

ALASKA LEGISLATURE SPECIAL COMMITTEES / SUBJECTS 86 / 260

660 SCOMM21: ROYALTY OIL & GAS FILES 1977-78

SECTION 7 - AGREEMENT BETWEEN THE UNITED STATES OF AMERICA
AND CANADA ON PRINCIPLES APPLICABLE TO A NORTHERN NATURAL
GAS PIPELINE

The Government of the United States of America and
the Government of Canada,

Desiring to advance the national economic and energy
interests and to maximize related industrial benefits of
each country, through the construction and operation of
a pipeline system to provide for the transportation of
natural gas from Alaska and from Northern Canada,

Hereby agree to the following principles for the
construction and operation of such a system:

1. Pipeline Route

The construction and operation of a pipeline for the
transmission of Alaska natural gas will be along the route
set forth in Annex I, such pipeline being hereinafter referred
to as "the Pipeline". All necessary action will be taken
to authorize the construction and operation of the Pipeline
in accordance with the principles set out in this Agreement.

2. Expeditious Construction; Timetable

a) Both Governments will take measures to ensure the
prompt issuance of all necessary permits, licenses, certi-
ficates, rights-of-way, leases and other authorizations

required for the expeditious construction and commencement of operation of the Pipeline, with a view to commencing construction according to the following timetable:

- Alaska - January 1, 1980
- Yukon - main line pipe laying January 1, 1981
- Other construction in Canada to provide for timely completion of the Pipeline to enable initial operation by January 1, 1983.

b) All charges for such permits, licenses, certificates, rights-of-way, leases and other authorizations will be just and reasonable and apply to the Pipeline in the same non-discriminatory manner as to any other similar pipeline.

c) Both Governments will take measures necessary to facilitate the expeditious and efficient construction of the Pipeline, consistent with the respective regulatory requirements of each country.

3. Capacity of Pipeline and Availability of Gas

a) The initial capacity of the Pipeline will be sufficient to meet, when required, the contractual requirements of United States shippers and of Canadian shippers. It is contemplated that this capacity will be 2.4 billion cubic feet per day (bcfd) for Alaska gas and 1.2 bcfd for northern Canadian gas. At such time as a lateral pipeline

transmitting Northern Canadian gas, hereinafter referred to as "the Dempster Line", is to be connected to the Pipeline or at any time additional pipeline capacity is needed to meet the contractual requirements of United States or Canadian shippers, the required authorizations will be provided, subject to regulatory requirements, to expand the capacity of the Pipeline in an efficient manner to meet those contractual requirements.

b) The shippers on the Pipeline will, upon demonstration that an amount of Canadian gas equal on a British Thermal Unit (BTU) replacement value basis will be made available for contemporaneous export to the United States, make available from Alaska gas transmitted through the Pipeline, gas to meet the needs of remote users in the Yukon and in the provinces through which the Pipeline passes. Such replacement gas will be treated as hydrocarbons in transit for purposes of the Agreement between the Government of Canada and the Government of the United States of America concerning Transit Pipelines, hereinafter referred to as "the Transit Pipeline Treaty". The shippers on the Pipeline will not incur any cost for provision of such Alaska gas except those capital costs arising from the following provisions:

i) the owner of the Pipeline in the Yukon will make arrangements to provide gas to the communities of Beaver Creek, Burwash Landing, Destruction Bay, Haines Junction, Whitehorse, Teslin, Upper Liard and Watson Lake at a total cost to the owner of the Pipeline not to exceed Canadian \$2.5 million;

ii) the owner of the Pipeline in the Yukon will make arrangements to provide gas to such other remote communities in the Yukon as may request such gas within a period of two years following commencement of operation of the Pipeline at a cost to the owner not to exceed the product of Canadian \$2500 and the number of customers in the communities, to a maximum total cost of Canadian \$2.5 million.

4. Financing

a) It is understood that the construction of the Pipeline will be privately financed. Both Governments recognize that the companies owning the Pipeline in each country will have to demonstrate to the satisfaction of the United States or the Canadian Government, as applicable, that protections against risks of non-completion and interruption are on a basis acceptable to that Government before proof of financing is established and construction allowed to begin.

b) The two Governments recognize the importance of constructing the Pipeline in a timely way and under effective cost controls. Therefore, the return on the equity investment in the Pipeline will be based on a variable rate of return for each company owning a segment of the Pipeline, designed to provide incentives to avoid cost overruns and to minimize costs consistent with sound pipeline management. The base for the incentive program used for establishing the appropriate rate of return will be the capital costs used in measuring cost overruns as set forth in Annex III.

c) It is understood that debt instruments issued in connection with the financing of the Pipeline in Canada will not contain any provision, apart from normal trust indenture restrictions generally applicable in the pipeline industry, which would prohibit, limit or inhibit the financing of the construction of the Dempster Line; nor will the variable rate of return provisions referred to in subparagraph (b) be continued to the detriment of financing the Dempster Line.

5. Taxation and Provincial Undertakings

a) Both Governments reiterate their commitments as set forth in the Transit Pipeline Treaty with respect to

non-discriminatory taxation, and take note of the statements issued by Governments of the Provinces of British Columbia, Alberta and Saskatchewan, attached hereto as Annex V, in which those Governments undertake to ensure adherence to the provisions of the Transit Pipeline Treaty with respect to non-interference with throughput and to non-discriminatory treatment with respect to taxes, fees or other monetary charges on either the Pipeline or throughput.

b) With respect to the Yukon Property Tax imposed on or for the use of the Pipeline the following principles apply:

i) The maximum level of the property tax, and other direct taxes having an incidence exclusively, or virtually exclusively, on the Pipeline, including taxes on gas used as compressor fuel, imposed by the Government of the Yukon Territory or any public authority therein on or for the use of the Pipeline, herein referred to as "the Yukon Property Tax", will not exceed \$30 million Canadian per year adjusted annually from 1983 by the Canadian Gross National Product price deflator as determined by Statistics Canada, hereinafter referred to as the GNP price deflator.

ii) For the period beginning January 1, 1980, and ending on December 31 of the year in which leave to open the Pipeline is granted by the appropriate regulatory authority, the Yukon Property Tax will not exceed the following:

1980--\$5 million Canadian

1981--\$10 million Canadian

1982--\$20 million Canadian

Any subsequent year to which this provision applies--\$25 million Canadian.

iii) The Yukon Property Tax formula described in subparagraph (b)(i) will apply from January 1 after the year in which leave to open the Pipeline is granted by the appropriate regulatory authority until the date that is the earlier of the following, hereinafter called the tax termination date:

A) December 31, 2008, or

B) December 31 of the year in which leave to open the Dempster Line is granted by the appropriate regulatory authority.

iv) Subject to subparagraph (b) (iii), if for the year ending on December 31, 1987, the percentage increase of the aggregate per capita revenue derived from all

property tax levied by any public authority in the Yukon Territory (excluding the Yukon Property Tax) and grants to municipalities and Local Improvement Districts from the Government of the Yukon Territory as compared to aggregate per capita revenue derived from such sources for 1983 is greater than the percentage increase for 1987 of the Yukon Property Tax as compared to the Yukon Property Tax for 1983, the maximum level of the Yukon Property Tax for 1987 may be increased to equal the amount it would have reached had it increased over the period at the same rate as the aggregate per capita revenue.

v) If for any year in the period commencing January 1, 1988, and ending on the tax termination date, the annual percentage increase of the aggregate per capita revenue derived from all property tax levied by any public authority in the Yukon Territory (excluding the Yukon Property Tax) and grants to municipalities and Local Improvement Districts from the Government of the Yukon Territory as compared to the aggregate per capita revenue derived from such sources for the immediately preceding year exceeds the percentage increase for that year of the Yukon Property

Tax as compared to the Yukon Property Tax for the immediately preceding year, the maximum level of the Yukon Property Tax for that year may be adjusted by the percentage increase of the aggregate per capita revenue in place of the percentage increase that otherwise might apply.

vi) The provisions of subparagraph (b)(i) will apply to the value of the Pipeline for the capacities contemplated in this Agreement. The Yukon Property Tax will increase for the additional facilities beyond the aforesaid contemplated capacity in direct proportion to the increase in the gross asset value of the Pipeline.

vii) In the event that between the date of this Agreement and January 1, 1983, the rate of the Alaska property tax on pipelines, taking into account the mill rate and the method of valuation, increases by a percentage greater than the cumulative percentage increase in the Canadian GNP deflator over the same period, there may be an adjustment on January 1, 1983, to the amount of \$30 million Canadian described in subparagraph (b) (i) of the Yukon Property Tax to reflect this difference. In defining the Alaska

property tax for purposes of this Agreement, the definition of the Yukon Property Tax will apply mutatis mutandis.

viii) In the event that, for any year during the period described in subparagraph (iii), the annual rate of the Alaska property tax on or for the use of the Pipeline in Alaska increases by a percentage over that imposed for the immediate preceding year that is greater than the increase in percentage of the Yukon Property Tax for the year, as adjusted, from that applied to the immediately preceding year, the Yukon Property Tax may be increased to reflect the percentage increase of the Alaska property tax.

ix) It is understood that indirect socioeconomic costs in the Yukon Territory will not be reflected in the cost-of-service to the United States shippers other than through the Yukon Property Tax. It is further understood that no public authority will require creation of a special fund or funds in connection with construction of the Pipeline in the Yukon, financed in a manner which is reflected in the cost of service to U.S. shippers, other than through the Yukon Property Tax. However, should public authorities

in the State of Alaska require creation of a special fund or funds, financed by contributions not fully reimbursable, in connection with construction of the Pipeline in Alaska, the Governments of Canada or the Yukon Territory will have the right to take similar action.

c) The Government of Canada will use its best endeavors to ensure that the level of any property tax imposed by the Government of the Northwest Territories on or for the use of that part of the Dempster Line that is within the Northwest Territories is reasonably comparable to the level of the property tax imposed by the Government of the Yukon Territory on or for the use of that part of the Dempster Line that is in the Yukon.

6. Tariffs and Cost Allocation

It is agreed that the following principles will apply for purposes of cost allocation used in determining the cost of service applicable to each shipper on the Pipeline in Canada:

a) The Pipeline in Canada and the Dempster Line will be divided into zones as set forth in Annex II. Except for fuel and except for Zone 11 (the Dawson-Whitehorse portion of the Dempster Line), the cost of service to each

shipper in each zone will be determined on the basis of volumes as set forth in transportation contracts. The volumes used to assign these costs will reflect the original BTU content of Alaskan gas for U.S. shippers and Northern Canadian gas for Canadian shippers, and will make allowance for the change in heat content as the result of commingling. Each shipper will provide volumes for line losses and line pack in proportion to the contracted volumes transported in the zone. Each shipper will provide fuel requirements in relation to the volume of his gas being carried and to the content of the gas as it affects fuel consumption.

b) It is understood that, to avoid increased construction and operating costs for the transportation of Alaskan gas, the Pipeline will follow a southern route through the Yukon along the Alaska Highway rather than a northern route through Dawson City and along the Klondike Highway. In order to provide alternative benefits for the transportation of Canadian gas to replace those benefits that would have been provided by the northern route through Dawson City, U.S. shippers will participate in the cost of service in Zone 11. It is agreed that if cost overruns on construction of the Pipeline in Canada do not exceed filed costs set forth in Part D of Annex III by more than 35

percent, U.S. shippers will pay the full cost of service in Zone 11. U.S. shipper participation will decline if overruns on the Pipeline in Canada exceed 35 percent; however, at the minimum the U.S. shippers' share will be the greater of either two-thirds of the cost of service or the proportion of contracted Alaska gas in relation to all contracted gas carried in the Pipeline. The proportion of the cost of service borne by U.S. shippers in Zone 11 will be reduced should overruns on the cost of construction in that Zone exceed 35 percent after allowance for the benefits to U.S. shippers derived from Pipeline construction cost savings in other Zones. Notwithstanding the foregoing, at the minimum, the U.S. shippers' share will be the greater of either two-thirds of the cost of service or the proportion of contracted Alaska gas in relation to all contracted gas carried in the Pipeline. Details of this allocation of cost-of-service are set out in Annex III.

c) Notwithstanding the principles in subparagraphs (a) and (b), in the event that the total volume of gas offered for shipment exceeds the efficient capacity of the Pipeline, the method of cost allocation for the cost of service for shipments of Alaskan gas (minimum entitlement 2.4 bcfd) or Northern Canadian gas (minimum entitlement 1.2 bcfd) in

excess of the efficient capacity of the Pipeline will be subject to review and subsequent agreement by both Governments; provided however that shippers of either country may transport additional volumes without such review and agreement, but subject to appropriate regulatory approval, if such transportation does not lead to a higher cost of service or share of Pipeline fuel requirements attributable to shippers of the other country.

d) It is agreed that Zone 11 costs of service allocated to U.S. shippers will not include costs additional to those attributable to a pipe size of 42 inches. It is understood that in Zones 10 and 11 the Dempster Line will be of the same gauge and diameter and similar in other respects, subject to differences in terrain. Zone 11 costs will include only facilities installed at the date of issuance of the leave to open order, or that are added within three years thereafter.

7. Supply of Goods and Services

a) Having regard to the objectives of this Agreement, each Government will endeavor to ensure that the supply of goods and services to the Pipeline project will be on generally competitive terms. Elements to be taken into account in weighing competitiveness will include price, reliability, servicing capacity and delivery schedules.

b) It is understood that through the coordination procedures in Paragraph 8 below, either Government may institute consultations with the other in particular cases where it may appear that the objectives of subparagraph (a) are not being met. Remedies to be considered would include the renegotiation of contracts or the reopening of bids.

8. Coordination and Consultation

Each Government will designate a senior official for the purpose of carrying on periodic consultations on the implementation of these principles relating to the construction and operation of the Pipeline. The designated senior officials may, in turn, designate additional representatives to carry out such consultations, which representatives, individually or as a group, may make recommendations with respect to particular disputes or other matters, and may take such other action as may be mutually agreed, for the purpose of facilitating the construction and operation of the Pipeline.

9. Regulatory Authorities: Consultation

The respective regulatory authorities of the two Governments will consult from time to time on relevant

matters arising under this Agreement, particularly on the matters referred to in paragraphs 4, 5 and 6, relating to tariffs for the transportation of gas through the Pipeline.

10. Technical Study Group on Pipe

a) The Governments will establish a technical study group for the purpose of testing and evaluating 54-inch 1120 pounds per square inch (psi), 48-inch 1260 psi, and 48-inch 1680 psi pipe or any other combination of pressure and diameter which would achieve safety, reliability and economic efficiency for operation of the Pipeline. It is understood that the decision relating to pipeline specifications remains the responsibility of the appropriate regulatory authorities.

b) It is agreed that the efficient pipe for the volumes contemplated (including reasonable provision for expansion), subject to appropriate regulatory authorization, will be installed from the point of interconnection of the Pipeline with the Dempster Line near Whitehorse to the point near Caroline, Alberta, where the Pipeline bifurcates into a western and an eastern leg.

11. Direct Charges by Public Authorities

a) Consultation will take place at the request of either Government to consider direct charges by public

authorities imposed on the Pipeline where there is an element of doubt as to whether such charges should be included in the cost of service.

b) It is understood that the direct charges imposed by public authorities requiring approval by the appropriate regulatory authority for inclusion in the cost of service will be subject to all of the tests required by the appropriate legislation and will include only

i) those charges that are considered by the regulatory authority to be just and reasonable on the basis of accepted regulatory practice, and

ii) those charges of a nature that would normally be paid by a natural gas pipeline in Canada. Examples of such charges are listed in Annex IV.

12. Other Costs

It is understood that there will be no charges on the Pipeline having an effect on the cost of service other than those:

i) imposed by a public authority as contemplated in this Agreement or in accordance with the Transit Pipeline Treaty, or

- ii) caused by Acts of God, other unforeseen circumstances, or
- iii) normally paid by natural gas pipelines in Canada in accordance with accepted regulatory practice.

13. Compliance with Terms and Conditions

The principles applicable directly to the construction, operation and expansion of the Pipeline will be implemented through the imposition by the two Governments of appropriate terms and conditions in the granting of required authorizations. In the event of subsequent non-fulfillment of such a term or condition by an owner of the Pipeline, or by any other private person, the two Governments will not have responsibility therefor, but will take such appropriate action as is required to cause the owner to remedy or mitigate the consequences of such non-fulfillment.

14. Legislation

The two Governments recognize that legislation will be required to implement the provisions of this Agreement. In this regard, they will expeditiously seek all required legislative authority so as to facilitate the timely and efficient construction of the Pipeline and to remove any delays or impediments thereto.

15. Entry Into Force

This Agreement will become effective upon signature and shall remain in force for a period of 35 years and thereafter until terminated upon 12 months' notice given in writing by one Government to the other, provided that those provisions of the Agreement requiring legislative action will become effective upon exchange of notification that such legislative action has been completed.

IN WITNESS WHEREOF the undersigned representatives,
duly authorized by their respective Governments, have
signed this Agreement.

DONE in duplicate at Ottawa in the English and French
languages, both versions being equally authentic, this
_____ day of _____, 1977.

For the Government
of the United States:

For the Government
of Canada:

The Pipeline Route

In Alaska:

The Pipeline constructed in Alaska by Alcan will commence at the discharge side of the Prudhoe Bay Field gas plant facilities. It will parallel the Alyeska oil pipeline southward on the North Slope of Alaska, cross the Brooks Range through the Atigun Pass, and continue on to Delta Junction.

At Delta Junction, the Pipeline will diverge from the Alyeska oil pipeline and follow the Alaska Highway and Haines oil products pipeline passing near the towns of Tanacross, Tok, and Northway Junction in Alaska. The Alcan facilities will connect with the proposed new facilities of Foothills Pipe Lines (South Yukon) Ltd. at the Alaska-Yukon border.

In Canada:

In Canada the Pipeline will commence at the Boundary of the State of Alaska, and the Yukon Territory in the vicinity of the towns of Border City, Alaska and Boundary, Yukon. The following describes the general routing of the Pipeline in Canada:

From the Alaska-Yukon border, the Foothills Pipe Lines (South Yukon) Ltd. portion of the Pipeline will proceed in a southerly direction generally along the Alaska Highway to

a point near Whitehorse, Yukon, and thence to a point on the Yukon-British Columbia border near Watson Lake, Yukon, where it will join with the Foothills Pipe Lines (North B.C.) Ltd. portion of the Pipeline.

The Foothills Pipe Lines (North B.C.) Ltd. portion of the Pipeline will extend from Watson Lake in a southeasterly direction across the north eastern part of the Province of British Columbia to a point on the boundary between the Provinces of British Columbia and Alberta near Boundary Lake where it will interconnect with the Foothills Pipe Lines (Alta.) Ltd. portion of the Pipeline.

The Foothills Pipe Lines (Alta.) Ltd. portion of the Pipeline will extend from a point on the British Columbia-Alberta boundary near Boundary Lake in a southeasterly direction to Gold Creek and thence parallel to the existing right-of-way of the Alberta Gas Trunk Line Company Limited to James River near Caroline.

From James River a "western leg" will proceed in a southerly direction, generally following the existing right-of-way of the Alberta Gas Trunk Line Company Limited to a point on the Alberta-British Columbia boundary near Coleman in the Crow's Nest Pass area. At or near Coleman the Foothills Pipe Lines (Alta.) Ltd. portion of the Pipeline will interconnect with the Foothills Pipe Lines (South B.C.) Ltd. portion of the Pipeline.

The Foothills Pipe Lines (South B.C.) Ltd. portion of the Pipeline will extend from a point on the Alberta-British Columbia boundary near Coleman in a southwesterly direction across British Columbia generally parallel to the existing pipeline facilities of Alberta Natural Gas Company Ltd. to a point on the International Boundary Line between Canada and the United States of America at or near Kingsgate in the Province of British Columbia where it will interconnect with the facilities of Pacific Gas Transmission Company.

Also, from James River, an "eastern leg" will proceed in a southeasterly direction to a point on the Alberta-Saskatchewan boundary near Empress Alberta where it will interconnect with the Foothills Pipe Lines (Sask.) Ltd. portion of the Pipeline. The Foothills Pipe Lines (Sask.) Ltd. portion of the Pipeline will extend in a southeasterly direction across Saskatchewan to a point on the International Boundary Line between Canada and the United States of America at or near Monchy, Saskatchewan where it will interconnect with the facilities of Northern Border Pipeline Company.

Zones for the Pipeline and the Dempster Line in Canada

- Zone 1 Foothills Pipe Lines (South Yukon) Ltd.
Alaska Boundary to point of interconnection with
the Dempster Line at or near Whitehorse.
- Zone 2 Foothills Pipe Lines (South Yukon) Ltd.
Whitehorse to Watson Lake.
- Zone 3 Foothills Pipe Lines (North B.C.) Ltd.
Watson Lake to point of interconnection with
Westcoast's main pipeline near Fort Nelson.
- Zone 4 Foothills Pipe Lines (North B.C.) Ltd.
Point of interconnection with Westcoast's main
pipeline near Fort Nelson to the Alberta-B.C.
border.
- Zone 5 Foothills Pipe Lines (Alta.) Ltd.
Alberta-B.C. border to point of bifurcation near
Caroline, Alberta.
- Zone 6 Foothills Pipe Lines (Alta.) Ltd.
Caroline, Alta. to Alberta-Saskatchewan border
near Empress.

- Zone 7 Foothills Pipe Lines (Alta.) Ltd.
Caroline to Alberta-B.C. border near Coleman.
- Zone 8 Foothills Pipe Lines (South B.C.) Ltd.
Alberta-B.C. border near Coleman to B.C.-U.S.
border near Kingsgate.
- Zone 9 Foothills Pipe Lines (Sask.) Ltd.
Alberta-Saskatchewan border near Empress to
Saskatchewan-U.S. border near Monchy.
- Zone 10 Foothills Pipe Lines (North Yukon) Ltd.
Mackenzie Delta Gas fields in the Mackenzie
Delta, N.W.T., to a point near the junction of
the Klondike and Dempster highways just west
of Dawson, Yukon Territory.
- Zone 11 Foothills Pipe Lines (South Yukon) Ltd.
A point near the junction of the Klondike and
Dempster highways near Dawson to the connecting
point with the Pipeline at or near Whitehorse.

Cost Allocation in Zone 11

The cost of service in Zone 11 shall be allocated to United States shippers on the following basis:

- i) There will be calculated, in accordance with (iii) below, a percentage for Zones 1 - 9 in total by dividing the actual capital costs by the filed capital costs and multiplying by 100. If actual capital costs are equal to or less than 135% of filed capital costs, then United States shippers will pay 100% of the cost of service in Zone 11. If actual capital costs in Zones 1 - 9 are between 135% and 145% of filed capital costs, then the percentage paid by United States shippers will be adjusted between 100% and 66 2/3% on a straight-line basis, except that in no case will the portion of cost of service paid by United States shippers be less than the proportion of the contracted volumes of Alaskan gas at the Alaska-Yukon border to the same volume of Alaskan gas plus the contracted volume of Northern Canadian gas. If the actual capital

costs are equal to or exceed 145% of filed capital costs, the portion of the cost of service paid by United States shippers will be not less than $66 \frac{2}{3}\%$ or the proportion as calculated above, whichever is the greater.

ii) There will be calculated a percentage for the cost-overflow on the Dawson to Whitehorse lateral (Zone 11). After determining the dollar value of the overflow, there will be deducted from it:

- (a) the dollar amount by which actual capital costs in zones 1,7,8 and 9 (carrying U.S. gas only) are less than 135% of filed capital costs referred to in (iii) below;
- (b) in each of Zones 2, 3, 4, 5 and 6 the dollar amount by which actual capital costs are less than 135% of filed capital costs referred to in (iii) below, multiplied by the proportion that the U.S. contracted volume bears to the total contracted volume in that zone.

If the actual capital costs in Zone 11, after making this adjustment, are equal to or less than 135% of filed capital costs, then no adjustment is required to the percentage of the cost of service paid by United States shippers as calculated in (i) above. If, however, after making this adjustment, the actual capital cost in Zone 11 is greater than 135% of the filed capital cost, then the proportion of the cost of service paid by United States shippers will be a fraction (not exceeding 1) of the percentage of the cost of service calculated in (i) above, where the numerator of the fraction is 135% of the filed capital cost and the denominator of the fraction is actual capital cost less the adjustments from (a) and (b) above. Notwithstanding the adjustments outlined above, in no case will the percentage of the actual cost of service borne by United States

shippers be less than the greater of 66 2/3% or the proportion of the contracted volumes of Alaskan gas at the Alaska-Yukon border to the same volume of Alaskan gas plus the contracted volume of Northern Canadian gas.

- iii) The "filed capital cost" to be applied to determine cost overruns for the purpose of cost allocation in (i) and (ii) above will be:

<u>The Pipeline in Canada (Zones 1 - 9)</u> ^{1/}	<u>"Filed Capital Cost"</u> Estimates for the Pipeline in Canada (millions of Canadian dollars)
48" - 1260 lb. pressure pipeline -	3,873
or 48" - 1680 lb. pressure pipeline -	4,418
or 54" - 1120 lb. pressure pipeline -	4,234

^{1/} These filed capital costs include and are based upon (a) a 1260 psi, 48-inch line from the Alaska-Yukon border to the point of possible interconnection near Whitehorse; (b) a 1260 psi, 48-inch; or 1680 psi, 48-inch; or 1120 psi 54-inch line from the point of possible interconnection near Whitehorse to Caroline Junction; (c) a 42-inch line from Caroline Junction to the Canada-U.S. border near Monchy, Saskatchewan; and (d) a 36-inch line from Caroline Junction to the Canada-U.S. border near Kingsgate, British Columbia. These costs are escalated for a date of commencement of operations of January 1, 1983.

"Filed Capital Cost"
Estimates for the
Pipeline in Canada
(millions of Canadian
dollars)

Zone 11 of the Dempster Line^{2/}

30" - Section of Dempster line from Whitehorse to Dawson	-	549
or 36" - Section of Dempster line from Whitehorse to Dawson	-	585
or 42" - Section of Dempster line from Whitehorse to Dawson	-	705

Details for Zones 1 - 9 are shown in the following table:

^{2/} The costs are escalated for a date of commencement of operations of January 1, 1985.

Filed Capital Costs for the Pipeline in Canada

Zone	48"	48"	54"
	1260 psi \$ million (Canadian)	1680 psi \$ million (Canadian)	1120 psi \$ million (Canadian)
1	707	707	707
2	721	864	805
3	738	850	803
4	380	488	456
5	677	859	813
6	236	236	236
7	126	126	126
8	83	83	83
* 9	<u>205</u>	<u>205</u>	<u>205</u>
Total Zones 1-9	3,873	4,418	4,234

*The last compression station in Zone 9 includes facilities to provide compression up to 1440 psi.

It is recognized that the above are estimates of capital costs. They do not include working capital, property taxes or the provision for road maintenance in the Yukon Territory (not to exceed \$30 million Canadian).

If at the time construction is authorized, both Governments have agreed to a starting date for the operation of the Pipeline different from January 1, 1983, then the capital cost estimates shall be adjusted for the difference in time using the GNP price deflator from January 1, 1983. Similarly at the time construction is authorized for the Dempster Line, if the starting date for the operation agreed to by the Canadian Government is different from January 1, 1985, then the capital cost estimate shall be adjusted for the difference in timing using the GNP price deflator from January 1, 1985. The diameter of the pipeline in Zone 11, for purposes of cost allocation, may be 30", 36" or 42", so long as the same diameter pipe is used from the Delta to Dawson (Zone 10).

The actual capital cost, for purposes of this Annex will be the booked cost as of the date "leave to open" is granted plus amounts still outstanding to be accrued on a basis to be approved by the National Energy Board. Actual

capital costs will exclude working capital, property taxes, and direct charges for road maintenance of up to \$30 million Canadian in the Yukon Territory as specifically provided herein.

For purposes of this Annex above, actual capital costs will exclude the effect of increases in cost or delays caused by actions attributable to the U.S. shippers, related U.S. pipeline companies, Alaskan producers, the Prudhoe Bay deliverability or gas conditioning plant construction and the United States or State Governments. If the appropriate regulatory bodies of the two countries are unable to agree upon the amount of such costs to be excluded, the determination shall be made in accordance with the procedures set forth in Article IX of the Transit Pipeline Treaty.

The filed capital costs of facilities in Zones 7 and 8 will be included in calculations pursuant to this Annex only to the extent that such Facilities are constructed to meet the requirements of U.S. shippers.

Direct Charges by Public Authorities

- *1. Crossing damages (roads, railroad crossings, etc.; this item is usually covered in the crossing permit).
- *2. Road damages caused by exceeding design load limits.
- *3. Required bridge reinforcements caused by exceeding design load limits.
- 4. Airfield and airstrip repairs.
- 5. Drainage maintenance.
- 6. Erosion control.
- 7. Borrow pit reclamation.
- 8. Powerline damage.
- 9. Legal liability for fire damage.
- 10. Utility system repair (water, sewer, etc.)
- 11. Camp waste disposal.
- 12. Camp site reclamation.
- 13. Other items specified in environmental stipulations.
- 14. Costs of surveillance and related studies as required by regulatory bodies or applicable laws.

* In the case of these items and all other road related charges by public authorities, total charges in the Yukon Territory shall not exceed Canadian \$30 million.

British Columbia Statement

The Government of the Province of British Columbia agrees in principle to the provisions contained in the Canada-United States Pipeline Treaty of January 28, 1977, and furthermore British Columbia is prepared to cooperate with the Federal Government to ensure that the provisions of the Canada-United States Treaty, with respect to non-interference of throughput and non-discriminatory treatment with respect to taxes, fees or other monetary charges on either the pipeline or throughput, are adhered to. Specific details of this undertaking will be the subject of a Federal-Provincial Agreement to be negotiated at as early a date as possible. Such Agreements should guarantee that British Columbia's position expressed in its telegram of August 31 is protected.

Alberta Statement

The Government of the Province of Alberta agrees in principle to the provisions contained in the Canada-United States Pipeline Treaty of January 28, 1977, and furthermore, Alberta is prepared to cooperate with the Federal Government to ensure that the provisions of the Canada-United States Treaty, with respect to non-interference of throughput and non-discriminatory treatment with respect to taxes, fees, or other monetary charges on either the Pipeline or throughput, are adhered to. Specific details of this undertaking will be the subject of a Federal-Provincial Agreement to be negotiated when the Canada-United States protocol or understanding has been finalized.

Saskatchewan Statement

The Government of Saskatchewan is willing to cooperate with the Government of Canada to facilitate construction of the Alcan Pipeline through southwestern Saskatchewan and, to that end, the Government of Saskatchewan expresses its concurrence with the principles elaborated in the Transit Pipeline Agreement signed between Canada and the United States on January 28, 1977. In so doing, it intends not to take any discriminatory action towards such pipelines in respect of throughput, reporting requirements, and environmental protection, pipeline safety, taxes, fees or monetary charges that it would not take against any similar pipeline passing through its jurisdiction. Further details relating to Canada-Saskatchewan relations regarding the Alcan Pipeline will be the subject of Federal-Provincial agreements to be negotiated after a Canada-United States understanding has been finalized.

REPORT ACCOMPANYING A
DECISION ON AN ALASKA
NATURAL GAS TRANSPORTATION
SYSTEM

PREFACE

The Alaska Natural Gas Transportation Act (ANGTA) established a unique and comprehensive process designed to make use of the collective expertise of various branches and departments of government in reaching a final decision on an Alaska Natural Gas Transportation System. By statutory direction, after months of hearings, the Federal Power Commission issued on May 1, 1977, a one-volume report, Recommendation to the President, which urged the designation of an overland pipeline system. After the FPC Report, pursuant to Section 6(a) of ANGTA, ten Federal interagency task forces were organized to report, not later than July 1, 1977, on the impacts and considerations of an Alaska natural gas transportation system. The July 1 Reports submitted by these task forces covered the following subjects:

1. The energy policy impacts of an Alaska natural gas project;
2. Environmental considerations;
3. Sources of financing for capital costs;
4. The impact on competition;
5. Safety and design;
6. International relations;

7. National security, particularly security of supply;
8. Impact on the national economy;
9. Potential cost overruns and time delay; and
10. Socioeconomic impact of the transportation system.

Pursuant to Section 6(d) of ANGTA, the Council of Environmental Quality submitted a report on July 1, 1977, which found that the environmental impact statements submitted by the FPC with respect to Alcan, pursuant to Section 5(e) of ANGTA, are legally and factually sufficient.

In the preparation of this decision, all the inter-agency reports, the FPC Recommendation, and many other submissions and public comments received from Governors, local officials and other interested individuals have been carefully considered. This Report to the Congress on an Alaska Natural Gas Transportation System, as well as the President's decision which precedes it, are the product of this collective study process. As required by the Alaska Natural Gas Transportation Act, this Report explains in detail the basis for the decision favoring the Alcan project.

CHAPTER I - DESIRABILITY OF AN ALASKA NATURAL GAS PROJECT

Natural Gas Supply

United States

There is currently estimated to be a potential natural gas demand in the United States of 25 to 30 trillion cubic feet per year. The U.S. will have to use every source it can to maintain the early 1970 production level of approximately 20 trillion cubic feet per year. As our dependence on foreign sources of energy continues to rise, the nation can use all the reasonably priced domestic natural gas it can produce to displace oil imports. Because of its premium nature, the more gas the U.S. produces, the more it will be able to use.

Looking toward 1990, even under the most optimistic conservation and production assumptions, natural gas shortages are a very real possibility, even with the delivery of Alaska gas. This is so because of the expected tapering off of domestic gas production in the lower-48 states, and a reversal in the decline of natural gas demand when conservation measures have had their full effect and the nation experiences a renewed increase of demand growth from normal economic activity. This situation could be further aggravated by the expiration and nonrenewal of Canadian gas

export contracts through the 1980's. The Alcan project maximizes our chances for avoiding such curtailments.

The most optimistic 1985 projection for U.S. domestic production of gas is 17.5 tcf without Prudhoe Bay gas. This is 15 percent less production than in 1970. Yet during this same period - 1970 to 1985 - it is estimated that total energy demand will increase by over 40 percent. Further, a more pessimistic but still plausible estimate of the domestic resource base would reduce 1985 production of gas by an additional 0.9 tcf per year.

On the demand side, it is apparent that this nation could use all the reasonably priced natural gas it can produce. Even with the ambitious coal conversion program proposed earlier this year by the Administration, projections indicate that Alaska natural gas will be needed to meet demand in the coming decade.

Additionally, such projections do not make any allowance for unusually cold weather, such as that experienced last winter. The increase in gas demand last winter for space heating in the residential sector alone was estimated to be over 0.4 tcf. Under these probabilities, gas shortages are likely in the near future and throughout the 1980's with or without substantial new sources of supply.

In general, there are three economically attractive means to supplement traditional domestic gas supplies by 1985. The first is to accelerate OCS leasing in the Gulf of Mexico, which could produce as much as an additional 0.2 tcf per year by 1985 and 0.6 tcf per year by 1990. The second is to import gas from Mexico, which could be as much as 0.5 tcf per year by 1985 and 0.7 tcf per year by 1990 if the recently-announced gas sales contracts should be completed and approved. The third is to proceed with an Alaska gas project.

Proved saleable gas reserves of 20.6 to 22.8 trillion cubic feet (tcf) in the Main Pool accumulation in the Prudhoe Bay Field represent more than a full year of natural gas consumption at the current consumption rate of about 17.5 tcf per year. Prudhoe Bay production at 2.4 bcf/d of gas will include production from other reservoirs which have been identified in the field, the Kuparuk and the Lisburne. Production at that rate would increase domestic gas production by approximately 5 percent in the years when Alaska gas first becomes available. Additional gas discoveries on the North Slope, or in other areas of Alaska through which the pipeline passes, would increase potential deliverability even further.

The certain increase in supply from an Alaska gas project is estimated to be 0.7 tcf per year (2.0 bcfd) by 1985. By 1990, a volume greater than 0.9 tcf per year (2.4 bcfd) might be produced.

Under the best of circumstances - which assume the most optimistic supply projections, demand reductions and fuel substitutions - the addition of Alaska gas to domestic production will make a substantial contribution toward closing the gap between natural gas supply and demand. Such additional gas supplies could allow some industries with special processes to continue burning natural gas longer, and allow more residential use of natural gas, further displacing oil imports.

By 1990, use of every conceivable supply option under any scenario may still leave us with serious domestic gas shortages. By 1990, oil imports are projected to be 9.6 mmbd, provided that supplemental supply sources can furnish gas in the following volumes:

- 0.9 tcf per year from Alaska gas;
- 0.7 tcf per year from Mexican gas exports;
- 0.6 tcf per year from accelerated OCS leasing in the Gulf of Mexico.

Clearly, each of these gas supply options will become more desirable and important as conventional gas supplies decline in the years after 1990.

Our best efforts will only temporarily stem the decline in conventional onshore gas production in the lower-48 states. The U.S. may increasingly need supplemental sources of gas supply to meet demand. These will include:

- geopressurized methane
- Devonian shale
- deeper, tighter, formations
- coal gasification
- imports of liquefied natural gas (LNG)
- synthetic natural gas (SNG).

Although Alaska gas will add about 5 percent to total domestic gas production, it will be a larger proportion of supply for consumers in the Middle West and on the West Coast. For these regions, it will be between 6 and 10 percent of their supply depending on the distribution which is reflected in the final gas sales contracts. These volumes will be important to the availability of gas in these regions, and should be delivered at a competitive price with other supplemental sources of supply.

Canada

One of the most significant effects of the Alcan project on gas supply will be its effect on Canada's natural gas sales policies. In its July 4th decision on a northern pipeline project, the Canadian National Energy Board (NEB) found that unless the project gave Canadians access to their frontier gas reserves, Canada might not have sufficient supplies available to fulfill its existing gas export commitments to the U.S. If the frontier gas reserves were made available, however, increased supplies would exist to allow continuation of current export levels.

A possibility offered by the Alcan project is the effective availability of Alaska gas to the U.S. before completion of the project through pre-delivery of Canadian gas under existing export licenses. The southern portions of the Alcan project could be constructed first, and deliveries of excess gas from Alberta could reach as much as 1.1 bcfd by the winter of 1979 - 1980. As currently proposed, the pre-deliveries would be repaid by reduced export commitments in the late 1980's, or by time-swaps for Alaska gas. The pre-deliveries would make extra gas available over the next few years when the Nation faces

serious and immediate natural gas shortages, prior to the time when supply stimulation and demand reduction measures under the National Energy Plan have had any effect in helping bring natural gas supply and demand back into balance.

A pre-delivery arrangement involving Alberta gas would provide stimulus to exploration for additional supplies in that province by providing producers with additional markets for their gas. Similarly, agreement on a project which brings a major pipeline effectively within 500 miles of the Mackenzie Delta region should stimulate further exploration activity there. If that additional exploration is undertaken, the possibility of obtaining additional volumes of Canadian gas in future years will be enhanced. The joint project will thus ensure maximum availability of Canadian gas in the near term, through continued exports under existing contracts and possible pre-deliveries. It will also give the U.S. its best chance of obtaining longer-term supplies of Canadian gas by providing the impetus for broad-scale exploration programs.

Economic Considerations

An economic analysis of the Alaska gas projects can be made from both a private market perspective and from a national economic perspective. The utility of the project

from a private market perspective is determined by whether there are less expensive alternative fuels available. This depends on the field price of the gas and the transportation cost. The reliance upon the National Energy Plan (NEP) for setting of a field price is discussed in Section 6 of the Decision. For illustrative purposes here, the \$1.45 price that would be set under the NEP is used. The transportation cost of service will be determined by the capital and operating costs of the delivery system. The project applicants have filed cost estimates that produce a 20-year average cost of service which ranges from \$.80 to \$1.07 per mmbtu (1975 dollars).

The large cost overruns of the Alyeska pipeline have raised new concerns regarding the accuracy of base capital cost estimates for such major projects. For the Alaska gas project, cost overrun assessments have been made which allow for capital cost increases by factors from about 1.3 to 2.0.

The expected 20-year average cost of service for the Alcan project described in the Decision, and including an expected case 40 percent cost overrun, is estimated at approximately \$1.04 per mmbtu in constant 1975 dollars.

The cost of service under similar assumptions for the El Paso project is \$1.21 per mmbtu. The "worst case" estimates for both projects result in a 20-year average cost of service of about \$1.80 to \$2.00 per mmbtu. In addition, the transporters (i.e., the project sponsors) will probably be required to bear a portion of the "conditioning" or processing cost of the gas. When the cost of service price of the Alcan project is added to a wellhead price of \$1.45 to \$1.75 per mmbtu (depending on the amount the FPC will allow producers for their processing costs), the wholesale or "city gate" price of the gas should be about \$2.50 to \$2.80 per mmbtu in constant 1975 dollars. The delivered cost of Alcan gas under three different overrun assumptions is:

20 Year Average Alcan Delivered Cost
(1975 Dollars)

	Filed Costs	Expected Cost Overrun	Worst Case Cost Overrun
Field Price	\$1.45	\$1.45	\$1.45
Processing	0 to .30	0 to .30	0 to .30
Transportation	0.80	1.04	1.57
	<u>2.25 to 2.55</u>	<u>2.49 to 2.79</u>	<u>3.02 to 3.32</u>

The conservatively projected costs of imported LNG and other alternative non-conventional gas supplies would be at least \$3.25 per mmbtu (in 1975 dollars). SNG would be at least \$3.75 per mmbtu. Only if there were a "worst case" cost overrun and high processing costs would Alaska gas be more expensive than imported LNG; it would still be considerably less expensive than SNG. One of the most important objectives of the Federal Government's involvement during the planning and construction period will be to avoid such "worst case" overruns.

Estimates of availability and cost of gas from coal gasification and other unconventional sources must be considered speculative at this time. However, as there are no confirmed estimates which put the city gate price of marketable amounts of gas from these sources below \$3.50 to \$4.00 per mmbtu, the Alcan project would appear to be competitive for the life of the project.

The measure of the project's value to the nation is the Net National Economic Benefit (NNEB), which compares the present value of real resource expenditures for the project with the present value of its future benefits. The resource expenditures are measured by the capital and operating expenses. The benefits are measured by the costs

of alternate fuel displaced by the gas, such as imported oil or LNG. The benefit value which has been used for evaluating this project is approximately \$2.60 per mmbtu (1975 dollars). This analysis shows that both the El Paso and Alcan projects would have net benefits of almost \$5.0 billion at the expected overrun cost. This clearly indicates that construction of some project is preferable to the no project option. Significantly, the benefits of either project remain positive, although smaller, at the "worst case" cost overrun level.

Most significantly, the NNEB of the Alcan project is over \$1.1 billion more than that of El Paso under the expected overrun case as indicated below:

	<u>"Expected" Costs</u>	<u>"Worst Case" Costs</u>
Alcan Project	\$5.7 billion	\$1.8 billion
El Paso	\$4.6 billion	\$700 million

If the resource value assumption is changed to take account of the reasonable potential for an increasing world oil price over the 25 year accounting life of the project, or if the price of supplemental gas supplies such as SNG (now at \$3.75 or more per mmbtu) is used,

and if the benefits of the project beyond its 25 year accounting life are included, the expected case NNEB more than doubles.

Conclusion

This analysis indicates the importance and superiority of the Alcan project as compared to either the El Paso project or the no project option. It appears that Alaska gas will be one of our cheapest sources of supplemental gas supply and will assure at least near-term continuation of our access to Canadian gas supplies.

Even if we achieve the ambitious coal conversion, conservation and production goals outlined in the National Energy Plan, Alaska gas provides us with a needed additional resource for helping reduce oil imports while heating more of our homes and running more of our factories with a premium domestically produced fuel. If we fall short of our goals, Alaskan gas is essential in the effort to minimize imports and help fill the gap between natural gas supply and demand.

A realistic assessment of all the supply and demand potentials indicates that Alaska gas delivered by the Alcan system will be an important source of energy. The Alcan

project has a high expected net national economic benefit. It should provide transportation services at a projected cost that will assure the sale of Alaska gas. The Alcan project is both a good investment for the United States as a matter of national energy policy, and a good investment for the private interests that will manage and finance its construction.

Chapter II - FINANCIAL ANALYSIS

Conclusions

As indicated by the terms and conditions in Section 5 of the Decision, the Alcan project is required to be privately financed. As such, it will be the largest privately financed energy project ever undertaken, requiring between \$10 billion and \$15 billion by the time it is completed. This Chapter addresses the reasons for concluding the project can be privately financed and the conditions under which a private financing is expected to occur.

To effectuate such a private financing, a plan that equitably and carefully balances the project's benefits and risks is required. The following plan to share the risks and benefits of the Alcan project is proposed:

1. The equity investment in the project would be placed at risk under all circumstances and the budgeted equity investment be considered the first funds spent. The rate of return on equity would compensate sponsors for bearing this risk.
2. Producers and the State of Alaska, as direct and major beneficiaries of this project, should

participate in the financing either directly or in the form of debt guarantees.

3. The burden of cost overruns be shared by equity holders and consumers upon completion through the application of a variable rate of return on common equity. This would provide a strong incentive for the project to be constructed at the lowest possible cost.
4. Provision of debt service in the event of service interruption would be borne by consumers through a tariff that becomes effective only after service commences.

Analysis

Given the large volumes of proven reserves in the Prudhoe Bay Oil Pool, the high degree of experience and excellent performance record of gas pipeline transmission facilities, the support and best efforts of Canada, and the clear need for additional natural gas supplies throughout the United States, there is good reason to expect this project will be financed by the capital markets without the use of consumer noncompletion agreements. This determination takes into account the following considerations:

1. The risks associated with the construction and operation of the Alcan project must be assumed by creditworthy parties in order to achieve private financing. There is sufficient credit support capacity among the direct beneficiaries of the project to assure completion of the pipeline without assistance from consumers. Such beneficiaries are the gas transmission companies, gas producers, and the State of Alaska. The benefits of these parties sufficiently outweigh the risks associated with the project so that it is reasonable to expect them to provide support at small additional cost to consumers. Once operation begins, however, consumers must expect to pay the full cost of service based upon certified expenditures.
2. To reduce uncertainty to a minimum, the Federal Government should:
 - a) specify clearly the terms and conditions that are to be imposed on the pipeline during its construction and operation prior to commencement of construction;

- b) provide a mechanism to coordinate engineering and environmental regulation and permit rapid and unambiguous resolution of any difficulties which may be encountered;
 - c) provide for timely approval of outlays for incorporation into the project's rate base;
 - d) provide a mechanism to permit a high degree of cooperation with Canada and rapid resolution of any difficulties which are encountered;
 - e) allow sufficient time to plan, coordinate and manage procurement, logistics and construction.
3. To hold the total direct cost of the project to a minimum and the project on schedule, it is desirable to:
- a) develop a variable rate of return on equity that provides for a realizable high return if actual costs are near or below budget and a reduced return if cost overruns occur;
 - b) provide for similar treatment of the return on equity in both the U.S. and Canada;
 - c) provide an incentive to the Canadian Government and its regulatory authorities to achieve

all possible cost savings and promote management efficiency.

The Terms and Conditions in Section 5 of the Decision, along with the Agreement on Principles included as Section 7, provides the requisite processes and assurances for the reduction of both uncertainty and costs.

The conclusion reached here regarding private financing without consumer noncompletion guarantees differs substantially from the position taken by most parties in the Federal Power Commission proceeding and by representatives of El Paso in their most recent statements. These statements were made prior to the significant steps that have been taken in recent weeks to reduce uncertainty and create proper planning, control and incentives. While the fundamental economic potential of the project has not changed, the likelihood of achieving that potential is greater.

Alcan Financial Plan

The Alaska natural gas transportation project proposed by Alcan will involve a large and complex financing which will be arranged prior to the commencement of construction.^{1/}

^{1/} A detailed financial analysis of the competing proposals can be found in Report to the President, Financing an Alaskan Gas Transportation System, Department of the Treasury, Lead Agency, and other participating Agencies: July 1, 1977.

In view of the size of the project relative to the financing capacity of its sponsors, Alcan has proposed that the required capital be raised and secured by means of "project financing" as distinguished from the more traditional "balance sheet financing" used in the gas pipeline industry. That is, a new project entity will be created which will be expected in and of itself to generate sufficient revenues to pay for its operating costs, interest and principal on debt, and a return on, and ultimately a return of, equity to its investors.

It is expected that the equity funds for the project entities will be provided by the sponsoring consortium companies.^{2/} Debt capital will come from a variety of lenders.

The basic requirement for a successful financing is the economic viability of the project. In Chapter IV of the Report, the basic economic soundness of the project is demonstrated. Even under extreme cost overruns, the delivered cost of Alaska gas will be economically attractive. Appropriate incentives will encourage the

^{2/} For the sake of simplicity, the new interdependent project entities will hereafter be referred to collectively as "the project."

minimization of cost overruns. Pipeline and gas distribution companies can be expected to purchase the Alaska gas from Prudhoe Bay producers under long-term contracts and sign transportation contracts with Alcan.

The conclusion that Alcan can be privately financed is founded on the basic economic desirability of Alaska gas and the viability Alcan transportation system; nevertheless, skillful financial packaging and risk-benefit balancing will be required. It is therefore necessary to explore the boundaries of the financing problem by considering Alcan's likely capital needs and sources, relating those needs to the capital market in general, and reviewing the list of beneficiaries and examining the roles each might be expected to play in the financing.

Capital Requirements and Sources of Funds

Alcan has estimated the capital costs of its system under varying design, route and completion date assumptions. It has also made two capital requirements and source of funds projections under its 48-inch proposal: one was filed with the FPC in March 1977, and was based upon an "express" 1260 psi line carrying no Canadian gas; the other was based upon the July 4, 1977, NEB-recommended modifications of that system to divert to Dawson in order to carry Canadian gas

and make \$200 million in socioeconomic payments. Both of these projections assumed delivery beginning October 1, 1981.

The Agreement on Principles with Canada has altered the system from that specified by the NEB. This alteration has little affect on the basic total capital needs of the system as compared with the needs estimated for the system including the NEB recommendations; the capital saved by rerouting from the Dawson diversion back to the prime route is almost exactly offset by the additional cost of installing a higher-capacity pipeline system from Whitehorse to Caroline Junction.^{3/} Thus by simply adjusting the Alcan financial plan for the NEB recommended system to reflect a more realistic commencement date of January 1, 1983, a financial plan consistent with the agreed-upon system design, route and commencement date results. Exhibits 1 and 2 display the original and adjusted Alcan plans.

Alcan is expected to require approximately \$10.3 billion according to cost estimates filed with U.S. and

^{3/} On the basis of filed costs, moving back to the prime route saves \$444 million while putting in 1680 psi pipe adds \$472 million. The overrun estimate was \$630 million for the Dawson diversion and \$565 million for the increase in the capacity of the system.

Canadian regulatory bodies, adjusted to reflect commencement of operations on January 1, 1983. The projected sources for these funds are the following:

U.S. Banks	\$ 1,233 million
Canadian Banks	542
U.S. Long-Term Debt	5,865
Canadian Long-Term Debt	445
U.S. Common Stock	1,362
Canadian Common Stock	855
	<u>\$10,302 million</u>

With cost overruns, the requirements would be higher. For example, if the projected cost overrun percentage detailed elsewhere in this report of approximately 32 percent is used, the total capital requirements would rise to approximately \$13.6 billion.

Capital Markets

The capital requirements of the Alcan project are so large that the project cannot be viewed in conventional terms by its pipeline sponsors and other potential investors. At the end of 1976, the total assets of the gas transmission industry were \$26 billion. The project must be seen as a corporate entity in itself, capable of issuing and servicing its own debt and equity.

Exhibit 1
Financing Requirements
of Companies Associated with
THE ALCAN PIPELINE PROJECT*
(1978-1982)
(Dollars in Millions)

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>Total Basic Requirements</u>
<u>ALCAN PIPELINE</u>						
U.S. Banks	\$ -	\$ 36	\$ 555	\$ 279	-	\$ 870
U.S. Long Term Debt	-	700	600	450	-	1,750
U.S. Common Stock	-	350	270	260	-	880
	-	<u>\$1,086</u>	<u>\$1,425</u>	<u>\$ 989</u>	-	<u>\$3,500</u>
<u>FOOTHILLS GROUP</u>						
Canadian Banks	-	110	300	100	-	510
U.S. Long Term Debt	-	321	1,038	736	-	2,095
Canadian Long Term Debt	75	100	100	-	144	419
Canadian Common Stock	220	172	256	149	7	804
	<u>295</u>	<u>703</u>	<u>1,694</u>	<u>985</u>	<u>151</u>	<u>3,828</u>
<u>PG&E</u>						
U.S. Banks	-	-	-	-	-	-
U.S. Long Term Debt	-	-	-	388	-	388
U.S. Common Stock	-	-	-	-	-	-
	-	-	-	<u>388</u>	-	<u>388</u>
<u>PG&E</u>						
U.S. Banks	-	-	-	-	-	-
U.S. Long Term Debt	-	82	205	77	-	364
U.S. Common Stock	-	-	-	-	-	-
	-	<u>82</u>	<u>205</u>	<u>77</u>	-	<u>364</u>
<u>NORTHERN BORDER</u>						
U.S. Banks	-	-	-	290	-	290
U.S. Long Term Debt	-	46	410	465	-	921
U.S. Common Stock	-	16	136	250	-	402
	-	<u>62</u>	<u>546</u>	<u>1,005</u>	-	<u>1,613</u>
<u>TOTAL</u>						
Canadian Funds	295	382	656	249	151	1,733
U.S. Funds	-	1,551	3,214	3,195	-	7,960
	<u>\$295</u>	<u>\$1,933</u>	<u>\$3,870</u>	<u>\$3,444</u>	<u>\$151</u>	<u>\$ 9,693</u>

* Assumes "Dawson Re-Routing" and October 1, 1981, gas deliveries.

Source: Documents Submitted by Alcan Project to White House Task Force, August 2, 1977, Tab 4, Schedule B.

Exhibit 2
Adjusted Financing Requirements
of Companies Associated with
THE ALCAN PIPELINE PROJECT*
(1979-1983)
(Dollars in Millions)

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>Total Basic Requirements</u>
<u>ALCAN PIPELINE</u>						
U.S. Banks	\$ -	\$ 38	\$ 590	\$ 297	-	\$ 925
U.S. Long Term Debt	-	744	638	478	-	1,860
U.S. Common Stock	-	372	287	276	-	935
	-	<u>\$1,154</u>	<u>\$1,515</u>	<u>\$1,051</u>	-	<u>\$3,720</u>
<u>FOOTHILLS GROUP</u>						
Canadian Banks	-	117	319	106	-	542
U.S. Long Term Debt	-	341	1,103	782	-	2,227
Canadian Long Term Debt	80	106	106	-	153	445
Canadian Common Stock	234	183	272	158	7	855
	<u>314</u>	<u>747</u>	<u>1,800</u>	<u>1,046</u>	<u>160</u>	<u>4,069</u>
<u>PG&E</u>						
U.S. Banks	-	-	-	-	-	-
U.S. Long Term Debt	-	-	-	412	-	412
U.S. Common Stock	-	-	-	-	-	-
	-	-	-	<u>412</u>	-	<u>412</u>
<u>PG&E</u>						
U.S. Banks	-	-	-	-	-	-
U.S. Long Term Debt	-	87	218	82	-	387
U.S. Common Stock	-	-	-	-	-	-
	-	<u>87</u>	<u>218</u>	<u>82</u>	-	<u>387</u>
<u>NORTHERN BORDER</u>						
U.S. Banks	-	-	-	308	-	308
U.S. Long Term Debt	-	49	436	494	-	979
U.S. Common Stock	-	17	145	266	-	427
	-	<u>68</u>	<u>581</u>	<u>1,068</u>	-	<u>1,714</u>
<u>TOTAL</u>						
Canadian Funds	314	406	697	265	160	1,842
U.S. Funds	-	1,649	3,416	3,396	-	8,460
	<u>\$314</u>	<u>\$2,055</u>	<u>\$4,113</u>	<u>\$3,661</u>	<u>\$160</u>	<u>\$10,302</u>

* Based upon financial plan presented to White House Staff on August 2, 1977, adjusted to reflect one and one-quarter year lag in outlays and 5 percent inflation factor.

While this investment is large for the industry, its importance in terms of aggregate investment or total capital markets is modest. To put these requirements into perspective, U.S. gross private investment in 1976 was \$241 billion. Alcan's peak year capital needs for U.S. funds, expressed in 1976 dollars, are only 1.1 percent of total U.S. gross private investment for that year, which was not a particularly good one for the economy.

It is anticipated that most, if not all, of the U.S. common equity will come from U.S. shippers (i.e., U.S. transmission or distribution companies). A broad consortium of companies would have sufficient financial capacity to make the required \$1.4 billion investment. The transmission sector of the industry alone had almost double that amount in annual cash flow in 1976. While the industry must continue to make other investments, its internal cash flow, plus the ability to issue new securities, provides ample capacity to fund the necessary equity investment, including the equity portion of potential cost overruns.

The Canadian equity is expected to be provided by the four companies supporting the project in Canada: Westcoast Transmission Company, Ltd., Alberta Gas Trunkline Company,

Ltd. (AGTL), Alberta Natural Gas Company, Ltd., and Trans-Canada Pipelines, Ltd. While the first two companies are the major and previously the only firms in the Canadian consortium, the addition of the latter two in recent weeks has contributed additional financial strength to the Alcan project.^{4/}

As to the debt portion of financing this project, Alcan's impact on the U.S. debt market cannot be considered burdensome. In 1976, non-government long-term debt offerings in the U.S. totaled \$62.9 billion. Ignoring the state of the economy in 1976 and not including the likely positive real growth of the long-term debt market from 1976 until the Alcan debt is issued, Alcan's projected total U.S. long-term debt requirement (including the Foothills Group debt sold in the U.S.) in its peak year is only 3 percent of the market (both expressed in 1976 dollars). Over the five year period, 1978 through 1982, the aggregate requirement is less than approximately 1.4 percent.

^{4/} The Alcan project is relatively more important to Westcoast and AGTL; together they have total assets of \$1.6 billion at the end of 1976. Their equity investment in the project will be a major investment for them.

Similarly, the Canadian long-term debt to be issued by the Foothills group expressed as a fraction of all corporate bonds issued in Canada in 1975 is approximately 5 percent for the peak year and 3 percent overall.^{5/}

It is also worth noting that even though the financing requirements expected for the Alcan system are large in an absolute sense, peak year requirements as a percentage of total market capacity are about the same as the peak year requirements for the Alyeska project in 1975. Yet no question of capital market capability was raised with respect to Alyeska.^{6/}

^{5/} It is not necessary to restrict the supply to these two domestic markets. Other international capital markets could be utilized. For example, in 1974 Canadian net foreign liabilities reached \$3.0 billion in mid-year, up from \$1.7 billion one half year earlier, when business loan demand rose abruptly and exceeded domestic liability expansion.

^{6/} Alyeska's peak year financial requirements, in light of capital market capability, were as follows:

1975 Alyeska Debt Issued	\$3.0 billion
1975 Total Corporate Debt Issued	\$27.2 billion
Peak Year as a Percent of Total Issues	11.0 percent

The above analysis shows that the Alcan project would not squeeze out most other investment. It is true it will have to compete for funds with different investments in the energy as well as other fields, but if the project offers a competitive return for the perceived risk, its securities will be purchased. The capital markets are probably the most competitive element in our economic system.

Cost Overrun Financing

The question of how to finance cost overruns is closely related to the question of noncompletion. Once sponsor equity is invested, construction has started, and the lenders have committed to the project, it is unlikely that the capital markets would cease to provide funds simply because of higher than expected costs. The real consideration here is not the absolute level of costs, but the probability that the project would be ultimately successful. Analysis of the Alyeska experience shows that although the ultimate cost of the project was not known, as costs escalated lenders increased the amount of funds they were willing to provide on several occasions because they were convinced that the project would deliver oil at competitive prices. As a result, the risk of noncompletion due to cost overruns is insignificant once the project is

under way, and is only a problem at the initial stage of financing. It is at that time that the lenders must be convinced that the sponsoring group will follow the project through to completion. Committing equity funds at the outset provides the basis for that assurance.^{7/}

The project sponsors alone cannot be expected to provide such assurances because of their limited assets, liabilities and cash flows; as a result, it is desirable to include in the sponsor group other beneficiaries as participants in the financing.

Project Participants and Beneficiaries

Tradition and equity suggest that the parties who stand to benefit directly from a transportation system participate in the financing and share the burden of these risks. The direct beneficiaries include the equity investors, namely a consortium of gas transmission companies;

^{7/} An important element of this financial plan will likely be the commitment of equity capital "up front." In order to provide for the risk-bearing characteristic of having the equity component of budgeted cost be invested before debt, while simultaneously keeping the interest during construction as small as possible, it is contemplated that debt and equity shall be obtained simultaneously in their long-run proportion with equity commitments to be honored even in the event of noncompletion.

the producers of the gas; and the State of Alaska with its royalty interest in the gas.

Equity Investors

The Alcan proposal was initially developed by Northwest Pipeline in conjunction with two Canadian transmission corporations, Westcoast Transmission Company and Alberta Gas Trunk Line and their subsidiary, Foothills Pipe Lines (Yukon) Ltd. Subsequently, the Alcan proposal has acquired the support of many large U.S. and Canadian gas transmission firms. An important advantage of the Alcan project over the El Paso alternative is the equity investment by Canadian transmission companies which will total at least \$800 million.

The strength of the sponsoring consortium of gas transmission companies is a significant element of the financing. The consortium must have the ability to provide the sizable equity funds as well as the equity component of any cost overrun requirements. From the outset, Alcan will enjoy a strong consortium with participation by most of the large natural gas transmission corporations in both countries.

After careful study of their financial capacity, the conclusion has been reached that the natural gas transmission industry has ample capacity to provide the requisite equity commitments to the Alcan transportation project. The current members of the Alcan consortium are judged to be capable of meeting the equity requirements as proposed in the financing plan.

Producers of Alaskan Natural Gas

The owners and potential producers of Alaskan natural gas are primarily Exxon, Atlantic Richfield, and the Standard Oil Company of Ohio. These companies stand to benefit directly from the sale of their Prudhoe Bay natural gas reserves. Timely development of the Alcan system is in their best interests.

1. At the NEP price of \$1.45 per mmbtu, the producers' constant 1977 dollar value of 23 Tcf of saleable reserves, net of royalty and severance taxes, is more than \$30 billion.
2. Because of the time value of money, a field price that escalates more slowly than the amount producers could otherwise earn on the funds makes it more profitable to produce gas now rather than defer production for later.

Producer participation in the financing of the project is warranted due to their beneficiary status and their financial strength. The producing companies have the investment capacity to participate in the financing of a transportation system, especially as full returns from their North Slope oil and the Alyeska pipeline investment are realized. These three companies had total assets of \$51.5 billion in 1976 and net income of \$3.4 billion. Financial participation by the producing companies, most likely in the form of debt guarantees, can be structured consistent with the terms and conditions placed upon the producers in Section 5 of the Decision.

The State of Alaska

The State of Alaska could realize as much as \$7.5 billion (1977 dollars) from the sale of Prudhoe Bay natural gas in the form of royalties and severance taxes. The State would also realize about \$50 million per year in property taxes. Furthermore, the State will be able to utilize the pipeline for natural gas distribution and development within the State. Prudhoe Bay gas, including the State of Alaska's royalty gas, will be made available to local Alaskan communities along the route of the Alcan Pipeline System. Installation of additional pipeline facilities connecting

with the Alcan system could provide natural gas to other areas of the State, particularly the Cook Inlet region and Southeastern Alaska, and thus supply the energy base required for long-term economic development. The Alcan system also will offer a readily accessible transportation service for a number of potential Alaska gas reserves located in interior Alaska, Cook Inlet and the Gulf of Alaska.

The State of Alaska has indicated a willingness and ability to guarantee up to \$900 million of the El Paso project debt, with the final amount depending upon the percentage of royalty revenues that the State Legislature votes to have placed in a permanent capital account that can be used for such purposes. While no comparable commitment has been received from the State for the Alcan project, such participation by the State in the financing would be in the interest of the State, the Nation and the expeditious construction of the project.

Transfer of Financial Risks

Gas Consumers

The issue of gas consumers bearing some or all of the financial risk of this project was widely discussed in the Federal Power Commission hearing and has been carefully

considered in reaching the Decision. The most frequently discussed mechanism for consumer support would involve a consumer financial guarantee through an "all-events" tariff with noncompletion arrangements. The noncompletion guarantee would include a consumer guarantee of at least debt service, and possibly a return of equity, in the event the project was not completed.

The financial advisors and sponsors of the El Paso project continue to believe that consumer guarantees through the "all-events" tariff with noncompletion features is required to finance an Alaska gas transportation project. The Alcan financial advisors and sponsors, however, have stated in correspondence that in their professional opinion the Alcan project can be financed under certain conditions with a more traditional tariff, that is without consumer noncompletion guarantees or Federal financial assistance.^{8/} They now propose a tariff arrangement similar to previously approved arrangements for major projects which would provide for maintenance of debt service through consumer charges in

^{8/} Memorandum from Mark Millard, Vice Chairman of Loeb Rhoades, dated August 10, 1977, attached to a letter dated August 10, 1977, from John McMillian, President of the Alcan Pipeline Company, to Secretary of Energy, James Schlesinger.

the event of interruption only after the project is completed and initial operation of the delivery system has commenced.

The Agreement on Principles reached with Canada and the terms and conditions imposed in the Decision satisfy the conditions specified by the Alcan financial advisors. Their finding appears supportable and reasonable. Extraordinary consumer guarantees prior to completion of the project are judged to be unnecessary.

Federal Government Financial Assistance

Federal Government support to the project in the form of loan guarantees or insurance has also received extensive scrutiny. The El Paso proposal anticipated approximately \$1.5 billion of Federal loan guarantees for the financing of the LNG tanker fleet through the existing Maritime Administration Shipbuilding Program (under Title XI of the Merchant Marine Act of 1936). The Lead Agency Report to the President on financing demonstrated that new and special Federal financing assistance was not necessary.^{9/} El Paso did not request new forms of Government assistance for this project. The Alcan financial advisors believe there is no need for any Federal financial assistance.

^{9/} Report to the President, Financing an Alaskan Gas Transportation System; Department of the Treasury Lead Agency, and other Participating Agencies; July, 1977.

In addition to being unnecessary, Federal financial assistance for this project is considered undesirable for the following reasons:

1. Serious questions of equity result from the transfer of risks to taxpayers, many of whom are not gas consumers or will not receive additional gas supplies as a result of the Alaskan project.
2. Federal financial support substitutes the Government for private lenders in the critical risk assessment function normally performed by private lenders.
3. A subsidy in the form of lower interest rates yields an artificially low price for gas.
4. The incentive for efficient management of the project is reduced.
5. The Government is placed in conflicting roles as guarantor and as regulator of the project.
6. Providing unnecessary Federal assistance to this project would set a precedent with respect to other large energy projects that is misleading and counterproductive.

Variable Rate of Return

Since the tariff will require gas consumers to pay for

all costs except those found unreasonable by the regulatory authority, incentives to minimize cost overruns must be ensured. In order to give sponsors an incentive to control costs, the rate of return on equity should be tied to the size of the cost overruns. Within certain maximum and minimum levels, return on equity would increase were the project to come in at or under budget but decrease were costs to exceed budget. Were the project under budget, consumers would pay a lower price for gas and sponsors would receive a higher return on equity. Were the project over budget, the higher total invested capital would be partially offset by a lower allowed rate of return on that capital, so that equity investors would assume part of the cost overrun. The variable rate of return offers consumers the possibility of lower costs and the sponsors compensation for risking their equity, and may assist in making this project attractive to equity investors. The details of how the variable rate of return will be implemented are left to the FPC and NEB to balance the economic incentive with administrative feasibility.

The combination of an economic project, adequate compensation of risk capital, and contingent financing agreements appear to minimize the risk of cost overruns as it

relates to financing and the delivered cost of gas. With the cost overrun risk reduced to manageable proportions, the project will have a high probability of being successfully financed in the private sector.

Cost to the Consumer

The aspect of the financing plan adopted here which will have the greatest effect on the total transportation cost paid by consumers is the assumption of the entire noncompletion risk by the project sponsors and other beneficiaries. The alternative would be to let consumers or taxpayers bear part or all of that risk through a noncompletion guarantee or through Federal government guarantees.

In the capital markets additional risks are assumed only if additional rewards are provided, and that principle is likely to operate in this instance. If the State of Alaska and the producers provide assurances for cost overrun financing, they would expect to receive some commitment or guarantee fee, although the amount of such fee should be relatively small given the small risk they are bearing.

Insofar as there is any risk, most of it will be assumed by the sponsors as equity capital investors. Under the plan recommended here, their equity would finance the

first \$2 billion of investment. They would, therefore, bear what little risk there is of project abandonment.

While it is difficult to give a precise value to this risk-sharing principle, the rate of return on equity used in developing all the numerical analysis has been 15 percent rather than the more normal 12.5 to 14.0 percent found in recent FPC decisions. Thus, for example, the effect of changing the rate of return on equity from 13.5 percent to 15 percent is an increase in the average cost of service of about 4 percent.

This risk-sharing principle, however, provides an important incentive for efficient management and cost control that would be foregone if consumers or the Federal Government were to assume noncompletion guarantees. The effect of this incentive on total project costs may more than offset the direct effect on the rate of return associated with avoidance of consumer completion guarantees. Overall, therefore, the objective of placing the risk of noncompletion on sponsors and beneficiaries other than consumers appears equitable and cost-effective.

Financeability

In its Recommendation to the President, the FPC found:

El Paso would be the easiest system to finance because of its slightly lower initial cost and because of Federal guarantees of bonds for its tankers under Title XI of the Merchant Marine Act.

This finding is no longer accepted in view of several recent developments. First, while El Paso requires less total initial outlay, approximately 20 percent of Alcan's total capital requirements are now anticipated to be drawn from the Canadian capital market. This sharing of the raising and servicing of Alcan's capital by the strong Foothills group makes the total U.S. capital requirements less for Alcan than El Paso.

Second, the cornerstone of financeability is economic viability. There is no doubt that Alcan's superior economic efficiency (lower operating cost and higher fuel efficiency), which has now been further assured by the Agreement on Principles, will make its financial instruments more attractive than those of the El Paso system.

In general, El Paso's dependence upon Federal Government support for financeability is not a particularly desirable characteristic. Overall, it is reasonable to conclude that Alcan will be at least as easy and probably easier to finance privately than El Paso.

Presidential Finding That the Alcan System Can be Privately
Financed

The Alcan sponsors and financial advisors have stated the Alcan project can be privately financed. The financial analysis above supports this conclusion. Therefore, it is reasonable to anticipate that the Alcan project can be financed in the private sector.

Novel regulatory schemes to shift this project's risks from the private sector to consumers are found to be neither necessary nor desirable. Federal financing assistance is also found to be neither necessary or desirable, and any such approach is herewith explicitly rejected.

CHAPTER III - ENVIRONMENTAL AND SOCIOECONOMIC CONSIDERATIONS

The Environmental Advantages of Alcan

It is significant to note that the Alcan proposal was originally presented to the FPC after the preliminary environmental impact statements had been critical of both the El Paso and Arctic Gas proposals. The "environmentally preferred route" suggested by the FPC staff early in the proceeding was followed closely by Alcan in developing its system. The success of the Alcan proposal is in large measure a result of its attention to environmental impact.

The environmental impact of large-scale construction in a northern environment is a particularly sensitive issue. The tundra and permafrost are delicate and slow to heal; the fauna is unaccustomed to the presence of large-scale human activities, and the breeding patterns and survival rate are easily upset. Endangered wildlife species cling precariously to existence; aquatic life is as sensitive as terrestrial life; and native populations must subsist on this fragile environment for their economic and physical well-being.

Many parties in both the U.S. and Canada contended that the Arctic Gas proposal, even if it was, as some claimed, superior on economic grounds, had the potential

for substantial environmental and socioeconomic impact. The Arctic Gas route would not have followed existing utility corridors and would have cut through the Arctic National Wildlife Range in the northeast corner of Alaska. While Arctic Gas proposed mitigating measures that included, among other things, all-winter construction across the North Slope and above the 60th parallel with snow roads and work pads, some parties considered these measures technically unfeasible. The State of Alaska also opposed construction in the Range.

The Canadian National Energy Board found that the Arctic Gas route in Canada was "environmentally unacceptable" because it would have impacts "which could not be avoided, which could not be accepted, and for which mitigative measures are unknown or uncertain of development." This finding of the NEB effectively forced the withdrawal of the Arctic Gas proposal from further consideration.

On environmental and socioeconomic grounds, both El Paso and Alcan are superior to Arctic Gas because they generally follow existing utility corridors where the incremental environmental impacts tend to be small. In this respect, the Alcan proposal is particularly advantageous. The Alcan route follows the Alyeska oil

pipeline in Alaska until it turns to follow along the Alaska Highway into Canada at Delta Junction; from Delta Junction the pipeline will generally make use of the Alaska Highway right-of-way or the now-abandoned Haines-Fairbanks pipeline right-of-way (a line built during World War II to transport oil products to Fairbanks from Haines, which is north of Juneau, Alaska).

The environmental impact of the El Paso proposal, on the other hand, would be more adverse than Alcan's. After departing from the Alyeska corridor near Valdez, the El Paso route would traverse the wild and mountainous Chugach National Forest for about 40 miles, an area of great beauty which supports many forms of wildlife and has no roads. A gravel haul road and LNG plant could affect the bald eagles and Sitka black-tail deer that inhabit the area. Furthermore, El Paso would also have an adverse impact on the marine biota of Prince William Sound from the thermal, chlorine and other toxic material discharge of its LNG plant. The impact of this LNG plant would have to be mitigated by the addition of cooling towers - which have their own environmental impact - at an estimated 1975 dollar cost of \$75 million. Similarly, El Paso's California regasification facility also has the potential for adverse impact on marine biota with its cold water

discharge into the Pacific Ocean. By comparison to these impacts, no particular impact of Alcan has been singled out for the same degree of concern.

The environmental impacts of Alcan's eastern and western legs in the lower-48 states have never been considered serious. In the FPC hearing, Alcan showed sensitivity to a myriad of local impacts and suggested mitigative measures that appear adequate.

Finally, Alcan's far superior fuel efficiency means that the system will deliver more units of clean-burning and efficient natural gas than El Paso for the same amount of wellhead deliveries. Alcan is expected to consume only about three-fourths as much gas for fuel as the El Paso system.

Presidential Finding - Environmental Impact Statements

In its Recommendation to the President, the Federal Power Commission found after months of hearings and evaluations of impact statements that "no doubt, the Alcan route promises the least environmental impact." In its subsequent July 1 Report, the Interagency Task Force on Environmental Issues, under the lead of Department of the Interior, concluded that Alcan appeared to have the least environmental impact of the proposed routes, provided that proper mitigative actions are taken. The conservationist intervenors in

the proceedings (Sierra Club, The Wilderness Society, National Audubon Society, and the Alaskan Conservation Society) also stated a clear preference for the Alcan proposal.

Pursuant to Section 6(d) of ANGTA, the Council on Environmental Quality submitted a report on July 1, 1977, which found that the environmental impact statements submitted by the FPC with respect to Alcan, pursuant to Section 5(e) of ANGTA, are legally and factually sufficient.

After four days of public hearings, and extensive study, the CEQ reached the following conclusion: "Alcan is the environmentally preferable route. Its impacts are largely restricted to existing transportation corridors ... and involve no large-scale intrusion into wilderness values." The CEQ also found that the information was insufficient to determine whether the El Paso project is environmentally acceptable. It is clear from the FPC hearings, the environmental impact statements prepared by the FPC and Department of the Interior the certification of those impact statements by the CEQ, and many other submissions from many parties that the Alcan route is clearly the superior system on environmental grounds.

The President hereby determines pursuant to the direction of Section 8(e) of ANGTA, that the required environmental impact statements relative to an Alaska natural gas transportation system have been prepared, that they have been certified by the CEQ and that they are in compliance with the National Environmental Policy Act of 1969.

Consequently the enactment of a joint resolution approving the Decision shall be conclusive as to the legal and factual sufficiency of the final environmental impact statements as provided by Section 10(c)(3) of ANGTA.

Socioeconomic Impact

The socioeconomic impacts of both systems are roughly the same in Alaska. Under either proposal, the royalty, severance tax, property tax and income tax revenues to the State of Alaska will increase substantially. The Department of Commerce's Report on Socioeconomic Impacts found the El Paso proposal would provide a greater impetus to the Alaskan economy, but if factors such as adverse effects on native communities and local lifestyles are given primary importance, the Department concluded that the El Paso proposal would then suffer in comparison with Alcan.

On the basis of relative growth, Cordova, 13 miles southeast of Gravina Point, will suffer the most change with the El Paso project. Because of LNG plant and construction, the population would be expected to fluctuate from 2400 in 1977 to 9100 in 1979 to 4100 in 1982. As a result, the character of the town itself might change from a fishing village to an industrial town. The State of Alaska has noted that the socioeconomic costs to small communities will be greatest for the El Paso project.

Otherwise, it should be noted that both proposed pipelines follow existing utility corridors; the native communities near these corridor have already been affected by the pressures created from major construction activity. Accordingly, the socioeconomic impact of Alcan's construction, which more closely follows these corridors, should not be as great as El Paso's.

Conclusion

To sum up, environmental values have been extensively considered and evaluated throughout the certification and decision process. In the future, Federal oversight of design and construction of the Alcan system should strengthen and implement the environmental priorities established in this decision process. Significantly, both the Administrator of the Environmental Protection

Agency and the Secretary of the Interior will be represented on the Executive Policy Board. The Board, as discussed in Chapter VI of the Report and specified in Section 5 of the Decision, will provide policy direction through the Federal Inspector to the Agency Authorized Officers, including those from the EPA and Interior, who will directly represent and exercise the statutory authorities of their respective agencies. The strong representation of EPA and Interior on the Executive Policy Board will help ensure the protection of environmental interests through the enforcement activities of the Federal Inspector.

As required by ANGTA, environmental concerns have been paramount in the study and decision process, and will be translated into a responsive permitting and enforcement mechanism for implementation of the Decision. Federal oversight will seek to avoid "trade-offs" between protection of environmental priorities and construction economics by seeking through advance planning by the Government and the applicant for the coordinated enhancement of both.

CHAPTER IV - ECONOMIC CONSIDERATIONS

Potential for Cost Overruns and Time Delay

The cost overruns that occurred in construction of the Alyeska oil pipeline naturally raise questions about the potential of any Alaskan natural gas transportation system for cost overruns. Such overruns can result from poor initial cost estimates, waste, institutional delays, inflation, low construction productivity, or management inefficiency. While it is difficult to assess the likelihood of such problems prior to the start of construction, they provide a useful basis on which to compare the respective projects. The major causes of cost overruns appear to be the following:

1. Incentives to make a low initial cost estimate.

In projects where institutional approval must be obtained prior to the start of construction, the project applicant may try to increase the chances for approval by conservative estimates of the project costs.

2. Use of new complex technology or scaled increases in design size. Technologically uncomplicated systems are less expensive and have fewer uncertainties that increase capital costs.

3. Labor productivity and equipment capacity. There is a well-recognized inverse correlation between productivity and the increasing utilization of the capacity in an industry. As the use of labor capacity, equipment capacity, or management availability approaches 100 percent, productivity begins to decline rapidly. Furthermore, the more complex the project, the greater the loss in productivity or efficiency as the project capabilities are reached or exceeded. When large-scale projects experience equipment and material shortages, they generate their own internal, demand-pull inflation, resulting in an increase in equipment and material costs.

4. Cost of service tariffs and cost-plus contracts. Cost increases during construction of public utility projects merely expand the rate base of the utility absent a variable rate of return, they do not result in any loss to investors. The same effect occurs from use of cost-plus contracts; the contractors' profit will not be adversely affected by cost overruns.

5. Construction schedule pressure. In most situations, accelerated construction schedules can be accomplished only at a high premium in cost.

6. Long delays after project start-up. Large scale projects are frequently delayed because of litigation, labor grievances, and cumbersome bureaucratic actions or regulations.

7. Remote areas or inhospitable environments. Remote locations create severe logistical problems and magnify the costs of poor planning. Breakdown of equipment that would cause only minor delays in well settled areas may result in considerable delays in remote areas. Furthermore, new techniques, methods, and materials are frequently required when work is done in an inhospitable environment. Such conditions often cause on-site modifications of equipment or design.

8. Unforeseen geotechnical factors. Even to experienced geologists, the earth holds many surprises -- especially in the Arctic. Unexpected water flows or earth movements can create severe construction problems and cause expensive delays. The unstable permafrost soils in the Arctic regions are particularly troubling for large-scale construction.

Comparisons with Alyeska

Both the Alcan and El Paso projects would encounter these problems to one degree or another. Like Alyeska, they have the potential for significant cost overruns. But when

the Alyeska experience is examined, a convincing case can be made that the cost overruns for Alcan and El Paso would not be as great. The major problems described above provide a useful framework for comparison.

1. Low cost estimates. The early cost estimates by Alyeska were made for a system smaller than the one Alyeska finally built. Alyeska had no appreciation at the time of these estimates for the vast changes in construction techniques that would be required for arctic construction by subsequently enacted environmental laws. Alyeska also had no experience with the logistics problems and low labor productivity characteristic of arctic construction. By 1974, Alyeska had become aware of the increased costs of environmental requirements, but still had no data on labor or contractor productivity in arctic conditions. By mid-1975, when Alyeska submitted its first design cost estimate of \$6.3 billion, it had developed considerable experience with pipeline construction.

El Paso's cost estimates for Alaska construction of its 2.3614 bcfd case were submitted to the Federal Power Commission in late 1975 and Alcan's estimates were submitted in mid-1976. Thus, El Paso and, to an even greater degree,

Alcan had the opportunity to factor into their cost estimates the Alyeska experience. While there are valid reasons to expect both Alcan's and El Paso's estimates to be conservative, there is little reason to expect that their initial estimates are as grossly under-estimated as the early estimates of Alyeska. Both projects had too much data and experience available to them to have made large errors, and excessive underestimates would have been challenged by competitors.

2. New technology and increases in scale. While El Paso and Alcan involve some new technology and increases in scale, the problems from these factors will be of an order of magnitude less than Alyeska's. The large capacity systems of both projects require an increase in operating pressures. DOT has concluded, however, that subject to testing to be conducted by the applicant in conjunction with the U.S. and Canadian governments, such increases are within current technological capability and safety standards.

In addition, no scale-up in construction equipment (e.g., building equipment to handle 48-inch pipe) will be required for the gas pipeline. The problems of scale-up were mostly solved by Alyeska. Thus, El Paso with its

42-inch pipe, or Alcan, with its 48-inch pipe, would have the benefit of using field-proven equipment.

The Alyeska pipeline also required a large amount of automated and sophisticated equipment. Remotely controlled "topping plants" (i.e., miniature refineries) and storage areas at pumping stations were used to provide the turbine fuel to drive the pumps. A separate gas pipeline was constructed to bring the fuel to the northernmost pump stations. In addition, Alyeska could not bury a hot oil line in the thaw-unstable permafrost. It had to employ considerably sophisticated and advanced technology to design the vertical support members and heat exchangers necessary to insulate the oil line from the surrounding environment. Approximately 400 miles or 50 percent of the line is elevated.

By contrast, a natural gas pipeline is a far more simple, less sophisticated system. Fuel for the compressor turbines is drawn directly from the gas stream, and controls are simple and easily automated. The chilled gas pipeline is compatible with the permafrost environment even in a buried mode. There are uncertainties regarding the best design and engineering to eliminate frost heave potential in discontinuous permafrost areas. However, this problem is not comparable in complexity or size with the problem of adapting a hot oil pipeline to the arctic environment.