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BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

Prospects For Cooperation And Trade Of Energy Resources Between The United States And Canada

The future of the United States and Canada is closely linked by these countries' economic, security, and political interdependencies which have expanded into the area of energy. Canada now supplies the United States with about 5 percent of its total gas supply and has the potential for additional exports. Its conventional oil reserves are relatively small and are not seen as the solution to the continuing U.S. dependence on Organization of Petroleum Exporting Countries oil.

This year marked an agreement between the two countries for joint cooperation in dealing with mutual energy problems. Because of these close relations, initiatives taken by Canada to manage its energy resources may be of interest to the Congress and the executive branch in connection with U.S. energy plans.



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To the President of the Senate and the
Speaker of the House of Representatives

This report focuses on the way Canada deals with its energy problems and the effects of its policies on the United States. It also addresses Canada's position as a potential source of needed energy resources to the United States; and it discusses the opportunities for continued cooperativeness between the two countries on energy matters. This report is one of a series of studies on how energy plays an important role in U.S. bilateral relationships.

Copies of this report are being sent to the Secretaries of Energy and State; the Director, Office of Management and Budget; and to interested congressional committees.

James B. Steeds

Comptroller General
of the United States

Oil resources
Energy supplies
International cooperation
International economic relations
Exporting pipeline operation

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

PROSPECTS FOR COOPERATION AND
TRADE OF ENERGY RESOURCES
BETWEEN THE UNITED STATES AND
CANADA

Canada
9/27/79

D I G E S T

The future of the United States and Canada is closely linked. Because the two countries are each other's largest trading partner, occupy the same continent, and share a stake in the future of Western democracies, the interdependencies have expanded into the area of energy. In March 1979, the two countries agreed to deal cooperatively with mutual energy problems.

An overview of the Canadian energy situation shows that its Government, in cooperation with private industry, began to be concerned with energy problems, long before the 1973 Arab oil embargo. A National Energy Board was established in 1959 and 2 years later, a national oil policy was formulated to assist in the development of western Canadian oil. (See pp. 3 and 16.)

Back p. 16

In the 1960s, its oil production was limited by U.S.-imposed oil import quotas. The pressure of increasing U.S. demand on Canadian supplies forced the Canadian Government to begin controlling exports in March 1973. (See p. 17.)

After the oil embargo of 1973, the Canadians reassessed the new energy situation, and published "An Energy Strategy for Canada" in 1976. Recognizing the changing role of government in Canada's energy resource development, the energy plan established goals to

- raise domestic oil and natural gas prices toward world levels,
- increase exploration and development activity,
- establish a conservation program,

--maintain natural gas self-sufficiency, and

--educate the public. (See pp. 5 and 6.)

FC
The actions taken by Canada in implementing its National Energy Plan have resulted in the conservation of resources, increased exploration and development, and increased supplies. (See pp. 6 to 9.) Its energy information system, mandated in 1959, has also provided it with an overview of the supply/demand situation and a basis for import/export and other energy policy decisions. (See pp. 4 and 5.)

Canada has been particularly successful in finding additional gas reserves. Not only have proven reserves increased but developmental prospects look promising. Canada presently enjoys a surplus natural gas situation because reserves have grown faster than domestic demand. This enhances the likelihood for additional gas exports to the United States, the earnings of which could provide capital for further exploration activity in Canada. Also, the surplus simultaneously reduces the need for developing immediately the more expensive frontier reserves. (See pp. 11 to 14.)

FC
From 1973-1978 Canada supplied the United States with about 5 percent of its total gas supply. Questions of continued supply are imminent since most licenses to export to the United States expire in the mid-to-late 1980s. (See pp. 10 and 11.) The Canadian Federal Government's position on future exports will become public when the results of the latest gas supply/demand inquiry are released later this year. (See p. 13.)

FC
Canada's conventional oil reserves, on the other hand, are relatively small. During the past few years, it has become more restrictive in its oil exports. In 1974, the United States was importing from Canada 791,000 barrels a day, down to

172,000 barrels in 1978, with the likelihood of the imports being much less in the future. This quantity is minimal compared to the 1973 level of about 1 million barrels a day. Development of Canada's extensive tar sands' reserves represent massive oil potential and the Federal and Provincial governments are encouraging additional exploration and supporting reserves' development.

Canada, as a source of crude oil in the near future, therefore, is not the solution to the continuing U.S. dependence on oil imported from the Organization of Petroleum Exporting Countries. (See ch. 4.)

Because of the close economic, security, and political interrelations between the United States and Canada, the energy initiatives taken by Canada may be of interest to the Congress and the executive branch in implementing the U.S. energy plan.

The Departments of Energy and State provided GAO comments containing technical clarifications and updated information which have been incorporated in this report where appropriate.

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ABBREVIATIONS

b/d	barrels per day
GOC	Government of Canada
tcf	trillion cubic feet

CHAPTER 1

INTRODUCTION

The future of Canada and the United States are closely linked. The two countries (1) are each other's largest trading partner, (2) occupy the same continent, and (3) share a stake in the future of Western democracies. These economic, security, and political interdependencies have expanded into the area of energy. For example, in March 1979, the United States and Canada agreed to a joint consultative mechanism to deal with mutual energy problems.

Common oil and natural gas delivery systems as well as electricity interconnections are in place and mutually beneficial. Although the volume of oil trade has recently decreased, Canada continues to export natural gas, crude oil, and electricity to the United States while importing significant quantities of coal.

The 1973 Arab oil embargo and the subsequent fourfold price increases caused the United States and most other nations to reassess their energy policies. Before the embargo, the world price of oil imports posed no economic problems for Canada or the United States; however, the situation has changed dramatically. The embargo exposed the vulnerability of nations relying on foreign sources to meet crude oil requirements.

Canada, together with other countries, attempted to counter the adverse economic impact of Organization of Petroleum Exporting Countries pricing policies (i.e., inflation, unemployment, eroded currencies, etc.) by developing energy policies and strategies. These included conservation measures, use of lower cost domestic sources of energy, and price controls. In 1976, Canada published an energy strategy which became its national energy plan. The Canadian approach encouraged energy conservation and an accelerated development of conventional as well as new energy sources. As a result, drilling activity reached record levels and significant oil and natural gas discoveries were made in western Canada. Oil production from massive tar sands deposits was expanded and is expected to increase in the years ahead.

SCOPE OF STUDY

Because of the close interrelations between the United States and Canada, the energy initiatives taken by Canada may be of interest to the executive branch and the Congress. In making our study, we concentrated on Canada's response to the

energy crisis, Canada's development of natural resources, and energy projects affecting U.S./Canadian interests. We recognize that many other issues affect and interrelate to the energy problem of each country.

During our study we obtained information from U.S. and Canadian officials representing many public and private agencies, departments, organizations, and associations both in Canada and the United States.

Our draft of this study was provided to the Departments of Energy and State. The Department of Energy provided us with written comments (see app. I) and we obtained verbal comments from the Department of State. Their comments contained technical clarifications and updated information which have been incorporated where appropriate.

CHAPTER 2

THE CANADIAN RESPONSE TO THE ENERGY CRISIS

The Government of Canada (GOC), in cooperation with private industry, began to address energy problems long before the 1973 embargo. In 1959, a National Energy Board was established and an energy information system developed. In 1961, a national oil policy was formulated. After the 1973 oil embargo, the Canadians began formalizing an energy plan. In 1976, the plan--An Energy Strategy for Canada--was issued and provided for the

- establishment of oil and natural gas pricing policies,
- institution of tax measures and programs encouraging conservation, and
- support of exploration and development programs.

Collectively, the above actions have moderated the adverse effects of the energy problems on Canada's economy.

The energy information system provides an overview of the supply/demand situation and a basis for import/export and other energy policy decisions. Conservation efforts have decreased energy consumption from a pre-embargo annual growth rate of 5.5 percent to a current rate of about 3.5 percent. In addition, increased energy prices have stimulated exploration and have contributed to new natural gas and oil discoveries.

GOVERNMENT ORGANIZATION

Both the Federal and Provincial governments have established organizations to identify and solve energy-related problems. The organizations have both regulatory and policy responsibilities.

In 1958, Canada, faced with a domestic oil surplus, established the Royal Borden Commission to study the problem and recommend a course of action. As a result, GOC created a National Energy Board in 1959. The Board has two principal roles, to

- regulate specific areas of oil, gas, and electrical utility industries, and
- advise GOC on the development and use of energy resources.

According to Canadian Embassy officials, the Canadian Federal Government has the right to impose direct taxes and to regulate interprovincial and international trade. The Provinces, on the other hand, own the mineral and petroleum deposits and can require the payment of royalties on resource production.

Because the Provinces own the natural resource, they also have established energy agencies. For example, Alberta has the

- Alberta Energy Resources Conservation Board, which develops supply/demand data;
- Alberta Petroleum Marketing Commission, which controls the sale of Provincial oil and gas; and
- Alberta Oil Sand Technology Research Authority, which develops and controls oil sands technology.

*Canadian
Canadian
National
Energy
Board*

Energy information system

The National Energy Act of 1959 gave the National Energy Board the responsibility for regulating and advising the Canadian Government on energy resources. To this end, the Board holds inquiries, conducts studies, prepares reports, etc., to ensure that the interests of the public are protected.

The Board periodically conducts public hearings on the supply and demand for oil and natural gas. Hearings are held separately for oil and for gas to afford the general public and those involved in the energy sector an opportunity to present oral and written testimony. In the case of the natural gas inquiry which began in October 1978, the Board planned to determine

- natural gas reserves and production potential,
- domestic demand,
- the extent to which gas can replace other energy forms, and
- the volume of gas which may be surplus and amounts which can be exported.

Industry spokesmen believe that the National Energy Board will determine that a surplus exists and that current export contracts will be renewed. Additional exports may result.

They cautioned, however, that future natural gas contracts will be for shorter lengths of time (probably 6 years) with renewal, subject to Board approval. Also, Canada will retain the option to decrease the amount of exports as Canadian demand rises.

Oil hearings are similar to the gas hearings, with additional emphasis given to foreign imports. In each case, the Board compares the evidence developed in the hearings with its own estimates and presents its view.

The conclusions reached by the Board constitute the basis upon which Canada arrives at energy policy decisions. Examples of suggestions made by the Board and adopted by GOC were

- a systematic reduction of oil exports to the United States from 1.1 million barrels per day (b/d) in 1973 to 175,000 b/d in 1978; 1/
- construction of an oil pipeline from the western Provinces to eastern markets to reduce reliance on imported oil;
- indications that sales of 55,000 b/d of light crude to the United States could be maintained through 1981 based on its 1978 reassessment of the oil supply situation (this has since been modified, see p. 18); and
- allowance of crude oil exchanges to satisfy geographic shortages in the United States.

In short, the information system has enabled the National Energy Board to advise GOC on current energy policy.

ENACTMENT OF A NATIONAL ENERGY PLAN

In cooperation with the private sector, GOC has been establishing energy policy since 1961. The 1973 oil embargo and ensuing energy price increases led to the formalization of a national energy plan, "An Energy Strategy for Canada," which outlined objectives and policies.

In 1961 GOC established a national oil policy. However, the private sector continued to have primary responsibility for domestic energy resource development. The Government's

1/Actual oil exports to the United States averaged 172,000 b/d.

role was chiefly advisory. In the summer of 1973, GOC published a report entitled "An Energy Policy for Canada, Phase I." This report was a study of the Canadian energy situation, its history, prospects, and problems.

After the energy crisis of 1973, Canada reassessed the new energy situation. The Canadian Government began to question whether industry had the capability to objectively deal with a national problem while simultaneously satisfying the profit motive. GOC, viewing energy as a potential national security problem, began to take a more active role in the energy area.

To attain its goal of self-reliance, Canada in 1976 published "An Energy Strategy for Canada" which outlined specific targets and their supporting policies. The major objectives of the energy plan were to raise the price of oil and gas toward the world level, increase exploration and development, establish a conservation program, maintain self-reliance in natural gas, and educate the public. From GOC's point of view, the changes that it has introduced have been directed at accomplishing the following three objectives:

"* * * first, to leave the industry with a fair rate of return on its existing investment as well as adequate cash flow to meet its financial obligations and to undertake the exploration and development that Canadians require and expect; second, to allow an appropriate return to the producing provinces in recognition of both their rights of ownership and the depleting nature of their resources; and third, to preserve a reasonable share of the resource revenues generated by a healthy and mature petroleum industry for the Federal Government, on behalf of all Canadians."

Because of the importance of energy bilateral relations, Canada also included in their energy plan a chapter entitled "Canada-United States Energy Relations." This plan specifically rejected the concept of a continental energy policy.

Pricing policies

The economic systems of industrialized countries, such as Canada, had become accustomed to a plentiful energy supply at low cost. However, within a short period, the price of crude increased fourfold, affecting the cost of all related commodities. This situation required GOC to reassess their pricing policies. Subsequently, GOC implemented a policy

of incrementally raising oil and gas prices toward the world level. Canada's gas reserves subsequently increased.

As U.S. demand for imported oil increased during the early 1970s, international oil prices also rose. Following the international trend, Canadian crude oil prices rose to \$3.80 a barrel in August 1973. Then the embargo hit. Although international oil prices rose to \$9.60 a barrel in January 1974, Canadian prices remained frozen at \$3.80. After the Canadian Provincial governments agreed on a new oil pricing policy, the Alberta wellhead prices rose to \$6.50 a barrel on April 1, 1974.

With Canadian reserves diminishing, resource development costing more, and a continuing advance of international oil prices, the Prime Minister, in April 1975, stated that the Canadian oil prices had to move toward the world price. Thus, prices were systematically increased until they reached \$12.75 on July 1, 1978, compared to \$16.00 per barrel for foreign crude landed at Montreal.

By 1978, the Canadian crude oil price reached parity with the American price. According to industry and GOC officials, Ontario manufacturers are opposed to any further increases because such increases may cause their products to become non-competitive with American goods.

In 1970, the Federal cabinet introduced legislation which raised almost all export prices. To establish export prices, the National Energy Board reviewed the cost of alternative energy supplies for each U.S. gas export market. Both the Canadian and the U.S. Governments agreed that replacement cost was an acceptable basis for pricing export gas. From the 1974 price of \$0.62 per 1,000 cubic feet, Canada incrementally raised export prices to \$2.16 (U.S.) in June 1977, to \$2.30 (U.S.) in May 1979, and again to \$2.80 (U.S.) in August 1979, except for one minor exception.

Accompanying the gas price rises in recent years have been significant additions to reserves. Conventional natural gas reserves increased from 52.5 trillion cubic feet (tcf) in 1973 to 66.1 tcf this year. A Canadian official also informed us that this figure does not include unconventional gas reserves of 5.3 tcf in the MacKenzie Delta and 7.3 to 9.2 tcf in the Arctic region. These reserve figures are considered "unconventional" because there is presently no system capable

of delivering the gas to the market place. In addition, a Canadian Natural Gas Supply and Requirements report, issued in February 1979, forecasts an ultimate conventional reserve level of 147 tcf.

The reserve additions have resulted in a recent Albertan Government estimate that 14 tcf of natural gas could be exported from the Province during the next 4 years. Reserves are expected to increase by about 20 percent or to about 130 tcf during the 1980s. In contrast, Canadian oil reserves have declined for 8 consecutive years. Activity in the West Pembina region of Alberta indicates a find of between 0.5 to 1.5 billion barrels. Although not a large find, when contrasted with Canada's 1977 yearend reserves of 7.1 billion barrels, the West Pembina find is significant.

Exploration and development

From a Canadian perspective, the average consumer has been forced to pay higher energy prices to "subsidize" accelerated exploration and development. The higher oil and gas prices have, however, provided the impetus for greater exploration and development. According to a trade source, industry expenditures rose from \$3.4 billion in 1974 to an estimated \$7.2 billion in 1977. Expenditures for 1978 were forecast at \$8.2 billion.

With higher prices, increased drilling incentives, and Federal/Provincial agreement, the number of exploratory and development wells increased from about 4,419 in 1975 to about 6,994 in 1978. During the same period the average number of drilling rigs in use rose from 135 to 304.

To help achieve its goal of assuring a future energy supply, Canada, in July 1975, established a national oil company--Petro-Canada. Canada's energy policy stated that "Petro-Canada will participate actively in frontier exploration." By 1977, Petro-Canada was taking a leading role in exploration in the Arctic and off the east coast.

Conservation efforts

Canada's energy conservation program is designed to encourage efficiencies in energy use and to reduce the annual consumption growth rate to less than 3.5 percent. Statistics indicate that from 1963-1973 such growth averaged 5.5 percent. To reduce energy consumption, Canada instituted a public information program, moved domestic crude oil and natural gas

pricing toward world levels, increased taxes on automobiles and gasoline, and provided grants and loans to encourage the efficient use of energy.

In 1976 Canada imposed a 10 cents a gallon excise tax on gasoline. Cars over a certain weight and cars with air-conditioners were assessed additional taxes. GOC home insulation grants and loans have been made available to homeowners and a national building code incorporated new guidelines for the design and construction of energy-efficient buildings. To further effect conservation, GOC and the private sector have both undertaken programs to improve heating unit efficiencies.

Recent reports indicate that the Canadian people are serious about making conservation of energy a way of life and Canada expects to keep its annual energy consumption growth rate to about 3.5 percent. During the recent National Energy Board oil supply/demand hearings, most forecasters predicted an annual energy consumption growth rate of about 2 to 3.5 percent to the 1990s.

Public information program

To communicate the seriousness of the energy crisis to the public, GOC sponsored a public information and education program. The effort included the use of several media, including print, radio, television, movies, and direct contact through the educational community. Results from surveys and questionnaires indicate a great amount of interest has been generated and the Canadians have adopted suggestions outlined in the information program.

Energy relations

In its energy plan, Canada stressed the importance of bilateral energy trading with the United States. Canada also noted that a "consultative process has evolved to minimize any disruptive effects that might occur because of national energy decisions taken in either country." Although the energy plan emphasized the need for determining areas of mutually beneficial cooperation, the plan noted that the "Government of Canada has rejected the concept of a continental energy policy."

Discussions with GOC officials reconfirmed their rejection of a continental energy plan. Several industry spokesmen, however, stated that Canada and the United States may want to again consider a continental energy strategy.

CHAPTER 3

CANADIAN NATURAL GAS

Canadian exports of natural gas to the United States have fallen from 1.027 tcf in 1973 to 0.881 tcf in 1978. In 1978, it amounted to about 30 percent of Canadian production and 5 percent of total U.S. consumption.

The National Energy Board concluded in its February 1979 report that Canada would have an exportable surplus of 1.6 tcf to 2 tcf of gas per year over the next 4 to 8 years. This could result in significant new exports to the United States; however, as of August 1979, no decision had been made by GOC as to new export licenses.

The following table shows U.S. natural gas consumption and imports from Canada for 1973 through 1978.

<u>Year</u>	<u>Domestic consumption</u>	<u>U.S. imports from Canada</u>
	(trillion cubic feet)	
1973	22.049	1.027
1974	21.223	0.959
1975	19.538	0.948
1976	19.946	0.954
1977	19.521	0.997
1978	19.390	0.881

The development rate of Canada's Arctic and frontier gas reserves will also be affected by the size of the gas surplus. Without sizable domestic or export markets, the producers face prohibitive development costs. If conventional production can continue to supply traditional markets and no additional markets are created, GOC and industry officials believe that frontier development will come to a standstill.

CANADIAN GAS DEVELOPMENT

Canada discovered its first, large gas reserves in 1947. Because the gas resource development required heavy capital expenditures in processing plants and long-distance

transmission pipelines, Canada sought to export the surplus to the United States. This provided the volume and load factor necessary to make the development economically feasible.

Pipelines

To market and transport natural gas to the United States, several pipelines were built. (See app. II.) Among the principal ones are the

- Alberta to Montana line;
- Alberta to California line;
- Trans Canada line transporting gas from Alberta to Eastern Canada and the United States (this system began serving Canada in 1958 and the United States in 1960); and
- Westcoast Transmission line moving British Columbian gas to Vancouver (for economic reasons, this pipeline was subsequently extended to serve the U.S. Northwest).

To finance the construction of these pipelines, long-term contracts were required. The majority of Canadian natural gas export contracts were consummated during the late 1950s and early 1960s. Usually granted for more than 20 years, most of these licenses will expire around the mid-1980s.

The last major export licenses granted by the National Energy Board were approved in 1970. It was at this time that concerns were raised in Canada about the future ability of domestic production to meet Canadian demand. Because of this, the 1970 export applications were considerably cut back and only 6-1/2 tcf were approved for export. Then, in 1971, additional export applications were turned down completely. Since that time, there have been no significant additional export licenses granted.

Reserves

Fourfold increases in world oil prices caused similar increases in natural gas prices. Accompanying the gas price rise in recent years have been significant additions to reserves. The Canadian Petroleum Association reported in 1977 that Canada's reserves were estimated at 60.2 tcf and another Canadian report dated February 1979 stated reserves at 66.1 tcf. This represents a considerable increase from the Association's 1973 estimate of 52.5 tcf.

These estimates do not include natural gas recently discovered in the Canadian Arctic nor some of the promising areas now being developed. For example, in the high-risk/high-cost Elmsworth-Wapiti areas of Alberta and British Columbia, a Canadian gas company report suggests recoverable reserves of 440 tcf. However, a conservative estimate of recoverable reserves by another Canadian gas company is in the range of 15 tcf.

The dominant producing Province, Alberta, issued a May 1978 report entitled "The Supply of and Demand for Alberta Gas." Although the report conservatively estimated the current reserve situation, it stated that over the next 4 years, 14 tcf of natural gas could be exported from the Province. In the conservative case, the report stated that Canadian demand and authorized exports can be met until 1985. Under the more optimistic assumption, all demand could be met until 1992. These forecasts all assume that Alberta can meet its own requirements for 30 years.

Although Canada has a very promising reserve picture, Canada's domestic gas markets are not expanding. Economic downturn, conservation efforts, and cheaper substitute fuels have all had an adverse impact on the gas market. The market depression has even forced a major Canadian gas distributor to implement, with the producers' consent, a plan of action. This plan allows the distributor to "reduce a projected 20 percent excess of available supply over market requirements" for the period extending through October 31, 1979.

In the U.S. Pacific Northwest, industries have converted from gas to residual fuel oil. The glut of Alaskan oil depressed residual oil prices and triggered the conversion to oil. Consequently, a major distributor in the Pacific Northwest has been trying to sell its imported Canadian gas to California and Colorado suppliers. According to several Canadian industry and Government officials, the Pacific Northwest conversion to oil from gas might have been averted if Canada had been able to sell their gas at competitive (i.e., lower) prices. The single-price policy prevented this.

The president of one large firm noted that, because of the lack of market development in Canada and the United States, exploration and development efforts are already being curtailed. The Alberta Energy Resources Conservation Board estimated present surplus productive capacity in Alberta at 300 billion cubic feet per year and in Canada, 400 billion cubic feet per year.

From the U.S. perspective, the surplus productive capacity and optimistic reserve picture are primary reasons why additional gas exports to the United States are possible. Canadian industry officials have slightly contradictory views on exports. Some industry and financial community spokesmen believe that, unless the Alaskan Highway gas pipeline is built (see p. 28.), additional exports might not be forthcoming. On the other hand, some industry spokesmen believe that producers of natural gas need the U.S. market, not only to sustain the industry, but for the cash flow to finance future exploration and development.

The volume of future Canadian gas exports to the United States was the subject of hearings starting in July 1979 before the National Energy Board. Department of State officials said in July 1979 that they expect the findings or results of the hearings to be available in the fall of 1979.

Frontier development

Canada's frontier region has surfaced potential for further natural gas discoveries. In the Canadian Arctic, reserve estimates range from 10 to 15 tcf while reserves in the MacKenzie Delta area are estimated at 5.1 tcf.

As a step toward bringing the Arctic resources to market, a consortium filed applications with the National Energy Board and the Department of Indian Affairs and Northern Development. The applications proposed the construction of a gas pipeline from the Arctic Island to southern markets. The proposal assumes that the southern markets would need the gas and that sufficient reserves (15 to 20 tcf) would be available. As an alternative to the Dempster Lateral (connecting Beauford Sea/MacKenzie Delta region with the Alaskan Highway gas pipeline), one industry official indicated that a plan will be proposed to connect Beauford Sea/MacKenzie Delta to the Arctic pipeline.

Although chief consortium officials believe that sufficient Arctic gas reserves will be available, the growth of conventional gas reserves has been strong and demand for gas weak. Even with a lead time of 7 to 10 years, the Canadian demand will not support the transported volume of gas. To support the system, short-term exports to the United States will likely be required. Otherwise, development may slow to a standstill.

As a complementary means of gas transportation, a consortium is considering liquefied natural gas transport of up to 250 million cubic feet per day by icebreaking tankers. Potential markets include the United States.

A May 1979 trade magazine article described a new gas strike in the Artic Islands. Estimates of newly discovered gas reserves range up to 5 tcf. The strike could boost the Artic Island gas reserves above the minimum 20 tcf needed to support the proposed pipeline to the southern markets.

In summary, Canada has developed a surplus of natural gas and has potential for additional conventional development which reduces the need for developing immediately more expensive frontier reserves. Transmission facilities are in place and a contractual framework has been established for exporting gas to the United States.

CHAPTER 4

CANADIAN OIL

Canada was a net importer of crude oil prior to large-scale discoveries in Alberta in 1947. Development of the oil resource required the construction of pipeline transportation networks to serve both eastern and western Canada and the United States.

Although exports to the United States were deemed essential to Canadian oil development, the United States, in 1959, imposed controls to curtail imports. Despite the controls, crude oil exports to the United States continued to rise until they reached a peak of about 1 million barrels a day in 1973. It was at this time that Canada, because of a declining reserve picture, initiated a policy of export curtailment. This systematically brought exports down to a 1978 level of 172,000 b/d. As a result of a recent oil assessment, exports are to be further reduced in the immediate future.

To supplement its traditional production, Canada has two tar sands mining projects. Collectively, these plants are expected to produce 175,000 b/d in the early 1980s. Because of the enormous potential of this resource, the Federal and Provincial governments are encouraging additional exploration and supporting research development.

Canada, as a source of crude oil in the near future, therefore, is not the solution to the continuing U.S. dependence on oil imported from the Organization of Petroleum Exporting Countries. The table on the following page shows U.S. crude oil consumption, production, and imports from Canada for 1967 through 1977.

<u>Year</u>	<u>U.S. consumption</u>	<u>U.S. production</u>	<u>Total U.S. imports</u>	<u>U.S. imports from Canada</u>	<u>Percent of imports from Canada</u>
----- (millions of barrels) -----					
1967	4,585	3,216	1,369	150.4	14.1
1968	4,902	3,329	1,573	169.4	10.8
1969	5,160	3,372	1,788	203.3	11.4
1970	5,365	3,517	1,848	245.3	13.3
1971	5,553	3,454	2,099	263.3	12.5
1972	5,990	3,455	2,535	312.4	12.3
1973	6,317	3,361	2,956	365.4	12.4
1974	6,078	3,203	2,864	288.8	10.1
1975	5,958	3,057	2,901	219.2	7.6
1976	6,391	2,976	3,415	135.7	4.0
1977	6,724	2,999	3,725	101.4	2.7

CANADIAN CRUDE OIL DEVELOPMENT

Until the discovery of oil in Alberta in 1947, Canada was a net importer of crude oil. The major demand for oil in Canada is about 2,000 miles from the wellhead. The need to develop markets resulted in several pipelines being constructed to transport the western Canadian crude oil to markets in eastern Canada and the United States.

The Interprovincial Pipeline from Edmonton, Alberta, to Superior, Wisconsin, was constructed in 1950. By 1953, it was extended further east through the United States to Sarnia, Ontario. To ease the burden of foreign imports, the Interprovincial Pipeline was further extended to Montreal in 1976. Soon after 1957, the Trans Mountain Pipeline system was constructed to transport crude from Alberta to the Pacific coast for export to the American Northwest and British Columbia.

Oil exports rose rapidly and, during the Suez crisis in 1956-57, Canadian exports to the United States reached 100,000 b/d. When the crisis ended, the United States introduced controls and curtailed Canadian imports. By 1958, Canada once again faced the problem of surplus oil. Because of this, the Canadian Government established the National Energy Board in 1959 and the National Oil Policy in 1960.

The National Oil Policy basically set aside the market in Canada west of Ottawa for Canadian production. Toronto and western areas would use domestic crudes whereas Ottawa and eastern areas would use imported crude. Imported oil was not to penetrate west of Ottawa.

Eastern Canadian refiners import most of their crude oil requirements. The Maritime refineries have docking facilities capable of handling oil tankers. The Montreal refineries receive only limited amounts of crude oil by tanker with most of their crude requirements being supplied by the Portland-to-Montreal pipeline. This pipeline traverses 166 miles from Portland, Maine, through New Hampshire, Vermont and 70 miles through the Province of Quebec to Montreal. The capacity of this system is 550,000 b/d.

The National Oil Policy assumed that the desirable development for western Canadian oil, after meeting Canadian market demand, was the export market in the United States. During the 1960s, the Canadian oil policy had the effect of constraining Canadian oil production chiefly because of oil import quotas imposed by the United States.

As Canada's domestic crude oil supply and requirements were coming into balance (1970), proven reserves began declining rapidly. In December 1972, the National Energy Board reported that production in Canada would not be able to supply the potential export and domestic markets after 1973. As a result of rapidly increasing U.S. demand in the early 1970s, the Board began to regulate crude oil exports in March 1973. U.S. import controls were terminated in May 1973.

In July 1973, the Board held a public hearing to determine the supply of and requirements for oil in Canada. As noted above, instead of trying to limit oil imports from Canada, the United States was now welcoming increased levels of imports. This was a complete reversal of roles for both nations.

In October 1974, the National Energy Board reported that Canadian oil supplies would be inadequate to serve traditional Canadian markets as well as part of the Montreal area beyond 1982 and recommended that exports be phased out.

Starting January 1, 1975, Canada instituted a protection procedure which resulted in a scaling down of its crude oil exports. On January 1, 1977, the National Energy Board modified its protection formula to stimulate heavy oil development. After the latest oil supply/demand inquiry, the Board, in its September 1978 report, decided to hold the level of light crude oil exports at the then present amount (55,000 b/d) over the next 3 years. They had also estimated that heavy oil exports may approximate 110,000 b/d during 1979 for anticipated total exports of 165,000 b/d. After that, heavy oil exports would be restricted only by actual productive capacity and Canadian demand.

We were informed by a Department of State official that in September 1979, the National Energy Board recommended that the availability of exports of Canadian crude oil be determined on a monthly basis. Furthermore, we were informed that on September 19, 1979, the National Energy Board announced that, due to Canadian supply and demand conditions, exports to the United States for October 1979 would be about 14,000 b/d of light and about 94,000 b/d of heavy crude.

Under the protection program, exports to the United States have been reduced as follows:

<u>Year</u>	<u>b/d</u> (000 omitted)
1974	791
1975	601
1976	372
1977	278
1978	172

Initially, Canada's phaseout policy included heavy crude oils as well as light crude. However, this policy seriously affected the industry's ability to develop the heavy oil resource. Canadian demand was only 40,000 of the 165,000 b/d production capacity. The National Energy Board decided to license heavy crude oil separately. This policy allowed exports of heavy oils surplus to Canadian demand. The industry still depends on the export market, particularly U.S. "Northern Tier" ¹/_{refiners}, many of which have installed special equipment to process this crude.

The Board decision to allow exports of heavy crude oil will assure continued development and production until the time when Canada can more fully use this resource. Before they can use more heavy oil, Canada must make a choice of either modifying existing Canadian refineries or building an upgrading plant. Upgrading converts the heavy oil into a synthetic crude acceptable to existing refineries.

Several industry spokesmen stated it is more economical to continue to export the heavy oils to the United States rather than upgrading it at a cost of \$2 to \$4 per

¹/Northern Tier is defined as Idaho, Illinois, Indiana, Michigan, Minnesota, Montana, North Dakota, Ohio, Oregon, Washington, and Wisconsin.

barrel. However, industry officials believe that an upgrading plant will be built by the mid-1980s because the Canadian Government wants the heavy crude to be used in Canada and because the industry fears that Alaskan crude will eventually replace Canadian heavy oils in American markets. A major oil company had been negotiating with the Federal Government and Saskatchewan Provincial government for the financial incentives to construct an upgrading plant. Another major company had also proposed a combination production and upgrading facility. Negotiations were canceled when both companies were purchased by other Canadian energy companies.

Canada's phaseout of light crude oil exports has resulted in a current excess productive capacity of 300,000 to 500,000 b/d. To decrease part of this excess and to further reduce reliance on imports, Canada is planning to increase the oil deliveries in the Interprovincial Pipeline (Sarnia to Montreal) from 250,000 to 315,000 b/d. Industry, financial, and trade association officials are in favor of short-term exports to the United States to stimulate exploration.

TAR SANDS DEVELOPMENT

The Canadian crude oil situation has been helped by the development of the Athabasca tar sands in Alberta, which contain nearly 600 billion barrels of heavy oil called bitumen. Other tar sands in Alberta contained an estimated 400 billion barrels of bitumen. The Province of Alberta estimates that 26 billion barrels of oil can be economically recovered from tar sands through existing mining methods. If Canada consumes about 2.3 million b/d, as projected for 1995, this would be about a 31-year supply for Canada. In addition, another 200 billion barrels may be recoverable by advanced techniques.

Canada has two major mining projects underway. The first project, operated by Great Canadian Oil Sands, Ltd., is a commercial venture producing 45,000 barrels of oil per day. Syncrude, the second mining project, began operations in July 1978. Built at a cost of \$2.1 billion, the plant has a production capacity of 129,000 b/d. Syncrude is unique because it is a consortium of Federal and Provincial governments and private industry. In addition to assuming equity positions when a major oil company dropped its share in 1974, the respective governments provided the following assurances

- world price for the synthetic crude,
- no production curtailment, and
- favorable royalty and tax structures.

Although the governments do not presently plan to become equity partners in future ventures, observers believe they will have to provide the proper financial incentives to encourage projects. With the return on investment forecast for Syncrude below industry norms, future projects will require some form of GOC support. Although the above projects are presently the only commercial mining operations, research officials advised us that the development of advanced technology represents a hope for the future.

The Alberta Oil Sands Technology and Research Authority, with a \$144 million financial base, was legislatively created in 1974 to develop the technology needed to establish a better commercial method of oil sands recovery. Normally, the Authority and private industry work together on specific research projects. With a 50-percent interest in each project, the Authority assures the expeditious completion of experiments and serves as an intermediary between private companies. The Authority is sole owner and licensing agent for all new technology developed through these joint research projects; however, private industry can license the technology outside of Canada. The Authority and participating private industry jointly own all project assets and share all revenues.

Canadian officials involved in tar sands research and development were of the opinion that the United States was duplicating Canadian efforts. The president of one Canadian firm involved in tar sands research stated, however, that despite being asked, his company would not work with the United States. He said that the United States would be better off if they developed its own oil shale technology. In this regard, current U.S. Department of Energy estimates indicate that the United States could recover 600 billion barrels of oil from domestic oil shale deposits or the equivalent of the existing world oil resources. Department of Energy scientists estimate that oil shale deposits can be commercially developed provided the U.S. Government funds an initial investment of perhaps as much as \$200 million for a demonstration plant. Department of Energy officials pointed out in July 1979, however, that the price of shale oil is still higher than the current world price of conventional oil.

In early June 1979, the United States and Canada agreed to cooperate on oil sands and heavy oil research and development. This, we believe, is a step in the right direction.

CHAPTER 5

OTHER ENERGY SOURCES

The United States and Canada have enjoyed a long period of cooperation in the energy area. Both countries have cooperated in the development and use of conventional and nuclear-generated electricity and have extensive interconnections of their electricity distribution systems. In the future, forest waste offers a potential energy source for both countries.

ELECTRICITY

Seven of the 10 Canadian Provinces border on the United States. Four of these seven, New Brunswick, Ontario, Manitoba, and British Columbia, have voltage system interconnections with neighboring utilities in the United States. In recent years the number of major system interconnections between the two countries has increased considerably. Several major international tie lines are presently in various stages of consideration. If built, they would increase the total transfer capability between Canada and the United States to well over 10,000 megawatts. Advantages of interconnections include export potential as well as emergency support during utility disruptions, etc.

Estimates for 1978 show that Canada exported 20.7 trillion watt hours of electricity to the United States and imported 2.2 trillion watt hours. The net exchange represented 5.5 percent of Canadian production of 336 trillion watt hours.

The National Energy Board is in favor of continued exchanges and supports the exchange activities with the United States for the following reasons

- access to electricity when needed,
- better service to Canadian consumers, and
- export revenues to help finance capital projects.

Both industry and GOC officials believe that the mutual benefit relating to interconnecting electrical systems will stimulate future activity. In this regard, Ontario and British Columbian officials stated that their Provinces are interested in exporting more electricity to the United States. Further, two U.S. governors have approached the British Columbian

Government about building future hydroelectric plants based on firm exports to the United States. This would enable British Columbia to construct powerplants in advance of Canadian demand and lower future costs to its consumers. British Columbian Government officials stated that, because future plants will be so costly, joint participation is being seriously evaluated.

British Columbian officials pointed out that there are problems between the two nations over water rights. They said that under the Columbia River Treaty, Canada can divert some of the Kootenay River flow--which would have gone directly to the United States--into the Columbia River. This will increase the amount of electrical generation in Canada, but will decrease U.S. generation. In a similar vein, Seattle City Light has the option, under an agreement between the City of Seattle and British Columbia, to flood an additional 5,000 acres of British Columbian land to increase their generating capacity. The British Columbian Government has joined with the environmentalists in opposition to this flooding. Discussions between Seattle and British Columbia have been futile. According to an industry official in British Columbia, if the water rights problems are not resolved, future hydroelectric development in this area might be impaired.

NUCLEAR

Dating back to the beginning of the atomic age, exchanges of data between Canada and the United States helped shape the future of nuclear development. Cooperation in the mid-1940s involved the supply of critical materials from the United States for construction of reactors in Canada. In the 1950s, a strong cooperative program involving the construction and operation of test loops in reactors provided excellent data for predicting behavior in nuclear submarines and nuclear powerplants. In the 1960s, the operation of an organic cooled loop in a reactor furnished data for the design of U.S. and Canadian reactors. Also, during the 1960s Canada supported the U.S. Atoms for Peace Program, the Nuclear Safeguard Program (under the International Atomic Energy Agency), and the Nuclear Non-Proliferation Treaty. Further, there was a jointly funded program on the development of heavy water-moderated power reactors. During the 1970s, cooperation continued with technical exchanges in heavy water reactor technology and nuclear waste management. Among the formal agreements reached between the two nations are

--an Agreement for Cooperation Concerning Civil
Uses of Atomic Energy, signed on June 15, 1955;

- a Memorandum of Understanding for the cooperative development of heavy water-moderated power reactors, signed in 1960; and
- an Agreement for Information Exchange in the Nuclear Field, signed in 1976.

The Canadians have expressed a strong interest in joint research and development projects in nuclear fusion. While Canadian research directors concede they have comparatively little money or direct knowledge to contribute, they do have considerable expertise in some related areas. One research director suggested a technology swap of Canadian tar sands expertise for U.S. nuclear fusion expertise.

COAL

In 1976 and 1977, Canada annually imported from the United States about 15 million tons of coal or about 50 percent of its total consumption. Preliminary statistics for 1978 show that Canada imported 12.9 million tons of coal or about 40 percent of its total consumption.

A large amount of this coal was used to generate electricity, some of which is exported to the United States. In spite of the interdependence of the two countries, Canada is concerned about the security of supply because the United States is the sole source of Canadian coal imports. It is also concerned that future U.S. exports of coal may be affected by such varied factors as increased U.S. consumption, mining strikes, and low mining productivity. The concern has prompted Canada to look to its western Provinces for future supplies. Despite the distance to the eastern Canadian markets, Canadians are planning to transport coal via rail from Alberta to Thunder Bay, Ontario (1,400 miles), and then via barge across the Great Lakes.

A senior GOC official stated that Canada has had very good working relations in energy matters with the United States and desires to undertake joint research and development efforts--particularly in areas such as coal utilization and transportation.

FOREST WASTE

Although both the United States and Canadian Governments have sponsored studies exploring the potential of forest biomass, the subject is novel and is still in its early state. Of importance, however, is that both countries possess large expanses of forest. One U.S. Department of Energy report

indicated that 3.5 percent of the total energy consumption in the United States could be fulfilled from unused forest waste.

In British Columbia, it has been estimated that 8 percent of the Province's energy demands are met with forest wastes. Many lumber mills began converting from oil to forest waste when the Provincial government made it economically unattractive to otherwise dispose of wood waste. Now the Federal Government has provided incentive funds for capital investment. Discussions with officials from both countries, including those involved in the research and development area, have supported the belief that cooperative research and development in forest waste and other areas would benefit both countries.

CHAPTER 6

OTHER ENERGY PROJECTS AFFECTING U.S.-CANADIAN INTERESTS

Although Canada and the United States have experienced a long history of energy relations, the energy crisis has dramatized the importance of increasing these efforts. The two nations are currently assessing numerous energy projects that affect the interests of both countries. Some of these projects were discussed (1) during the Vice-President's January 1978 visit to Canada and (2) by the U.S. President and the Canadian Prime Minister in March 1979. U.S. Department of Energy officials informed us in July 1979 that some of the projects are to be treated in more detail in its upcoming final Northern Tier Study report. A brief commentary on the major oil and gas project follows.

PIPELINE PROPOSALS

Significant oil and natural gas discoveries in the Beaufort Sea, northern Alaska, and the Canadian Arctic coupled with the increased demand for energy may lead to the construction of additional transmission systems to the Canadian and U.S. markets. A Trans Alaskan pipeline was constructed to transport North Slope crude oil from Prudhoe Bay to Valdez, Alaska. The oil is then transported by tanker to the west coast and other market places in the United States. The west coast markets have not, however, been able to fully absorb the North Slope oil. Although excess oil is available on the west coast, crude oil shortages exist in other parts of the United States. To alleviate this distribution problem, various pipeline proposals--all designed to market North Slope crude--have been entertained. Department of State officials pointed out in July 1979 that under Title V of the Public Utility Regulatory Policies Act of 1978 (approved November 9, 1978), the Department of the Interior has lead responsibilities for the evaluations of crude oil transportation systems, including pipelines. Three of the proposals under title V would involve pipeline routes through Canada. Each of the proposed pipelines has its proponents and opponents and contains issues and considerations which are beyond the scope of this study. (See app.II.)

Kitimat

The Kitimat proposal is a plan to construct a pipeline from Kitimat, British Columbia, to Edmonton, Alberta, where it would tie in with the Canadian pipeline system. Alaskan crude or foreign oil would be delivered to Kitimat via tankers. Estimated to cost \$750 million in 1977, the Kitimat pipeline could transport 750,000 b/d.

Kitimat could provide Canada with a west coast oil port if one is needed. Further, Canada would benefit economically from the construction phase and from the transmission charges.

The United States would receive access to alternative supplies of crude for Northern Tier refiners as well as alleviating the surplus of Alaskan crude on the west coast. Also, because Kitimat would connect with Canada's pipeline system in Alberta, swaps of Alaskan and foreign crude for Alberta crude could become a possibility.

The outlook for the Kitimat project was not bright prior to May 1979 because of the environmental opposition in British Columbia. The U.S. Department of Energy pointed out in July 1979 in commenting on the draft of this study, however, that the May 1979 British Columbia and National elections in Canada have given new lift to this project. The Department said:

"It is presently to be a 500 thousand barrels per day (MB/D) pipeline from a port at Kitimat to Edmonton connecting into the existing inter-provincial pipeline for transporting Alaskan North Slope (ANS) and foreign crudes. * * * The project may propose construction of a heavy oil refinery at Kitimat with the plan to use some of the ANS crude. This might be beneficial in effecting exchanges for sweet crude for use by the Montana and North Dakota refinery centers which are presently not configured to process high amounts of heavy crudes. Success of the project may require refineries in the Chicago area to modify for greater use of heavy sour crudes to make this project economical. Presently, the Northern Tier refiners, excluding those on the west coast of Washington are configured to process 250-350 MB/D. This assumes use of indigenous oil in that region including recent finds in North Dakota (20 MB/D)."

Trans Mountain

When Canada decided to cut back oil exports, the Trans Mountain Pipeline was delivering 270,000 b/d from Edmonton, Alberta, to Cherry Point, Washington. This dropped to approximately 14,000 b/d on a swap basis. Trans Mountain is in operation for only about 10 days a month.

In an attempt to more fully use the pipeline and to relieve the Northern Tier problem, a consortium proposed the reversal of the pipeline. This would have allowed oil to be transported in each direction for part of the month.

The British Columbian refiners and Provincial government opposed the proposal because of fear that British Columbian refiners might eventually be shut off from Albertan crude. When the U.S. Congress passed legislation restricting the volume of port traffic, the consortium withdrew its application to the National Energy Board.

The Department of Energy, in commenting on the draft of this study in July 1979, said that currently, this project proposes a port on the Strait of Juan de Fuca and the construction of a new line paralleling the existing line to Alberta. The Department also said:

"Design throughput is also 500 MB/D [thousand barrels per day]. To serve the Montana refineries, * * * [a pipeline] into Billings needs to be extended into Edmonton * * *. It is unlikely this will occur unless sweet crude can be exchanged for ANS [Alaskan North Slope] crude with Canada, or at the Billings refineries modified to handle heavy sour crude. However, it could furnish ANS crude to Chicago through the existing Interprovincial Line and increase exchanges with refineries in Puget Sound."

Alaskan Highway oil

The Alaskan Highway oil pipeline proposal offers four alternative projects to move surplus Alaskan crude into the U.S. midcontinent and Northern Tier States. Two of the projects would construct a pipeline leg off the Trans-Alaska pipeline and transport the crude to Alberta.

The other two projects would ship the Alaskan crude from Valdez and Kinai Peninsula to Skagway, Alaska, and then via a new pipeline to Alberta. The Department of Energy, in commenting on the draft of this study in July 1979, said that to be economically viable with the other two Canadian projects, the line proposed from Skagway, Alaska, would have to terminate at Keg River and not Edmonton. Existing pipelines running from Keg River to Edmonton would have to be changed from gas to oil, product to crude, and new lines built to accommodate this flow into Edmonton.

As the crude would enter Canada's pipeline system in Alberta, the same benefits would accrue to both nations as outlined under the Kitimat Pipeline proposal. Because this pipeline would be constructed side-by-side with the Alaska Highway gas pipeline, the environmental impact would be held to a minimum. This proposal appears to have less opposition than does the Kitimat proposal.

Other proposals (e.g., Northern Tier Pipeline ^{1/}) have been offered as alternatives to transport surplus Alaskan crude and foreign crude to refining centers in the U.S. Northern Tier and midcontinent. Because they do not directly involve Canada, the proposals are not discussed here.

OTHER PROJECTS

Alaskan Highway gas

The Alaskan Highway gas pipeline is designed to transport natural gas from the North Slope of Alaska to California and the U.S. Midwest via a pipeline through Canada. This project will provide Canada with an economic stimulus during the construction phase plus potential access to its frontier resources. Plans call for building the southern legs of the pipeline before beginning construction of the main line to enable surplus Albertan natural gas to be exported to the United States. However, construction (and perhaps exports) is contingent upon the entire project proceeding.

When Premier Trudeau and President Carter signed the formal agreement to allow construction of the Alaskan Highway gas pipeline, the decision to proceed was based in part upon a natural gas shortage and the availability of private financing. Department of State officials, in commenting on a draft of this study in July 1979, said that initial delays occurred when the United States was unable to promptly settle on a gas-pricing policy. Although the regulatory pace has quickened since the establishment of the wellhead price for Alaskan gas in late 1978, important factors, such as (1) gas-conditioning costs, (2) an incentive rate of return formula, and (3) gas import authorizations need to be resolved. Another hurdle to be overcome is attracting the necessary private financing. In the interim, the sponsor stated they have been spending \$500,000 a month to keep their organization intact.

^{1/}As this report went to press, the Secretary of the Interior on October 15, 1979, recommended that President Carter approve the Northern Tier Pipeline proposal.

A consensus exists among industry and financial community spokesmen that the project will need some sort of Government (United States and/or Canada) guarantee or backstopping. Both Governments, however, have agreed that they will not participate in the financing.

Department of State officials stated that the United States has a requirement for the line, but they also said that increased U.S. natural gas supplies, increased conventional Canadian gas reserves, and prospects for imports of Mexican gas could affect the need for the Alaskan pipeline.

The New Brunswick proposal

The New Brunswick liquefied natural gas proposal called for the 20-year purchase of 1 billion cubic feet a day of Algerian gas. The liquefied natural gas would have been shipped to New Brunswick, regasified, and then transmitted to the Maine border. From Maine, the gas was to be sent through a 500-mile pipeline to connect with existing distribution systems.

In December 1977, the National Energy Board conditionally approved the application for construction of the regasification terminal at Saint John, New Brunswick, and a pipeline to the Maine border. Import and export licenses were also conditionally approved.

The Department of Energy, in commenting on the draft of this study in July 1979, said that it rejected the proposal in its Economic Regulatory Administration Order Number 3, dated December 18, 1978.

Strategic Petroleum Reserve storage

The United States has a Strategic Petroleum Reserve program which, under statutory authority, provides for eventual storage of up to 1 billion barrels of crude oil and petroleum products to counter emergency situations such as another embargo. Three Canadian companies have proposed facilities to help meet this requirement. A joint study recommended by Premier Trudeau and Vice President Mondale concluded that additional technical issues needed to be studied before determining the feasibility of the Canadian sites. The joint study indicated the proposals would provide the United States with storage facilities while providing a stimulus to the local Canadian economy. Department of State officials informed us in July 1979 that the United States and Canada are currently holding discussions on a potential agreement for the United States to use Canadian storage.



**Department of Energy
Washington, D.C. 20545**

July 9, 1979

Mr. J. Dexter Peach, Director
Energy and Minerals Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Peach:

We appreciate the opportunity to review and comment on the GAO draft report entitled "Selected Data On The Canadian Energy Situation." Our views with respect to the text of the report are discussed below.

The report implies that commercial development of U.S. shale oil depends only on the expenditure of \$200 million for a demonstration plant. However, the report does not make it clear that the price of shale oil is still higher than the current world price of conventional oil.

Some of the information presented in chapter 6 regarding crude oil pipeline proposals is no longer accurate. While these projects will be treated in more detail in the Department of Energy's (DOE) upcoming final Northern Tier Study report, it might still be appropriate to update the status of these projects in the report.

Three of the Canadian proposals are under study as a solution to projected Northern Tier petroleum product shortfalls and transportation deficits owing to curtailment of Canadian imports in that region; namely Kitimat, Trans Mountain and Foothills (Alaska Highway Project); as well as all-American Northern Tier Pipeline Project.

Contrary to the impression given by the report in discussing these projects, all appear to be viable at this time, in particular the Kitimat and Trans Mountain Projects. All three of the Canadian proposals and the Northern Tier Project have filed applications with the Department of Interior (DOI) under Title V of P.L. 95-617, Public Utilities Regulatory Policy Act of 1978, Section 508.

Mr. J. Dexter Peach, Director
Energy and Minerals Division

2.

Preliminary supply/demand and cost analyses based on information furnished by the project sponsors are being submitted to DOI for a draft of the DOI Title V report which is to be issued for public comment this summer. The purpose of the Act and DOE's involvement is to provide the President with information upon which he can decide on one or more such projects for meeting the Northern Tier needs through 2000, and for expediting Federal permits. A Presidential decision is planned in December 1979.

Specifics on each of the Canadian proposals which should be updated in the draft report follows:

Kitimat: - The May 1979 British Columbia (BC) and National elections in Canada have given new lift to this project. It is presently to be a 500 thousand barrels per day (MB/D) pipeline from a port at Kitimat to Edmonton connecting into the existing Interprovincial pipeline for transporting Alaskan North Slope (ANS) and foreign crudes. Kaiser Resources is a recent addition to the existing consortium of sponsors. The project may propose construction of a heavy oil refinery at Kitimat with the plan to use some of the ANS crude. This might be beneficial in effecting exchanges for sweet crude for use by the Montana and North Dakota refinery centers which are presently not configured to process high amounts of heavy crudes. Success of the project may require refineries in the Chicago area to modify for greater use of heavy sour crudes to make this project economical. Presently, the Northern Tier refiners, excluding those on the west coast of Washington are configured to process 250-350 MB/D. This assumes use of indigenous oil in that region including recent finds in North Dakota (20 MB/D).

Trans Mountain: - This project proposes a port in Puget Sound (at Low Point on the Strait of Juan de Fuca) and the construction of a new line paralleling the existing line to Alberta. Design throughput is also 500 MB/D. To serve the Montana refineries, the Conoco line into Billings needs to be extended into Edmonton by others. It is unlikely this will occur unless sweet crude can be exchanged for ANS crude with Canada, or at the Billings refineries modified to handle heavy sour crude. However, it could furnish ANS crude to Chicago through the existing Interprovincial Line and increase exchanges with refineries in Puget Sound.

Mr. J. Dexter Peach, Director
Energy and Minerals Division

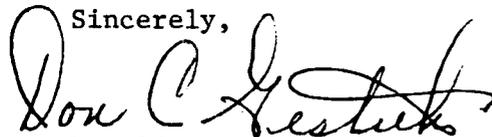
3.

Foothills: - To be economically viable with the other two Canadian projects the line proposed from Skagway, Alaska (500 MB/D design capacity) would have to terminate at Keg River and not Edmonton. Existing pipelines running from Keg River to Edmonton would have to be changed by others from gas to oil, product to crude, and new lines built to accommodate this flow into Edmonton.

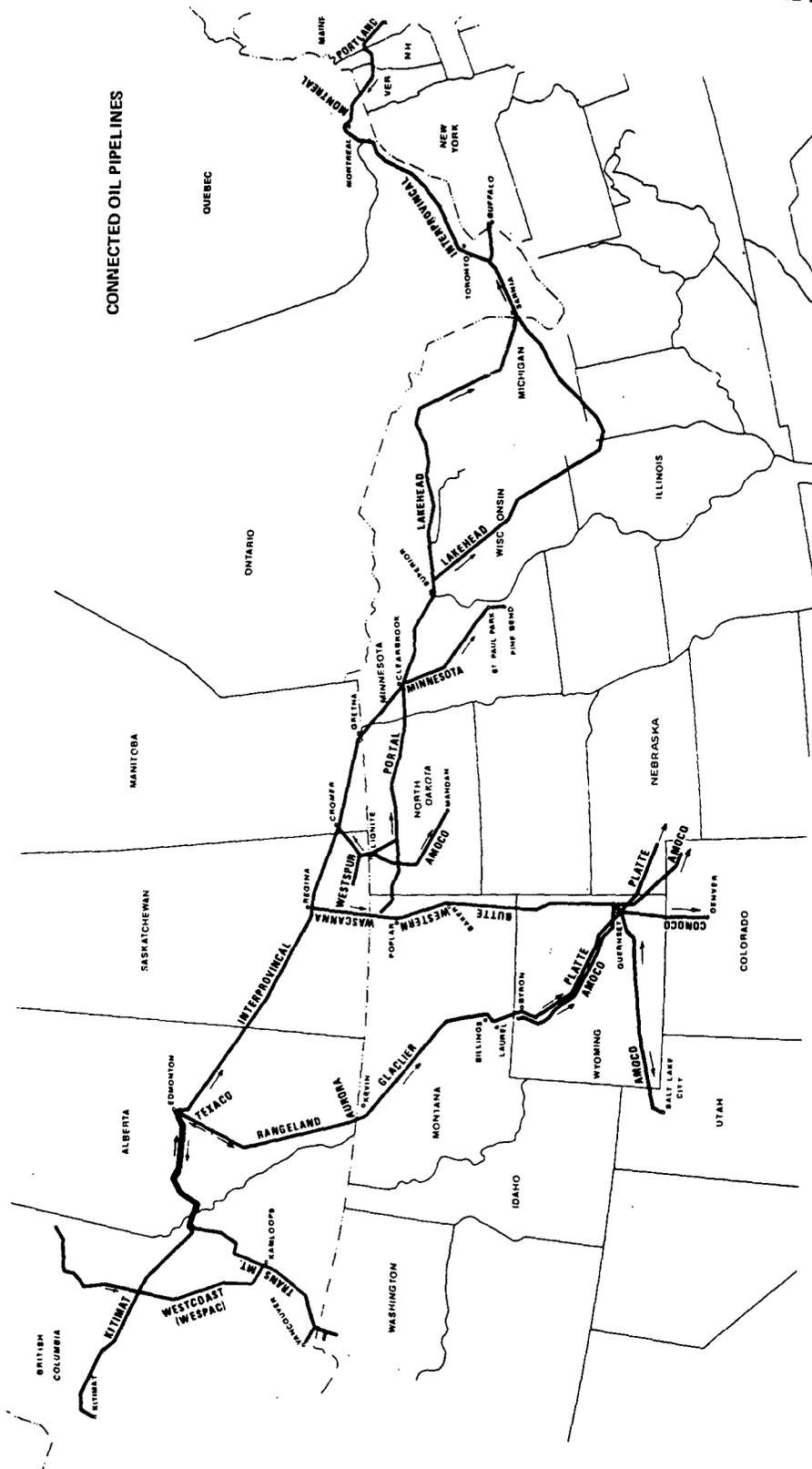
The Department of Energy did not grant conditional approval to the Trans Alaska Pipeline Company (TAPCO) project in 1977 as cited on page 39 of the report. While the Federal Power Commission (FPC) Administrative Law Judge reached a qualified approval in his initial opinion, the decision is not binding. Furthermore, DOE rejected the proposal in its Economic Regulatory Administration (ERA) Order No. 3, dated December 18, 1978.

We appreciate your consideration of these comments in the preparation of the final report and will be pleased to provide any additional information you may desire. Comments of an editorial nature have been provided to members of your staff.

Sincerely,



Donald C. Gestiehr
Director
Office of GAO Liaison



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