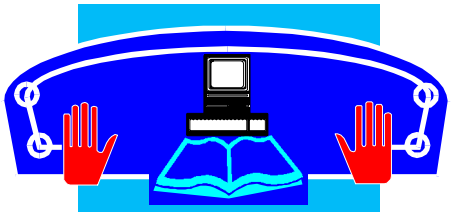


Before The National Energy Board In The Matter Of An Application By The Arctic Pilot Project Inc. - Phase I -Evidence- in-chief - The Government Of The Northwest Territories

Type of Study: Policy Material/related Library

Date of Report: 1981

Author: G.n.w.t. - Various Departments

Catalogue Number: 6-1-76

BEFORE
THE NATIONAL ENERGY BOARD

IN THE MATTER OF an Application
by ARCTIC PILOT PROJECT INC.

PHASE I - EVIDENCE-IN-CHIEF
THE GOVERNMENT OF THE NORTHWEST TERRITORIES

FEBRUARY 1982

GOVERNMENT OF THE NORTHWEST TERRITORIES

In the matter of an Application
by ARCTIC PILOT PROJECT INC.

PHASE I - EVIDENCE-IN-CHIEF

THE NATIONAL ENERGY BOARD

ORDER NO. AO-1-GH-3-81

IN THE MATTER OF an Application by Arctic Pilot Project Inc. for a licence under PART VI of the National Energy Board Act for the export of natural gas from Canada to the United States of America.

List of Witnesses for
the Government of the Northwest Territories

SUBJECT	WITNESS	TAB
POLICY	THE HON. R. NERYSOO	1
ENERGY SUPPLY	P. HART	2
COST BENEFIT ANALYSIS	D. WEISBECK	3

BEFORE

THE NATIONAL ENERGY BOARD

IN THE MATTER OF

AN APPLICATION BY

ARCTIC PILOT PROJECT

PHASE I

PANEL 1 - POLICY

PREPARED EVIDENCE OF PANEL CONSISTING OF:

HONORABLE RICHARD W. NERYSOO

MINISTER FOR ENERGY AND RESOURCE DEVELOPMENT

ENERGY AND RESOURCE DEVELOPMENT SECRETARIAT
GOVERNMENT OF THE NORTHWEST TERRITORIES
YELLOWKNIFE, NORTHWEST TERRITORIES
X1A 2L9

FEBRUARY 1982

TESTIMONY OF THE HONORABLE RICHARD W. NERYSOO

I am speaking to you on behalf of the Executive Committee of the Government of the Northwest Territories. As you may know, the Executive Committee is the senior decision-making body of the Government of the Northwest Territories. The Commissioner, Deputy Commissioner and seven elected ministers serve as members. We are responsible for decisions on policy and program and for relations with the Federal Government. It is also important for you to realize that the Legislative Assembly is made up of twenty-two fully elected members with a native majority. I am appearing today before the National Energy Board to express the concerns of citizens of the Northwest Territories about the Arctic Pilot Project. The Government of the Northwest Territories speaks on behalf of its people to articulate requirements for increasing benefits from resource development, for adequate protection of traditions and lifestyles, and for meaningful and northern-based control of resource development.

Exploration for non-renewable resources has long been a reality in the Northwest Territories. We are aware that the development of our economy depends to a great extent on the level of activity in the non-renewable resource sector. The next twenty years will see an increasing emphasis on the implementation of production technology. It seems that industry is prepared to invest the billions of dollars necessary to develop the resources in the Northwest Territories. The Norman Wells oilfield expansion is an example of this. Industry is also preparing plans for hydrocarbon production in the Beaufort Sea.

The implementation of Socio-Economic Action Plans with industry is one mechanism that can respond to the concerns of the Government of the Northwest Territories. These plans are developed in consultation with Mr.' Munro in his role as the Minister of Indian and Northern Affairs.

An Action Plan details the programs that industry will use to provide benefits to Northerners, in the form of jobs, training and business

opportunities. It spells out the protection measures, the compensation programs as well as the information and participation methods that industry will use.

The plan forms the basis for monitoring the actions of resource developers. I cannot over-emphasize the importance of the Socio-Economic Action Plan as it can control and manage the socio-economic impacts associated with a resource development.

The review mechanisms such as the Environmental Assessment Review Process, and the agencies of the Federal Government, such as the Beaufort Sea Office, also provide opportunities for the Government of the Northwest Territories to articulate concerns about resource development.

The mandate of the Government of the Northwest Territories has, over the years, made necessary the development of close liaison and communication with the native organizations.

Recently, the Government of the Northwest Territories has concluded agreements with the Dene Nation and the Metis Association. These agreements outline the arrangements for the funding that Mr. Munro has provided for programs related to the Norman Wells project. Of special interest, will be the formation of the Project Management Committee with membership from the Territorial and Federal Governments, communities and native groups.

The Government of the Northwest Territories, through its Executive Committee and civil servants, has acquired considerable experience in effective representation and practical planning for major resource development, much of it through the Norman Wells project. We are committed to maintaining our involvement with that project and to establish that intensity of involvement with all major resource development projects.

The Government of the Northwest Territories has also been very interested in the development of the Arctic Pilot Project. Our staff have met with industry officials on numerous occasions. Our Government has participated in regulatory reviews of this project such as the Environmental Assessment Review Panel. Also, on December 3, 1981, John Amagoalik, President of the Inuit Tapirisat of Canada, and Simon Awa, President of the 8affin Region Inuit Association made a presentation concerning their position on the Arctic Pilot Project to the Legislative Assembly. They requested the support of the Government of the Northwest Territories in pursuing a rigorous examination of the Arctic Pilot Project development plans.

The position of the Government of the Northwest Territories on the Arctic Pilot Project reflects our commitment to residents of the Northwest Territories and to the Inuit Tapirisat of Canada and the Baffin Region Inuit Association to seriously review the Arctic Pilot Project proposal and to determine conditions that will provide benefits to the residents of the Northwest Territories.

We want to make clear our context for support of the Arctic Pilot Project. Our position is one of support with conditions. It is the entire list of conditions that adequately reflects the concerns of the Government of the Northwest Territories.

Conditions for Support of the Arctic Pilot Project

1. Arctic Pilot Project, Inc. must assure the Government of the Northwest Territories that at no time will the Arctic Pilot Project become more than an experiment for the duration of the project. It is the pilot project as described, not its potential for adaptation, but its careful control of cargo, consisting of liquified natural gas and its small scale shipping component, that is supported by the Government of the Northwest Territories.

There are proposals from industry in the Western Arctic that call for a fleet of ice-breaking tankers in the Northwest Passage. We believe that Arctic Pilot Project can be an opportunity to permit study and assessment of the impacts and to evaluate the technical feasibility of gas production and transportation in the Arctic. In response to those who think that the Arctic Pilot Project approval will represent support for year round Arctic marine transportation, the Government of the Northwest Territories does not support the transportation of oil in ice-breaking tankers through the Northwest Passage. The Government of the Northwest Territories believes that pipeline transportation options are preferable to the expansion of marine traffic in the Northwest Passage.

42. It is also important for the National Energy Board to realize that the Government of the Northwest Territories recognizes and supports the concerns expressed by native organizations that claims based upon aboriginal rights to land in the Northwest Territories may, be prejudiced if large scale resource developments are allowed to proceed before substantial progress has been made towards a settlement. With that in mind, the Arctic Pilot Project must conform to any management regimes negotiated through the Inuit Rights settlement.

43. It is our intention to negotiate a Socio-Economic Action Plan directly with Arctic Pilot Project, Inc. and the following conditions will form the basis for discussions with the proponent.

a) Arctic Pilot Project, Inc. and its contractors must work with the Government of the Northwest Territories, settlement and municipal councils, and local residents to jointly plan and implement measures to cope with potential negative social consequences of the project.

b) Arctic Pilot Project, Inc. and its contractors must work with the Government of the Northwest Territories, settlement and municipal councils and local residents to develop employment strategies which ensure northern residents shall have the right of first refusal on all jobs in which they are interested and for which they are qualified or trainable.

c) Arctic Pilot Project, Inc. and its contractors must work with the Government of the Northwest Territories to ensure that northern businesses will be utilized in the construction and operational phases whenever possible.

d) Arctic Pilot Project, Inc., the Government of the Northwest Territories and settlement and municipal councils must set up a committee to conduct a 'needs assessment survey within the impact area to determine employment skill needs, industrial training needs and entry level for these industrial training requirements. Subsequent to the completion of the survey, Arctic Pilot Project, Inc. and the Government of the Northwest Territories will develop and deliver industrial training programs and entry level training to ensure that northern residents are qualified to compete for all employment positions.

4. Arctic Pilot Project, Inc. must assure the Government of the Northwest Territories that construction, operation and abandonment of the project will take place with minimal damage to the flora and fauna of the region.

a) Arctic Pilot Project, Inc. must assure the Government of the Northwest Territories, Hunters and Trappers Associations and native interest groups that environmental impacts will be minimized and adequate contingency plans developed to protect the renewable resources of the region.

b) Arctic Pilot Project, Inc. must assure the Government of the Northwest Territories, Hunters and Trappers Associations and native interest groups that disruptions of wildlife harvesting activities will be minimized.

c) Arctic Pilot Project, Inc. must develop appropriate plans to allow the Inuit to carry on traditional resource harvesting activities and must assure the Government of the Northwest Territories, Hunters and Trappers Associations and native interest groups that losses to the renewable resource base resulting from the effects of the project will be the subject of a plan for compensation of the resource users.

d) Arctic Pilot Project, Inc. must assure the Government of the Northwest Territories that environmental baseline data gaps will be identified, that effects on renewable resources and their uses will be monitored and that appropriate plans and studies will be funded to address unanswered concerns. The Government of the Northwest Territories, Hunters and Trappers Associations and native interest groups must be assured a meaningful role in advising and directing future biological studies funded by Arctic Pilot Project, Inc.

5. Historical and archaeological sites known and discovered during construction activity on Melville Island, specifically the Bridport Inlet area, must be protected according to appropriate guidelines and principles established by the National Museum and the Government of the Northwest Territories Northern Heritage Centre.

6. Arctic Pilot Project, Inc. must assure the Government of the Northwest Territories that the community marine resupply will not be affected by the shipping activities of the project.

7. A project management structure including representatives from Arctic Pilot Project, Inc., Federal Government, the Government of the Northwest Territories, settlement and municipal councils and native interest groups will be established which monitors the management of the project.

8. The applicant should, at all times, remain aware of the requirements in the Territorial Public Health Ordinance and should expect to be strictly accountable for meeting all legislated standards and procedures including public health and sanitation, pollution and medical care of its camp employees. Despite the intrinsically experimental nature of the project, at all times the standards identified in the Ordinances of the Northwest Territories must be observed by Arctic Pilot Project, Inc. for they relate directly to the health and safety of the workers involved in all on-land aspects and phases of the project. Examples of Government of the Northwest Territories Ordinances include the Fire Prevention Ordinance and Regulations, Safety Ordinance and Regulations, Electrical Protection Ordinance and Regulations, and Boilders and Pressure Vessel Safety Ordinance and Regulations.

Finally, I will outline some aspects of our position that have yet to receive much attention. I want to point out additional and necessary benefits from resource development. To realize significant results in these areas will, I suspect, take much planning, discussion and negotiation with industry and the Federal Government.

9. It is our position that Arctic Pilot Project, Inc., in consultation with the Government of the Northwest Territories, should develop a plan to provide energy to accessible communities and Arctic Pilot Project, Inc. will include in its production proposal the delivery of such energy.

I want to emphasize that we believe the residents of the Northwest Territories must receive an energy benefit from large scale hydrocarbon development taking place in the Territories. We are concerned that the Northwest Territories receive guarantees of reasonably priced energy supplies. Considering the relative size of the northern demand, and the high costs associated with our current energy mechanisms, it is not an unreasonable request to call for the adjustment of energy distribution networks to meet northern needs. I am advised that using current delivery schemes, northern communities along the Arctic Pilot Project, Inc. shipping route, will be paying $26 per gigajoule for oil in 1986 while the passing tankers will be carrying liquified natural gas priced at $10 per gigajoule in Toronto.

10. It is our position that the Government of the Northwest Territories should receive an equitable share of the revenues and royalties from the Arctic Pilot Project. These revenues are currently projected to accrue to the Government of Canada.

Resource development projects involve a cost to the Government of the Northwest Territories in the form of increased programs and services and community infrastructure. Revenues and royalties from the development projects are an accepted mechanism to offset these costs. Yet these methods are not yet available to the Government of the Northwest Territories.

I have been advised that our Government can expect about 470 million dollars (1981 dollars) over the life of the Arctic Pilot Project. This is from property taxes and our portion of corporate income taxes, and assumes a 10% inflation rate. In contrast, over 6 billion dollars are generated for the Federal Government through corporate income taxes and gas revenue and excise taxes. Our support of norther resource development projects will certainly reflect our ability to participate fully in the economic benefits.

The development of resources is an issue that brings daily demands on the Government of the Northwest Territories. We seek to become more involved with the processes that set into action the development of northern resources. It is only natural that when resource development projects take place because of national and international factors, that local people seek to derive the economic and social' benefits potentially associated with projects. Benefits can be in the form of new and better job opportunities, business growth and development of community services. Because of growing energy bills and because of the nature of our resources, communities of the Northwest Territories expect energy benefits. In light of the projections of royalties and revenues accruing to the Federal Government, the Northwest Territories government is seeking an equitable share of these revenues.

In this day and age of corporate responsibility and environmental sensitivity, it only makes sense to design and operate projects in such a manner as to alleviate and minimize impacts on lifestyle styles and traditional pursuits. The Government of the Northwest Territories looks forward to well balanced and orderly development of resources in the Northwest Territories.

It is with these principles in mind that the Arctic Pilot Project is supported.

I wish to thank the Board. for this opportunity to speak and for the serious consideration that will be given to our presentations.

HONOURABLE RICHARD W. NERYSOO

MLA MACKENZIE DELTA

Mr. Nerysoo is the minister responsible for the portfolios of renewable resources, energy and resource development. He is also the chairman of the Legislation and House Planning Committee.

Mr. Nerysoo is responsible for the Northwest Territories Water Board and the Science Advisory Council.

Richard Nerysoo was born in a camp on the Peel River, Northwest Territories, and received his education in Fort McPherson, Inuvik and Whitehorse.

He was vice-president of the Northwest Territories Indian Brotherhood (now Dene Nation) between 1975 and 1976 and then worked for the Territorial Government one year before he was elected vice-president of the Dene Nation representing the Mackenzie Delta region.

BEFORE

THE NATIONAL ENERGY BOARD

IN THE MATTER OF

AN APPLICATION BY

ARCTIC PILOT PROJECT

PHASE I

PANEL 2 - ENERGY SUPPLY

PREPARED EVIDENCE OF PANEL CONSISTING OF:

PETER J. HART

ENERGY AND RESOURCE DEVELOPMENT SECRETARIAT
GOVERNMENT OF THE NORTHWEST TERRITORIES
YELLOWKNIFE, NORTHWEST TERRITORIES
X1A 2L9

FEBRUARY 1982

PREPARED TESTIMONY

PETER J. HART

Q1 What is your role in the Government of the Northwest Territories?

A1 I am an Energy Advisor in the Energy and Resource Development Secretariat, Department of Executive. I am responsible for the development of energy policy within the Government of the Northwest Territories, and for defining the strategy through which the energy problems of the territory can be overcome.

Q2 Basically, what are the energy problems of the Northwest Territories?

A2 Very briefly, petroleum products and electricity are extremely expensive in the Northwest Territories. This creates an excessive burden upon all consumers in the North: private homeowners, businesses and government. Aggravating the problem is a heavy dependence upon the more expensive forms of energy, a dependence occasioned primarily by climate.

Q3 How high are energy costs in the Northwest Territories?

A3 I have included in Table 1 a comparison of energy retail prices in regional centres across Canada. This will give an idea of what the non-government customer of the Northwest Territories pays at the burner tip.

However, it is not such a simple matter to compare energy costs in the Northwest Territories with those of Southern Canada. The reason is that the price of energy in the North is generally not a good indication of its true cost due to the price subsidization by Governments that currently exists.

I have included Table 2 which shows, for communities along the proposed Arctic Pilot Project tanker route, the retail prices of heating fuel and gasoline compared to the true cost of this fuel. You will note that this table shows fuel costs already in excess of $1.00 per litre in several Arctic communities. The difference between the retail price and the true cost reflects the price subsidy granted by the Government of the Northwest Territories. This subsidy is in reality the cost of tank farm capital and the inventory carrying cost which is not charged to the product, but is retained by the Territorial Government. The total value of this subsidy across the entire Northwest Territories for the forty communities supplied by the Government of the Northwest Territories amounted to approximately $4.5 million a year in 1980.

Even the subsidized retail prices are well past the reach of the majority of our citizens and are viewed by policy makers within the Government of the Northwest Territories as being a deterrent of economic growth. The Federal and Territorial Governments have reacted by establishing a number of other subsidies to particular classes of individuals for particular energy uses. These subsidies total approximately another $20 million a year. This level of subsidization has increased the dependence of many citizens of the Northwest Territories on government, with undesirable social and cultural effects.

The Government of the Northwest Territories views the complicated array of subsidies, some overlapping, as an undesirable situation and wishes to develop energy solutions which will eliminate their need altogether.

COMPARATIVE ENERGY PRICES
Major Regional Centres in Canada
(net of provincial fuel taxes)

Data contained in this table suffers from collection at varying points in time. Figures cannot therefore be taken as absolutes but must be used with great caution and only as a general indication of the regional differences within Canada.

		Full Semite Regular Gasoline ¢/litre	Home Heating Fuel ¢/litre	Electricity Residential $/1000 kw.h
Canada	Low	Edmonton 29.1	Saskatoon 25.0	Kelowna, B.C. 17.98
	High	St. John's 35.7	St. John's 27	Summerside 78.78
NWT	Low	Hay River 37.0	Fort Simpson 30.1	Yellowknif e 66.84
	Yells.knife	40.2	30.4	66.84
	High	Rankin Inlet 57.1	Rankin Inlet 48.8	Rankin Inlet 173.00

sources :

Statistics Canada 62-010 April-June 1981
Government N.W.T. , POL Division - September 1980
Alberta Power Ltd. , Rate Application - May 31, 1980
Stats Canada 57-203 - 1981
Northern Canada Power Commission, Proposed Rate Adj., August 1980

Table 1

COMPARATIVE ENERGY PRICES AND COSTS

Communities on Arctic Pilot Project, Inc. Tanker Route

(net of territorial fuel taxes)

	Cents Per Litre			
	P50		GASOLINE	
	Retail Price	Approximate cost	Retail Price	Approximate Cost
Arctic Bay	50.3	59.9	58.1	64.1
Broughton Island	47.0	55.0	56.3	68.7
Cape Dorset	49.1	80.7	56.9	103.3
Clyde River	46.5	87.6	55.6	100.4
Grise Fiord	51.1	92.0	56.0	100.0
Hall Beach	49.9	90.6	56.3	100.9
Igloolik	47.3	88.0	55.8	100.2
Lake Harbour	47.4	88.3	58.9	103.7
Pangnirtung	47.8	88.5	55.8	101.3
Pelly Bay	68.6	112.6	75.0	119.0
Pond Inlet	48.7	89.8	57.9	103.0

Sources:

Government of the Northwest Territories - P.O.L. price list 1981/82

Energy Costs' and Prices, Northwest Territories 1980, Trans-Service Ltd., March, 1981.

Table 2

Q4 Briefly, why are fuel prices so high?

A4 Basically, the problem relates to geography. The Northwest Territories is an immense land with its population grouped in widely scattered, small communities. Few of these are connected to the South by road, rather, they are supplied by river or sea routes, in many cases once a year. There are 62 communities in the Northwest Territories with an average population of 770.

The fact that these small communities are strewn across the map creates a petroleum product marketing problem of difficult proportions.

Oil product transportation costs are extremely high and in some areas account for more than 50% of the landed cost of the produce.

Product storage facilities must be sized to hold at least one full year's consumption plus a generous contingency reserve for missed shipments, product spills and extreme weather conditions.

Q5 Why are electrical rates so high?

A5 Again, given the dispersionof the population, it has generally been impossible to justify the cost of hydro projects based on the size of the market that can be connected. All but six communities are serviced by on-site diesel generation, burning the high cost fuel shipped in annually. Even in communities serviced by hydro electricity, diesel units provide a significant proportion of the total generation.

Q6 Are Northerners more dependent upon energy than other Canadians?

A6 It depends on the form of energy considered.

Residents of the Northwest Territories use less electricity and motor gasoline than other Canadians on a per capita basis. Northwest Territories electricity consumption per person is 79% of the Canadian average, while gasoline consumption is 56% on the same basis.

On the other hand, Northwest Territories per capita consumption of diesel fuel is seven times the national average, and consumption of light fuel oil is almost 2.5 times that of Canada.

These figures are drawn from Statistics Canada and may be slightly misleading. Diesel is considered a multi-use product in the central and eastern arctic and serves both motive and space heating needs. To eliminate the confusion, if diesel fuel and light fuel oil were combined, the Northwest Territories demand would be five times the Canadian average on a per capita basis.

This difference is believed to be accounted for by degree-day differences, the poor condition of a significant proporation of the northern housing stock, the predominance of diesel generated electricity and large transportation fuel inputs.

Attached is a comparative energy demand schedule, shown as Table 3.

Q7 What remedies is the Government of the Northwest Territories pursuing to offset these high energy costs?

A7 The Government of the Northwest Territories is establishing an energy policy centered on a number of strategies to be pursued simultaneously. The first of these is conservation. We define “conservation” as the

N.W.T. · CANADA
Selected Comparative Energy Demand

	Electricity[3] (millions of kW.h)	Motor Gas	Diesel Fuel	Light Fuel Oil
		(thousands of cubic meters)		
Canada Sales	339,125	38,475	14,977	13,803
N.W. T. Sales	455	38	186	61
per capita Canadian demand[1,2]	14	1.6	.6	.6
per capita NWT demand[1, 2]	11	.9	4.3	1.4

sources :

Petroleum product sales are 1980 domestic sales as per Stats Canada 45-004 June 1981

Electricity figures are 1980 cumulative generation available for purchase as per Stats Canada 57-001 June 1981

Notes :

1. figures are cubic meters per person for petroleum products, and, M W H per person for electricity.
2. population figures used are 1980 preliminary postcensal estimates derived from statistics Canada publications 91-512 and 91-518.
3. Available generation after exports

Table 3

reduction and avoidance of energy waste, and place a very high priority on this remedy.

Conservation of oil in the Northwest Territories does not include switching from oil to other energy forms such as electricity or gas. Rather, conservation to us relates to demand reduction means.

Generally speaking, the reasons are simple enough. Electricity is more expensive than oil everywhere in the Northwest Territories, and is therefore, not an economic alternative. There is no gas distribution network that can be expanded. For the majority of communities, there is no energy alternative easily available to the private citizen. For example, wood heating is a possibility only in the south-western corner of the Northwest Territories and along the Mackenzie River.

The conclusion to be drawn, is that the remedies to energy costs that a private citizen can himself bring to bear, are limited in most cases, solely to demand restraint. This fact forces a larger role on Government in the Northwest Territories, dictating that they develop cheaper sources of energy, whenever and however possible.

Q8 What has the Government of the Northwest Territories done to conserve?

A8 The Government of the Northwest Territories is taking action to reduce oil consumption in every economic sector.

We have developed our own public information campaign encouraging private sector conservation. This campaign involved full media coverage in the six major native languages in the Northwest Territories.

As a major energy consumer, we have sought to reduce our own consumption through improvement in the energy efficiency of public housing

and government buildings. We spend in the order of 8% of our capital budget on this effort, about $6 million each year. The Northwest Territories Housing Corporation is pioneering new Northern construction techniques to guide builders in the future. Our Department of Local Government is developing new concepts of community design with a view to planning expansions in such a way that the new houses will require the least energy inputs. Our Office of Energy Conservation is negotiating with the Federal Government in an attempt to have the National Audit Program made available to businesses in the North.

It should be noted that improving the energy efficiency of existing buildings in the North is a costly task. The retrofit of a typical three bedroom bungalow in the Keewatin costs this Government in the order of $30,000 to $40,000. That is the price tag for taking a house considered adequately efficient five years ago to one considered adequately efficient today. Immediate and massive retrofit campaigns as a solution to energy cost problems is not a viable solution given our financial constraints. 800 stable housing stocks (single detached Housing Corps (single detached,)

Q9 Does the Government of the Northwest Territories see remedies other than conservation?

A9 Yes. Recognizing that conservation will reduce the proportion of our problem, but not eliminate it, we are studying the local energy options of communities. This represents the second strategy within our energy policy. It is our desire to develop new community energy supply systems to replace oil use. We are actively investigating the use of wind, water, wood and coal as sources for new community scale energy systems. Obviously our focus is on the replacement of oil as a space heating and electricity generation source.

There are alternatives that promise significantly lower per unit production costs than currently experienced. Unfortunately, the concomitant capital and carrying costs have to date made these projects uneconomic. The problems are again the size of the isolated markets and the higher than otherwise cost of northern construction. However, we are continuing to study these alternatives and hope to have one or two pilot projects operating in the next few years.

Q10 Does the Government of the Northwest Territories see energy supply options beyond the alternatives locally available to communities?

A10 Yes. The third strategy in our energy policy deals with tapping the large reserves of arctic oil and gas. It appears now that hydrocarbon developments such as the Arctic Pilot Project offer the most promising supply options for communities above the treeline.

From a strategic standpoint, the entire nation would benefit from such an arrangement, If local supplies were utilized, Canada would benefit through the reduction in the drain of scarce product northward. For example, Eastern Arctic resupply from Montreal now amounts to approximately 45,000 cubic metres of diesel fuel per year, almost seven days of Quebec demand for the same product.

Northerners would gain through lower cost product, reduced prices and a more assured supply.

To put it another way, if hypothetically the 45,000 cubic metres Eastern Arctic supply could be displaced by tapping Northern sources, using as arbitrary figures the yields reported by the National Energy Board for Quebec refineries in October, 1981, 410,000 barrels of imported crude would be replaced.

Q11 Are there already precedents which have been established for local supply from large projects?

All Yes. The Northern Pipeline Act of 1977 regulates the construction of the natural gas pipeline between Alaska and the lower 48 States.

The Act requires Foothills Pipe Lines (South Yukon) Ltd. to construct high pressure laterals to the town gates of eight specified Yukon communities. The Company is further required to make a financial contribution in respect of providing this gas of 2.5 million dollars ($1977).

Any other communities that wish to receive a connection will receive a financial contribution from the Company of $2,500 ($1977) for each customer, not to exceed $2.5 million ($1977) for Yukon as a whole.

Gas supplied to Yukon communities will be replaced by Yukon in Alberta at the going Alberta border price.

The value of this energy benefit is considered by some Yukon analysts to far outweigh the sum of the pipeline's employment and business incentive benefits. In their view, home heating costs will be reduced up to 75%.

The Government of the Northwest Territories views the steps taken in Yukon as an extremely rational approach to the Nation's energy supply system. There appears to be no reason why the same approach in the Northwest Territories would not yield the same benefits.

Q12 How could Arctic Oil and Gas be used to supply communities above the treeline?

Al 2 The research of the Government of the Northwest Territories into this matter to date has been minimal. We are indeed only on the threshold of analyzing the problem. A number of options are evident and these are described below. The list should not be considered all-encompassing as it is likely that if industry and government turned their collective minds to this problem, in a creative way, new options would be defined.

a) The most simple supply method involves the construction of "topping plants" to provide conventional product for industry's use and that of Northern communities. These small scale refineries can be constructed on barges in the South, and simply towed to a suitable location in the North.

We understand that industry is considering this option in the Beaufort Sea area as a means of supplying diesel fuel and gasoline for drilling and base operations, as well as heavy fuel oil for fueling ice breakers and supply ships.

If this option were undertaken, community energy needs could be met without changes to the current energy consumption infrastructure. In this way, both heating and transportation fuels could be provided.

b) Liquified natural gas (LNG) is another option. LNG could be produced at any gas well, whether the gas was to be shipped South in that form or not. LNG could be used as a motive fuel for diesel , generators utilizing natural or induced boil off.

Barring significant developments in northern transportation technology, this form of energy would not be easy to use, particularly in the

outlying communities with once-a-year resupply. Large storage facilities and community distribution systems would have to be built.

To supply Arctic Bay for example, with a current annual heating and diesel generation requirement of 1250 m^3 (275,000 gallons) would require storage for approximately 2270 m^3 (500,000 gallons) of LNG.

This storage would undoubtedly be extremely costly, as would the distribution system required for its use. Moreover, it is possible that the boil-off after the annual delivery of product would exceed the energy requirements of the town. In addition, safety aspects might very well rule out the concept of extremely large tanks fixed within the borders of the community.

c) Propane would be an ideal fuel for heating, transportation and electrical generation needs of our communities.

The technology for production and use of this fuel is well known and costs can be forecast accurately. With an energy equivalency by volume closer to oil than LNG, storage requirements would not be as great. Moreover, propane is amenable to distribution throughout the community to homes by the conventional trucked method.

d) Methanol is another fuel which appears to have strong potential for future Arctic Use. This fuel can be produced from natural gas with existing and commercially available equipment. It is relatively safe and non-polluting. It could potentially serve the space heating, transportation and electrical generation needs of remote communities. It is stored, distributed and handled in ways similar to conventional petroleum products.

Difficulties with alcohol fuels have been identified, particularly their affinity for water, their corrosive properties on some metals and their cold weather combustion problems.

These problems appear to be amenable to solution. Testimony before the National Energy Board's All-Energy Inquiry of 1981 indicated that both industry and governments were taking the future use of this fuel seriously. This attitude is quite consistent with the recommendation of the House of Common's Special Committee on Alternative Energy and Oil Substitution:

> "To develop a truly alternative vehicle fuel option for consumers, the Committee recommends that the Government of Canada urge automobile manufacturers to produce methanol and dual-fuel engines in Canada. Through this action and the development of a methanol-fuel producing industry, Canada could become a world leader in methanol production and utilization."

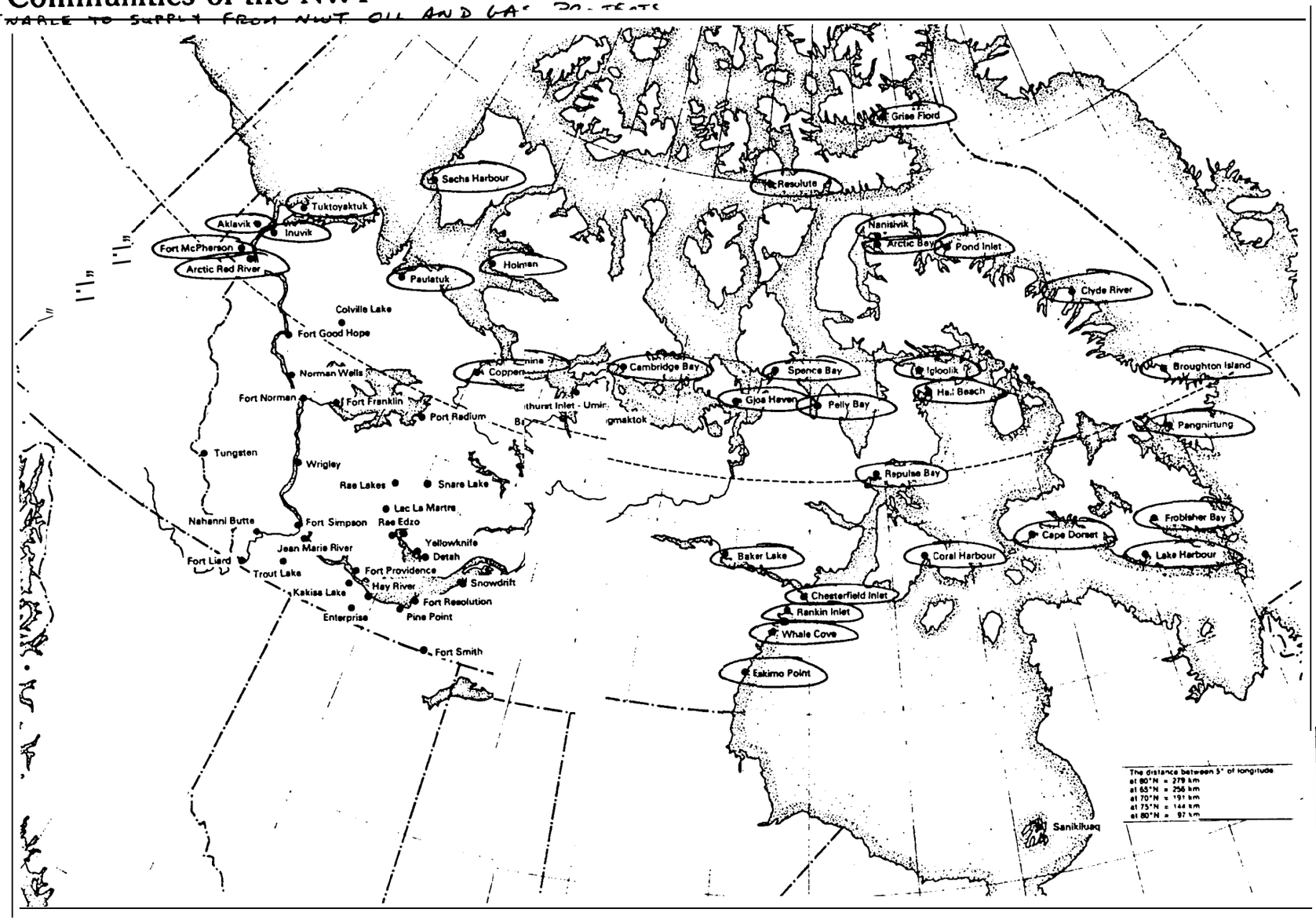
I submit the opinion that there is no better place for Canada to commence production and use of fuel-grade methanol than in its Northland.

Q13 Which Communities do you think could be supplied by one of these alternatives and what is their current demand?

A13 I have included a map with my testimony. All communities which lie , adjacent to oil and gas development areas, or on the likely transportation routes, are circled. These communities should be considered for supply. Tables 4 and 5 show the current community demand for key petroleum products. The communities have been grouped according to current transportation zones. This grouping provides a clue as to the volumes of any new product that would have to be supplied to

Communities of the NWT

AMENABLE TO SUPPLY FROM NWT OIL AND GA[illegible]



ARCTIC COASTAL & ISLAND ANNUAL COMMUNITY
LIQUID FUEL (EXCLUDING AVIATION) CONSUMPTION
BY TRANSPORTATION ZONE

MACKENZIE DELTA/BEAUFORT SEA	CUBIC METRES (m^3)		
	P50 FOR SPACE HEATING AND DIESEL MOTIVE[1]	GASOLINE[3]	FUEL FOR ELECTRICITY
AKLAVIK	1,670*	421*	702*
ARCTIC RED RIVER	136	46	130*
CAMBRIDGE BAY	2,970*	431*	1,280*
COPPERMINE	1,455	410	739*
FORT McPHERSON	1,380	460	733*
GJOA HAVEN	1,144	255	573
HOLMAN ISLAND	666	200	273
INUVIK	6,901*	3,480*	11,136*
PAULATUK	306	77	200
SACHS HARBOUR	751	114	464
SPENCE BAY	1,245	264	534
TUKTOYAKTUK	2,775	683	273
TOTAL ZONE	21,399	6,841	17,037

Table 4

BAFFIN/ARCTIC ISLANDS	CUBIC METRES (m^3)		
	P50 FOR SPACE HEATING AND DIESEL MOTIVE	GASOLINE	FUEL FOR ELECTRICITY
ARCTIC BAY	696	214	543
BROUGHTON ISLAND	1,201	264	430
CAPE DORSET	2,284	387	682
CLYDE RIVER	962	214	518
FROBISHER BAY	192*	1 ,673*	11,215*
GRISE FIORD	400	50	232
HALL BEACH	598	159	446
IGLOOLIK	1,656	405	509
LAKE HARBOUR	725	209	391
NANISIVIK	3,018*	265*	Not Available
PANGNIRTUNG	2,333	673	898
PELLY BAY	820		355
POND INLET	2,508	382	623
REPULSE BAY	712	198	377
RESOLUTE BAY	7,566*	l ,001*	2,076*
TOTAL ZONE	25,275	6,094	19,295

HUDSON BAY	CUBIC METRES (m^3)		
	P50 FOR SPACE HEATING AND DIESEL MOTIVE	GASOLINE	FUEL FOR ELECTRICITY
BAKER LAKE	2,090	481	1,318
CHESTERFIELD INLET	743	155	205
CORAL HARBOUR	793	264	982
ESKIMO POINT	1,742	391	1,191
RANKIN INLET	2,766	382	2,105
SANIKILUAQ	614	36	
WHALE COVE	514	156	273
TOTAL ZONE	9,262	1,865	6,074

NOTES

1. All figures, except where specifically noted, are product disbursed during the resupply year of summer 1980 to summer 1981. Figures noted (*) are taken from the Northwest Territories Science Advisory Board Report, Energy in the Northwest Territories, A Summary of Electricity and Petroleum Product Conservation, October, 1980.

2. P50 consumption April 1980 to March 1982 as estimated by Northern Canada Power Commission except:

   i) where (*) indicates April 1979 to March 1980 actuals;
   ii) Inuvik consumption is heavy oil;
   iii) Inuvik and Frobisher Bay consumption includes fuel for water heating in utilidor system.

3. All figures, except where specifically noted, are April 1980 to May 1981 sales by the Petroleum Oil Lubricants Division, Government of the Northwest Territories. Figures noted (*) are taken from the Northwest Territories Science Advisory Board Report, October, 1980.

ARCTIC COASTAL & ISLAND ANNUAL COMMUNITY

LIQUID FUEL (EXCLUDING AVIATION) CONSUMPTION

SUMMARY

ZONE	m^3	THOUSANDS OF GALLONS	EQUIVALENT PJ
MACKENZIE DELTA/BEAUFORT SEA			
P50: Space Heating & Motive	21,399	4,703	.8
Gasoline	6,841	1,504	.2
Fuel for Electricity Generation	17,037	3,744	.7
TOTAL ZONE	45,277	9,951	.7
BAFFIN/ARCTIC ISLANDS			
P50: Space Heating & Motive	25,275	5,555	1.0
Gasoline	6,094	1,339	.2
Fuel for Electricity Generation	19,295	4,241	.7
TOTAL ZONE	50,664	11,135	1,9
HUDSON BAY			
P50: Space Heating & Motive	9,262	2,036	.4
Gasoline	1,865	410	.1
Fuel for Electricity Generation	6,074	1,335	.2
TOTAL ZONE	17,201	3,781	.7
ALL ZONES			
P50: Space Heating & Motive	55,936	12,294	2.2
Gasoline	14,800	3,253	.5
Fuel for Electricity Generation	42,406	9,320	1.6
TOTAL ALL ZONES	113,142	24,867	4.3

Table 5

satisfy the needs of the Northwest Territories from a development taking place in a particular part of the Northwest Territories.

As an example, the Arctic Pilot Project could conceivably service all communities on Baffin/Arctic Islands shipping route. It could even supply communities on the Hudson Bay route. Developments in the Beaufort Sea area, on the other hand, would more logically supply those communities shown in the Mackenzie Delta/Beaufort Sea zone.

Q14 You have indicated that there are significant problems with the LNG option in the context of total conversion of any annually resupplied community.

Are there other possible uses for the product?

A14 LNG supply makes the most sense in areas with a more developed transportation system, areas in which periodic deliveries can be made. Moreover, one could consider LNG as a single-use fuel -- for example, as a fuel source for the diesels generating electricity.

Aklavik, Fort McPherson and Arctic Red River are Mackenzie Delta communities that are connected to Inuvik and Tuktoyaktuk by winter road. The diesel generators in these communities would require the more manageable volumes of LNG of 3, 3 and 1 m^3/day respectively. It is not hard to imagine trucking LNG to these communities. A total of 1,500 m^3 of diesel per year could be saved.

Q15 Why do you believe Propane is a strong option for the Arctic?

A15 Basically, because it is available and it appears to cost less per unit energy than oil , even with full capital recovery.

In its All-Energy Inquiry report published in June, 1981, the National Energy Board noted the testimony by industry that gas in the Northwest Territories, with the exception of Mackenzie Delta reserves, is quite lean. The Board concluded that:

> "Arctic Islands and Beaufort gas have a low potential for liquids recovery and if liquids were recovered from this gas, the quantities may be too small to warrant transportation to markets."

I believe the Board had Southern markets in mind when it made this statement, and that future Northern markets were not considered. Therefore, the Board concluded that LPG's would be reinfected to maintain reservoir pressures.

Based on the gas analysis from the Borden Island formation, there appears to be roughly .02 Mol % C_3's. Based on the volumes of gas to be produced, production of LPG's would approximate 1,350 m^3 of furnace fuel in equivalent heating value. This amount *would* suffice to completely replace the use of oil for space heating in one typical Arctic community.

During the All-Energy Inquiry that led to the June, 1981 Board report, Imperial forecast propane production rates from Mackenzie Delta formations as 700 m^3/d in 1992 increasing to 1,500 m^3/d in 1994. On an energy equivalent basis, this equals diesel fuel of 100,000 gallons per day and 219,000 gallons per day respectively, much more than is required to supply the Delta area and communities to the East. Shipping routes between the Delta and communities as far East as Spence Bay are already well established, these being the normal annual resupply routes that carry Norman Wells product to the Arctic.

The advantage of Propane as a fuel is its relative ease of transportation and storage, and the relative ease of conversion to its use.

Petro Canada has completed an initial review of this option for Arctic communities at the request of the Government of the Northwest Territories. They concluded that available information indicates that a gas product would be a viable economic alternative to the existing diesel dependent systems, thus providing significant local benefits; however, the number of assumptions required in reaching this conclusion demonstrated a need for more detailed information.

Applying the results of the study to the community of Arctic Bay, using the capital conversion costs and 1986 East Coast Canada propane prices given in the report, it is simple enough to conclude that consumer energy costs would be in the order of 50% of their oil equivalent in 1986. This calculation does not include costs related to propane transportation, installation of the required capital or the conversion costs of the diesel generators to propane. However, the result is sufficiently striking to warrant further in-depth analysis of the option.

Q16 You said that Methanol appears to have strong potential for future Arctic use. Would you elaborate on this conclusion.

A16 There is a rapidly expanding research and development effort in Canada, focussed on the use of methanol both as a motive fuel and a domestic heating fuel.

Considering first its motive uses, the Ontario Research Foundation has been experimenting with methanol as a fuel extender for on-road motive uses. Their tests center around the performance of a 30% methanol, 70% diesel oil emulsion in an unmodified diesel truck engine. Apparently, no problems have been encountered to date (including lubricity and corrosion) that cannot be relatively simply overcome.

The Foundation may extend their research into the use of 100% methanol fueled diesels, similar to the great amount of research on this option taking place in Europe.

According to the experts, stationary diesels offer greater opportunities for conversion to 100% methanol fuels than do on-road engines. This is due to the way in which the engines are operated (constant load), and the ability of the operators to assure a steady stream of constant quality fuel. The practicability of using methanol to replace diesel oil in a diesel-electric generating set seems greater than the practicability of its use in on-road trucks.

The big disadvantage of methanol is its lower heating value, roughly one-half that of diesel oil. An unmodified engine must burn a significantly greater quantity. Research has shown, however, that engines can be optimized for the new fuel input by adjustments to compression, fuel feed and ignition systems. These adjustments have led to remarkably better efficiencies.

Considering methanol use as a substitute furnace fuel, the possibility is much clearer and the opportunity more immediate.

The Canadian Combustion Research Laboratory, CANMET, has been testing methanol as a furnace fuel for some years. Their work has led to the conclusion that methanol can be burned in conventional oil furnaces at steady state efficiencies of about 80%! This compares favorably with the efficiency of oil fired units. Conversion to methanol would involve a few changes to the existing fuel handling and furnace control systems. These were valued in the order of $200 in 1977.[11]

The Laboratory's work also indicated that efficiencies above 95% could be realized through changes to the furnace design.

Given that methanol could be practicably used in the North, how would it compare with oil on the basis of cost? To quote the Financial Post of October 24, 1981, the future price of fuel grade methanol "is almost impossible to guage accurately". However, some indications of its competitiveness with oil are:

1. The October, 1981 market price for chemical grade methanol was just over $300/tonne which equates to diesel oil at $0.52/litre on an energy equivalency basis. You have seen that the Government of the Northwest Territories' true cost is approaching double that in many High Arctic communities.

2. The production cost of fuel grade methanol is reported to be significantly lower than that of chemical grade. In a report "Fuels for the Future: Alternative Transportation Fuels for Ontario", February, 1981, the Ontario Ministry of Energy reported a 1980 cost of $59 to $63 per barrel of oil equivalent, which translates to $0.37 to $0.40/litre for diesel oil.

3. Further, a report prepared by Atomic Energy Canada Ltd.[III] presented an equation relating the production cost of methanol to the price of the natural gas feedstock.

   Methanol cost ($/gal) $\approx 0.35 + 0.14$ NG
   where NG is the natural gas cost in $/GJ.

Using the October, 1981 Alberta Border Price of natural gas of $1 .83/Mcf, the production cost of methanol would be $0. 59/gallon ($0.13 /litre) which equates to $0.30/l itre for diesel oil on a heating equivalency basis.

To use this fuel in the Arctic, it would be necessary to construct a barge mounted plant in the South and to tow this plant to an appropriate permanent location in the North, perhaps close to a natural gas supply. The finished product could thereafter be transported to communities within the transportation zone.

Using the Baffin/Arctic Islands zone travelled by Arctic Pilot Project, Inc. tankers as an example, the annual diesel oil consumption of 44,570m^3 per year would require the annual production of 77,000 tonnes of methanol, approximately 300 tonnes/day. A plant of this size would cost in the order of $16 million, which if amortized over twenty years at 18%, would add only about $0.03/litre to the production cost of the fuel.

In conclusion, it appears quite possible to replace the use of premium fuels in the Arctic with methanol produced in the North with Northwest Territories natural gas. This would free up a significant amount of the product in shortest supply in Canada, replacing it with energy in the most abundant supply.

Methanol is perhaps the most promising alternative fuel available. Consideration of its production should become part of the planning inherent in the Arctic Pilot Project. Given that natural gas will be readily available to the Bridport Inlet facility, that site becomes an obvious candidate for a methanol plant.

Q17 You have described the energy alternatives available to the Northwest Territories. What recommendations does the Government of the Northwest Territories wish to make to the National Energy Board on this issue?

A17 In view of the opportunities described, the Government of the Northwest Territories recommends the following factors should be considered by the National Energy Board.

Pursuant to section 22(1) of the National Energy Board Act, we urge the Board to study and advise the Minister of the opportunities in the Northwest Territories for alternative energy supply. Further, we urge the Board to advise the Minister of the possible options that he can implement to resolve the Northwest Territories' pressing energy problems.

In addition, pursuant to section 22(3) of the National Energy Board Act, we urge the National Energy Board to work in concert with the Government of the Northwest Territories to assist the Board and the proponent in examining possible fuel options for the Northwest Territories.

We urge the Board to revise its analysis of Canadian natural gas supply and demand to recognize the potential future of a market in the Northwest Territories. It is almost certain that economically viable technology will exist by the start-up date of the Arctic Pilot Project, allowing the Northwest Territories communities to form a real market. Recognition of this fact will affect the quantities of gas that are deemed surplus to Canada's needs and eligible for export. For example, the current demand for space heating, electrical generation and non-aviation motive fuels in portions of the Northwest Territories serviceable from major hydrocarbon projects currently stands at 4.3 PJ per annum.

Applying the Board's current deliverability test, which establishes a minimum five year period of highly assured protection, and allowing for moderate demand growth, approximately 25 PJ of end use energy would be required to meet these needs in the portion of the Northwest Territories in question. Approximately 15 PJ of this pertains to communities that could be served from the Arctic Pilot Project.

Applying the Board's established reserves test of twenty-five years requires a much more sophisticated forecasting model than is available at this time. However, to establish rough figures, twenty-five years of consumption at current rates, allowing for a modest growth of 5% per year from 1986 to 2011 gives an estimated requirement of 260 PJ of end-use energy for the specified uses.

The phrase "end-use energy" is important. With an option such as methanol, there are losses involved in the conversion of natural gas to that fuel. As approximately 30% of the methane fuel appears not to emerge as methanol in the ICI methanol process, for every unit energy methanol required, 1.43 units of energy methane must be provided. Therefore, the 260 PJ requirement could become, if methanol was the selected option, a 370 PJ requirement. Using an arbitrary conversion figure of 38 MJ/m^3, this energy requirement equates to 9.7 billion m^3 or 342 billion cubic feet of gas.

The Government of the Northwest Territories believes that the Board's deliverability and established reserves tests must include the possibility of a future Northwest Territories market. This stems from our belief that it would be poor management of national resources to allow export contracts of a size as to prevent the development of a new Northwest Territories market. In our opinion, such would lead to a wasteful energy management practice in Canada.

The Government of the Northwest Territories believes that because the Arctic market previously described, is not connected to supplies of Southern natural gas, a block of Arctic natural gas should be set aside for Northwest Territories use according to the twenty-five year established reserves test. In addition, the Government of the Northwest Territories believes that such a reserve should be set aside as soon as possible.

In conclusion, the Government of the Northwest Territories does not view the Arctic Pilot Project, by virtue of the volumes to be exported, as jeopardizing the potential deliveries of natural gas products to Arctic Communities. Rather, the. Government of the Northwest Territories has supported the Arctic Pilot Project, subject to certain conditions, partly because it is through this project that specific Arctic communities can be more economically supplied with energy.

FOOTNOTES

1 Methanol as a Domestic Heating Fuel, a presentation at the 74th Annual Meeting of the Air Pollution Control Association, Philadelphia, Pennsylvania, June 21 - 26, 1981, by A.C.S. Hayden, R.W. Broaten, E. Palmer.

II Utilization of Methanol in Stationary Source Combustion, A.C.S. Hayden, Canadian Combustion Research Laboratory, Ottawa, November, 1977.

III Gasoline and Other Transportation Fuels From Natural Gas in Canada, Atomic Energy of Canada Limited, Chalk River, Ontario, March, 1981.

Curriculum Vitae

February, 1982

Peter J. Hart

Address:	4911 Matonabbee Street, Yellowknife, Northwest Territories
Date of Birth:	1943, Ottawa, Ontario
Marital Status:	Married
Education:	Bachelor of Commerce (ECON), St. Patricks College, University of Ottawa, 1965
	Master of Business Administration, Queen's University at Kingston, 1979
Experience:	Supervisor, Computer Training Group Bell Canada, Montreal, Quebec, 1965 - 1967
	Senior Systems Analyst Ontario Hydro, Toronto, Ontario, 1968 - 1972
	Manager, Systems and Program Development Government of the Northwest Territories Yellowknife, Northwest Territories, 1973 - 1977
	Special Assistant to the Minister responsible for Energy, Government of the Northwest Territories 1980 - 1981
	Energy Advisor Energy and Resource Development Secretariat, Government of the Northwest Territories, 1982

BEFORE

THE NATIONAL ENERGY BOARD

IN THE MATTER OF

AN APPLICATION BY

ARCTIC PILOT PROJECT

PHASE I

PANEL 3 - COST BENEFIT ANALYSIS

PREPARED EVIDENCE OF PANEL CONSISTING OF:

DON WEISBECK

ENERGY AND RESOURCE DEVELOPMENT SECRETARIAT
GOVERNMENT OF THE NORTHWEST TERRITORIES
YELLOWKNIFE, NORTHWEST TERRITORIES
XIA 2L9

FEBRUARY 1982

PREPARED TESTIMONY

DON WEISBECK

Q1 What is your name and occupation?

A1 My name is Don Weisbeck; I live in Yellowknife, Northwest Territories. By profession, I am an Economist. My present position with the Government of the Northwest Territories is Chief, Planning and Resource Development Division, Department of Economic Development and Tourism.

Q2 Could you outline for us the purpose of your testimony and any concerns you have regarding the Arctic Pilot Project?

A2 The reason for my being here is to address the issue of resource revenue sharing as it relates to the Arctic Pilot Project and the distribution of government revenues generated as a result. At present, there are no arrangements available whereby the Government of the Northwest Territories receives an identifiable share of the Federal Royalties generated by the development of non-renewable resources in the Northwest Territories. As prescribed under Sections 13(a) and 13(c) of the Northwest Territories Act, the jurisdictional mandate of the Government of the Northwest Territories regarding direct taxation is restricted. In turn, the financial benefits received by the Government of the Northwest Territories from the Arctic Pilot Project are limited to only property taxes and an allocated portion of corporate income taxes, the end result being substantial inequities in revenue distribution.

In Volume IV, Part C of the Arctic Pilot Project document series, the proponents have indicated the various tax and other revenues which would accrue to the public sector as a result of the Project.

On the basis of this submission and information obtained by the Government of the Northwest Territories, we have developed our own simulation model of this project. We wish to address our findings with specific reference to the distribution of government revenues.

Q3 Could you provide us with a brief description of your model and its significant components?

A3 The model is based on one previously prepared by the Government of the Northwest Territories for the National Energy Board hearings that dealt with the Norman Wells project. The model uses expenditure, price and financing data as presented in Arctic Pilot Project, Inc.'s submission to the National Energy Board and as obtained directly from the proponents to simulate the various cash flows associated with the project. The model deals not only with the activities of Arctic Pilot Project, Inc. in the Northwest Territories, but also those of the producer, Pan Arctic Oils Ltd., as they relate to the Project. The endogenous variables of the model are basically accounting in nature and determine the profits or revenues that would accrue to Arctic Pilot Project, Inc., Pan Arctic Oils Ltd., and the Federal Government and the Government of the Northwest Territories over the life of the Project.

Q4 With respect to the potential government revenues that would result from the Arctic Pilot Project, could *you* outline the various tax and other measures that are incorporated in your model?

A4 In addition to corporate income tax, other tax measures considered in the model include the Petroleum and Gas Revenue Tax, Natural Gas and Gas Liquids Excise Tax and Property Taxes. The federal basic royalty and the progressive incremental royalty have also been taken into account.

Q5 In regard to both royalty sources, what is your estimate of the total royalties accruing from the Arctic Pilot Project?

A5 Over the life of the Project, total cumulative royalties are estimated at 7,555 million, in terms of current dollars. In 1981 dollars and assuming an overall inflation rate of ten percent, this value translates to an estimated 1202 million or approximately 60.5 million dollars per year.

Q6 What proportion of these royalty payments are allocated to the Government of the Northwest Territories?

A6 None.

Q7 Will the Government of the Northwest Territories receive any revenue from this project?

A7 Yes, during the first year of operation, we estimate that the Government of the Northwest Territories will receive some 8.3 million dollars in property taxes. By the end of the Project life, this amount will have diminished to 4.9 million dollars per annum and will represent a cumulative total of 150 million dollars in property tax revenue. These figures are in current dollars. In terms of corporate income taxes, we estimate that the Government of the Northwest Territories will earn 18.5 million dollars in the start-up year and approximately 284 million by the end of the Project. Over the entire life of the Project, total corporate income tax revenue received by the Government of the Northwest Territories will be only 2,353 million dollars.

Q8 How does this compare with the tax revenue to be received by the Federal Government?

A8 We estimate that the Government of Canada will generate approximately 133 million dollars and 1843 million dollars in corporate income tax revenues in the first and last years of the Project life, respectively. Again, in current dollars, this represents a cumulative total of nearly 15,519 million dollars. In addition, the Government of Canada will earn considerable revenues in the form of gas revenue and excise taxes. In this regard, the estimated Petroleum and Gas Revenue Tax to be received by the Federal Government from Pan Arctic Oils Ltd. over the Project life is 3,605 million dollars. In the first year of operation, we estimate that the Natural Gas and Gas Liquids Excise Tax will generate 147.3 million dollars in Federal revenue and nearly 826.5 million dollars per annum by the end of the Project for a cumulative total of 8,291 million dollars. It should be noted that in preparing these excise tax revenue estimates, the tax rate forecast presented in Volume VI, Part A of Arctic Pilot Project, Inc. 's submission to the National Energy Board was employed.

Q9 With respect to the total revenues accruing to both the Government of Canada and the Government of the Northwest Territories, could you summarize your findings?

A9 Assuming an overall inflation rate of 10 percent in 1981 dollars, we estimate that over the entire life of the Project, the Government of Canada will receive some 6,264 million dollars in revenues, or approximately 313 million dollars per annum. This compares to a cummulative total of 472 million dollars to be received by the Government of the Northwest Territories or an estimated 23.6 million dollars per year. In comparison, the Government of Canada will receive revenues equal to approximately 13% times that of the Government of the Northwest Territories over the Project life.

Q10 Could you explain for us why such drastic dissimilarities exist between those revenues received by the Government of Canada and those of the Government of the Northwest Territories?

A10 In essence, the bulk of the revenues earned by the Government of the Northwest Territories is in the form of corporate income tax revenue. The revenue received through corporate income taxes represents only a portion of the non-Federal corporate income tax revenue allocated amongst all relevant provinces and territories. While the Government of the Northwest Territories does receive some revenue from property taxation, the overall revenue generated is very small. Besides receiving the greater share of corporate income tax revenue, the Federal Government generates substantial earnings through royalties and other taxes. Because the Northwest Territories does not have the same jurisdictional authority over its petroleum and gas resources as do the provinces, it is unable to impose production royalties on such projects. Using the Alberta/Canada Energy Pricing and Taxation Agreement as a model case, we have estimated that under the same terms and conditions of the agreement, the Government of the Northwest Territories would receive approximately 3,032 million 1981 dollars in revenue over the life of the project or nearly 152 million dollars per year.

APP Cash Flow Simulation Model

Status Quo

(output expressed as cumulative totals)

Year	Property Taxes In Current Dollars	GNWT Corporate Income Tax Revenue In In Current Dollars
1980	.00	.00
1981	.04	.00
1982	1.36	.00
1983	5.57	.00
1984	13.23	.00
1985	21.28	.00
1986	29.60	18.54
1987	37.66	29.52
1988	45.45	49.04
1989	52.99	87.01
1990	60.30	144.53
1991	67.36	206.57
1992	74.20	275.87
1993	80.82	353.08
1994	87.22	438.73
1995	93.97	531.96
1996	100.53	640.00
1997	106.85	760.07
1998	112.97	893.31
1999	118.92	1040.45
2000	124.66	1204.32
2001	130.21	1386.48
2002	135.60	1589.41
2003	140.80	1815.72
2004	145.83	2069.99
2005	150.71	2353.40

APP Cash Flow Simulation Model

Status Quo

(output expressed as cumulative totals)

Year	Federal Corporate Income Tax Revenue In Current Dollars	PGRT In Current Dollars
1980	.00	.00
1981	.00	.00
1982	.00	.00
1983	.00	.00
1984	.00	.00
1985	.00	.00
1986	132.99	11.39
1987	211.00	24.48
1988	349,29	39.25
1989	619.09	56.10
1990	1028.55	74.71
1991	1449.70	143.54
1992	1913.35	235.68
1993	2426.66	344.87
1994.	2994.40	469.13
1995	3612.07	611.10
1996	4325.71	777.39
1997	5116.59	965.04
1998	5992.16	1176.19
1999	6957.01	1412.74
2000	8029.79	1679.03
2001	9220.40	1978.17
2002	10545.06	2314.64
2003	12020.48	2693.20
2004	13676.40	3122.06
2005	15519.61	3605.26

APP Cash Flow Simulation Model

Status Quo

(output expressed as cumulative totals)

Year	NGGL Tax In Current Dollars	Total Federal Revenue in 1981 Dollars	**Total GNWT Revenue in 1981 Dollars**
1980	.00	.00	.00
1981	.00	.00	.03
1982	.00	.0.0	1.12
1983	.00	.00	4.29
1984	.00	.00	9.52
1985	.00	.00	14.52
1986	147.34	171.39	29.68
1987	315.49	311.37	39.45
1988	507.07	479.20	52.19
1989	727.21	702.35	71.49
1990	942.16	961.44	96.50
1991	1193.50	1270.15	120.72
1992	1461.96	1593.60	144.98
1993	1751.96	1924.25	169.26
1994	2082.26	2262.51	193.50
199s	2439.05	2597.65	217.43
1996	2800.34	2941.35	242.37
1997	3194.84	3289.55	267.38
1998	3644.26	3644.87	292.45
1999	4165.08	4007.45	317.48
2000	4727.51	4373.63	342.70
2001	5335.00	4743.46	368.06
2002	5991.12	5116.97	393.67
2003	6699.66	5494.12	419.53
2004	7464.90	5877.12	445.85
2005	8291.38	6264.27	472.46

APP Cash Flow Simulation Model

Status Quo

(output expressed as cumulative totals)

Year	Royalty Payments In Current Dollars	Royalty Payments In 1981 Dollars
1980	.00	.00
1981	.00	.00
1982	.00	.00
1983	.00	.00
1984	.00	.00
1985	.00	.00
1986	11.88	6.71
1987	2S.39	13.64
1988	40.51	20.69
1989	59.90	28.91
1990	88.71	40.02
1991	228.17	88.90
1992	419.12	149.74
1993	647.98	216.04
1994	910.38	285.13
199s	1193.88	353.00
1996	1532.16	426.61
1997	1918.59	503.09
1998	2357.56	582.06
1999	28S2.95	663.05
2000	3413.96	746.48
2001	4054.17	832.97
2002	4776.14	921.70
2003	5590.00	1012.61
2004	6513.40	1106.33
2005	7554.97	1202.47

APP Cash Flow Simulation Model

Alberta Case

(output expressed as cummulative totals)

Year	Total GNWT Revenue In 1981 Dollars
1980	.00
1981	.04
1982	1.25
1983	4,80
1984	10.72
1985	16.42
1986	76.27
1987	124.92
1988	169.92
1989	216.15
1990	26S.28
1991	341.74
1992	444.90
1993	568.44
1994	706.25
1995	859.02
1996	1032.06
1997	121s.95
1998	1410.00
1999	1612.73
2000	1825.51
2001	2047.47
2002	2278.91
2003	2519.80
2004	2771.83
2005	'3032.77

Curriculum Vitae

February, 1982

Donald Beverly Weisbeck

Address:	Box 1227, Yellowknife, Northwest Territories, XOE lHO
Telephone Number:	(403) 873-8710
Date of Birth:	May lst, 1949
Marital Status:	Married (Linda Marlene) Two children (Derek 9 and Karen 6)
Education:	Kamloops High School Grade 12, June 1967
	University of British Columbia, B.A. (Honours - Economics) - April, 1973
	Society of Industrial Accountants 3 courses toward R.I.A. designation - January 1974
	University of British Columbia, M.A. (Economics) - September 1976.
Education Specialties:	Welfare Economics Government Finance Resource Economics
Experience:	Accountant Trainee, Bank of Montreal, June 1967 - August 1968
	Assistant Forester, S.N. McLean Forestry Services October 1968 - August 1969; Summers of 1970, 1971, 1972.
	Budget Analyst, Department of Finance, Government of Saskatchewan, June 1973 - June 1974.
	Executive Assistant, Department of Northern Saskatchewan July, August, 1974
	Research Officer, Department of Economic Development, Government of the Northwest Territories November 1975 - April 1976
	Partner - Smith, Weisbeck & Associates, January 1975 - October 1975, May 1976 - April 1978

Experience:

Evaluation Economist, Department of Planning and Program Evaluation, Government of the Northwest Territories, April 1978 - February 1980

Chief, Planning and Resource Development Division, Department of Economic Development and Tourism, Government of the Northwest Territories, March 1980 - Present

Major Studies:

"Taxation Aspect of Production and Transportation of Northern Natural Gas" Honour Thesis, April 1973.

"Community Pastures Evaluation" Prepared for the Department of Agriculture (Government of B.C.) and the Department of Regional Economic Expansion, Co-authored with Murray Smith, September 1975.

"Implications of Transportation Development of Arctic Energy Resources for Western Canada, Direct Economic Impacts and Policy Considerations" Prepared for the Department of Regional Economic Expansion, Co-authored with Murray Smith and Gerry May, December, 1976.

"A Review of Natural Gas Pipeline Property Taxation Procedures" Prepared for the Department of Local Government and the Department of Economic Development and Tourism, Government of the Northwest Territories, Co-authored with Mel Smith March, 1977.

"Development of Project Criteria" Prepared for the Department of Economic Development and Tourism, Government of the Northwest Territories, Co-authored with Eric Christensen, December, 1977.

"Economic Rents Associated with Major Mining and Hydrocarbon Activities" Prepared for the Metis Association of the Northwest Territories, March 1978.

"Evaluation of the Assistance to Industry Program" Prepared for the Department of Planning and Program Evaluation and the Department of Economic Development and Tourism, Government of the Northwest Territories, September, 1978.

"Evaluation of the Aklavik and Tuktoyaktuk Fur Garment Projects" Prepared for the Department of Economic Development and Tourism, January 1979.