to assist local employment and participation by local businesses.

Effects Upon Government Services

39. It is recorrrnended that government departments seriously consider the following options in order to wet new project-related requirements:

(i) second staff from one level of government to the other,

(ii) increase the public service temporarily in some cases and permanently in others;

(iii) purchase expertise in planning, managerial and technical skills where necessary, and;

(iv) redirect existing resources and programs into others which are related to the project.

40. It is recommended that, in connection with such government programs as mental health services, housing, school facilities, police services and alcohol programs, that project-related requirements not be allowed to displace existing government programs and responsibilities and that government agencies be provided with resources necessary to meet the demands from both the project and from existing programs.

41. It is recorrrnended that realistic government financing be assured and in place so that adequate programs exist for planning and servicing the project and the needs of northern residents.

Effects on Transportation and Communication Facilities

42. It is recommended that the Proponents, and the Federal and the GNWT Departments of Public Works prepare plans to insure that the normal truck and passenger vehicle traffic are not displaced and that the quality of the road and driving conditions are preserved and even enhanced, by highway

upgrading in some cases and paving in others.

43. It is recommended that the Federal and GNWT Departments of Public Works plan for the possibility of extension of the Mackenzie Highway to Norman Wells should the project increase demand.

44. It is recommended that the appropriate regulatory authority monitor the licensing conditions governing commercial air service to Mackenzie Valley communities so that there will not be a decrease in commercial air service to other northern residents because of project demands.

45. It is recommended that steps be taken to identify all project-related communication needs and to provide an adequate communications system so that there is no reduction of present services.

SOCIAL CONCERNS

The Dual Society

46. It is recommended that the Proponents provide an orientation program for all incoming southern workers to instil an understanding of northern working conditions and northern society and its value system.

47. It is recommended that detailed planning and location of main work camps and work-sites for the pipeline be determined in consultation with nearby community leaders.

48. It is recommended that temporary camps be operated as self-contained units with full recreational facilities. Casual visitor access to camp facilities should be denied.

49. It is recommended that, at Norman Wells, project-related community facilities which are to be built by Esso be planned to have lasting benefit to the community. For instance, Esso should contribute to new recreational facilities to accommodate the influx of new residents to Norman Wells.

50. It is recommended that all aspects of project development which affect Fort Simpson and Hay River be planned and carried out in close cooperation with local authorities in those communities.

51. It is recommended that the Proponents provide orientation programs for new local workers, and that the Proponents or government provide literature and advice in management of personal finances and the wage economy; such literature to be used on a voluntary basis. It is further recommended that community advisors, government departments and the Proponents collaborate in planning and monitoring these orientation programs.

The Project and Northerners Living on the Land.

52. It is recommended that the Esso rotational work arrangement be encouraged with careful monitoring of results. Esso should keep the arrangement flexible, extend the system geographically as needed, and minimize transportation delays for rotating workers.

Social Benefits and Costs

53. It is recommended that Federal and GNWT agencies responsible for social and health matters prepare an adequate data base against which project

related impacts can be identified and measured, and that these agencies move promptly to minimize or remove anticipated problems by applying mitigative measures.

54. It is recommended that before the project begins, Federal and Territorial agencies predict the needs in social and health services by developing plans for staff increments, for improvement of existing programs and delivery, and for both preventive and mitigative action.

55. It is recommended that GNWT agencies and local community leaders review liquor distribution practices to determine if licensing hours, rationed buying, or other limiting conditions could be put in place as a measure to control liquor accessibility, and to determine if these or other measures are necessary and practicable.

56. It is recommended that the NWT public education alcohol awareness programs and other rehabilitative programs be adequately staffed and funded to meet project-related requirements.

The Need for Goals and Planning

57. It is recommended that a policy statement of socio-economic goals and objectives be prepared for the western NWT and that a comprehensive plan be prepared by the GNWT to serve as a framework for specific socio-economic and natural resource development programs associated with the project.

Government - Proponent Liaison

58. It is recommended that an on-going consultative program be established and maintained at the initiative of the GNWT, and include such Federal agencies as may be required.

The Role of Community Advice

59. It is recommended that liaison between the communities in the project area and the Proponents should be formally organized and should begin immediately. This community consultation is necessary not only in pre-construction planning and the construction phases, but also in the first few years of the operation of the project. The GNWT should participate in this consultation as well.

NORTHWESTERN ALBERTA

60. It is recommended that the Department of Indian Affairs and Northern Development take the initiative in identifying the agencies to address terms and conditions raised by the Dene Tha Band, and in coordinating the responses to them.

61. Finally, it is recommended that because of outstanding environmental and socio-economic questions and the need for government preparation, the Norman Wells Oilfield Expansion and Pipeline Project should not be commenced with until 1982 at the earliest. The Panel believes that a start-up in 1982 could provide time for adequate safeguards and programs to be planned and installed.

CLOSING COMMENT

Before concluding, the Panel feels obliged to comment on the unresolved land settlement of the Mackenzie Valley in relation to the Norman Wells Pipeline project. As pointed out in this report the dominant position expressed at the

public meetings by the Chiefs, Elders and representatives of the Dene Nation was -- 'No resource development before a land settlement'. The Panel concluded that any resource development proposal would face the same opposition, and therefore, declined to make a recommendation which linked land settlement to the Norman Wells project.

For the Dene the subject of land settlement is not only a political thrust requiring a political response, but also a chance for a new beginning, with controls and choices in their own hands for their own lives, and a more assured future for their children. Moreover, northern society as a whole has called for a prompt and just settlement.

The Panel, for reasons related directly to the Norman Wells project itself, has recommended that the project not be commenced until 1982. The opportunity thus exists for the Minister of Indian Affairs and Northern Development, and the native leadership of the Dene people to open land settlement negotiations and to make substantial progress before development goes ahead. The issue is serious and the timing is critical. The Panel strongly urges that the opportunity not be lost; an orderly and optimistic future for the region depends upon it.

The Environmental Assessment Panel for the Norman Wells Project

Patrick Duffy

Patrick Duffy, Chairman

W. J. Bryant

A. L. Look

J. Alan Heginbottom

J. A. Heginbottom

J. K. Stager

APPENDICES

APPENDIX I - METRIC - IMPERIAL CONVERSION TABLE

Although metric units were used throughout the EIS and have been used in this report, the Panel has included this conversion table for the convenience of readers.

Distances, lengths of pipelines, roads, etc.		
Length of proposed Norman Wells to Zama oil pipeline	866 km	540 mi.
Additional length for route along Mackenzie Highway	250 km	155 mi.
Length of access roads to be built	=30 km	=20 mi.
Length of Trans-Alaska oil pipeline	1300 km	800 mi.
Norman Wells, south of Arctic Circle	145 km	90 mi.
Norman Wells, northwest of Yellowknife	685 km	425 mi.
Dimensions of pipelines		
Diameter of Canol Pipeline	10 cm	4 inch
Diameter of proposed Norman Wells to Zama oil pipeline	324 mm	12 inch
Diameter of Trans-Alaska oil pipeline	1.22 m	48 inch
Diameter of proposed Arctic Gas natural gas pipeline	1.22 m	48 inch
Diameter of proposed Foothills natural gas pipeline	1.07 m	42 inch
Dimensions of oilfield and pipeline facilities		
Size of top of proposed artificial islands	80 x 45 m	260 x 150 ft.
Elevation of top of proposed artificial islands	54 m	177 ft.
Elevation of 100-year flood of Mackenzie River	51 m	167 ft.
Maximum elevation of ice scars on trees on Bear Island	52.5 m	172 ft.
Height of dyke around proposed artificial islands	1 m	3 ft.
Depth of burial of pipeline	1 m	3 ft.
Predicted amount of thaw settlement of pipeline	1 - 1.2 m	3-4 ft.
Area of pump station site	1 ha	2.5 acre
Oil production rates, pipeline capacities, etc.		
Historic oil production rates at Norman Wells	100; 500 m^3/d	630; 3000 b/d
Proposed production rate with oilfield expansion	4000 m^3/d	25,000 b/d
Capacity of proposed pipeline	5000 m^3/d	32,000 b/d
Production rate excess over refinery capacity	1600-2000 m^3d	10-12,500 b/d
Potential undetected oil leakage rate	70 m^3/d	440 b/d
Water use, waste production		
Daily volume of water for water-flooding oil field	6400 m^3/d	1.4 mill. gals/d
Volume of drilling wastes per well	700 m^3	150,000 gals.
Volume of cuttings per well	37 m^3	1300 $ft.^3$
Total quantity of waste fluids at Norman Wells	56,000 m^3	15 mill. gals.
Unit volume of water for pipeline hydrostatic testing	1,250 m^3	275,000 gals.

APPENDIX II - PIOGRAPHIES OF PANEL MEMBERS

PATRICK DUFFY - PANEL CHAIRMAN

Mr. Duffy is from Vancouver where he obtained a forestry degree from the University of British Columbia in 1955. He holds a Master of Forestry degree from Yale University and a Doctor's degree in land classification from the University of Minnesota.

From 1956-1968, he was research forester in the Alberta-Yukon-N.W.T. Region of the Canadian Forestry Service, working in forest land productivity studies. From 1968-1972, Mr. Duffy co-ordinated the Canada Land Inventory, Forestry Sector, on a national basis. In 1972, he chaired an Environment Canada task force which drafted the Federal Environmental Assessment and Review Process, created by Cabinet Decision in 1973.

In 1974, Mr. Duffy undertook a two-year assignment to manage a consulting firm in British Columbia, carrying out environmental planning work in Western Canada and overseas. Since 1977, he has been a member of the Federal Environmental Assessment Review Office. At present, he is Director, Panel Operations, Northern Region with responsibilities for the Environmental Assessment and Review Process in N.W.T., Yukon and the Prairie Provinces.

JOHN ALAN HEGINBOTTOM

Mr. Heginbottom was born in South Wales and attended school in England. He graduated in Geography from London University (B.Sc.) and did graduate work at McGill (M.Sc.). He joined the Geological Survey of Canada in 1968.

His field work has included mapping surficial geology in central British Columbia (1968-1970), permafrost and terrain studies in the Mackenzie Delta and lower Mackenzie Valley region (1969-1974) and geomorphology studies in the central Arctic Islands (1977-1979). He was appointed Head, Geomorphic Processes Section, Terrain Sciences Division in April, 1978.

In 1973-1975, he was involved with the environmental assessment of the design of the Mackenzie Highway. From 1975 until 1977, he was seconded to the Department of Indian Affairs and Northern Development as a staff advisor to Mr. Justice T.R. Berger and the Mackenzie Valley Pipeline Inquiry.

ARTHUR LOOK

Mr. Look was born in Portland, Oregon, in 1914 and lived in the Edmonton area before moving to Rocher River, Northwest Territories, in 1921. He trapped there until 1946 when he moved to Yellowknife where he worked as a private contractor and later for Cominco as a mill mechanic.

Mr. Look joined the Department of Northern Affairs and National Resources in 1954 with the Game Service. The Game Service transferred to the Territorial Government in 1967, and Mr. Look retired in 1975 after 21 years of government service.

Mr. Look has worked and lived in the Central and Eastern Arctic and the Mackenzie Valley. He is now living in Fort Providence, NWT and earns his living by trapping.

JOHN K. STAGER

Dr. Stager was born in Preston, Ontario - now Cambridge - and received his Bachelor of Arts degree in Honours Geography at McMaster University in 1951. Following a

period of employment with the Geographical Branch in the Federal Department of Mines and Technical Surveys, he did graduate work at the University of British Columbia and then took a teaching appointment at the University of Edinburgh. He received his Ph.D. from Edinburgh University in 1962 with a dissertation on the Historical Geography of the Mackenzie Valley 1750-1850. Dr. Stager has been a member of the Geography Department of the University of British Columbia since 1957 where he holds the rank of professor and is Associate Dean in the Faculty of Arts.

In 7952, Dr. Stager began his field studies in the north on Cornwallis Island and subsequently did work in Mould Bay 1952, the Mackenzie Delta area 1954, 1963 and 7964 with numerous subsequent short excursions to the Delta region. His publications include work on permafrost features, historical aspects of the western arctic and social and economic conditions in northern Canada. In 1972 he completed a study of the Reindeer Industry and prepared a socio-economic report on Old Crow, Y.T., in 1974 for the Environmental Social Committee on Northern Pipelines in preparation for Berger hearings on the Mackenzie Valley Pipeline. Dr. Stager took part in the overview hearings for the Berger Inquiry by discussing the social/historical background of the Lower Mackenzie region. He has al so prepared socio-economic baseline studies of Baker Lake, N.W.T., and was joint author for a similar study of Chesterfield Inlet, N.W.T.

WAYNE J. BRYANT

Mr. Bryant was born in Winnipeg and educated in eastern Canada. He received his Bachelor of Science degree in chemistry from Dalhousie University in 1966 and his Bachelor of Science in chemical engineering in 1971 from Queen's University.

Mr. Bryant, under the Regular Officer's Training Program, received his commission in 1966 and began his career with the Department of National Defense. During his tenure with the Armed Forces, he was seconded for two years to the Defense Research Board at Valcartier where he was engaged in basic chemical engineering research on explosives and pyrotechnics.

In 1972, Mr. Bryant moved to Winnipeg where he began his career in the environmental field as a pollution control engineer with the Department of Fisheries. In 1973, he was appointed senior project engineer with the Department of Environment in Edmonton where he was responsible for implementing federal water pollution regulations and guidelines in western and northern Canada pertaining to the oi7 and gas, mining and pulp and paper industries.

In 1975, Mr. Bryant was appointed as the Northwest Territories District Director of the Environmental Protection Service (EPS) based in Yellowknife, a position he currently holds. In this capacity, Mr. Bryant is responsible for the management and implementation of all EPS activities in the N.W.T. which includes enforcement of a number of federal environmental statutes, ecologicai impact assessments, air pollution control, environmental emergencies, waste management, water conservation and pollution control. These activities have directly involved Mr. Bryant in all the major development activities that'are currently of regional and national importance, such as northern pipelines, and Beaufort Sea oil exploration. Mr. Bryant also serves as a member of the N.W.T. Water Board.

APPENDIX III - PARTICIPANTS IN THE PUBLIC REVIEW

Individuals

F. Andrew

J. Antoine
Chief, Fort Simpson

G. Antoine

A. Arrowmaker
Chief, Snare Lake

B. Barradell

B. Bassett

J. Blondin

J. Bonnetrouge
Chief, Fort Providence

L. Boucane

G. Boyd

D. Cardinal

A. Cazon

B. Cazon

J. Charlo

C. Chisaakay

H. Chonkolay
Chief, Dena Tha Band
High Level, Alberta

E. Comerford

B. Cooper

B. Deedza

H. Deneron
Chief, Fort Liard

Father Denis

D. Duncan

E. Fabian

R. Fabian

J. Gauthier

G. Godt

G. Grandjambe

R. Gruenewegen

J.B. Gully

G. Hardisty
Chief, Wrigley

P. Hardisty

R. Hardy

C. Hopkins

W. Irwin

L. Jackson

W. Jackson

E. Jumbo
Sub-chief, Trout Lake

E. Kakfwi

G. Kodakin
Chief, Fort Franklin

W. Konestista
Sub-chief, Nahanni Butte

A. Lacorne

B. Lafferty

A. Lafferty

R. Larsen

S.V.C. Latour

A. Lcnnie

R.H. MacQuarrie
MLA Yellowknife Centre

P. Martel
Chief, Hay River Dene Band

F. Martel

V. Menacho

D. Menicoche

B. Menicoche

R. Michaud

J. Migwi
Chief, Fort Rae

B. Moffat

G. Monuik

J. Neyelle

B. Niziol

D. Prima

D. Proctor

D. Rose

A. Seniantha

A. Sexsnith

J. Shae

N. Sibbeston
MLA Mackenzie Liard

D. Sonfrere

L. Sorensen
MLA Yellowknife South

C. Templ eton

J. Thom

G. Tobac

F. T'Seleie
Chief, Fort Good Hope

I. T'Setta
Chief, Yellowknife

R. Whitford

F. Widow

P. Wright
Chief, Fort Norman

E. Yakalaya

A. Yallee

Government (Federal, Territorial, Municipal)

M.R. Ballantyne
Mayor
City of Yellowknife

M. Barnett
Environmental Assessment Division
Northern Affairs Program
Indian and Northern Affairs

G. Braden
Minister of Economic Development and Tourism
GNWT

S. Brooks
Counsellor
Town of Hay River

J. Cinq-Mars
Archaeological Survey of Canada

R. Crossley
Deputy Minister
Health and Social Services
GNWT

T.M. Dick
Hydraulics Division
National Water Research Institute
Environment Canada

L. Elkin
Deputy Minister
Local Government
GNWT

H. Lawler
Regional Director General
Fisheries and Oceans

M. Lawrence
Freshwater Institute
Fisheries and Oceans

A.H.Macpherson
Regional Director General
Environment Canada

F. McFarland
Environmental Assessment Division
Northern Affairs Program
Indian and Northern Affairs

S. Meldrum
Assessment Officer
Northern Pipelines
Indian and Northern Affairs

B. Moore
Environmental Protection Service
Environment Canada

t?. Morrison
Deputy Minister
Economic Development & Tourism
GNWT

R.G. Morrison
Chief
Environmental Assessment Division
Northern Affairs Program
Indian and Northern Affairs

F. Norwegian
Manager
Canada Employment Centre

V. Schilder
Cnvironnental Assessment Division
Northern Affairs Program
Indian and Northern Affairs

P. Scott
Federal Environmental Assessment
Review Office
(Reading brief submitted by
Energy, Mines & Resources)

5.3. Séguin
Director General
Arctic Transportation Directorate
Transport Canada

R.G. Skinner
Head, Environmental Affairs
Energy, Mines & Resources Canada

N. Simmons
Assistant Deputy Minister
Department of Renewable Resources
GNWT

J. Stein
Freshwater Institute
Fisheries and Oceans

0. Watsyk
Mayor, Fort Simpson

E. Weick
Chief, Assessment Division
Northern Pipelines
Indian and Northern Affairs

D. Weisbeck
Chief, Planning & Resource
Development Division
Economic Development and Tourism
GNWT

J. Whelly
Administrative Assistant
Town of Hay River

E. Wilson
Research Meteorologist
Atmospheric Environment Service
Environment Canada

J.R. Witty
Chief, Manpower and Development Division
Economic Development and Tourism
GNWT

S.C. Zoltai
Canadian Forestry Service
Environment Canada

Groups, Associations, & Industry

M.C. Arnett
Project Manager
Esso Resources Canada Ltd.

J. Blackstock
NWT Grade Stamping Agency

R. Coulthard
Norwel Developments
Norman Wells

T.D. Daniels
NWT Chamber of Mines
Yellowknife, NWT

S. Dean
Stan Dean and Sons Ltd.

L. Dodman
Metis Association
Hay River Local 51

G. Erasmus
President
Dene Nation

F. Hasey
Hay River and Area Economic
Development Corporation

R. Hill
Inuvik and District Chamber of Commerce

J. MacQuarrie
Canadian Mental Health Association
Northwest Territories

D. McNeill
President
Hay River Chamber of Commerce

W. McTaggart
Metis Association
Norman Wells Local 59 NWT

H. Norwegian
Vice President, Dene Nation

W.M. Pierce
Project Manager
Interprovincial Pipe Line (N.W.) Ltd.

J. Sexsmith
Circle J. Ltd.
Norman Wells

Technical Advisors to Panel

Kloepfer, Coles, Nikiforuk, Pennell
Associates Limited
Petroleum Consultants, Calgary

D. Sherstone
National Hydrology Research Institute
Environment Canada

M.W. Smith
Peter J. Williams & Associates Limited

J.K. Torrance
Peter J. Williams & Associates Limited

R.O. Van Everdingen
National Hydrology Research Institute
Environment Canada

P.J. Williams
Peter J. Williams and Associates Limited

H.B. Hawthorn

APPENDIX IV - BRIEFS SUBMITTED TO THE ENVIRONMENTAL ASSESSMENT PANEL NORMAN WELLS PROJECT

1. A Compendium including:
   a) A Summary of Issues on which the Panel Requests Further Information.

   b) Peter J. Williams & Associates Limited, Ottawa, Ontario, memorandum regarding Deficiencies in Environmental Impact and Other Documentation Submitted to Panel.

   c) Jacques Cinq-Mars, Chairman, Rescue Archaeology Programme, Archaeological Survey of Canada, National Museums Canada, initial comments on Historical Resources: Archaeology.

   d) Dr. R.O. van Everdingen, Hydrology Research Division, National Hydrology Research Institute, Calgary, Alberta, comments on the Environmental Impact Statement for the Norman Wells Oil Field Expansion and Pipeline Projects.

   e) D. Sherstone, Senior Advisor on Ice Conditions, Northern Hydrology Section, Snow and Ice Division, N.H.R.I., Environment Canada.

2. Esso Resources Canada Limited and Interprovincial Pipe Line (NW) Limited response to Norman Wells Oilfield and Pipeline Environmental Assessment Panel on: "A Summary of Issues on which the Panel Requests Further Information".

3. Draft presentation to the EARP Panel at Fort Norman, N.W.T., August 11, 1980, by Roderick A. Hardy.

4. Presentation to the EARP Hearings by Ric Coulthard, Norwel Developments Limited, Norman Wells, N.W.T.

5. Submission by Mrs. Dora Duncan.

6. Submission by Mr. Barney Cooper.

7. Submission by Mrs. Georgie Monuik.

8. Submission by S.V.C. Latour, resident of Hay River, N.W.T., August 18, 1980.

9. Submission to the Environmental Assessment Panel from the Hay River and Area Economic Development Corporation, Hay River, N.W.T. August 18, 1980.

10. Presentation to the Environmental Assessment Panel submitted by the Town of Hay River, N.W.T., August 18, 1980.

11. A petition from the citizens of Hay River and surrounding areas.

12. Submission for the Northwest Territories Grade Stamping Agency, John R. Elackstock, Secretary Manager, Hay River, N.W.T. August 18, 1980.

13. Submission by Alex Cazon.

14. Submission by the Village of Fort Simpson, August 20-21, 1980.

15. Government of the Northwest Territories Position Paper on the Norman Wells Expansion Project presented by the Honourable George Braden, Leader, Elected Executive, August 21, 1980.

16. An Additional Request from the Panel for Further Information on the Project, August 22, 1980.

17. Csso Resources Canada Limited, Mr. M.C. Arnett, -Response to Additional Request from the EAR? Panel for Information on Product Marketing and Supply.

18. Presentation to EARP Hearing, Yellowknife, N.W.T., by Bob MacQuarrie, August 25, 1980.

19. Canadian Mental Health Association, Northwest Territories Brief presented to the Environmental Assessment Review Panel by Jo MacQuarrie, Yellowknife, N.W.T., August 25, 1980.

20. Inuvik and District Chamber of Commerce submission to the Norman Wells Pipeline Environmental Assessment Panel by Dick Hill.

21. Submission to the Environmental Assessment Review Panel by Lynda Sorenson, Member Legislative Assembly, Yellowknife South, August 25, 1980.

22. Submission to the Norman Wells Pipeline Environmental Assessment Panel by the City of Yellowknife.

23. Presentation to the EARP Panel by Rod Morrison, Alternate Chairman of the Resource Development Committee, C.N.W.T.

24. Opening Statement to the Environmental Assessment Panel on the Norman Wells Oilfield and Pipeline Project by A.H. MacPherson, Regional Director General, Environment Canada, Western and Northern Region.

25. Review of the EIS submitted in support of the Norman Wells Oil Field Expansion and Pipeline Project, Department of the Environment and Department of Fisheries and Oceans, July 4, 1980.

26. Submission on the Application of Interprovincial Pipe Line (NW) Limited of an Oil Pipeline from Norman Wells, N.W.T. to Zama, Alberta, by Carson H. Templeton, OC, P. Eng.

27. Presentation to the Norman Wells EARP Panel, Opening Statement on the EIS, Volume 4, DIAND, August 25, 1980.

28. Department of Fisheries and Oceans re two changes made to their Position Statement, Dr. H. Lawler, Yellowknife, N.W.T., August 25, 1980.

29. Department of Fisheries and Oceans, synopsis of Opening Statement.

30. Department of Fisheries and Oceans Opening Statement to the Environmental Assessment Panel on the Norman Wells Oilfield Expansion and Pipeline Project, Yellowknife, August, 1980.

31. Amplification of the Review of the EIS submitted by the Department of the Environment and the Department of Fisheries and Oceans on July 4, 1980, P.M. Dick, National Water Research Institute.

32. Presentation Regarding Employment as it Pertains to the Development/Non-Development of the Norman Wells Oil Field by J.R. Witty, Manpower Development Division, GNWT, August 28, 1980.

33. Presentation to the Environmental Review Panel on the Norman Wells Expansion Project presented by Don Weisbeck, Chief, Planning & Resource Development Division, Department of

Economic Development & Tourism, Government of the Northwest Territories, August 28, 1980.

34. Submission of the Departments of Health and Social Services, Government of the Northwest Territories, to the Norman Wells Oilfield and Pipeline Environmental Assessment Panel by Ron Crossley, Deputy Minister of Health and Social Services, Yellowknife, N.W.T., August 29, 1980.

35. Submission of the Department of Local Government, Government of the N.W.T., to the Norman Wells and Pipeline Environmental Assessment Panel by Larry Elkin, Deputy Minister of the Department.

36. Interprovincial Pipe Line (NW) Limited Socio-Economic Summary Statement, Yellowknife, August 29, 1980.

37. Review of the Socio-Economic Impact Statement of the Norman Wells Project by H.B. Hawthorn.

38. Letter received from L.R. Montpetit, Northern Transportation Company Limited, Edmonton, Alberta, re the EIS Norman Wells Pipeline Project.

39. Royal Canadian Mounted Police submission by A.H. Ruttler, Chief Superintendent, Commanding Officer.

40. Department of Indian Affairs and Northern Development - Opening Remarks, Dr. R. Morrison, August 14, 1980.

41. Review Comments on the Environmental Impact Statement for the Norman Wells Oilfield Expansion and Pipeline Project by Northern Affairs Program, Department of Indian Affairs and Northern Development, July 29, 1980.

42. Address and Report to the Environmental Impact Assessment Review Panel Hearing, Yellowknife, N.W.T., by Peter J. Williams & Associates Limited, August 26, 1980.

43. Presentation by Rod Morrison, Deputy Minister of Economic Development and Tourism to the Environmental Assessment Review Panel.

44. Presentation to the Environmental Assessment Review Panel made by Mayor M.A. Ballantyne, City of Yellowknife, August 29, 1980.

45. Analysis of the Socio-Economic Statement of the Norman Wells Oilfield Expansion and Pipeline Project by Indian and Inuit Affairs Program, Department of Indian Affairs and Northern Development, July 31, 1980.

46. Brief submitted to the Environmental Assessment Panel by R.G. Skinner, Head, Office of Environmental Affairs, Energy, Mines and Resources, Canada.

47. Brief submitted to the Environmental Assessment Panel by Kloepfer Coles Nikiforuk Pennell Associates Limited, Petroleum Consultants, Calgary, Alberta.

48. Supplementary Statement to the Environmental Assessment Panel by the Environmental Protection Service, Environment Canada.

49. Closing Statement to the Environmental Assessment Panel by the Department of the Environment, Yellowknife, N.W.T., August 29, 1980.

50. Review Corrments on the Regional Socio-Economic Impact Assessment for the Norman Wells Oilfield Expansion and Pipeline Project by Northern

Affairs Program, Department of Indian Affairs and Northern Development.

51. Questions from the Norman Wells Environmental Assessment Panel, August 28, 1980. (Esso response, August 29, 1980, at the technical meeting).

52. Interprovincial Pipe Line (NW) Limited Geotechnical Summary Statement read to the Panel, August 27, 1980.

53. Letter from J. Jacques Séguin, Director General, Arctic Transportation Directorate, Transport Canada, on the Norman Wells Oilfield and Pipeline Project.

54. Submission of the Department of Renewable Resources, Government of the N.W.T., to the Norman Wells Oilficld Expansion Pipeline Environmental Assessment Panel by Norman Simmons, Assistant Deputy Minister of the Department.

55. Additional Request for Information from the Norman Wells Environmental Assessment Panel, August 1980.

56. Esso Resources Canada Limited and Interprovincial Pipe Lines (NW) Limited response to: EARP Panel Request for Additional Information of the Norman Wells Project, August 11, 1980.

57. Interprovincial Pipe Lines (NW) Limited Response to Request for Additional Information from the Panel, August 1980.

58. Potential Impacts on the Community by M.C. Arnett of Esso Resources Canada Limited, to Mr. A.A. Menard, Chief, Town Planning and Lands Division, Department of Local Government., Government of Northwest Territories, Yellowknife, N.W.T.

59. N.W.T. Chamber of Mines, Yellowknife, N.W.T., brief by T.D. Daniels, August 27, 1980.

60. Additional comments on the Norman Wells EIS - Historical Resources: Archaeology, Jacques Cinq-Mars, Archaeological Survey of Canada, August 29, 1980.

61. Archaeological Concerns, Interprovincial Pipe Lines (NW) Limited reply to letter and telex from Jacques Cinq-Mars, Chairman, Rescue Archaeology Programme, Archaeology Survey of Canada, June 24 and August 29, 1980.

62. Submission on behalf of the Atmospheric Environment Service of the Department of the Environment, and Esso Resources Canada Limited Response to the Atmospheric Environment Service submission.

63. Esso Resources Canada Ltd. Response to Submission on Behalf of the Atmospheric Environment Service of the Department of the Environment to the Norman Wells Oilfield Expansion and Pipeline Project Environmental Assessment Panel.

G4. Statement by C.H. Templeton on the subject of the Energy, Mines and Resources brief submitted to the Panel.

65. Final Statements from the Department of Renewable Resources to the Norman Wells Oilfield Expansion/Pipeline Environmental Assessment Panel.

66. Interprovincial Pipe Lines (NW) Limited, Environmental Summary Statement, W.M. Pearce, Yellowknife, N.W.T., August 29, 1980.

67. Letter from M.C. Arnett, Esso Resources Canada Limited rc: DOE Intervention Dealing with the Integrity of Artificial Islands - Dr. T. Milne Dick.

68. Letter from J.J.A. de Jong, P. Eng., for M.C. Arnett, P. Eng., Esso Resources Canada Limited, re: DOE Intervention by Dr. T. Milne Dick.

69. Submission made to the Panel by Harriette Ahnassay, Assumption, Alberta, September 1, 1980.

70. Letter from W.M. Pearce, Interprovincial Pipe Lines (NW) Limited, re: Dene Tha Meeting, September 15, 1980, at High Level, Alberta.

71. Esso Resources Canada Ltd. Supplementary Response to EARP Panel Request for Additional Information on Toxic & Hazardous Materials Including Methods of Handling & Disposal of These Substances, September 9, 1980.

72. Response to the Panel's Questions to the Department of Renewable Resources, G.N.W.T., October 1980.

73. Hay River and Area Economic Development Corporation, Supplementary Remarks to August 18, 1980, Submission.

All of the above Submissions to the Panel and the Panel's Requests for Further Information are available from the Federal Environmental Assessment Review Office, Hull.

APPENDIX V

TECHNICAL MEETINGS AGENDA
NORMAN WELLS ENVIRONMENTAL ASSESSMENT PANEL
EXPLORER HOTEL, YELLOWKNIFE, N.W.T.

Monday, August 25	7:30-10:00 P.M. **Opening Statements and Overview Briefs**
Tuesday, August 26	1:30-5:00 P.M. **Geotechnical and Terrain Subjects** 7:30-10:00 P.M. **Hydrology, Ice Conditions**
Wednesday, August 27	1:30-5:00 P.M. **Land Use, Wildlife** 7:30-10:00 P.M. **Fisheries**
Thursday, August 28	1:30-5:00 P.M. **Contaminants and Pollution Control, Oil Spill Clean-up, Noise Issues** 7:30-10:00 P.M. **Socio-economic Issues**
Friday, August 29	1:30-5:00 P.M. **Socio-economic Issues** 7:30-10:00 P.M. **Socio-economic Issues and Closing Statements**

APPENDIX VI - ACKNOWLEDGEMENTS

The Panel wishes to thank all those who participated in the public review of the Norman Wells Oilfield Expansion and Pipeline Project. The information the Panel received from the public, Federal and Territorial Government agencies, community councils, Panel Advisors and Proponents was appreciated.

The Panel wishes to thank the representatives of the media for the radio and newspaper coverage during the public meetings. Reporting in the Slavey and Dogrib languages allowed people in the native communities to follow the meetings and was especially appreciated.

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Credit for the photographs used in the report are listed below:

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