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Before the
Federal Power Commission

El Paso Alaska Company, et al.) Docket No. CP75-96, et al.

POSITION BRIEF OF THE COMMISSION STAFF

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I. INTRODUCTION AND STATEMENT OF POSITION

The enormous record in this case 1/ coupled with the need for expedition to meet the spirit and letter of the Alaska Natural Gas Transportation Act of 1976 (Public Law 94-586) necessitated the adoption of a segmented individual issue by issue briefing schedule. This process has been under way since early 1976 and is due to conclude with the filing of Wrap-Up briefs on December 15, 1976. Appendix A lists the series of briefs filed by Staff starting on May 28, 1976. This brief states the position of the Commission Staff on the overall question of which of the three competitive projects is superior. It is not intended to be a summary of the series of briefs filed previously by Staff because some issue areas are common to all three proposals, and the conclusions we reach in these specific issue areas do not for the most part favor one applicant over another. In the interest of a concise statement of the Staff position in this case, we have attempted to distill our thinking on this very complex case into the shortest document possible. The arguments and project comparisons which are presented in Section IV cover, in our opinion, the key issues in the case, but the list of issues contained therein is by no means exhaustive. The specific issue areas in the project comparisons are presented in the order of significance as we perceive them, in terms of their relative weight in deciding the superiority of one project over another. This does not mean that issue areas lower in the list are not significant in this case in and of themselves, quite the contrary; rather, in our opinion such areas are relatively less significant in deciding between the projects. For example the area of tariffs is of enormous significance to Staff but is of little moment in determining which of the three projects is superior.

For a full statement of our arguments, conclusions, and positions on specific issue areas, reference should be made to individual Staff briefs and the Staff final environmental impact statement (FEIS). Section IV (2) of this brief constitutes Staff's economics brief.

1/ 44,584 pages of transcript in 253 volumes (days) together with countless exhibits.

Based upon the analysis that follows and our overall experience in participating in the preparations for and conduct of the hearing in this case, the Staff has reached a position on which of the three projects 2/ best serves the public convenience and necessity.

Staff supports the Arctic Gas project modified and improved by the elimination of the "western leg" lateral to California, which has been shown on this record to be high risk, uneconomic, unnecessary, and environmentally unsound. The modified Arctic Gas project supported by Staff, shown in Figure No. 1, is a trunkline which would provide equitable access to Prudhoe Bay gas for all regions of the nation. Shorn of the unnecessary $700 million California lateral 3/, the recommended Arctic Gas project consists of a 48-inch and 42-inch diameter high pressure natural gas system that can deliver Mackenzie Delta gas to the Trans-Canada pipeline system for transmission throughout Canada, and at the same time can deliver Prudhoe Bay gas to central locations in the United States, from which it can be delivered to all existing continental markets. In our opinion, the only Arctic Gas trunkline transmission facility that can be certificated at this time excludes the western leg. Particularly significant in this opinion is the fact that only 12-1/2% of the Prudhoe Bay gas has as of this time been placed under contract. 4/ If the Prudhoe Bay gas is purchased by transmission and distribution companies spread throughout the continental 48 states, as has been assumed on the record and as we think is highly probable, this modified Arctic Gas trunkline in conjunction with the existing interstate natural gas pipeline network will be all that is required to move Prudhoe Bay gas to distributors and ultimately to the consumers of this gas. If particular purchasing companies in specific regions of the nation contract for more or less gas than has nominally been assumed in this record, then the certification of anything more than the modified Arctic Gas trunkline could turn out to have been a costly mistake. We believe the certification of this Arctic Gas system, modified by the elimination of the California lateral, is prudent, reasonable, and in the public interest, conditioned upon subsequent evidence of gas purchase contracts and financing.

2/ Arctic Gas project, El Paso Alaska project, Alcan project

3/ The original Arctic Gas project was amended to reflect the deletion of a $300 million eastern extention from the Chicago area to near Pittsburgh and by the requested withdrawal of Interstate Transmission Associates proposal for a second western leg to Los Angeles.

4/ By the State of Alaska whose royalty gas contracts do not contain price provisions and are subject to legislative approval in the future.

Figure 1.

FPC STAFF SUPPORTED ARCTIC GAS TRUNKLINE PROJECT

II. BRIEF DESCRIPTION OF COMPETING PROJECTS

(1) Alaskan Arctic Gas Pipeline Company, et al. (Arctic Gas) 5/

The Alaskan Arctic project (Figure 2) involves the construction of 3,486 miles of 48-, 42-, 36- and 30-inch diameter pipeline. 6/ Under this proposal a 48-inch diameter pipeline will be constructed from Prudhoe Bay, Alaska, east to the Mackenzie Delta in the Northwest Territories of Canada. From the Delta a 48-inch diameter pipeline will be constructed through Caroline, Alberta, to Empress, Alberta. At Empress the facilities will intertie with those of Trans-Canada Pipelines Limited and a new 42-inch diameter pipeline to the U.S. border at Monchy, Saskatchewan. A new 30-inch pipeline will be constructed from Caroline to the Alberta-British Columbia border at Coleman, Alberta. From Coleman, Alberta, the existing facilities of Alberta Natural, PGT, and PG&E, as far south as an intertie with the Southern California Gas Company (SoCal) system at Hinkley Station in California, will be expanded with a total 36-inch diameter pipeline loop. A new 42-inch diameter pipeline will be constructed from the border at Monchy to Dwight, Illinois. This system is designed to transport 2.25 Bcf/d of Prudhoe Bay gas to U.S. markets and 2.25 Bcf/d of Mackenzie Delta gas to Canadian markets. As proposed, 1,530 MMcf/d of Alaskan gas will be delivered to Northern Border at Monchy for delivery to markets in the Midwest and East; the remaining 659 MMcf/d will be transported through the western leg for delivery to Northwest Pipeline Company (22 MMcf/d), PG&E (200 MMcf/d), and SoCal (437 MMcf/d).

(2) El Paso Alaska Company, et al. (El Paso) 7/

As proposed, El Paso (Figure 3) will construct an 809-mile 42-inch diameter pipeline from Prudhoe Bay, following the Alyeska oil pipeline corridor, to an eight-train LNG liquefaction facility and terminal at Point Gravina on the south coast of Alaska. A

5/ Includes the transmission facilities proposed by Canadian Arctic Gas Pipeline Limited, Alberta Natural Gas Company Limited (Alberta Natural), Pacific Gas Transmission Company (PGT), Pacific Gas and Electric Company (PG&E), and Northern Border Pipeline Company (Northern Border).

6/ Only 1,903.9 miles are actually involved in applications before this Commission; the remaining are within the jurisdiction of Canada (2,281 miles) and the State of California (418 miles).

7/ Includes the facilities of Western LNG Terminal Company (Western LNG).

fleet of eleven, 165,000 cubic meter cryogenic tankers will be built to transport the LNG 1,900 nautical miles to Point Conception, California. Terminal, regasification facilities, and 251 miles of 42-inch diameter pipeline from Point Conception to Cajon, California, will be constructed by Western LNG. These facilities have been designed on the basis of the delivery of a nominal 3.2 Bcf/d to the liquefaction plant.

El Paso has made alternate showings which describe the facilities predicated on the deliver of 2.4 Bcf/d to the liquefaction plant and realignment of the Alaska pipeline closer to the Alyeska pipeline. The 2.4 Bcf/d case involves essentially the same pipeline with less compression, a six-train liquefaction plant, and the use of eight cryogenic tankers. El Paso maintains that it is ready, willing, and able to build any of the three alternatives (Applications Brief, page 9). Western LNG has also provided showings that correspond to the 2.4 Bcf/d case.

(3) Alcan Pipeline Company, et al. (Alcan) 8/

Alcan (Figure 4) proposes the construction of 1,800 miles of new pipeline in Alaska and Canada and the expansion of existing facilities in the provinces of Alberta and British Columbia and the States of Oregon and Washington. A 42-inch diameter pipeline will be constructed from Prudhoe Bay to Fort Nelson, British Columbia. The route will follow the Alyeska oil pipeline as far as Delta Junction, Alaska, from there the Alcan Highway through the Yukon Territory to Fort Nelson where it will connect with the existing facilities of Westcoast. A 36-inch diameter pipeline will be built from Fort Nelson to a point of interconnection with the facilities of AGTL near Lake Zama, Alberta. The Westcoast facilities will be expanded through the addition of 201 miles of 36-inch diameter pipeline looping, and the AGTL facilities will be expanded by the use of an unknown amount of 42-inch diameter pipeline looping. A 30-inch diameter pipeline

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8/ Includes Northwest Pipeline Corporation (Northwest), Foothills Pipe Lines (Yukon) Ltd. (Foothills), Westcoast Transmission Company Limited (Westcoast), the Alberta Gas Trunk Line Limited, and the Alberta Gas Trunk Line (Canada) Limited (AGTL). Only the facilities of Alcan and Northwest are within the U.S. and subject to this Commission's jurisdiction.

looping of 359 miles will be constructed by Northwest on its existing system between Sumas, Washington and a proposed new intertie with PGT at Kent, Oregon. A new 36-inch diameter pipeline will also be constructed in Saskatchewan connecting the existing AGTL facilities at Empress, Alberta, with the Northern Border facilities at Monchy. The Alcan project envisions the construction by Northern Border of a 36-inch diameter pipeline along its currently proposed route and the expansion of the existing PGT and PG&E facilities south of Kent, Oregon.

As will be discussed in other sections of this brief, Staff believes the Maple Leaf project must also be considered with Alcan; therefore, this project is included in Figure 4 and described as follows. The Maple Leaf project is a system for the delivery of Mackenzie Delta gas to Canadian markets sponsored by Foothills, Westcoast, and AGTL. The Maple Leaf group proposes to construct 898 miles of 42-inch diameter pipeline from the Mackenzie Delta to the existing AGTL system and 155 miles of 30-inch diameter pipeline laterals connecting this facility with Parsons Lake and the existing facilities of Westcoast. The existing facilities of AGTL and Westcoast will also be expanded to transport the 800 MMcf/d to 2,400 MMcf/d anticipated from the Mackenzie Delta.

III. BASIS FOR COMPARISON

The Arctic Gas project was filed with this Commission and the Canadian National Energy Board (NEB) on March 21, 1974. The initial filing with the Commission was deficient in many significant ways. This fact was not disputed by the applicants. They themselves highlighted some of the omissions and explained the rationale behind their filing schedule.

The El Paso Alaska project was filed with the Commission on September 24, 1974. The El Paso Alaska filing also lacked significant required information.

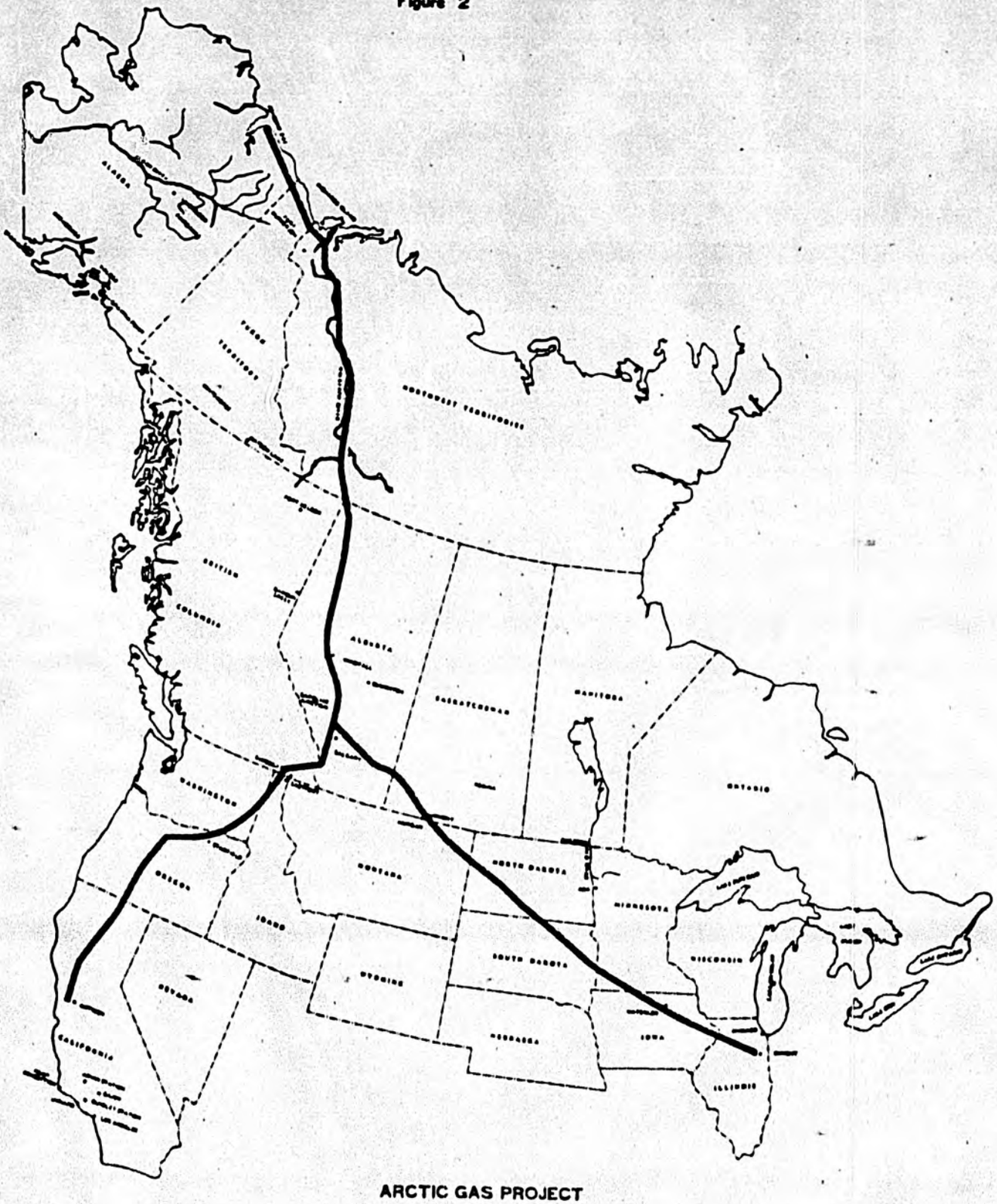
The two above filings went through a long and laborous process of refinement resulting in very tightly reasoned, highly defendable presentations which included the testimony, exhibits, backup studies, and supporting workpapers of the expert witnesses presented.

The Alcan project was filed on July 9, 1976, after a massive and impressive effort on the part of its sponsoring Canadian and U.S. companies. The process of perfecting the Alcan project was carried out in a much shorter time period than the other two projects. As a result, the degree of certainty that can

be attached to the cost projections associated with the Alcan project is significantly less than for the other two projects, in our opinion. By the same token, the minor adjustments and improvements that occurred during the hearing process did not run to full completion. On balance, though, Staff believes that the Alcan project was fairly presented and adequately reviewed. The enormous problems the Staff has with the Alcan project stem from the fundamental concepts underlying the project, not how or to what degree it was presented on the record. We are of the opinion that another year of hearing on the Alcan project, as filed, would add very little evidence that would be of value in deciding for or against Alcan. This is not to say that we cannot see many ways in which we would modify the Alcan project.

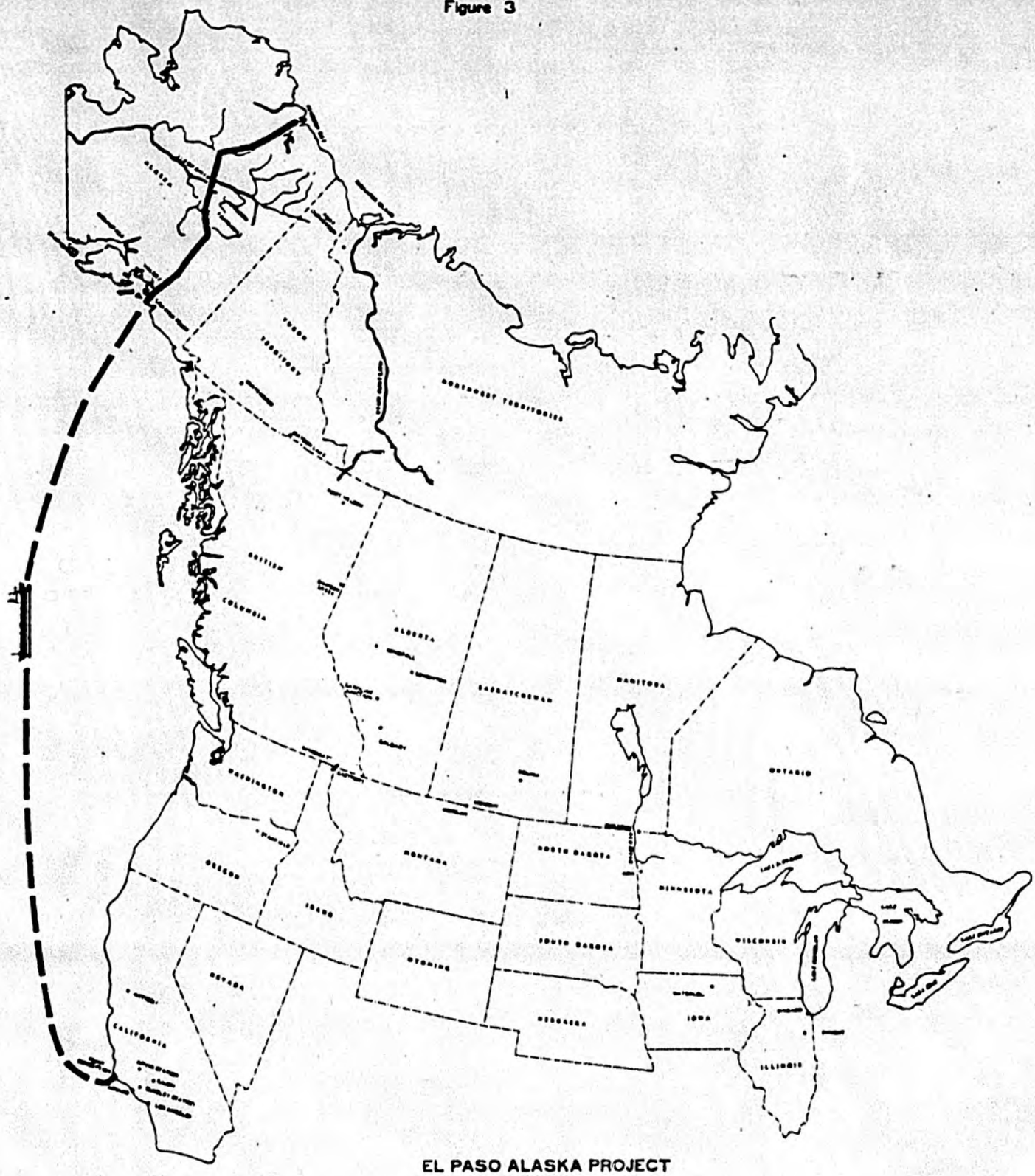
The Staff approach throughout the proceeding has been to modify the El Paso Alaska and Arctic Gas projects and to then compare them. In considering the Alcan filing in terms of Staff-supported testimony modifying and improving the filed proposal, we came to an interesting conclusion. The modified Alcan project we ended up with was in essence the Arctic Gas project. Our reasoning was essentially this. If you have approximately 3.25 Bcf/d of gas to transport, you do not incrementally expand two existing low-pressure transmission systems that are, for all intents and purposes, full. You take advantage of the economies of scale and build the largest diameter new facility that can be justified. Secondly, if the Maple Leaf project is assumed, and the Alcan project sponsors so assume, conventional natural gas industry logic suggests that one should look at a 400-mile leg to bring Prudhoe Bay gas east to the Delta and then expand the Maple Leaf line to 48-inch diameter. These changes to the Alcan and Maple Leaf projects would result in basically an Arctic Gas project.

Figure 2



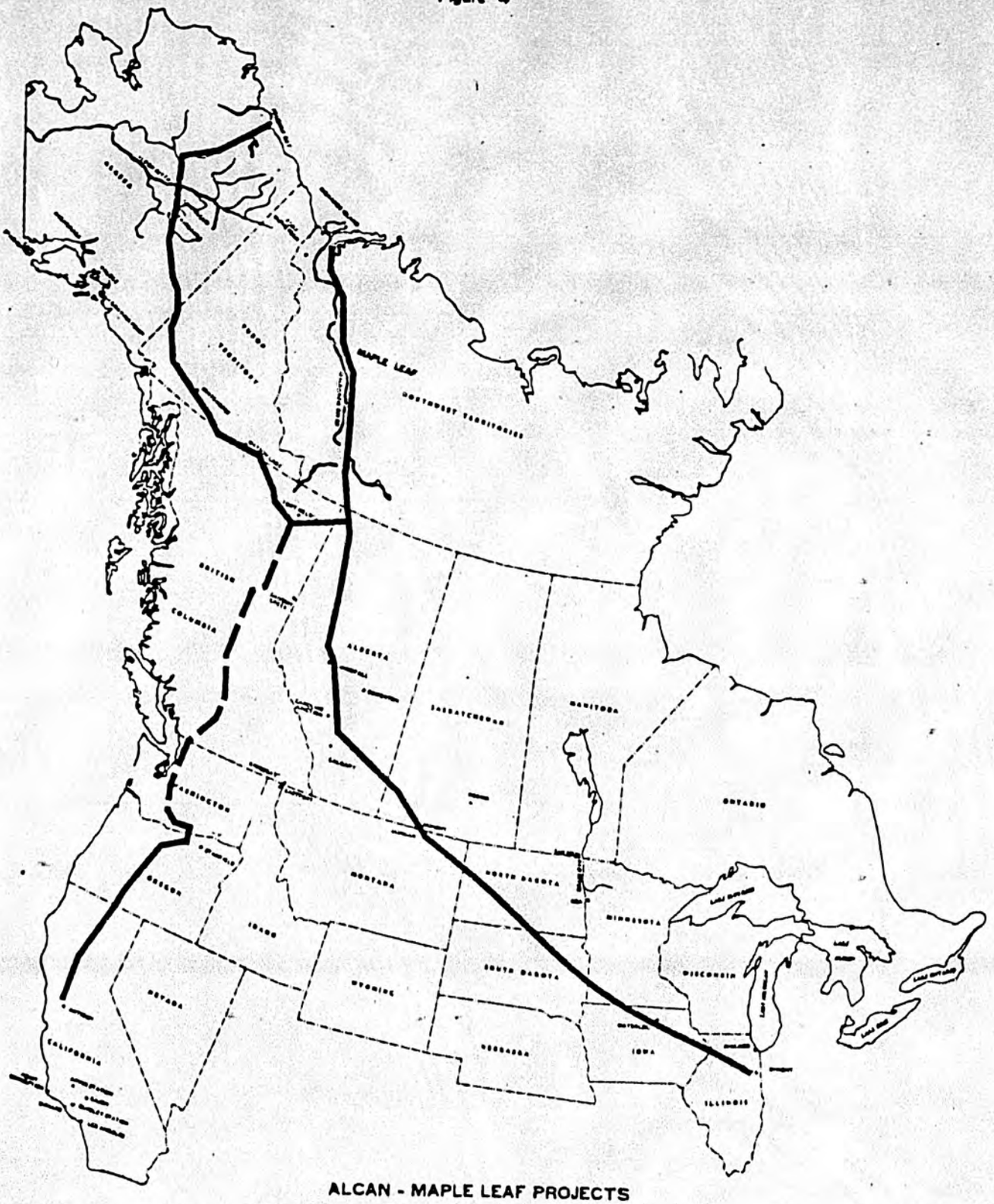
ARCTIC GAS PROJECT

Figure 3



EL PASO ALASKA PROJECT

Figure 4



ALCAN - MAPLE LEAF PROJECTS

IV. PROJECT COMPARISONS

(1) Overall Project Conception 9/

The three competitive projects in this case present significantly different approaches to the problem of delivering North Slope Alaska natural gas production to market in the lower 48 states. The fundamental underlying conceptual structure of each of the three projects is highly significant: in our opinion, the selection of the preferred project turns upon this decisive factor. This is the case because the key determinants in choosing between the alternative projects, such as economy, environment, engineering etc., all of which we consider in detail below, are to a large degree predetermined by the initial choices made in the formulation of each project.

(A) The Arctic Gas Project

Even a casual view of a topographic map of North America will reveal that the sponsors of the Arctic Gas project have chosen the most logical natural gas pipeline route from Prudhoe Bay across western Canada to the central United States. This is a physical fact. When the existence of a natural gas field in the Canadian Mackenzie Delta region is given recognition, the choice of the Arctic Gas route becomes overwhelming in its appeal. A natural corridor exists along the Beaufort Sea to the Delta and then south along the Mackenzie River Valley to Alberta. The mountains are, for the most part, skirted. Across Alberta the route follows existing natural gas lines to Empress, then strikes an essentially straight line for the midwestern region of the United States. In the process, two major existing natural gas trunklines serving western, central, and eastern Canada are crossed, three major pipelines in the United States are intersected and the major north-south transmission facility serving the region of the United States west of the Rocky Mountains is crossed. The fundamental logic of the Arctic Gas route is unassailable. If the realities of territorial sovereignty and the geography of wildlife preservation had been different, to the point of falling out of the decisional equation, there would have been no alternative proposals, period!

9/ The arguments presented here are based upon evidence that is woven throughout the entire 44,584 pages of transcript in this case. Staff's subject area briefs (see Appendix A) and those of other parties give ample record citations for particular points.

The choice of an all-land pipeline brings with it the benefits of over thirty years of natural gas pipeline technology. The Arctic Gas project 48-inch diameter 1680-psig proposal is a consistent next step in the evolution of high pressure natural gas pipeline design, if history is any guide. There will be problems, there are significant uncertainties, but the alternative is dramatically higher transmission costs. The risks are prudent and should be taken, in our opinion.

The combination of the Mackenzie Delta Field reserves in Canada with the Prudhoe Bay Field reserves in Alaska, as a foundation of supply for a joint project which takes full advantage of the economies of scale, minimizes the risks which are inherent in connecting these supplies. 10/ The effects of the uncertainties of gas reserve and deliverability projections are reduced by a joint project. Should the dictates of maximum oil recovery from the Prudhoe Bay oil field result in natural gas deliveries lower than the producer-projected minimum of 2.0 Bcf/d, there remains the very real chance that the Mackenzie Delta Field will out perform the assumed initial 1.0 Bcf/d projected by the Arctic Gas and Alcan sponsors. If the Delta Field does not come on as fast and to the degree projected, there is the possibility that Prudhoe Bay oil lifting will allow gas deliveries greater than the initial high-side 2.5 Bcf/d estimated by the field owners. The significance of this advantage to the Arctic Gas project is pervasive. The effects of it touch upon many key issue areas; neither of the other two competitive projects has this advantage.

The reliability of land pipelines is well documented. The natural gas network that spans the nation has been an unqualified success. Our standard of living is due in large part to this low cost, efficient, and reliable energy delivery system. The basic technology, upon which the Arctic Gas project is predicted, is elemental, low level, and highly reliable.

The direct route chosen by the Arctic sponsors together with the connection of two major reserve pools in one project, allows capital cost levels, transmission fuel requirements and construction material requirements that approach the physical minimums associated with the movement of natural gas. These are advantages and combinations of advantages that are formidable, and the superiority of the Arctic Gas project which we discuss below under specific topic heads largely flows from these central considerations.

10/ The resulting route also traverses the most promising potential gas reserve areas on the Arctic coast of the U.S. and western Canada.

(B) The El Paso Alaska LNG Project

The concept underlying and delimiting the El Paso Alaska project is that Prudhoe Bay gas should be delivered to the lower 48 states in such a manner that exclusive United States jurisdiction is maintained. Stated another way, the assumption--implicit or explicit--is that transit of Alaska gas across Canada is precluded or at very least unwise. This cardinal principle of the El Paso project is its paramount strength or its critical weakness, depending upon how the Canadian government decides its best interests will be served.

Viewed in the context of economics, engineering, environment, the history of the industry, etc.--in short in any way other than international politics--the El Paso project suffers significantly as a result of the physical realities of the circuitous route it must follow in order to stay within United States controlled areas. A water route is dictated, and this in turn necessitates the conversion of the transit Alaska gas into and out of the liquid state. At each step, costs in the broadest sense are necessarily incurred.

Water transit involves complex ships of a size not yet in existence. Ship movement introduces a line of discontinuous storage batch movement of gas between beginning and end links of continuous flow pipeline in the chain from gas field to market. The change in state required entails significant energy costs which can only be recovered under ideal conditions. The overall fuel requirements associated with land-water-land movement of natural gas are substantially greater than those associated with conventional land movement.

The liquefaction facility in Alaska and the corresponding regasification receiving terminal in California, in conjunction with the operation of ships, result in higher annual operating costs throughout the life of the project and introduce a risk of service interruptions. To a large degree, these types of costs are difficult to reduce and are prone to escalation due to inflation.

The required water route results in the significant environmental impact disadvantage associated with the El Paso Alaska project. The thermal pollution problems, the safety questions raised by LNG terminals and ships, the facility reliability uncertainty, and the passage through high-risk seismic activity areas in Alaska and California all result from the route selection dictated by the El Paso Alaska project concept.

The El Paso Alaska route extends 800 miles due south from Prudhoe Bay in a direction that points as much toward Honolulu as it does to San Francisco, let alone Chicago. The primary direction from Prudhoe Bay to the major market regions of the nation is southeast. As a result, the El Paso Alaska project lays the North Slope gas down on the California coast at one edge of the national natural gas market. An imaginative and innovative, but less than ideal, reverse flow proposal on the existing east-west El Paso Natural Pipeline is required to move North Slope gas to mid-continent points where it can be delivered throughout the nation.

Finally, by avoiding Canada, the El Paso Alaska route gives up the economic and risk reduction advantages of combining the Mackenzie Delta reserves with Prudhoe Bay reserves.

(C) The Alcan Project and the Maple Leaf Project

The underlying principles of the Alcan project appear to be as follows: (1) Prudhoe Bay gas should transit Alaska to Fairbanks and then follow the Alcan Highway to Fort Nelson; (2) the two existing western Canadian north-south transmission systems should be incrementally expanded to move Alaskan gas commingled with existing Canadian traditional production area gas; (3) an arbitrary 30%-70% split of Prudhoe Bay gas should occur at Fort Nelson; (4) 30% of the Alaskan gas should go south in the Westcoast Pipeline system, and 70% should go east to Zama Lake and then south in the Alberta Trunk system; (5) a design pressure of 1250 psig should be used on all new portions of the Alcan system; (6) no pipeline greater than 42-inch diameter should be utilized even if it is economically justified; (7) no co-ordinated corporate entity or Canadian and-U.S.-related entities should be created to construct the Alcan project; (8) the sequence of corporate entities which would build, own, and operate the Alcan system would basically follow state and provincial boundaries with individual corporations for each political subdivision down to the U.S. border; and (9) Prudhoe Bay gas should be brought on stream in the following sequence: 1.2 Bcf/d in year one, 1.6 Bcf/d in year two, and 2.4 Bcf/d in year three of the project.

The underlying principles of the Maple Leaf project appear to be as follows: (1) Mackenzie Delta gas should be brought on stream approximately 18 months after Prudhoe Bay gas begins to flow in the Alcan project, (2) the Mackenzie Delta gas should be commingled with existing Canadian traditional production area gas and with Prudhoe Bay gas south of Fort Nelson and Zama Lake; and (3) Mackenzie Delta gas will be rolled-in with the existing Canadian gas stream for transportation rate purposes.

The same two corporations sponsor the Alcan and Maple Leaf projects within Canada. These corporations, Westcoast Transmission Company and Alberta Gas Trunk Line Company, have indicated that their first objective is to build the Maple Leaf project, but that the Alcan project can be built first and the Maple Leaf project deferred into the late 1980's or longer if the Canadian Government chooses to do so.

The separability of the Alcan and Maple Leaf projects presents problems for any decision maker in comparing the Alcan project with the Arctic Gas project. The Arctic Gas project is predicated upon combining the Prudhoe Bay gas with the Mackenzie Delta gas to achieve significant economies, as we have discussed above. Comparing the Arctic Gas project, which connects the Mackenzie Delta reserves, with the Alcan project which does not, present problems that are not involved in the comparison of the Arctic Gas project, with the El Paso Alaska project. This is true even though the El Paso Alaska project does not connect the Delta reserves either. The Arctic Gas and the Alcan projects are international in scope. The needs and best interests of two nations must by law be considered. In the case of the U.S. go-it-alone El Paso Alaska project or the Canadian go it alone Maple Leaf project, there are impacts upon each nation as a result of the other nation selecting its unilateral project, but these effects are indirect and do not require that either government necessarily take the other governments' interests into consideration.

For our purposes Staff believes that from a logical, from a practical and from a legal point of view we must combine the Alcan and the Maple Leaf projects in attempting to select the superior route of the three applications before us. The two projects are on file in Canada before the National Energy Board, they have been consolidated and are being heard together. The Arctic Gas project connects the two reserve pools. The only logical approach we can see, is to look at what options the Alcan project leaves for Canada to connect Delta Gas and to compare the economic, engineering, financing etc. consequences of doing this with the Arctic Gas project. From a practical point of view there is no basis on this record for determining what the Alcan project would look like in detail, the detail required by the rules and regulations, if the Maple Leaf project were assumed to be delayed or never built. Staff defies anyone to segregate out the specific facilities, the specific costs associated with those facilities and point to the specific flow diagrams that would be associated with the Alberta Trunk portion of the Alcan project standing alone. Staff can not do it, Arctic

Gas could not do it and more importantly the Alcan sponsored witnesses for Alberta Trunk could not do it on the stand. This situation obtains for Westcoast and for Northwest Pipeline to a lesser degree. Northwest's facilities presentation is predicated upon the resumption of deliveries at Sumas in 1983, which according to testimony put on by Westcoast is predicated upon the Maple Leaf project being on stream by 1983. The Alcan project was presented for this record on the basis that the Maple Leaf project would track along 18 months later. The detailed subject area by subject area presentations are so intertwined, interconnected, and co-ordinated that at very best only a generalized Alcan project can be envisioned, absent any Maple Leaf project at all.

Based upon the above considerations we treat the Alcan project and the Maple Leaf project as one system in comparing it with the Arctic Gas and El Paso Alaska projects.

The Alcan and Maple Leaf system combines the Prudhoe Bay and Mackenzie Delta reserves in an enormously inefficient way. Approximately 1200 more miles of pipeline would be required to bring these two streams of gas together in northwestern Alberta, than in the Arctic Gas project. South of this junction point in Alberta the 30%-70% split of Alaska gas is arbitrary and appears to have been dictated by considerations other than economics. Alcan's own cost exhibits show that the use of the Westcoast system is significantly more expensive than the Alberta Trunk system would be. In similar fashion routing the California gas through the Northwest pipeline in Oregon and Washington is more expensive than using the existing or new Pacific Gas Transmission system. These curious facts are readily apparent and basically uncontested. Alcan even proposed a tariff arrangement to average out the transmission costs of their split stream approach, in order to avoid the obvious discrimination between shippers.

No!

No meaningful express line studies across Alberta were conducted by either company or by any participant in the Alcan and Maple Leaf projects. Subsequent to the filing of applications for the total Alcan and Maple Leaf system, Staff requested that a 42-inch diameter line from Sousa to Empress be analyzed and the results supplied for the record. The response from the Alcan and Maple Leaf sponsors was succinct and revealing "these

questions require us to analyze new designs which we have not proposed and have not sought authorization to construct" (Tr. 44,381).

The ultra-conservative engineering approach assume by the Alcan and Maple Leaf system sponsors in respect to maximum line pressure on new pipeline, leads necessarily to an uneconomic system. The filed for 1250 psig initial maximum design pressure with a very tentitive future escalation to 1440 psig with experience, became as the hearing progressed the 1440 psig design derated in early years to 1250 psig. The Alcan and Maple Leaf witnesses final word appears to be - 1680 psig systems as proposed by El Paso Alaska and Arctic Gas are probably feasible in the future, but are too speculative for use at this time.

The 2.4 Bcf/d ceiling on transit United States gas in the Alcan and Maple Leaf system was at first a cardinal principle underlying the fundamental concept of the project. The passage of time left this critical consideration in a kind of limbo. The policy witnesses attempted to explain the simple and clear contractual language away near the close of the record (witness Blair Tr. 41,868 to 41,896). The most revealing fact is that there is no basis in the record in this case to do anything other than speculate what it would cost to transport Prudhoe Bay volumes in excess of 2.4 Bcf/d in the Alcan and Maple Leaf system.

The above cited conceptual design considerations underlying the Alcan and Maple Leaf system virtually guarantee that any careful issue by issue comparison with the vastly superior Arctic Gas project will rebound to Alcan's disfavor. This is the overwhelming result of our analysis.

(2) Economics

The applicants have marshalled an imposing array of expert cost witnesses who have not only designed, developed, and presented the proposed projects but have also evaluated and criticized the proposals of the competition. Staff has not independently costed out the three systems proposed. This is entirely beyond our means. Fortunately the process of a contested administrative hearing with three competitive applicants has provided a detailed fully cross-examined record in the area of overall economics. Staff believes this record is excellent in respect to capital costs and unit cost of transportation, and we basically rely upon it in what follows.

The projects presented here do not involve traditional design or construction techniques. In the case of the El Paso Alaska proposal, only 16 percent of the estimated capital cost 11/ could be considered as even approaching traditional-type facilities. Approximately 53 percent of Arctic Gas' estimated cost involves construction north of existing Canadian facilities. 12/ The Alcan, Foothills, and Westcoast facilities necessary to deliver Prudhoe Bay gas into the existing systems represents approximately 60 percent of the total costs of all the facilities envisioned for this project (Exhibit AP-14).

We believe that the propensity for cost overruns increases the further north the construction. Staff considers that the Arctic Gas construction south of Lake Zama involves traditional techniques and costs, and thus any overrun that may occur would in all likelihood be a result of general economic pressures within the U.S. and Canada. Although we are highly skeptical of the costs shown for the expansions on the Westcoast and Alberta Gas Trunkline systems, primarily because the applicants failed to provide conclusive cost allocation information, the cost overruns on the Alcan and Maple Leaf systems south of Fort Nelson and Lake Zama would also fit in the general economic category.

11/ Total cost less the Alaska Pipeline, LNG plant, and tankers (EP-174, 178, 182, 185, 265 and WL-46).

12/ The cost of facilities from Prudhoe Bay to Sousa (AA-139) as a percentage of total cost (AA-71).

Because of a heavier reliance on new techniques and on an unconventional type of transportation mode, it appears that the El Paso project would be much more susceptible to inordinate cost overruns than the other proposals. Unlike the other proposals, El Paso's more southerly transportation mode is the much less traditional cryogenic tanker fleet. Furthermore, the design of both the LNG plant and tankers involves a technological advance, though probably sound, that may subject the project to a greater degree of possible overrun. As noted earlier, only approximately 16 percent of the El Paso project could be considered as traditional construction. Although this type of analysis is subjective and difficult to quantify, it must still be one of the major considerations in determining the best of several proposals.

It is Staff's view as expressed above that the Arctic Gas project is conceptually the best project in that it is the shortest route for the delivery of Alaskan gas into the major area of the lower 48 states, as well as being the most fuel efficient in that it provides the cheapest method of delivering U.S. gas to U.S. consumers and Canadian gas to Canadian consumers. Therefore, in analyzing the economics of the three proposals we will prepare the El Paso project and the Alcan and Maple Leaf projects with Arctic Gas.

Arctic Gas indicated that its proposal for the delivery of 4.2 Bcf/d will cost an estimated $8.6 billion, of which $2.75 billion will be attributable to the transportation of Canadian Gas, (Exhibit AA-71, as adjusted by Dau, Tr. 233/40,531). 13/ The average fifth year transportation cost as calculated by Arctic Gas is $1.238 per MMBtu (Exhibit AA-141). The facilities required for the delivery of 3.25 Bcf/d (no expansion case) are estimated to cost $7.95 billion, of which $1.82 billion is attributable to Canadian gas (Exhibit AA-73, as adjusted by Dau, Tr. 233/40,531). The average fifth year transportation cost for this no expansion facility is $1.392 per MMBtu.

13/ All of the capital costs shown herein were based on July 1975, estimates. This is basically true of the entire record. To the extent inflation occurs, all of the cost figures will escalate.

As the result of an analysis of the Arctic Gas project done by Green Construction Company for El Paso (Exhibit EP-255), the answering testimony presented by El Paso contended that there would be a delay of more than two years in the completion of the Arctic Gas project. As a consequence of this delay, the cost overrun was estimated at 42 percent for the 3.5 Bcf/d case and 44 percent for the 2.5 Bcf/d case (Argetsinger, Tr. 183/30,745). Accordingly, El Paso recalculated the incremental delivery cost per MMBtu for Arctic Gas as follows: (Jack, Tr. 189/32,232 and Exhibit EP-259).

	3.5 Bcf/d Case	2.5 Bcf/d Case
West	$1.653	$1.922
Midwest	$1.753	$2.151
East	$1.820	$2.227

The total estimated capital cost shown by El Paso for its base case (3.2 Bcf/d) is $7.92 billion 14/; with $6.57 billion being the estimate for the lower volume 2.4 Bcf/d case. 15/ The incremental delivery cost per MMBtu shown by El Paso for each case is as follows: (EP-265)

	3.1 Bcf/d	2.4 Bcf/d
West	$1.476	$1.610
Midwest	$1.759	$1.950
East	$1.807	$1.998
Average	$1.669	$1.836

The comparisons herein are based upon the cost of the proposed El Paso pipeline route, not its realignment case, which would add $200 million to its base case. These increased costs are primarily due to the need for thicker walled pipe, as required by U.S. regulations when situated in close proximity to the Alyeska haul road, and increased gravel needs (Wright, Tr. 169/27,698-710). When balancing these increased costs and other geotechnical problems against the environmental benefits of this alternative, Staff believes the prime alignment is the better of the El Paso options.

14/ Sum of the costs shown in Exhibits EP-174, 178, 182, 185, 265 and WL-35.

15/ Sum of the costs shown in Exhibits EP-200, 207, 228, 212, 265 and WL-46.

Arctic Gas responded with testimony indicating that the facility capital cost estimates should be approximately 12.6 percent greater than those shown by El Paso. This projected cost increase was shown as being in the major areas of Alaskan pipeline construction, LNG plant facilities, and ship construction (J.T. Mitchell Tr. 168/27,645-62, Martino Tr. 156/25,802-7 and DeLeon Tr. 156/25,848-56). Witness R.G. Anderson (Tr. 162/26,696-713) illustrated that the transportation cost under the 3.2 Bcf/d case, which reflected the adjusted capital costs and fuel use at $1.00 per MMBtu for the first full year of operation, ranged from $1.84 per MMBtu for deliveries to PG&E and $2.41 per MMBtu for deliveries to the Northern Border group (Exhibit AA-79).

In our opinion, Arctic Gas successfully rebutted the arguments of Green Construction except for the possibility that some cost overruns might occur because of a late start-up and early closing date for winter construction in the Arctic regions. This occurrence, which would be in probability terms very low, would most likely in all cases not delay the project but cause cost overruns through additional equipment and manpower utilized to finish the project as scheduled. Some additional costs may be incurred because of a modification of Arctic Gas' frost-heave program but this is not expected to be large. Arctic Gas may also have overestimated initial Mackenzie Delta reserves. However, in view of these possibilities, the estimated cost shown by Arctic Gas may be a little too optimistic, though nowhere near the disparity shown by Green Construction.

On the other hand, we believe that the answering testimony of Arctic Gas, as cited above, adequately described and quantifies the problems inherent in the El Paso proposal. Therefore Arctic Gas' contention that El Paso's cost could be at least 12 percent greater appears to be quite reasonable, particularly in view of the greater degree of nontraditional construction involved. 16/ The recalculation of an illustrative cost of service utilizing a fuel-use cost of $1 per MMBtu is also consistent with the showing of Arctic Gas and necessary for a fair and equitable comparison. It is quite apparent that the high fuel-use aspects of an LNG mode of transportation make its proponent reluctant to include such costs in an illustrative transportation showing.

16/ These overrun calculations did not consider the lack of meaningful base data for proper seismic design of the El Paso pipeline and both the Point Gravina and Point Conception LNG terminals, which Staff believes could lead to further overruns (See Staff's Geotechnical Briefs).

It is Staff's opinion that the following costs of service per MMBtu are the most appropriate estimates for each project. 17/

	Northern Border Delivery Points	California
El Paso	$2.41	$1.84
Arctic Gas	$1.61	$1.32

As noted earlier, there is a possibility that the Arctic Gas cost may be slightly higher; however, because of the wide disparity in the unit-cost estimates, it is doubtful that such an adjustment would make any appreciable difference in the outcome.

These unit cost figures are based upon the Arctic Gas project as proposed. If the Arctic project is modified as we propose by the elimination of the unnecessary $700 million western leg, the unit cost of transportation to California will be reduced by at least $.095 and that to Northern Border delivery points by at least $0.4. 18/ These are minimum savings figures which assume full displacement for 20 years. If displacement to California is required for only 36 MMcf/d for four years, as Staff projects, these unit cost of service savings would be more on the order of the full cost of service of the entire $700 million western leg. 19/ The nominal annual cost of service on a $700 million facility is $140 million (20%). Comparing this figure with the Arctic Gas derived $49 million annual cost of service savings resulting from elimination of the western leg, Staff concludes that the above unit-cost savings will be at least double if our assumptions about Canadian export curtailments prove to be correct.

17/ Since the lower volume cases are more assured and reflect a higher unit cost for each project, the comparisons are made on that basis.

18/ Volume 197, Tr. 33,382; Tr. 33,414; Tr. 33,469; Tr. 33,470-1; Tr. 33,476; Tr. 33,487. The nominal $.04 per MMBtu is derived by dividing the overall $49 million annual cost of service savings in two, half to the east, half to the west. The $24.5 million annual savings resulting is divided by the nominal 1530 MMBtu daily Northern Border delivery multiplied by 365 days in a year.

19/ Volume 197, Tr. 33,469, Line 18.

The derivation of specific unit cost of transportation savings on nominal delivery volumes, in the absence of gas supply contracts, is piling unknowns upon unknowns. The unit cost figures we site above are as valid as those shown by Arctic Gas. For purposes of a decision on the western leg, Staff relies upon the virtual stipulation between Staff and Arctic Gas that overall, the elimination of the western leg saves the Arctic Gas project $49 million per year in its cost of service, as a minimum. 20/

It cannot be emphasized too much that in order for the El Paso project to reflect a lower unit cost, the most pessimistic Arctic Gas costs would have to be compared with the most optimistic El Paso projection, and the fuel costs of El Paso must be left out. Any variation within this limitation results in Arctic Gas' unit costs being lower.

Alcan's presentation reflected an estimated total capital cost of $4.72 billion for the Alaskan and Canadian portions of its system and $1.56 billion for the facilities of Northwest and other non-participants within the lower 48 states (Ex. AP-14). Staff believes, as discussed in this brief, that the estimated cost of the Maple Leaf project, $3.14 billion (Exhibit ST-31), should be included as part of the cost of the total system. The transportation cost (per MMBtu) for the first full year of operation under the Alcan proposal was shown as follows (Exhibit AP-14):

Los Angeles	$1.55
San Francisco	$1.54
Northwest Pipeline System	$1.38
East Terminus of Northern Border System	$1.59

with or without fuel?

Answering testimony of Arctic Gas illustrated that the cost of the Alcan project from Prudhoe Bay to Sousa, Alberta, would be at least 12 percent greater 21/ based only upon a re-estimate of pipeline construction cost (Brackett, Tr. 245/42,778). Arctic Gas' witnesses also recalculated the cost of service for the Alcan system and argued that it would be as follows for the third year of operation (Exhibit AA-140):

20/ Volume 197, Tr. 33,476.

21/ $3.757 billion (AP-14) versus $4.216 billion (AA-139).

	Per MMBtu
Northwest Pipeline	$1.536
San Francisco	$1.674
Los Angeles	$1.718
Northern Border Delivery Points	$1.775

The Alcan proponents have presented several arguments that Staff must disagree with. First, that the Alcan and Maple Leaf projects can be considered independently (Br. p. 14). These projects are intertwined, as we have discussed above, and therefore their total cost must be considered when making a comparison with the Arctic Gas project. What is to be compared is the total cost of the facilities required to deliver Prudhoe Bay and Mackenzie Delta gas to their respective U.S. and Canadian markets and the appropriate allocation of such costs to the U.S. consumer. 22/ The estimated cost of the Westcoast (Item AP-T) and Alberta Gas Trunkline (Item AP-U) facilities under the Alcan project are inexorably intertwined with the facilities needed for the attachment of the Mackenzie Delta gas. In fact, after considerable cross-examination on the subject (Tr. 227/39,704, et seq.), witnesses for Alberta Gas Trunkline were still unable to detail with any specificity which facilities would be necessary for each project and their related costs.

Therefore, when comparing the Alcan and Maple Leaf projects with the Arctic Gas base case, a Maple Leaf cost of $3.2 billion (Exhibit ST-31) for its full-volume design is applicable, and for comparison with the non-expansion case a $2.7 billion, cost for the 800 MMcf/d facilities should be utilized (Kiely, Tr. 141/ 22,706). escalated

Alcan's other argument that should be addressed is the proposition that escalated costs should be shown in order to fully reflect the advantage of that system (Br. p. 36). To begin with, Staff does not believe that the expedited Alcan schedule is realistic 23/ and will therefore result in such a cost saving as is anticipated. This is regardless of other possible cost overruns. Regardless of this scheduling discrepancy, the

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22/ The other cost that could be considered in this comparison is the estimated $1.0 to $1.5 billion expansion required for the TransCanada system. Although our record is devoid of information on this matter and since the cost would be applicable to both the Arctic Gas and Alcan and Maple Leaf proposals and further would not be allocable to U.S. consumers, there is less need for its inclusion.

23/ See Geotechnical Reply Brief pages 15-18.

main reason that Alcan can show this supposed savings on escalated costs is the ability of the Alcan and Maple Leaf projects to shift all of the cost of the construction in the later years to the Canadian consumer. First of all, increased costs due to inflationary trends may or may not be true costs, depending upon their relationship to the overall economy. However, if this escalated cost is of the proportion and effect envisioned by Alcan, then why should the Canadians in their own interest permit the Maple Leaf project to lag behind the Alcan project by 18 months, when the so-called escalated cost of a cheaper Arctic Gas project would be borne by the consumers of both nations?

When comparing the Alcan and Maple Leaf projects with Arctic Gas, it is imperative that the functional aspects of the several segments of each project be analyzed. To begin with, the Arctic Gas facilities necessary for the delivery of Prudhoe Bay and Mackenzie Delta gas to the Lake Zama area of Alberta and Fort Nelson, British Columbia, are estimated to be $4.785 billion (Exhibit AA-139). This function will be performed by Alcan and Maple Leaf at a capital cost very optimistically estimated at $6.115 billion. 24/ Even considering untenable arguments that the Alcan costs should not include the Maple Leaf project, the facilities to transport Alaskan gas only to Lake Zama by Alcan are estimated to cost $3.757 billion. For this price, the consumer will get a low-pressure 42-inch pipeline with a very small amount of very high-cost expansability. We are certain that considering the differences in the length of the two pipelines, 1,272.4 miles for Arctic Gas (Exhibit AA-35) versus 1,646 miles for Alcan (Application in Docket No. CP76-433), that had Arctic Gas opted for a 42-inch pipeline following its route to transport only U.S. gas, the cost of this half measure would be less than the Alcan project. The Alcan route is 30% longer and follows mountainous terrain. The shorter Arctic Gas route follows a coastal plain and a river valley.

Even if a 42-inch pipeline had been proposed by Arctic Gas, with the Delta gas accommodated through additional looping, the overall cost, though more than the current proposal, would in all probability be cheaper than the Alcan and Maple Leaf projects.

24/ See Exhibit AA-17 for the facilities from Prudhoe Bay to the B. C.-Alberta border, Item by Reference AP-U for the cost of the extension from the border to Lake Zama and Exhibit ST-31 for the cost of the Maple Leaf facilities from the Mackenzie Delta to Lake Zama.

Within the lower 48 states, Alcan projects a cost of $1.558 billion (AP-14) for the facilities of PGT/PG&E, Northwest, and Northern Border. These facilities, of course, were predicated upon Northwest receiving the State of Alaska's royalty gas and a reduction in the facilities required for Northern Border. In view of the state's contractual arrangement with Tennessee, Southern and El Paso Natural, this proposal may no longer be applicable. The facilities in the lower 48 states proposed by Arctic Gas are estimated at $1.607 billion (AA-71).

Alcan argues that the expansion of the existing Westcoast and Alberta Gas Trunkline systems to accommodate the Alaskan volumes only will cost an estimated $991 million (AP-14). Exhibit ST-31 reflects an estimated cost of $783 million for the facilities relative to the transportation of Delta gas. Although, as noted earlier, the Alcan witnesses were unable to indicate the actual cost allocation between these two projects, it does appear that the Maple Leaf costs might be slightly less (Kiely Tr. 141/22,706). The Canadian Arctic facilities which are south of Lake Zama plus the Alberta Natural expansion are shown to cost an estimated $2.381 billion for the transportation of U.S. and Canadian gas; of this, $870 million could be attributed to Canadian use. 25/

The advantage for this segment, therefore, seems at first glance to rest with Alcan, with a savings in the order of $600 million for the joint project or $520 million for costs to U.S. consumers. However, not only will this slight saving be offset by an inordinately greater cost north of Lake Zama, but the resulting facilities will be of a much lower capacity and will be completely integrated with the existing Canadian pipelines wherein the U.S. consumers will, according to the proposed tariff, pay a disproportionate share of the incremental costs. 26/

Although it is possible that a single direct facility from Fort Nelson to Monchy might be more efficient and cheaper to construct and operate, the Alcan witnesses indicated that such a study was not made nor was one planned; therefore, any consideration of an improved Alcan system is mere conjecture.

25/ Canadian Arctic and Alberta Natural costs from Exhibit AA-71 less cost to Sousa shown in Exhibit AA-139.

26/ See Staff Allocation Brief.

When comparing the estimated capital costs presented by the Alcan and Maple Leaf proposals themselves, which Staff feels are neither realistic nor supportable, with those of Arctic Gas there is no doubt of the superiority of the Arctic Gas project.

As will be noted below under the environmental section (3) the Fairbanks Corridor Alternative would be environmentally preferable to all three of the applied for projects, even if such an alternative includes a pipeline from the Mackenzie Delta along the Dempster highway to the vicinity of Whitehorse (Richards Island lateral). It must be emphasized that this environmental preferance is not for the low pressure, thin walled pipeline being proposed by the Alcan project . What is contemplated in this environmentally preferred system is a 48-inch and 42-inch diameter high pressure project similar to the Arctic Gas project re-aligned to the Fairbanks corridor. The testimony of Staff witness Kiely (Tr. 141/22,681, et seq.) discusses the probable economic consequences of such a project. The cost of a 48-inch diameter pipeline from Prudhoe Bay, through Fairbanks, along the Alcan Highway (including south of Fort Nelson) to Caroline and Empress, Alberta would be in the neighborhood of $6.5 billion (Exhibit ST-31). The facilities currently proposed by Arctic Gas from Empress to Dwight, Illinois are estimated at $1.3 billion (Exhibits AA-35 and 71). A Richards Island lateral with a capacity of 2.4 Bcf/d would cost approximately in excess of $2 billion; thus, the total cost of the environmentally preferable alternative would be in the range of $10 billion, more than 16% greater than the Arctic Gas project as proposed. In view of this, it is still Staff's position that such an alternative is not economically viable when compared with the Arctic Gas project.

Staff's position with respect to economics and unit cost can be summarized as follows:

(a) The Arctic Gas showing of capital and unit cost although slightly optimistic, appears to be reasonable. In particular, the argument of the Green Construction witnesses was, in the main, successfully rebutted.

(b) The El Paso project is more susceptible to capital cost overruns because of the greater use of new and untried technology. The 12 percent increase envisioned by the Arctic Gas witnesses is reasonable, as is their inclusion within the cost of service of $1.00 per MMBtu for fuel use.

(c) The costs of both the Alcan and Maple Leaf projects must be considered when comparing with Arctic Gas. Alcan's construction schedule is unrealistic, and the supposed saving on escalated cost is indefensible.

(d) The Alcan and Maple Leaf projects are much costlier than the Arctic Gas project for both the U.S. and Canadian consumers. Not only are Alcan's projected unit costs higher, particularly in the west, but because of highly questionable capital cost estimates and inequitable and unsupported allocation methods, they are also highly suspect.

(e) On comparison the Arctic Gas project will be the ~~will be~~ cheapest of the three, both on a capital and unit-cost basis.

(3) Environment

The Alaska Natural Gas Transportation Systems Environmental Impact Statements evaluating the proposals of Arctic Gas, El Paso Alaska, and Alcan represent the most exhaustive study undertaken by the FPC environmental Staff to date. Working in cooperation with Staff members of the U.S. Department of the Interior (DOI), the Commission Staff issued a three-volume DEIS in November 1975 which adopted the 16-volume DEIS prepared by DOI, a five-volume FEIS in April 1976 which adopted the 11-volume FEIS prepared by DOI, and a two-part Supplement to the FEIS in September 1976. This massive effort culminated with the presentation of more than 40 environmental Staff witnesses in the Administrative Hearings to support the findings of the FEIS.

The Staff's conclusions concerning the environmental impact of the Arctic Gas, El Paso Alaska, and Alcan proposals have been based on a recognition that if gas is to be transported from Prudhoe Bay to the lower 48 states, facilities will have to be constructed. In this context, the overall projects as proposed by Arctic Gas, El Paso, and Alcan are each considered environmentally acceptable, presuming that the mitigating measures proposed by the applicants and those that would be developed and required by Federal agencies would be implemented and successfully enforced. These mitigating measures would significantly reduce potential impact and hold environmental damage to a minimum.

Staff's environmental analysis concludes that there are undesirable aspects associated with each project. It is clear that if one of the three proposals is certificated and built, impact associated with scenic, recreational, and game sanctuaries would not be avoided. In particular, the Arctic Gas system traverses the Arctic National Wildlife Range and the El Paso system traverses the Chugach National Forest and Prince William Sound areas which are highly worthy of preservation. The Alcan project lacks the necessary expansion and flexibility required to transport additional volumes of gas to the lower 48 states, suggesting that additional pipeline looping would be needed in the future. Both El Paso Alaska and Alcan projects would require that the Maple Leaf Pipeline system be constructed in Canada if transportation of the Mackenzie Delta gas is to become available for future Canadian consumption. The El Paso project, the least environmentally desirable of the three proposals, requires pipeline and LNG facilities to be built in areas of high seismic risk and unique beauty.

Staff believes that the Arctic Gas proposal, without the western leg, is environmentally preferable to the other two proposals, and it is preferable to any other route, including Staff's Fairbanks Corridor Alternative, if it included the Maple Leaf Pipeline system. However, the Fairbanks Corridor Alternative, suggested by the Commission Staff, with the Richard Island Lateral, remains environmentally superior to Arctic Gas, El Paso Alaska and Alcan if both proposed and non-proposed systems are considered (Tr. 23,772, 23,604-23,605; ST-52, p. 389; 23,613). This 48-inch diameter high-pressure system could provide the flexibility for expansion not available with the Alcan proposal, as well as environmental benefits not available with either Arctic Gas or El Paso Alaska. 27/ The above conclusions do not consider economic feasibility. These considerations are covered elsewhere in this brief. For an economic analysis of the Staff's Fairbanks Corridor proposal, see Section IV (2) above.

(4) Engineering

The particular terrain that is traversed by each of the proposed Alaskan natural gas transportation systems and their selected mode of operation determines the nature and extent of the engineering required for each project. Staff

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27/ A description of this alternative appears on page A-7 of Exhibit ST-18 and Tr. 23,527-23,529.

believes that the alignment of the Arctic Gas project with its proposed design parameters is clearly superior to the other two projects. The Arctic Gas system has been designed against a background of extensive research and engineering planning. Its proposed alignment avoids areas of high seismic risk, mountainous terrain, and high soil liquefaction potential. In contrast, the El Paso system would employ sophisticated liquefied natural gas (LNG) technology to build terminals in areas of high seismic vulnerability. El Paso has not conducted the necessary base line studies to accumulate the geological information to adequately design its system and estimate costs. The El Paso pipeline passes through rugged mountainous terrain. The Alcan project also traverses high seismic and mountainous areas in Alaska and Canada, but not to the degree of El Paso. Alcan faces a soil liquefaction problem along a portion of its route in Alaska from Delta Junction to the Alaska-Yukon border. The Alcan pipeline system is based upon engineering principles and facility limitations which would necessiate further construction and looping once additional supplies of natural gas are found in northern Alaska. The Arctic Gas project is superior to the other two proposals in terms of fuel usage.

The Arctic Gas project is based upon a enormous engineering effort into every important area of design. Arctic Gas has pioneered research in many of these areas like frost heave and construction equipment. It has conducted seismic surveys, soil liquefaction studies, pipe stress tests, and the testing and design of new construction equipment. The design of its pipeline gives gas consumers the most efficient system in terms of net energy at least cost to the consumer. Its alignment avoids mountainous areas and high seismic zones. The Shallow Bay area of the Mackenzie Delta is the only geological area where liquefaction might occur; however, recent tests suggest that the soil liquefaction potential is low. The 1680 design is a consistent next step in the evolution of pipeline design.

The Alcan project crosses moderate seismic areas in Alaska 28/ where the liquefaction potential of soils is high and ground shaking and its secondary effects would be the main earthquake hazard. In the Canadian section of the proposed Alcan system, the pipeline would face a danger of fault rupture in the Shakwak Valley where extentions of the Denali Fault are believed capable of magnitude 7 earthquakes. No studies have been performed and presented to this Commission, to support the finding that an adequate design for earthquake and soil liquefaction protection

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28/ Livengood, Alaska to the Yukon, Alaska border.

has been made or that costs for such protection have been adequately estimated. The proposed Alcan pipeline would closely follow the operational Alyeska oil pipeline. Special provisions would have to be made to assure that the Alyeska VSMs or the oil pipeline would not be damaged by Alcan construction where the natural gas pipeline would cross or lie near the operational oil pipeline. It is possible to design suitable construction procedures; however, one mistake could damage the Alyeska pipeline, i.e. a single blasting shot going awry. The Alcan pipeline would also be less efficient than the Arctic Gas line in terms of fuel usuage due to Alcan's lower wall thickness pipe, lower operating pressure, and longer route. Gas consumers would also lose valuable Btu's which will have to be stripped from the Prudhoe Bay gas stream in order to make the gas suitable for its transportation through the Alcan pipeline. 29/ Arctic Gas does not have this problem. The construction of the necessary gas conditioning plant in Prudhoe Bay and the necessary engineering and environmental studies for the Alcan pipeline make its proposed construction schedule impractical and unrealistic.

The El Paso system transporting gas through a rugged mountain area to a geologically dangerous Alaskan shoreline for further transportation to an earthquake region in California has the least desirable geotechnical alignment of the three proposed systems. El Paso's pipeline would cross the Denali Fault, traverse the Chugach mountains in Alaska where many faults may exist, and terminate at Point Gravina, another major earthquake region. El Paso has not conducted the necessary work to establish a proper seismic design for its terminal at Point Gravina, nor has it surveyed and studied the adjacent offshore region. At Point Conception, California, the receiving terminal for El Paso Alaska LNG ships has likewise not been designed adequately to assure that it would withstand the maximum credible earthquake expected at such site. Again the baseline studies necessary for such design have not been done. The El Paso system is extremely fuel inefficient when compared to a pipeline, even with the most advanced LNG technology. In addition to using the gas for fuel, the LNG system uses electricity and fuel oil to operate the regasification facility and tankers. Over the life of the El Paso LNG project, on a conservative basis, it can be expected to consume as addition fuel

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29/ Some of these Btu's extracted from the gas could be put into the Alyeska oil line; however, oil consumers would not necessarily be the gas consumers served by the Alcan project.

between 1/2 to one full years supply of delivered Prudhoe Bay gas. If the Arctic Gas's figures for fuel consumption are accepted, El Paso would deliver 6 percent less gas to market at a 2.25 Bcf/d of Alaskan input level, which over a 20-year period would equate to 1.2 years delivery of gas. 30/ The El Paso system requires a technology at its LNG vaporization and regasification terminals and ships which far surpasses presently operating LNG facilities.

(5) Gas Supply

All of the proposed systems are designed to transport gas from Prudhoe Bay to the lower 48 states. Prudhoe Bay contains the largest hydrocarbon reservoir on the North American Continent. Initial deliveries of gas from the North Slope of Alaska will approximate 2.0 to 2.5 Bcf/d in at least the initial years of production. Staff witness Wayne Thompson testified that a gas sales rate of 2.25 Bcf/d through year 1992, and thereafter a rate of 4.0 Bcf/d, could be achieved. All three of the proposed systems would be able to accommodate the initial volume. However, if additional volumes of gas should become available from nearby areas or Prudhoe Bay volumes reach a high level, Alcan and to a lesser extent El Paso are at a disadvantage to the Arctic Gas system, because of their capacity constraints and fuel usage.

The Kuparuk and Lisburne formations in the Prudhoe Bay area are possible future sources of additional supply. The Department of Interior estimates that reserve additions from these areas could reach 2.5 Tcf and 2.4 Tcf respectively. The most promising areas of potentially large gas reserves on the North Slope are the Arctic National Wildlife Range (ANWR) and the Beaufort Sea area. Potential reserve estimates in the ANWR are in excess of 14.5 Tcf and the potential reserves in the adjacent Beaufort and Chukchi sea provinces are estimated at 46.5 Tcf. If additional reserves are forthcoming from these areas, the Arctic Gas system would be the best system of the proposed three to transport such gas.

30/ With 26 trillion cubic feet of gas and with 6 percentage points difference in efficiency, 1.56 Tcf more gas would be delivered to market under Arctic's proposal assuming the same input volumes (See AA-127, p. 11, 16; Mitchell 168/27,653-27,657).

The Arctic Gas project would also benefit Canada through the transportation of gas from the Mackenzie Delta region of Canada. The transportation of Mackenzie Delta gas would further provide benefits to U.S. consumers by reducing the transportation costs associated with Prudhoe Bay gas. The shipment of Prudhoe Bay and Mackenzie Delta gas in one pipeline provides lower transportation costs for gas purchasers from both areas. It can be expected that approximately .7 Bcf/d of gas will be available from Mackenzie Delta in its early years of production. Canada has in recent years been allowing export permits to terminate. It is very doubtful, though, that Mackenzie Delta gas volumes will rise in the future to the level that exports of gas to the U.S. can be resumed at prior levels. Staff concludes, based upon NEB reports, that at best the connection of the Mackenzie Delta reserves will slow down or flatten out curtailment of Canadian exports of gas to the U.S. Rising Canadian domestic needs will absorb the Delta production in a relatively short period of time. The fact that Canada is now a net importer of oil may cause growing pressure upon its current surplus position in natural gas (Exhibit PG-126, page 140).

(6) Financing

The primary determinent to successful financing is the economic viability of a project (Tr. 25,655; 18,565). The project must be able to generate operating revenues sufficient to meet its expenses, service its debt, and provide an adequate return for equity investment and at the same time market a product which the public can afford and will purchase. This assures that a capital market exists which can provide funds to the project. If two projects are equally attractive in terms of economic viability, the cost of financing itself becomes important.

As discussed earlier, Staff believes that the Arctic Gas project is vastly superior to the other two projects in terms of economic viability. It is able to deliver gas to the lower 48 states at a lesser cost than the El Paso and Alcan projects. Lending institutions are available in Canada, the United States and Euro-dollar areas which can provide capital funds to the project. The Canadian market, however, could be somewhat strained because of its proposed portion of the Arctic Gas capital. This could result in additional financing costs, although the funds would probably be available. 31/ The Alcan and Maple Leaf projects would strain it possibly even more.

31/ Over its construction period, Arctic Gas would account for a portion of new gross new corporate issues in Canada higher than normally taken by any one issuer (See Staff Financial Brief).

In terms of financial costs, the El Paso project is more attractive. The cost of capital for the Canadian portions of the Arctic Gas or Alcan projects will be higher whether the capital comes from Canada or U.S. markets. The El Paso project also has the benefit of Federal subsidies through the U.S. government guarantee under Title XI of the Merchant Marine Act of 1931, as amended (Jiorle/Tr. 25,524-25,525).

(7) Tariff

Each of the three main applicants in this proceeding have filed pro forma tariffs designed to delineate the typical terms and conditions upon which gas transmission service would be rendered. The issues involved with tariff matters are common to all three applicants and would apply equally to all systems on an overall comparison basis except in the instance discussed below.

The one area where a tariff matter does have importance in an overall comparison between the applicants involves the proper allocation between U.S. and Canadian gas as it transits Canada in the same pipeline. Both Alcan and Arctic Gas have proposed a different manner to allocate costs between the U.S. and Canadian gas. Staff believes that the Arctic Gas procedure of utilizing the Mcf-mile method is a fair and equitable way of allocating costs. However, the proposed Alcan procedure is not fair and equitable to U.S. shippers. Alcan's method of cost allocation segregates its individual Canadian systems and assign costs to U.S. markets on an incremental basis. Alcan would freeze Alaskan gas costs at the initial looping stage of the AGT and Westcoast systems, which is the most expensive stage of any system's expansion. Later additons of other gas would get the benefit of lower costs. For this reason and others, as outlined in our cost allocation brief, Staff believes Alcan's Canadian allocation procedures are inequitable.

(8) Canadian Law and Treaty

Arctic states in its Canadian Reply Brief (p. 27) that Staff believes Canadian issues are "not real." This is inaccurate. The record evidence and legal argument of the parties have greatly reduced the number of conceivable unknowns which flow from the transit of U.S. gas across Canada. Moreover, these conceivable unknowns are not likely to affect the interests of the United States adversely, given the unprecedented trading relationship and history of cooperation between the two countries and the recent hydrocarbon treaty. The treaty is useful to the analysis not so much for its terms and conditions or for speculation about how protocols might be applied to a specific natural gas transportation system, but rather as evidence

that both governments are committed to carrying past cooperation into the future. Based in large measure on an evaluation of the persuasive record contribution of the State Department, 32/ Staff concludes that the Canadian law and treaty issue offers little if any guidance in a choice of an Alaskan Natural Gas Transportation System. The risks associated with the transit of United States gas across Canada are "real", but Staff believes they are modest and can be prudently incurred.

(9) Markets

The record in this proceeding contains considerable market and end-use information, but only with respect to those markets served by the respective potential shippers. However, reliability of this information is questionable. Since the major portion of the Prudhoe Bay reserves has not been contracted for, the identification and extent of specific markets to be served is merely speculative. Furthermore, in view of the time that will be required to complete any of the projects, we believe that these projected market studies may no longer be representative of the actual situation. The projected market requirements and anticipated supplies are too speculative to be utilized, particularly for comparative purposes. At the time such gas becomes available for curtailments, experienced during the interval coupled with a higher cost of gas, especially if deregulation becomes a fact, may result in a dramatic alteration in consumption patterns, not only for the participants but for the nation as a whole.

Although the future market requirements of individual pipelines may be speculative, it is apparent that the nation is presently experiencing a natural gas shortage 33/ and further, that future supply projections show a continued decline resulting in an even greater shortage. It is for this reason that Staff has recommended that, in spite of the absence of gas purchase contracts, a trunkline facility should be authorized at this time, but that such facilities be only those required to transport Alaskan gas to the lower 48 states and which would serve all regions of the country with a minimal amount of additional facilities (Lathom/Tr. 108/14,169-70).

32/ Exhibit EP-231, p. 173-188.

33/ "The Congress finds and declares that--(1) a natural gas shortage exists in the contiguous states of the United States; . . ." (Public Law 94-586).

Thus, the choice of an applicant does not revolve around which market its facilities will serve but rather which will best provide access to Prudhoe Bay gas for all markets. The trunkline of the Arctic Gas project best meets this criterion. It has been adequately demonstrated on the record that all regions of the country can be served either directly through the Northern Border facilities or by displacement. The proximity of the terminal point of the Northern Border Pipeline at Dwight, Illinois, to the center of the nation's major natural gas market area is graphically illustrated by Exhibit ST-46, and its relationship with the nationwide grid of existing pipeline facilities is evident when the proposed route is compared with Item by Reference ST-A.

V. CONCLUSIONS AND RECOMMENDATIONS

The modified Arctic Gas project which economically connects the Mackenzie Delta reserves to existing facilities within Canada and the Prudhoe Bay reserves to existing facilities within the United States, is vastly superior to the El Paso Alaska project and the Alcan and Maple Leaf system. The evidence is overwhelming.

Staff supports the Arctic Gas project modified and improved by the elimination of the "western leg" lateral to California, which has been shown on this record to be high risk, uneconomic, unnecessary and environmentally unsound. 34/ The project supported by Staff is shown in Figure 1. Reference is made to Appendix B which is a check list of Staff proposed action on specific docketed applications in this case.

In Section IV(1)(c) we concluded, for the reasons stated therein, that the Maple Leaf project must be considered with the Alcan project. Having taken this position for our purposes in reaching a position we hasten to point out the obvious. It is possible that the Canadian Government will decide that it is in Canada's best interests to defer indefinitely into the future, consideration of any and all projects south along the Mackenzie River corridor, no matter what the economic consequences for Canada and the United States. We believe, however, that our responsibilities in this case are to develop a record based upon traditional economic, engineering, environmental and other factors and to take a position based upon these factors and these factors alone. Determinations as to what the United States Government should do in respect to authorizing an Alaskan gas project, if use of the Mackenzie Valley corridor is precluded, would depend upon the reason for the Canadian rejection of a Mackenzie Valley corridor and a Canadian decision on what was not precluded. Consultations between the two governments would be necessary, and should include the participation of each government's working level Staff who were intimately involved in the development of the decision-making process. Only in the case when no Alaska gas would be permitted to transit Canada

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34/ Staff's position on the "western leg" or California lateral is fully covered in three specific briefs, which are listed in Appendix A.. . September 9, October 29 and November 19, 1976. The November 19th brief deals with Section 5(b)(1)(c) of Public Law 94-586 in respect to the "western leg".

is there a clear Staff choice of an alternative to the Arctic Gas project, without the need for more information. In this particular situation the El Paso Alaska project, in one of its variations, would be all that the United States could authorize.

Respectfully submitted,

Allan W. Anderson, Jr.
Commission Staff Counsel

Brian J. Heisler
Commission Staff Counsel

Washington, D.C.
December 7, 1976

Issue Date	Title of Brief
November 26, 1976	INITIAL SOCIO-ECONOMIC BRIEF OF THE COMMISSION STAFF
December 1, 1976	ANSWERING TARIFF BRIEF OF THE COMMISSION STAFF
December 3, 1976	GEOTECHNICAL REPLY BRIEF OF THE COMMISSION STAFF
December 3, 1976	BRIEF OF THE COMMISSION STAFF ON COST ALLOCATION ISSUE

Briefs to be Filed by Staff Prior to December 15, 1976:

STAFF NET NATIONAL ECONOMIC BENEFITS BRIEF

STAFF FINANCING BRIEF

STAFF WRAP-UP BRIEF

Reply briefs may be filed on socio-economic and environmental issues.

APPENDIX B

CHECKLIST FOR REGULATORY ACTION ON STAFF'S ARCTIC GAS TRUNKLINE

(1) Grant applications of Alaskan Arctic Gas Pipeline Company in Docket Nos. CP74-239, CP74-240

(2) Grant applications of Northern Border Pipeline Company in Docket Nos. CP74-290, CP74-291, with election filing for up to fully-powered case

(3) Deny applications of Pacific Gas Transmission Company in Docket Nos. CP74-241, CP74-242

(4) Permit withdrawal of Interstate Transmission Associates (Arctic) in Docket Nos. CP74-292, CP74-293

(5) Hold in abeyance */ action on the application of Northwest Pipeline Corporation in Docket No. CP76-174, directing submission of description of facilities needed for "Rye Valley" displacement in conjunction with termination of NEB Lic. GL-4

(6) Hold in abeyance */ the following pro forma Section 3 and 7(c) applications by shipper companies until perfected by submittal and Commission approval of gas purchase contracts: Columbia Gas Transmission, et al. CP75-257, Natural Gas of California (PGT) CP75-247, Pacific Interstate Transmission Company CP75-248, Northwest Alaska Company CP75-250, CP75-251 and Northwest Pipeline Company, Michigan Wisconsin Pipeline Company CP76-43, Natural Gas Pipeline Company of America CP76-49, Nothern Natural Gas Company CP76-45

(7) Deny stale Section 3 application of Pacific Gas Transmission Company in Docket No. CP71-182 for new import from Alberta.

(8) Deny the following pro forma Section 7(c) applications rendered moot by eastern displacement; Columbia Gas Transmission Corporation CP76-48; Panhandle Eastern Pipeline Company CP76-54; Texas Eastern Pipeline Company CP76-54

(9) Deny the following pro forma Section 7(c) application rendered moot by ITAA action Pacific Interstate Transmission Company CP75-249, CP75-251

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*/ Authority for this is section 5(a)(1) of PL94-586 which provides that the Commission "may refuse to act on any application, amendment, thereto, or other requests for action under the Natural Gas Act".

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding in accordance with the requirements of Section 1.17 of the Rules of Practice and Procedure.

Dated at Washington, D. C., this 7th day of December, 1976.

Allan W. Anderson, Jr.

Allan W. Anderson, Jr.
Commission Staff Counsel

Washington, D. C.
December 7, 1976

FEDERAL POWER COMMISSION

NEWS RELEASE

WASHINGTON, D.C. 20426

IMMEDIATE RELEASE
MAY 2, 1977 No. 23113
El Paso Alsaka Company, et al.
Docket No. CP75-96, et al.

FPC RECOMMENDS OVERLAND ROUTE FOR TRANSPORTATION OF ALASKAN NATURAL GAS

The Federal Power Commission today recommended an overland pipeline route to bring Alaskan natural gas to contiguous U.S. markets, but split on which of the two proposed overland routes to specifically recommend .

Chairman Richard L. Dunham and Commissioner James G. Watt recommend the Alcan proposal, and Commissioners Don S. Smith and John H. Holloman III recommend the Artic Gas proposal. All three proposals are described in the accompaning fact sheet (News Release No. 23112).

The Commission found that all three proposals are technically and economically feasible and that a system should be built to bring the natural gas to the lower 48 market. It said the benefits of Alaskan gas would help meet the energy needs of our society and fully justify the costs and risks involved.

However, it found an overland route preferable because of its greater reliability, easier expansibility, greater efficiency in terms of gas consumed in route, and lesser environmental impact.

The Canadian protions of the proposed overland routes are still subject to approval of the Canadian Government. The Commission said that in deciding between the two overland routes, additional information is needed as well as an understanding of the intentions of the Government of Canada. "Based on today's circumstances, reasonable men can disagree on the right course of actions," the Commission said.

(over)

Commissioners Holloman and Smith pointed out that the Alaska Natural Gas Transportation Act precludes the Commission from basing its recommendation on the fact that Canadian authorities have not at this time rendered a decision authorizing a pipeline system through Canada. They therefore recommend approval of the Arctic Gas proposal, conditioned on favorable decisions by the Canadian government to make the route available and permit Canadian natural gas reserves from the Mackenzie Delta to be transported by the same system. Absent a favorable decision concerning the Mackenzie Delta reserves, they would recommend approval of the Alcan project. If Canada disallows an overland pipeline route, they would approve the El Paso project.

Today's approximately 500-page recommendation follows over three years of hearings and consideration by the FPC, and compilation of a 45,000-page record. FPC Administrative Law Judge Nahum Litt last February 1 recommended approval of the Arctic Gas proposal. The Commission heard oral argument in the proceeding the first week of April.

The Alaskan Natural Gas Transportation Act of 1976 required the FPC to make a recommendation to the President by May 1, which fell on a Sunday. The President is to make a recommendation to Congress by September 1, but may postpone his decision until up to December 1, at his discretion.

The Commission said in making today's recommendation it is acting in an advisory capacity to the President, setting forth the strengths and weaknesses of the various options.

The three competing applications are by Alaskan Arctic Gas Pipeline Company known as the Arctic Gas Study Group, a consortium of U.S. and Canadian companies; by El Paso Alaska Company; and by Alcan Pipeline Company.

The Prudhoe Bay Field contains the largest unit of reserves yet discovered on the North American continent--virtually every estimate exceeds 20 trillion cubic feet of proven producible reserves, enough to provide about 5 percent of our gas consumption for the next 25 years. The gas can be produced for sale in four or five years.

(continued)

The Commission found the system approved should be designed to carry initially 2 to 2.5 billion cubic feet daily, with expansibility in the 1 to 1.5 range. Under the three proposals, the earliest the gas could reach the lower 48 states is 1981 (under Alcan's proposal).

The cost of the three projects were estimated by the applicants in the $6.5 to $6.7 range, in 1975 dollars. By the time the project is built the impact of inflation undobutedly would drive the cost in nominal dollars of $10 billion or more. There are risks of cost overruns and delays in completion, it said, but in each instance the risk is well within an acceptable range. There is virtually no chance that any system would become so costly as to be uneconomic, it stated.

The Commission recommended rolled-in pricing be used, meaning the price of the Alaskan gas would be averaged in with all other gas in the purchaser's system. This would assist in obtaining the critical financing, the FPC noted. Federal financial assistance was not recommended by the Commission. However, it said if this is to be avoided, innovative approaches will be needed to meet the greatest financing challenge ever considered by the FPC. A choice must be made, the FPC said, as to who shall bear the ultimate risk of project failure, severe interruption, or massive cost overruns--private investors or consumers. Should the former be chosen, the rate of return would have to be an adequate incentive to invest--in the 11 to 15 percent range. Should consumers and taxpayers bear the risk, their charges should be lower.

It is imperative that the price of Prudhoe Bay gas be established as soon as possible, the FPC declared, and proposed to establish in the near future a proceeding to determine that price. It will also examine pricing mechanisms other than setting a fixed price, it added, such as formula pricing. However, it said that since its authority to approve such a pricing procedure could be challenged, it urged the President to submit legislation to authorize it to determine field or wellhead rates for Prudhoe Bay gas on the basis of market factors and alternative fuel prices.

(over)

Adverse environmental impacts of all three projects can be substantially avoided or mitigated, the FPC found. All three applications demonstrated their technical ability and determination to reduce to acceptable levels the environmental impacts.

Of the three proposed systems the Commission concluded that Alcan promises the least environmental impact, if proper mitigative actions are taken. However, it rejected Alcan's contention that alignment in an existing utility corridor is a compelling reason to choose one transportation system over another. While some construction and operation impacts would be smaller, the FPC said, the overall decrease is not substantial. Each system must be judged on its own total impact, the Commission stated.

Substantial evidence in the record supports the feasibility of winter construction, the FPC said, which Arctic Gas would use wholly and the other two would use in part. Machines can be prepared and men equipped to enable construction to proceed in all except the most severe conditions, it said. Winter construction poses greater economic risks than summer consturction, the FPC stated, but it is clear that in artic regions winter construction is environmentally sounder.

The Commission said it intends to implement the requirements for a western leg to deliver gas directly to the U.S. west coast, but at this time does not believe it necessary to make a final decision as to what new facilities would be needed. That decision can be deferred until about two years before delivery is to begin, it said. However, the Commission found the Oxnard, Calif., site should be the first choice for a west coast ship terminal and regasification facilities should El Paso be granted a certificate.

-FPC-

For futher information call 275-4006 (Area Code 202)

DC - 114

FEDERAL POWER COMMISSION
WASHINGTON, D.C. 20426

IN REPLY REFER TO:

May 2, 1977

The President
The White House
Washington, D. C. 20500

Dear Mr. President:

Enclosed is the recommendation of the Federal Power Commission pursuant to Section 5 of the Alaska Natural Gas Transportation Act of 1976. We have come to the following basic conclusions:

1. It is in the best interests of the citizens of the United States that a system be built in the near future to transport natural gas from the North Slope of Alaska to the contiguous United States.

2. Three competing groups have applied for a certificate of public convenience and necessity to construct and operate such a system. They are the Alaskan Arctic Gas Pipeline Company, El Paso Alaska Company, and Alcan Pipeline Company. The first and third applicants propose overland systems, while the second is a pipeline and tanker route.

3. We recommend that an overland system through Canada be selected, if such a route is made available by the Government of Canada on acceptable terms and conditions. If appropriate, discussions could be undertaken after the completion of proceedings before their National Energy Board. Until the Canadian Government has made a decision whether a land route is available, it would be premature for this Commission to recommend a route, unconditionally.

4. In making a decision between the two overland routes, it will become obvious to the reader of this recommendation that additional information is needed as well as an understanding of the intentions of the Government of Canada. Based on today's circumstances, reasonable men can disagree on the right course of action. Under present circumstances and expectations, Chairman Dunham recommends Alcan, Commissioner Watt Alcan, Commissioner Holloman Arctic, Commissioner Smith Arctic.

Commissioners Holloman and Smith recommend that an overland system through Canada be selected. Section 5(d) of the Alaska Natural Gas Transportation Act precludes the Commission from basing its recommendation upon the fact that Canadian authorities have not at this time rendered a decision authorizing a pipeline system to transport Alaskan natural gas through Canada. They, therefore, recommend approval of the Arctic proposal, conditioned upon timely affirmative decisions by the Government of Canada to make the route available and, after development, to allow simultaneous transportation of Canadian natural gas reserves from the Mackenzie Delta. In the absence of a Canadian determination that development and transportation of Mackenzie reserves should be permitted, the Alcan project should be approved, subject to the Government of Canada's making the route available on acceptable terms and conditions. In the absence of timely and acceptable agreements with the Canadian Government to make a route available for an overland system, a United States pipeline and tanker system can be built and can deliver gas to the contiguous United States at an economical price, and the El Paso project should be selected.

5. In the absence of agreement with the Canadian Government, a United States pipeline can be built in Alaska and a tanker system can deliver the gas to the contiguous United States at an economical price.

6. Any of the proposed systems can be financed without extraordinary risk-bearing by consumers or taxpayers, if investors are allowed the opportunity to earn an adequate return commensurate with the unusual size and degree of risk in this project. Alternatively, consumers and taxpayers could assume the risks of noncompletion of the system or interruption of service in return for a lower delivered cost of gas.

In reaching these conclusions, we have exhaustively considered the massive record compiled here and material outside the record, as directed by the Alaska Natural Gas Transportation Act. Our full recommendation covers hundreds of points. In the last analysis, we find the following items to be the most important and we recommend that you and the Congress direct your attention primarily to the confirmation or modification of these conclusions.

A. At least 20 trillion cubic feet of producible natural gas exist at Prudhoe Bay in Alaska, enough to provide about five percent of our natural gas consumption for the next 25 years. These volumes are adequate to support an economical transportation system.

B. This gas must be produced and delivered to markets both for its own value as energy and because its extraction is necessary to avoid a long-term reduction in oil production from Prudhoe Bay.

C. This gas can be delivered to the contiguous United States and successfully marketed by any one of the three competing applicant groups: Arctic, Alcan and El Paso.

D. Each system will have some adverse environmental impacts. We believe all of these impacts to be acceptable, given proper precautionary measures. Arctic would involve crossing the Arctic National Wildlife Range, and other lands now little used by man. The other projects would generally follow existing utility corridors - a distinct environmental advantage.

E. An overland route can deliver each unit of gas more cheaply than a land and water route using liquefied natural gas technology. If Canadian gas is also developed, the sharing of facilities will lower Arctic's cost of servi to Americans slightly below that of Alcan.

F. Calculations of Net National Economic Benefit produce the same relative results for the three systems. El Paso has an advantage in this analysis, because all of its tax payments go to the United States, and virtually all of its wage and material payments go to Americans.

G. Using our best estimate of the likely ultimate construction cost (not the applicants' figures), El Paso's system would require the least capital, with Alcan and Arctic costing somewhat more.

H. Arctic has the greatest risk of major cost overruns beyond our estimate, primarily because of its difficult winter construction schedule. El Paso is least vulnerable to such overruns.

I. Each of the systems can be constructed basically in the manner proposed, with the qualifications and conditions contained in our report.

J. Each of the systems should operate reliably once service begins. El Paso has a slightly higher likelihood of service interruption due to its complex nature and greater seismic risk.

K. 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.

L. All of the above cost conslusions assume the simultaneous development and transportation of Canadian reserves in the Mackenzie Delta. Arctic's proposed route has the advantage of passing directly through this area. Should the Canadian Government decide not to proceed with the development of those reserves at this time, the overall balance of cost advantages shifts to Alcan.

M. Should additional gas be found in the vicinity of the transportation system, expansion capability could become important. Arctic can expand to deliver up to 3.5 billion cubic feet per day (Bcfd) from Prudhoe Bay, at a small cost. Any such expansion would lower the unit cost of gas delivered. Alcan is designed to start at 2.4 Bcfd, but can expand to 3.2 Bcfd at a small additional cost. El Paso can also expand its pipeline deliveries to 3.2 Bcfd at low cost, but its costs for ships, terminal facilities, and operating expenses will rise more rapidly proportionate to increased deliveries.

N. The North Slope gas should be distributed as widely as possible throughout the United States. Wide distribution will encourage broad-based financing for the chosen project, an important consideration in an undertaking of this size. Furthermore, because there is always some threat of service interruption, no area of the country should be allowed to become too heavily dependent on the Alaskan gas.

O. A choice must be made as to who shall bear the ultimate risks of project failure, service interruption, or massive cost overruns. If investors are to bear them, they will expect a commensurate return. If they do not receive such a return, the project cannot be privately financed. If consumers or taxpayers bear the risks, their charges, in the event of success, should be lowered in return for the service they have rendered. Our recommendation outlines the dimensions of each plan and contains specific suggestions for implementing either approach.

The President May 2, 1977

The decision now before you, we recognize, will significantly influence this nation's energy future. Therefore, beyond providing our best thinking in these recommendations, the commissioners and staff of the Federal Power Commission stand ready to assist you in every way.

Sincerely yours,

Richard L. Dunham
Chairman

James G. Watt
Vice Chairman

Don S. Smith
Commissioner

John H. Holloman III
Commissioner

For Monday Release
May 2, 1977

Office of Sen. John Sparkman
Contact: Grover Smith, Press Sec'y
202-224-4124, Wash., D.C.

Federal Power Commission Decision
Not Final, Says Sparkman Noting
Congressional-Presidential Role

(NOTE TO REPORTERS: This release is a comment on the Federal Power Commission release anticipated during the afternoon of Monday May 2).

WASHINGTON, D.C.---Foreign Relations Committee Chairman John Sparkman (D., Ala.), noted today that the Federal Power Commission recommendation for a Trans-Canadian pipeline running from Alaska to the United States still must be approved by the Congress and the President.

"The recommendation of the Federal Power Commission is not final," said Sparkman. "It is but one step in the process of selecting a project for bringing Alaskan gas to the lower 48 states.

"The Federal Power Commission is not structured for considering the foreign policy implications of this issue, and these considerations will now be fully explored by the President and the Congress," he stated.

In the face of three proposals submitted for natural gas routes from Alaska, the FPC today voted 4-0 for a Trans-Canada route, rather than a route involving Trans-Alaska pipeline and U.S. shipping to a Southern California distribution point. In a vote on which of two Trans-Canada routes proposed, the Commission voted two for a route along the Alcan Highway and two for a $10.4 billion line beginning on the Alaskan North Slope, running southeast through Canada to a point in Alberta near the U.S. border where the line would split with one route going down the U.S. Pacific Coast and the other to the Midwest.

- 30 -

FPC Divided in Recommendation of Alaskan Gas Transportation System; Two Members Recommend Alcan and Two Recommend Arctic Gas

On 5/2/77 the FPC forwarded a 460-page report to the President on the three competing Alaskan gas transportation proposals, together with a letter of transmittal containing a split (two-two) recommendation. "Under present circumstances and expectations," Chairman Dunham and Commissioner Watt recommended the Alcan project (the 48-inch alternative filed in March 1977), while Commissioners Holloman and Smith recommended Arctic Gas.

The report was submitted pursuant to the Alaskan Natural Gas Transportation Act of 1976 which requires the President to issue a decision by 9/1/77 regarding the transportation system to be built. This decision may be delayed for up to 90 days if the President should determine the need for an additional or supplemental environmental impact statement or the need otherwise for additional time to render a sound decision. The President's decision requires Congressional approval to become effective.

All four Commissioners favored selection of an overland system through Canada, provided such a route is made available by the Government of Canada on acceptable terms and conditions. However, they said, in deciding between the two overland routes (Alcan and Arctic Gas), further information is needed, as well as knowledge of the intentions of the Canadian Government. "Based on today's circumstances, reasonable men can disagree on the right course of action."

The preference of Commissioners Holloman and Smith for the Arctic Gas project was conditioned upon "timely affirmative decisions" by the Government of Canada to make the route available and, after development, to allow simultaneous transportation of Canadian natural gas reserves from the Mackenzie Delta. Absent a Canadian determination to permit development and transportation of Mackenzie Delta reserves, Messrs. Holloman and Smith supported the Alcan project. Failing "timely and acceptable agreements" with the Canadian Government regarding a route for an overland system, selection of the El Paso Alaska project was recommended.

Assuming selection of an overland system, the FPC recommended deferral of a decision on the Western Leg for one to two years until further information may be available regarding the continuation of Canadian exports under licenses due to expire in the early and mid-1980's and the extent of idle capacity on existing systems.

Neither the transmittal letter nor the FPC's report explained the specific basis for the recommendation of Arctic Gas by Commissioners Holloman and Smith, or for the recommendation of Alcan by Chairman Dunham and Commissioner Watt.

The Commission's transmittal letter stressed the following conclusions as most important: (1) at least 20 Tcf of producible gas reserves are contained in the Prudhoe Bay Field of Alaska, enough to provide about 5% of U.S. natural gas consumption for the next 25 years, and this gas can be delivered to the Lower 48 States and successfully marketed by any one of the three competing applicant groups; (2) each system will have some adverse environmental impacts, all of which are deemed acceptable given proper precautionary measures, although Alcan and El Paso Alaska have a "distinct environmental advantage" in generally following existing utility corridors; (3) an overland route can deliver gas more cheaply on a unit basis than a combined land and water route using liquefied natural gas technology, and Arctic Gas having a slight advantage over Alcan in this regard; (4) if the Canadian Government decides not to proceed with development of Mackenzie Delta reserves at this time, the overall balance of cost advantages shifts from

Arctic Gas to Alcan; (5) net national economic benefits are roughly the same for all systems, although El Paso Alaska has an advantage in the calculation because all of its tax payments go to the United States and virtually all of its wage and material payments go to Americans; (6) based on best estimates of likely ultimate construction costs (not the applicants' figures), the El Paso Alaska system would require the least capital, with Alcan and Arctic Gas costing somewhat more; (7) Arctic Gas has the greatest risk of major cost overruns, primarily because of its difficult winter construction schedule, while El Paso Alaska is least vulnerable to such overruns; (8) each of the systems should operate reliably once service begins, although El Paso Alaska is slightly more susceptible to service interruption due to its complex nature and greater seismic risks; (9) El Paso Alaska would be the easiest system to finance because of its slightly lower initial cost and the availability of federal loan guarantees for tanker construction under Title XI of the Merchant Marine Act; (10) Arctic Gas can expand to deliver up to 3.5 Bcf/d and Alcan to deliver up to 3.2 Bcf/d from the Prudhoe Bay Field at small cost, while expansion costs for El Paso (for ships, terminal facilities and operating expenses) would be greater relative to increased deliveries; (11) North Slope gas should be distributed as widely as possible throughout the United States, both to encourage broad-based financing for the selected project and to avoid too heavy a dependence by any area of the country on Alaskan gas; and (12) any of the proposed systems can be financed without extraordinary risk-bearing by consumers or taxpayers if investors are allowed an opportunity to earn an adequate return commensurate with the unusual size and degree of risk of the project. Alternatively, consumers and taxpayers could assume the risks of noncompletion of the system or interruption of service in return for a lower delivered cost of gas.

The FPC's 460-page report summarized major comparative advantages and disadvantages of the three projects from the standpoint of economics, environmental impact, system reliability and LNG safety, and financeability.

(1) Arctic Gas is economically superior -- in view of an estimated 20-year national average cost of service of 76¢/MMBtu (in 1975 dollars) compared to 79¢/MMBtu for Alcan and $1.09/MMBtu for El Paso Alaska. On the other hand, Arctic Gas is the most likely to suffer substantial cost overruns, due to potential construction delays in completing its North Slope section. However, even with a $270 million cost overrun in the Prudhoe Bay lateral section and a one-year delay before commencement of service from Prudhoe Bay (an "extreme assumption"), the unit cost of service for Arctic Gas would increase only 12%, or from 76¢ to 85¢/MMBtu. Neither Alcan nor El Paso appear to be subject to large cost overruns due to the forces of man or nature, even though Alcan's average 20-year cost would undoubtedly be somewhat higher than 79¢/MMBtu (in 1975 dollars) because of the unlikelihood of meeting its projected construction schedule. Finally, both Alcan and Arctic Gas can expand inexpensively from the initial flow rate of 2.25 Bcf/d by adding compression. By comparison, in order to expand deliveries, El Paso Alaska's LNG tankers, liquefaction and regasification facilities must all be scaled-up at costs roughly proportional to their initial costs.

(2) Alcan is environmentally preferable because of use of existing utility corridors and all-weather roads over much of its route.

(3) El Paso Alaska, because of its more complex LNG processing and transportation system, is subject to a slightly higher risk of service interruption. El Paso Alaska also presents the risk of hazard to a limited population in the event of an LNG accident, but the probability of such an accident is low and, if one should occur, damage to human life would be minimal.

(4) El Paso Alaska holds a distinct advantage in terms of financeability, even considering the likelihood of cost overruns for all three systems. Among other things, El Paso Alaska can obtain 20% of its total capital requirements easily and cheaply through U.S. Government guarantees available under Title XI of the Merchant Marine Act.

The Commission stressed the need to establish a field price for Prudhoe Bay gas as soon as possible, and indicated its intent to initiate a proceeding toward this end in the near future. In addition, the Commission suggested that field price (including gathering and conditioning) be determined on the basis of market value less transportation costs. In applying this formula, the Commission said "market value" would most likely be set by reference to the city gate cost of incremental gas or energy supplies, while the most appropriate transportation cost would be the national average cost to selected major market areas. Such a pricing formula, the Commission declared, would remove the possibility that producers could exercise monopoly power in the pricing of Alaskan gas, avoid the problem of allocating joint costs of gas produced in association with oil, and offer consumers significant protection against paying a price higher than market value for Alaskan gas since transportation cost increases would be offset by corresponding reductions in field price.

The report also discussed two possible approaches to financing -- one involving guarantee of debt service by project sponsors (assuming additional creditworthy parties can be induced to participate in financing) and the other involving consumer debt guarantees. Under the first approach, the FPC recommended an 18% rate of return on equity -- to be allowed so long as the delivered cost of gas (field price plus transportation cost) does not exceed the market value of the gas, but subject to reduction if market value is exceeded. Under the consumer debt guarantee approach, the Commission would allow a maximum rate of return on equity of 15%. In addition, the Commission recommended adoption of a consumer guarantee fee equal to the difference between the cost of service under the project sponsor debt guarantee approach and the cost of service with consumer guarantees. The consumer guarantee fee would be added to the out-of-pocket transportation cost for purposes of calculating gas field price (under a market value approach).

The FPC specifically did not recommend federal financial assistance to construct a gas transportation system. "Federal backstopping is a default option to be employed only if it is determined that the social benefits of a transportation system are overriding and private parties are unwilling to undertake the project alone at a reasonable cost." Here, however, the "private benefits are substantial and the risks bearable" under the proposed financing alternatives.

The FPC's conclusions differ in certain respects from those of Judge Litt who, in an initial decision issued 2/1/77, recommended Arctic Gas as superior to El Paso Alaska, found that El Paso Alaska nonetheless had a viable project which could be certificated if Arctic Gas were unable to go forward, and held that Alcan had no "possibility" of certification. (The Alcan project before Judge Litt, however, was its original 42-inch project which contemplated commingling of Alaskan gas and Canadian gas; in part because of Judge Litt's criticism, this proposal was replaced in March 1977 by a 48-inch express line alternative to carry only Alaskan gas to Lower 48 markets, with no commingling of Canadian gas.) Another difference was that Judge Litt urged approval of Western Leg facilities at this time rather than a deferral of decision. In regard to financing, Judge Litt recommended federal participation to the extent of an insurance or completion guarantee arrangement to facilitate raising project debt capital at a more reasonable cost, thereby reducing the cost of gas to consumers. (See REPORT NOS. 1090, App. pp1-23; 1095, App. pp1-26.)

The FPC's report to the President is summarized in greater detail in an Appendix to this REPORT.

Canadian Prime Minister Appoints Northern Pipeline Commissioner

On 4/29/77 Prime Minister Trudeau announced the appointment of Basil Robinson as Northern Pipeline Commissioner. Mr. Robinson will be responsible for coordinating all advice to the Canadian Government on the need for a northern gas pipeline, the choices open to the government and the advantages and disadvantages of each proposal. Among other things, he will assist the government in assimilating existing analyses and the forthcoming reports of the Berger Commission, the FPC, the National Energy Board and the two panels operating in the Yukon. Mr. Robinson's role will be to ensure that the Cabinet has before it all the analysis and advice required to make a decision in accordance with the broad national interest.

As part of his responsibilities, Mr. Robinson will consult closely with United States officials concerned with northern pipeline matters.

Mr. Robinson is presently Under-Secretary of State for External Affairs. He has previously been Deputy Minister of Indian Affairs and Northern Development.

Justice Department Concludes General Antitrust Investigation of Natural Gas Industry Not Justified at This Time

On 5/2/77 Donald Baker, Assistant Attorney General of the Antitrust Division, Department of Justice, replied to a letter dated 2/9/77 from Ralph Nader (and certain associates) requesting that the Antitrust Division conduct a general investigation into the natural gas industry to determine whether natural gas producers are engaged in an unlawful conspiracy to withhold gas from the market. In view of actions now being taken by the Antitrust Division on several fronts to scrutinize the natural gas industry, Mr. Baker stated that a more general antitrust investigation cannot be justified at this time. "There is to date no probative evidence of collusion, and a less precisely focused investigation would in large part merely duplicate the efforts of other government agencies . . . . Of course, if either our efforts or those of other agencies reveal any significant indications of collusion, we will rapidly undertake whatever additional investigation is necessary to determine whether an antitrust prosecution is warranted."

The bulk of Mr. Baker's letter described the Antitrust Division's current efforts in regard to the natural gas industry.

First, he said, the Division is closely monitoring the Interior Department's investigation into whether development and production of natural gas in the Gulf of Mexico has been intentionally withheld. The Secretary of Interior has indicated that the Justice Department will receive any evidence of deliberate withholding, and such evidence will be reviewed to determine whether an antitrust violation has occurred or whether further investigation is warranted. "An independent Antitrust Division investigation of possible collusive withholding of natural gas would be largely duplicative of the Interior Department's efforts."

Second, the Antitrust Division is following up on FPC inquiries into whether gas producers and pipelines have unlawfully colluded to withhold gas from the interstate market. "The FPC determined several years ago, based upon data submitted by jurisdictional pipelines, that there may be substantial amounts of dedicated natural gas reserves in the Gulf of Mexico that are not being produced." Also, in

5/23

Summary of FPC gas route decision.

Suggest you glance at pages 12-16 which speak of:

(1) State of AK & federal assistance in project financing.

(2) Early establishment of a field price.

(3) Federal auditing of construction costs during construction & determination of costs to be included in tariff. (Wouldn't that have been nice for the oil pipeline?)

CB

SUMMARY OF FPC REPORT TO PRESIDENT ON ALASKAN NATURAL GAS TRANSPORTATION PROPOSALS

On 5/2/77 the FPC forwarded a 460-page report to the President on the three competing proposals to transport Alaskan North Slope gas to the Lower 48 States, together with a 5-page letter of transmittal containing a split (2-2) recommendation. "Under present circumstances and expectations," Chairman Dunham and Commissioner Watt recommended the Alcan project (the 48-inch alternative filed in March 1977), while Commissioners Holloman and Smith recommended Arctic Gas.

The report was submitted pursuant to the Alaska Natural Gas Transportation Act of 1976 which requires the President to issue a decision by 9/1/77 regarding the transportation system to be built. This decision may be delayed for up to 90 days if the President should determine the need for an additional or supplemental environmental impact statement or the need otherwise for additional time to render a sound decision. The President's decision requires Congressional approval to become effective.

All four Commissioners favored selection of an overland system through Canada, provided such a route is made available by the Government of Canada on acceptable terms and conditions. However, they said, in deciding between the two overland routes (Alcan and Arctic Gas), further information is needed, as well as knowledge of the intentions of the Canadian Government. "Based on today's circumstances, reasonable men can disagree on the right course of action."

The preference of Commissioners Holloman and Smith for the Arctic Gas project was conditioned upon "timely affirmative decisions" by the Government of Canada to make the route available and, after development, to allow simultaneous transportation of Canadian natural gas reserves from the Mackenzie Delta. Absent a Canadian determination to permit development and transportation of Mackenzie Delta reserves, Messrs. Holloman and Smith supported the Alcan project. Failing "timely and acceptable agreements" with the Canadian Government regarding a route for an overland system, selection of the El Paso Alaska project was recommended.

Assuming selection of an overland system, the FPC recommended deferral of a decision on the Western Leg for one to two years until further information may be available regarding the continuation of Canadian exports under licenses due to expire in the early and mid-1980's and the extent of idle capacity on existing systems.

Neither the transmittal letter nor the FPC's report explained the specific basis for the recommendation of Arctic Gas by Commissioners Holloman and Smith, or for the recommendation of Alcan by Chairman Dunham and Commissioner Watt.

The report summarized the major comparative advantages and disadvantages of the three projects from the standpoint of economics, environmental impact, system reliability and LNG safety, and financeability, as follows:

(1) Arctic Gas is economically superior -- in view of an estimated 20-year national average cost of service of 76¢/MMBtu (in 1975 dollars) compared to 79¢/MMBtu for Alcan and $1.09/MMBtu for El Paso Alaska. On the other hand, Arctic Gas is the most likely to suffer substantial cost overruns, due to potential construction delays in completing its North Slope section. However, even with a $270 million cost overrun in the Prudhoe Bay lateral section and a one-year delay before commencement of service from Prudhoe Bay (an "extreme assumption"), the unit cost of service for Arctic Gas would increase only 12%, or from 76¢ to 85¢/MMBtu. Neither Alcan nor El Paso appear to be subject to large cost overruns due to the forces of man or nature, even though Alcan's average 20-year cost would undoubtedly be somewhat higher than 79¢/MMBtu (in

1975 dollars) because of the unlikelihood of meeting its projected construction schedule. Finally, both Alcan and Arctic Gas can expand inexpensively from an initial flow rate of 2.25 Bcf/d by adding compression. By comparison, in order to expand deliveries, El Paso Alaska's LNG tankers, liquefaction and regasification facilities must all be scaled-up at costs roughly proportional to their initial costs.

(2) Alcan is environmentally preferable because of use of existing utility corridors and all-weather roads over much of its route.

(3) El Paso Alaska, because of its more complex LNG processing and transportation system, is subject to a slightly higher risk of service interruption. El Paso Alaska also presents the risk of hazard to a limited population in the event of an LNG accident, but the probability of such an accident is low and, if one should occur, damage to human life would be minimal.

(4) El Paso Alaska holds a distinct advantage in terms of financeability, even considering the likelihood of cost overruns for all three systems. Among other things, El Paso Alaska can obtain 20% of its total capital requirements easily and cheaply through U.S. Government guarantees available under Title XI of the Merchant Marine Act.

The FPC report suggested that a field price (including gathering and conditioning) for Prudhoe Bay gas be determined on the basis of market value less transportation costs. In applying this formula, the Commission said "market value" would most likely be set by reference to the city gate cost of incremental gas or energy supplies, while the most appropriate transportation cost would be the national average cost to selected major market areas. The Commission also indicated the need to establish a field price for Prudhoe Bay gas as soon as possible, and announced its intent to initiate a proceeding toward this end in the near future.

The report discussed two possible approaches to financing -- one involving guarantee of debt service by project sponsors (assuming additional creditworthy parties can be induced to participate in financing) and the other involving consumer debt guarantees. Under the first approach, the FPC recommended an 18% rate of return on equity -- to be allowed so long as the delivered cost of gas (field price plus transportation cost) does not exceed the market value of the gas. Under the consumer debt guarantee approach, the Commission would allow a maximum rate of return on equity of 15%. In addition, the Commission recommended adoption of a consumer guarantee fee equal to the difference between the cost of service under the project sponsor debt guarantee approach and cost of service with consumer guarantees. In calculating the gas field price, the consumer guarantee fee would be added to the out-of-pocket transportation cost.

The FPC specifically did not recommend federal financial assistance to construct a gas transportation system. "Federal backstopping is a default option to be employed only if it is determined that the social benefits of a transportation system are overriding and private parties are unwilling to undertake the project alone at a reasonable cost." Here, however, the "private benefits are substantial and the risks bearable" under the financing proposals suggested above.

The FPC's conclusions differ in certain respects from those of Judge Litt who, in an initial decision issued 2/1/77, recommended Arctic Gas as superior to El Paso Alaska, found that El Paso Alaska nonetheless had a viable project which could be certificated if Arctic Gas were unable to go forward, and held that Alcan had no "possibility" of certification. (The Alcan project before Judge Litt, however, was its original 42-inch project which contemplated commingling of Alaskan gas and Canadian gas; in part because of Judge Litt's criticism, this proposal was replaced in March

1977 by a 48-inch express line alternative to carry only Alaskan gas to Lower 48 markets, with no commingling of Canadian gas.) Another difference was that Judge Litt urged approval of Western Leg facilities at this time rather than a deferral of decision. In regard to financing, Judge Litt recommended federal participation to the extent of an insurance or completion guarantee arrangement to facilitate raising project debt capital at a more reasonable cost, thereby reducing the cost of gas to consumers. (See REPORT NOS. 1090, App. pp1-23; 1095, App. pp1-26.)

The FPC report is summarized in greater detail below. The summary covers the following topics:

Gas Reserves and Deliverability
Comparative Cost of Service
Net National Economic Benefits
Environmental Impacts
Socio-Economic Impacts
Geotechnical Issues Affecting System Reliability (Including LNG Safety and Siting)
Construction Costs and Scheduling
Western Leg
Financing and Tariffs (Including Methodology for Determining Field Price)
Competitive Impact Assessment
Other Matters

Gas Reserves and Deliverability

The FPC stated that in-place gas volumes in the Prudhoe Bay Field exceed 40 Tcf (estimates range from 35.1 Tcf to 42.8 Tcf). Assuming a recovery efficiency of 75% to 80% and a 26% shrinkage factor, recoverable gas is 22.2 Tcf to 23.7 Tcf. Further, the Commission stated, available evidence indicates that at least 2.0 Bcf/d and possibly 2.5 Bcf/d, or even slightly higher, can be made available to any of the proposed gas transportation systems from the Prudhoe Bay Field. Gas deliveries can be sustained for 25 to 35 years depending on the sales rate and ultimate gas recovery efficiency, and assuming gas sales commence within roughly four to five years after oil production commences.

The Commission pointed out that the Prudhoe Bay Field is an oil reservoir, and that gas produced during at least the early years can be advantageously used for reinjection in order to maintain reservoir pressure and thus sustain oil production. Thus, the gas should not be viewed as a by-project that has to be sold, or that should even necessarily be sold during the initial years of oil production. However, the Commission added, reinjection of produced gas will require approximately 4% usage as fuel for compression. Therefore, the longer gas sales are postponed, the less total gas will be available for sale.

Possible future gas supplies which might be available in other areas of Alaska were also discussed by the Commission in the context of assessing system expansibility requirements of the three proposed systems. Based on review of available information, the Commission stated that (1) the possibility of significant supplies from Naval Petroleum Reserve No. 4 appears "slight" -- the most realistic resource estimate now available is about 14 Tcf which, assuming a maximum of 50% and a minimum of 15% capable of economic development, could be expected to provide maximum daily salable volumes ranging from roughly 0.3 Bcf/d to 0.9 Bcf/d (with the upper end of this range "highly speculative"); (2) geological and limited geophysical information suggests the possibility of substantial gas reserves under the Arctic National Wildlife Range, but no credible resource estimate can be made at this time; (3) high resource

potential exists for the Beaufort Sea (north of the Prudhoe Bay Field) and, to a lesser extent for the Chukchi Sea (west of NPR No. 4); and (4) the interior basins of Alaska hold little promise of natural gas.

In short, the Commission declared, there exists "some possibility" of increased deliveries from the North Slope of perhaps up to an additional 1.5 Bcf/d (from NPR No. 4, Arctic National Wildlife Range, the Beaufort Sea, and other reservoirs in or near the Prudhoe Bay oil field). Thus, the Alaskan gas transportation system should be designed to carry initially 2.0 to 2.5 Bcf/d, and be capable of expansion to an additional 1.0-1.5 Bcf/d. Each of the systems is so designed.

In regard to the Mackenzie Delta region, the Commission disagreed with Judge Litt's finding of a reasonable likelihood of 1 Bcf/d of deliveries in the first year of operations, rising to 1.5 Bcf/d in the fifth year. Rather, based on all available information, including gas supply information recently submitted to the NEB (in early 1977), the FPC concluded that the most realistic level of gas availability from the Mackenzie Delta area that can be projected at this time is 1 Bcf/d.

While additional exploration will likely result in new discoveries, the Commission explained, exploration and development activities to date have not been "totally encouraging," and the magnitude and timing of future reserves are uncertain. The three largest fields discovered thus far contain reserves (proved, probable and possible) of approximately 3 Tcf, 1.5 Tcf and 1 Tcf. No other discovered field has reserves in excess of 0.2 Tcf or 0.4 Tcf, according to recent estimates by Foothills and Canadian Arctic. Moreover, the Commission continued, there is no information presently available to indicate that future Mackenzie Delta discoveries (at least with respect to the onshore and shallow water area) would be different from the fields discovered to date. While there is some expectation that the Mackenzie Delta offshore area in the Beaufort Sea could hold substantial amounts of hydrocarbons, the Commission added, estimates of gas potential offshore are even more speculative than onshore. Also, "the pattern of onshore discoveries to date makes the likelihood of realizing any additions of reserves from the offshore Mackenzie Delta area -- at least during the near future -- highly questionable."

The Commission discounted the argument that the presence of a gas transportation system in the Mackenzie Delta area would result in a rapid escalation of drilling activity. If the best onshore prospects have already been drilled, and if technological and economic considerations require a high degree of selectivity for offshore activities, "no appreciable escalation in drilling activity is guaranteed by the mere presence of a gas transportation system." Nor, the Commission added, does the rate of reserves additions in the past, when most drilling activity was conducted onshore, provide a valid basis for projecting the level of reserves additions in the future, when much of the drilling activity may be offshore.

The FPC said projected deliverability of 1 Bcf/d could be met initially from the three largest fields discovered to date (Taglu, Parsons Lake and Niglintgak). However, to sustain this deliverability level for 20 years, additional reserves amounting to an approximate doubling of the claimed 3.8 Tcf of proved reserves (as of July 1975) would be required. To sustain this level for 30 years would require cumulative marketable reserves of 11 Tcf.

A gas deliverability rate of 1 Bcf/d from the Mackenzie Delta, the Commission noted further, is also supported by current plans for operating the Mackenzie Delta fields, including use of several centrally located gas conditioning plants to handle gas produced from all of the fields. This mode of field operations will most likely result in sequential production of various fields rather than simultaneous production

of all or a substantial number of fields. Moreover, even if the most optimistic recent estimate of current reserves (including proven, probable and possible categories) were accepted, "it seems questionable whether gas delivery rates substantially greater than 1 Bcf/d could be sustained long enough to justify expenditures for gas processing facilities capable of handling volumes greater than 1 Bcf/d."

However, the Commission added, if future Mackenzie Delta exploratory efforts should result in the discovery of more fields -- and particularly larger fields -- than have been discovered through past exploratory efforts, the projected deliverability of 1 Bcf/d could prove to be an understatement of the pipeline capacity required to handle Mackenzie Delta gas. In assessing the degree of pipeline system expansibility that may be required to handle gas supplies in excess of 1 Bcf/d, it is "conceivable" that the Mackenzie Delta area deliverability (including substantial offshore gas) could be sustained at 1.5 Bcf/d or even higher. Therefore, "the degree of gas transportation expansibility that should be attributed to the Mackenzie Delta area is 0.5 Bcf/d."

Comparative Cost of Service

The FPC compared unit transportation costs for the three projects using cost of service data recently submitted by the three applicants at the Commission's request. (See REPORT NO. 1101, App. pp13-14.) All costs are expressed in 1975 dollars.

	First Five Years				Twenty Years			
	East	Midwest	West	Natl. Avg.	East	Midwest	West	Natl. Avg.
	---(Dollars per Million Btu)---				---(Dollars per Million Btu)---			
Arctic Gas	$1.23	$1.19	$1.07	$1.17	$0.76	$0.74	$0.76	$0.76
El Paso Alaska	$1.71	$1.66	$1.28	$1.53	$1.23	$1.19	$0.91	$1.09
Alcan	$1.30	$1.28	$1.15	$1.24	$0.80	$0.79	$0.74	$0.79

The above estimates, the Commission stressed, indicate that all three systems can deliver Alaskan gas at a reasonable cost to the consumer. "Even El Paso could deliver gas at an average price of less than $2.10/MMBtu, assuming a field price of $1.00/MMBtu. We have no doubt that the gas is worth much more than this. Even with extremely large cost overruns, there is insignificant marketability risk for this gas, even on an incremental basis."

Net National Economic Benefit

The FPC determined that all three projects would yield substantial net national economic benefits, with the results close between Alcan and Arctic Gas and lower for El Paso Alaska (due to its higher operating costs and lower fuel efficiency). However, it was noted, unlike Arctic Gas and Alcan, El Paso Alaska would pay no Canadian taxes, which offsets in part its greater fuel consumption.

Using alternative discount rates of 6% and 10%, the Commission calculated NNEB for the three projects -- in 1975 dollars -- as follows:

	6% Discount Rate	10% Discount Rate
	---(Billions of 1975 Dollars)---	
Arctic Gas	$15.15	$7.12
El Paso Alaska	$12.86	$5.80
Alcan	$15.66	$7.65

The Commission added that Alcan's construction costs underlying the above calculations may be somewhat low, so that Alcan cannot be found superior to Arctic Gas on NNEB grounds.

Environmental Impacts

The FPC concluded that each of the three proposed systems is environmentally acceptable -- but that the Alcan route (48-inch alternative) would pose the least environmental impact assuming proper mitigative measures during final design, construction and operation. Compared with Arctic Gas, the Commission said the Alcan project would (1) use existing corridors to the maximum, thereby requiring less development of rights-of-way in virgin or unimpacted areas; (2) avoid crossing the Arctic National Wildlife Range, similar areas in Canada, and related waterfowl breeding areas; and (3) avoid caribou calving grounds in Alaska and Canada. Compared with El Paso Alaska, Alcan would avoid construction of a pipeline through the Chugach National Forest, construction of two LNG terminals in high seismic risk areas, and impacts on marine and wildlife resources in Prince William Sound.

At the same time, the FPC indicated that crossing of the Arctic National Wildlife Range by Arctic Gas could be accomplished without adverse environmental impact if proposed mitigative measures are undertaken. In this connection, the Commission dismissed fears of the Conservation Interveners and the State of Alaska that Arctic Gas' snow road construction plans to mitigate damage to tundra and permafrost areas would turn out to be technically infeasible or lead to problems which could cause abandonment of such plans and resort instead to gravel roads and workpads to complete construction. The Commission expressed the view that Arctic Gas' proposed snowroad construction can be made technically and environmentally feasible and that sufficient water exists to make snow without undue environmental impact. Moreover, the Commission noted, Arctic Gas would have two years of snowroad experience before beginning construction in the Wildlife Range. However, if Arctic Gas should encounter schedule difficulties in this phase, the Commission would oppose any deviation in the original construction proposal. In short, if construction could not be completed by the original deadline, "then completion of the project would simply have to be delayed."

Nor did the Commission agree with the contention of the Conservation Interveners that crossing of the Arctic National Wildlife Range would necessarily lead to an "inevitable progressive violation of the Range." Alaska and the Department of Interior have full authority to limit any further activity, the Commission noted. Further, while selection of Arctic Gas would probably serve as an "important catalyst for expansion into areas adjacent to the Range" due to increasing energy demands, any verified natural gas reserves "could readily and economically be attached to the proposed Arctic Gas system" and liquid hydrocarbons could be transported west to Prudhoe Bay and then into the Alyeska system. "The presence of the Arctic Gas pipeline thus would not constitute an additional incentive to later development." In short, a decision on crossing the Range now is not "an irrevocable choice between total development or no intrusion at all on the Range." Rather, "the Range would continue to support its current wildlife species, provided that strict controls and superior mitigation techniques are employed by builders of the pipeline."

The Commission also found that alignment in an existing utility corridor -- an advantage stressed by both Alcan and El Paso Alaska -- was not a compelling reason to choose one transportation system over another. Specifically, although construction and operational impacts for El Paso Alaska and Alcan would be smaller than for a wholly new route, "the overall difference is not substantial." El Paso, for example, will require a new right-of-way within the utility corridor since it runs parallel, but not adjacent to, the Alyeska line. Alcan's proposed alignment is adjacent to

Alyeska, "but it appears that an entirely new workpad will be required with its attendant gravel requirements." Moreover, the Commission noted, "adjacent" alignment to Alyeska will create oil pipeline integrity problems and could require additional costs for this reason.

Finally, the Commission indicated that it was not necessary to consider Mackenzie Delta gas in comparing the environmental impacts of the three systems. In other words, construction of a separate line to the Mackenzie Delta should not be considered in evaluating the El Paso Alaska and Alcan projects. Any such line, the Commission said, would be exclusively Canadian. "Canadian authorities have exclusive jurisdiction over timing of development and method by which Mackenzie Delta reserves will be brought to market. There is no point to our hypothesizing about those decisions."

Socio-Economic Impacts

The FPC stated that evaluation of socio-economic impacts of the three proposed projects provides little guidance for choosing between the three. These impacts will be greatest on the State of Alaska, and the principal benefits to Alaska -- from royalty payments and severance taxes and, to a lesser extent, from the operation of the pipeline itself -- will be largely independent of which pipeline system is certificated.

In general, the Commission concluded that El Paso would generate more jobs, more personal income, more property subject to tax, and more indirect economic activity than the other proposals, but it would also require more social services and probably also result in the highest unemployment. These impacts would be much smaller for Arctic Gas and somewhere in between for Alcan. On the other hand, "there is a possibility that Arctic Gas, with its lower projected transportation costs, would produce higher royalty income for Alaska, which will in turn aid the state in financing industrial development and expanding its social services."

Geotechnical Issues Affecting System Reliability, and LNG Siting Issues

The FPC concluded that, on balance, all three systems are adequately reliable for the transportation of Alaskan natural gas. Of the three, however, the El Paso Alaska system is most susceptible to some form of temporary interruption because of the location of its facilities in extremely active seismic zones and the complexity of its interrelated network of pipelines, ships and terminal facilities. On the other hand, the segmented nature of El Paso Alaska's operation, involving use of multiple ships and gasification trains, suggests that, "under most circumstances, the outcome of an untoward event will be a partial, rather than a total, cessation of supply."

In regard to particular geotechnical issues, the Commission declared that (1) seismic risk is greatest for El Paso Alaska, but its system can be designed to limit this risk to an acceptable level and is not likely to be completely destroyed by seismic activities; (2) frost heave and thaw settlement problems face all of the systems (although for differing distances), further work is required to determine the best solution, and whatever design is ultimately adopted will be available to all of the applicants; (3) metallurgy problems are also common to all of the projects, and none of the competing proposals appear to have a clear advantage in this area; and (4) LNG safety considerations do not render an LNG system inherently less reliable or more dangerous than a high pressure buried pipeline, although liquefaction and regasification facilities must be planned with the utmost care.

In regard to the proposed LNG terminal sites for the El Paso Alaska project, the Commission declared that Point Gravina had been shown to be an acceptable location in Alaska but that Cape Starichkof in the Cook Inlet -- an alternative site suggested by the FPC Staff -- may also be acceptable, depending on resolution of navigational questions posed by ice conditions. The Commission recommended further investigation of this alternative before any firm decision is made on location of the LNG plant in Alaska in the event that the El Paso Alaska system is selected.

As to regasification facilities in California, the Commission agreed with both Judge Litt and Staff that Oxnard (a developing industrial area) would be a preferable location to the proposed Point Conception site (an essentially undeveloped area) and should be certificated if the El Paso Alaska project is chosen, despite increased costs due to the need for larger tankers or an additional tanker to compensate for some 70 additional miles of shipping from the terminal in Alaska. As compared with Oxnard, the Commission said choice of Point Conception would cause construction of facilities on land otherwise lightly used, "thus spoiling that portion of the environment and inviting further development."

The Commission added that it was not necessary to decide at this time the further issue of whether there should be one single terminal or multiple terminals in California to accommodate the El Paso Alaska, Pacific Alaska and Pacific Indonesia LNG projects. Nevertheless, the Commission commented, while Western LNG Terminal Co. (which advocates three separate sites) argues that multiple facilities will ensure greater reliability, multiple terminals also impose considerably greater capital costs and cause greater environmental impact. Further, the Commission declared, the prospects of a major catastrophe are "sufficiently remote that little weight should be given to providing additional protection against such events through dispersed terminals. The sites [proposed by Western Terminal] are close enough together that a truly major catastrophe, such as a devastating earthquake or ocean storm could affect more than one of the terminals. Finally, the possibility of accidents which would affect a particular loading berth, gasification train, or storage tank, would be approximately the same whether concentrated at one location or spread out along various miles of coast line."

Construction Costs and Scheduling

The FPC indicated that capital cost estimates for the three projects (as developed by the respective applicants) are within a close range, as follows (in millions of 1975 dollars):

	Including AFUDC	Excluding AFUDC	System Capacity
Arctic Gas	$6,728.5	$5,620.5	2.25 Bcf/d
El Paso Alaska	$6,570.8	$5,587.5	2.36 Bcf/d
Alcan	$6,761.2	$5,780.9	2.4 Bcf/d

With construction continuing through 1983, the Commission noted, inflation will significantly increase actual dollar expenditures for all of the systems from those shown above. Moreover, none of the systems is free from risk of cost overruns and delays in completion. "Each applicant will be operating at the margin of current technology; construction conditions are frequently harsh; and final plans for design and construction are not yet developed." Nevertheless, each system's risk of cost overrun and completion delay appears to be "acceptable," and "there is virtually no chance that any system would become so costly as to be uneconomic."

In specific regard to the Arctic Gas project, the Commission stated that substantial evidence in the record supports the feasibility of winter construction (using snowroads and snowpads), if reasonable protective measures are applied; that Arctic Gas had devised a reasonable program for execution of such construction; that adequate water had been identified to overcome the risk of abnormally low natural snowfall on the North Slope to build snowroads and workpads; that a pipe laying productivity rate of 0.71 miles per spread per working day projected for the North Slope is "reasonably achievable"; and that cost estimates submitted by Arctic Gas are "reasonably reliable," although some additional expenditures are likely on North Slope segments of the project, as well as on extreme northern sections of the mainline in Canada. In this last connection, the FPC assigned a "high probability" of direct cost increases in the range of 7% to 10% for North Slope construction and in the range of 5% for construction of the overall system, due primarily to the risk of weather conditions more severe than normal.

With respect to the risk of construction delays for Arctic Gas, the Commission reviewed El Paso Alaska's risk analysis (which, among other things, indicated a 100% probability of at least a 1.5-year delay) at some length, but found this study lacked "sufficient realism to make the result a credible test of Arctic Gas' plan." Among other things, the Commission said, the analysis deprived Arctic Gas of 25-30 days of prime construction time on the North Slope in the fall and accumulated seasonal deficiencies throughout the entire construction program, with no provision for mitigative measures. Nevertheless, the Commission asserted, there exists some risk that adverse weather conditions could delay entry upon the tundra, prevent winter work for an extended period, or force premature cessation of construction in the spring. On the other hand, should such conditions occur and construction not be completed on schedule, a full year delay is unlikely. Rather, a delay of eight to nine months is more probable.

Even if an additional winter construction season were required and deliveries delayed for one year, the Commission added, the impact on unit transportation costs for Arctic Gas would be only 12%.

As to the El Paso Alaska project, the Commission found the construction schedule to be "basically credible" and overall construction cost estimates "reasonably reliable." However, the Commission indicated a "high probability" of a 7% to 10% cost increase for facilities in Alaska to cover additional geotechnical research, seismic design and certain other activities required prior to construction. In addition, if Oxnard is selected as the regasification plant site in California, El Paso Alaska would be required either to add another ship to transport the LNG to California (at an estimated capital cost of $200 million) or to expand the capacity of the eight ships now proposed. 1/ The Oxnard site, on the other hand, would result in cost savings for other facilities to be constructed in California.

1/ Judge Litt concluded that an additional ship would be required by El Paso Alaska regardless of whether the California terminal is located at Oxnard or Point Conception and, in addition, that an additional (seventh) liquefaction train would be required at the Gravina Point LNG plant to handle the projected volumes of LNG. By contrast, the Commission concluded that an eight-ship fleet would be adequate to deliver LNG from Gravina Point to Point Conception (but not to Oxnard) and that the six liquefaction trains now contemplated at the Gravina Point plant would provide sufficient reliability.

In the Lower 48 States, the Commission noted that El Paso proposes to construct a new 42-inch pipeline from Waha in the Permian Basin to Refugio, Texas, at an estimated cost of $223 million, to transport approximately 800,000 Mcf/d to pipelines serving the eastern U.S. However, as demonstrated by experience this past winter under the Emergency Natural Gas Act of 1977, excess capacity currently exists on intrastate pipelines traversing the same route. Therefore, if the El Paso Alaska project is selected, the Commission urged consideration of legislation which would enable use of intrastate gas pipelines for transmission of Alaskan natural gas. While the amount of available intrastate capacity in 1982 cannot be predicted at this time, it is nonetheless probable that capital expenditures for the proposed new pipeline could be "substantially reduced through the use of existing intrastate facilities."

Finally, with respect to Alcan, the Commission concluded that cost estimates for the 48-inch alternative -- although not subjected to detailed cross-examination -- appeared to be reasonable in Alaska, although an undetermined cost increase could result from reexamination and modification of the currently proposed alignment along the Alyeska right-of-way so as to locate the gas pipeline further from the oil pipeline than now planned. Specifically, there exists a "high probability" of a cost increase up to 5% of Alcan's estimates for construction in Alaska. For Canadian segments, the Commission added, Alcan's cost estimates -- which are considerably lower than estimates by Arctic Gas for construction in similar terrain -- are subject to uncertainty and hence must be assigned a "high probability" of at least a 10% increase to account for possible underestimation.

The Commission further concluded that Alcan could not complete construction by its scheduled deadline of October 1981, because of both additional time required for preconstruction activities and the potential for delay posed by "extraordinary labor demands" in Canada. At the same time, the Commission considered it probable that the Alcan pipeline could become operational in mid-1982, up to one year earlier than Arctic Gas or El Paso Alaska.

Western Leg

The FPC recommended deferral of a decision on certification of a Western Leg for one to two years when more information will be available regarding the need for additional looping of existing pipeline systems which import gas from Canada. The amount of looping required, the Commission said, is dependent on two currently unknown variables: the quantity of future Canadian imports, and the quantity of Alaskan gas contracted for sale in the western states.

In recommending deferral, the Commission partially accepted the position of its Staff which opposed construction of a Western Leg because of the likelihood of idle capacity on existing facilities in the near future but, at the very least, urged postponement of a decision on the issue until a later stage of the proceedings. The Commission thus rejected the conclusion of Judge Litt that Staff's displacement approach rested on "an unduly pessimistic view" respecting Canadian curtailments and "largely illusory" projections of transportation cost savings, and hence was not a preferable alternative.

The present Western Leg proposals, the Commission noted, assume roughly a 30% division of Alaskan gas for western states and 70% for midwestern and eastern states -- conforming to the division reflected in earlier advance payment agreements which were determined by the Commission in late 1975 to be contrary to the public interest. Since no gas sales contracts have been entered into, the Commission said, the actual division of Alaskan gas volumes between various regions and states cannot be determined now. "Any attempts to establish definitively the division of Alaskan

gas would require that the FPC, in effect, set up a mandatory gas allocation program. Such a measure is neither required nor desirable at this time."

In regard to future imports from Canada, the Commission observed that if three current export licenses expire as scheduled in 1981, 1985 and 1986, Pacific Gas Transmission will have idle capacity of approximately 140 MMcf/d in December 1981, 325 MMcf/d in October 1985, and 745 MMcf/d in October 1986. This excess capacity by 1986 would be sufficient to transport Alaskan gas volumes to West Coast and Mountain states -- assuming such states purchase Alaskan gas in proportion to their current share of U.S. interstate consumption, i.e., approximately 25% of 2.25 Bcf/d or 560 MMcf/d. The future level of gas exports from Canada will be determined by the Canadian Government, the Commission declared, and Canada's views and plans must be known to enable a determination of the extent of idle capacity on present gas importation systems when Alaskan gas becomes available. "These decisions may be affected by the timing and procedures Canada selects for developing its frontier gas supplies. If no new export licenses are granted and existing licenses are not extended, substantial idle capacity will be available on existing transportation facilities."

The FPC also assessed the possibility of delivering Alaskan gas to western states by displacement from the Permian Basin or other traditional producing areas in the Southwest. This would require both sufficient gas supplies to effectuate a displacement plan and idle capacity to transport the displacement gas. In this connection, the FPC concluded that sufficient gas would appear to be available to effectuate a displacement plan if El Paso Natural and Transwestern are assumed to purchase the same share of projected Permian Basin supplies (as projected in the FPC National Gas Survey Report) in the future as they purchased in 1975 (37%). "It is conceivable that at least 1 Bcf/d could be displaced westward by 1990, which is greater than the 659 MMcf/d gas volume entitlement assumed by the western states to be their share of Alaskan gas. Thus, by shifting 659 MMcf/d from other interstate lines to El Paso Natural and Transwestern, the displacement could be done." Also, comparing future supplies projected by El Paso Natural and Transwestern with their current system capacities, the Commission said estimated idle capacity commencing in 1982 is approximately 1.7 Bcf/d on El Paso's system and 0.3 Bcf/d on Transwestern's system. Even if El Paso is authorized to abandon one of its lines from the Permian Basin to California for conversion to oil transportation, its remaining gas transportation facilities would still have idle capacity of approximately 0.5 Bcf/d in 1977 and 1978, and approximately 0.7 Bcf/d in 1979. "These excess capacities are sufficient to deliver a significant share of the western states' purchase of Alaskan gas by displacement."

Deferral of a decision on the Western Leg, the Commission added, will not disadvantage the western states or deny them access to a share of Alaskan gas. Rather, when the final gas transportation system is "fine-tuned" in a subsequent phase of these proceedings, "attention should be focused on overall costs to consumers, fuel efficiency of the systems, and operating flexibility in determining the best method for providing direct access to Alaskan gas for the western states."

Financing and Tarrifs (Including Methodology for Determining Field Price)

The FPC agreed with Judge Litt's conclusion that, in the absence of additional creditworthy parties, financing of an Alaskan gas transportation system will require either consumer or government backstopping, or both, to guarantee project completion. The Commission expressed the view, however, that additional creditworthy parties can be induced to back the project. In this connection, the Commission noted an assertion by the State of Alaska during oral argument that it is searching for a way to participate meaingfully in financing of the El Paso Alaska project and that, if this project is ruled out, it would then seriously consider whether to assist the financing of the Alcan project. Further, the Commission noted, Atlantic Richfield Co. "indicates an open mind regarding gas transportation system investments," and the Treasury Department continues to suggest the possibility of participation by industrial gas consumers. Also, participation of more gas pipeline and distribution companies in the purchase of Alaskan gas and in transportation system financing would be desirable.

Consequently, the Commission focused on financing and tariff proposals designed to provide adequate incentives to private parties and the State of Alaska to make the necessary capital investments, while bearing acceptable risks. In addition, the Commission considered an alternative approach requiring consumers to guarantee repayment of project debt financing but at the same time compensating them for the bearing of increased risks. 1/

The FPC specifically did not recommend federal financial assistance for an Alaskan gas transportation system. "Federal backstopping is a default option to be employed only if it is determined that the social benefits of a transportation system are overriding and private parties are unwilling to undertake the project alone at a reasonable cost." Given the large positive net national economic benefits of all three systems, the FPC continued, the social benefits are undoubtedly adequate to warrant the construction and operation of any of the systems. Also, numerous questions have been raised regarding the achievement of a private financing. Nevertheless, "private benefits are substantial and the risks bearable . . ." under the proposals advanced here. For these reasons plus the opposition of the Treasury Department to federal financial assistance, the Commission decided not to recommend a financial plan contingent on federal guarantees.

Regardless of financing approach adopted, the Commission recommended the following measures to facilitate financing: (1) rolled-in pricing, although "Alaskan gas most likely could be sold competitively on an incremental pricing basis; (2) "reasonably broad" distribution of Alaskan gas across domestic markets, thereby reducing proportional equity investments required of gas pipeline and gas distribution company sponsors to a more manageable size and spreading the economic burdens of extended service interruptions over a wider number of consumers in the event that consumer debt guarantees are required; and (3) establishment of a field price for Prudhoe Bay gas as soon as possible.

In the last connection, the Commission indicated its intent to initiate a proceeding in the near future to determine an appropriate field price (defined to include gathering and conditioning) for Prudhoe Bay gas, as well as to examine vintaging and throughput agreement issues. Prompt action is necessary, the Commission explained, since North Slope producers have identified establishment of a sale price as a precondition to entering into gas sales contracts and since financing is infeasible in the absence of gas sales contracts determining which companies will receive the

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1/ Since some of these proposals were not fully considered in the record, the Commission said, a special proceeding to perfect the details may be needed in the near future.

gas and hence be willing to supply equity capital. Also, the Commission noted, if the maximum price for Prudhoe Bay gas is set relatively high, it might be possible to attract gas producer participation in the transportation system financing either directly or through debt guarantees.

Based on estimated gas gathering and conditioning costs including a 15% after-tax rate of return on investment, the Commission computed a field price of approximately 70¢/MMBtu in current dollars (and approximately 50¢/MMBtu in 1975 dollars).

As an alternative to setting a fixed field price for Prudhoe Bay gas, the Commission suggested determination on the basis of market value less transportation cost, subject to allowance of a minimum field price to ensure that producers recover their incremental costs for producing and conditioning gas. While further evidence is needed to determine a precise definition, the FPC said "market value" of Alaskan gas would most likely be set by reference to the city gate cost of incremental gas or energy supplies, 1/ and the most appropriate transportation cost would seem to be the national average cost to selected major market areas.

Such a pricing formula, the FPC declared, would (1) remove the possibility that producers could exercise monopoly power in the pricing of Alaskan gas, (2) avoid the difficult problem of allocating joint costs of gas produced in association with oil, and (3) provide significant protection to consumers against the possibility of paying a higher than market value for Alaskan gas (even with a cost of service tariff and rolled-in pricing) since transportation cost increases would be offset by corresponding reductions in field price. Further, the "upside profit potential" offered by the formula, as well as the "downside protection" provided by a minimum wellhead price, could stimulate gas producers to assist in financing since they would have a direct incentive to see that the transportation system is constructed and operated as efficiently as possible in order to maximize their profits. "Such considerations might prompt gas producers to desire some amount of management control over the project and thus to invest some equity capital."

In short, the Commission declared, a formula approach to determining the field price for Alaskan gas has "considerable merit." However, because the Commission's authority to approve such a pricing procedure under the just and reasonable standard of the Natural Gas Act is "doubtful," the President should submit legislation to authorize the FPC "to determine field or wellhead rates for Prudhoe Bay gas on the basis of market factors and alternative fuel prices."

The FPC then outlined two alternative financing approaches -- one involving guarantee of debt by the project sponsors, and the other involving consumer debt guarantees.

1/ In this connection, the FPC noted testimony by an Arctic Gas witness (submitted in mid-1976) that the incremental Btu equivalent price of distillate fuel oil at the city gate in 1975 dollars was $2.61/MMBtu and that natural gas should command a premium above this amount. (See REPORT NO. 1059, App. pp17-18.) The FPC report, however, did not mention a recent market value study (submitted on 4/5/77 by Atlantic Richfield) which, on the basis of current statistics, determined an average incremental city gate value of distillate fuel oil and electricity (in residential and commercial markets) of $5.42/MMBtu. Subtracting an estimated transportation cost of $1.60, the study arrived at a market value of $3.82/MMBtu at the pipeline inlet in Alaska. (See REPORT NO. 1101, App. pp6-7.)

A. Project Sponsor Debt Guarantee Approach

The basic objectives of this approach, the Commission said, are to (1) achieve a successful private financing by providing incentives to stimulate the maximum amount of risk bearing by the projects' potential sponsors; (2) minimize the likelihood that consumers will have to pay higher than market value for Alaskan gas, or incur substantial expenses in the case of project noncompletion or extended service interruption; and (3) provide incentives for efficiency in construction and operation of the project.

The essence of the approach is "to allow gas producers and project investors the potential of earning profits equal to the market value of the gas less the cost of producing and transporting it to market, while assuring a minimum return on investment as long as minimum gas deliveries are met." It is hoped that gas producers, additional gas utility companies, the State of Alaska, and creditworthy corporations looking for an attractive investment will thereby assist in financing the gas transportation system. If this approach is not successful in attracting both the required equity investments and debt financing guarantees, the Commission "would be inclined to endorse consumer debt guarantees only after obtaining a better understanding of why the indicated parties did not participate in the financing more fully."

In addition to guarantee of debt by the project sponsors, other elements of this approach would include: (1) a cost of service tariff during normal operation -- subject to automatic reduction to disallow recovery of a proportional amount of net plant and working capital accounts if the average level of gas deliveries fell for 30 days below 60% of a level defined to constitute normal operation; (2) tracking of both gas purchase and transportation costs to gas shippers, and thence to local distribution companies, with limitation of the FPC's suspension powers to proposed increases in operation and maintenance expenses; (3) quarterly audit of project construction costs, with the Commission to determine within 120 days after such audits, whether such costs were prudently incurred and may be recovered through the project's tariff; (4) a 50/50 debt-equity ratio, conforming generally to the capitalization of major natural gas companies in the Lower 48 States; and (5) a variable rate of return on equity ranging from a maximum of 18% to a minimum of 11%.

More specifically, with regard to rate of return on equity, the Commission stated that a 23% overall pretax return on rate base would yield approximately a 13.7% after-tax rate of return on equity (assuming a 10% interest rate and a 50% income tax rate) at a 25/75 debt to equity ratio, an 18% after-tax return at a 50/50 debt-equity ratio, and a 31% after-tax return at a 75/25 debt-equity ratio. "Such after-tax returns on equity are in line with the returns petroleum companies currently earn on their integrated operations, and will likely earn on the Alaskan oil pipeline if comparable D/E ratios are assumed." Thus, with a 50/50 debt-equity ratio, a maximum 18% after-tax return on common equity would appear "just and reasonable" under current financial market conditions for the project sponsor debt-guarantee financing approach.

An 18% rate of return on equity, the Commission added, would be allowed so long as the delivered cost of gas (field price plus transportation cost) does not exceed the market value of the gas. If the minimum field price plus transportation cost were to exceed market value of the gas, however, return on equity would be reduced as necessary to maintain the delivered cost of gas equal to its market value. In other words, the rate of return would be adjusted so as to equate the transportation cost to the difference between the market value of the gas and the minimum field price. At the same time, to provide investors some protection against the project being uneconomic, the Commission recommended a minimum after-tax return on equity of 11% so long as a minimum volume of gas is delivered for a minimum period of time.

While an 11% return is lower than the level currently allowed for most regulated utilities, the Commission noted, "the proposed automatic tracking of costs through to the distribution companies means that project equity investors can have confidence that these returns will be realized."

Should both the field price for gas and the return on transportation system investment be reduced to their minimum levels, the FPC added, consumers would then begin to pay a price higher than market value for Alaskan gas.

B. Consumer Debt Guarantee Approach

Because of uncertainty whether additional creditworthy parties can be induced to participate in financing or whether private parties will be willing to finance the project on the basis described above, the Commission said it is necessary to consider a consumer debt guarantee financing alternative. Such alternative requires measures to protect consumers from bearing unnecessary costs and risks, as well as realistic compensation for the risks that must be borne. "Consumers should not bear a major portion of the project's risk while other parties reap the bulk of the economic benefits."

Above all, the Commission stressed, equity investors should bear the risk of loss of their total equity investment in the event of extended service interruption or noncompletion.

The elements of the consumer debt guarantee approach suggested by the Commission would include, among others, (1) once the project begins operation, an all-events cost of service tariff under which gas shippers, and their customers in turn, would be charged an amount adequate to cover the total dollar cost of service less return on and recovery of equity capital in the event of extended service interruption; (2) noncompletion agreements whereby gas shippers would be committed to cover debt service payments in the event that the project was not completed, with federally regulated gas shippers authorized to flow through such payments to their customers on a current basis; (3) a maximum rate of return on equity of 15%, reflecting the reduction in financial risk to the project sponsors due to consumer guarantees for debt service payments, with a minimum return of 11%; (4) possible adoption of some form of consumer surcharges prior to project operations under certain circumstances, subject to resolution of tax problems regarding such surcharges; and (5) a consumer guarantee fee equal to the difference between the cost of service if the project were financed under the project sponsor debt guarantee approach and the cost of service under a consumer debt guarantee form of financing.

The consumer guarantee fee would be added to the out-of-pocket transportation cost for purposes of calculating the gas field price (under the "market value" formula described above). Thus, "the allowed field price would be approximately the same whether the project sponsor or consumer debt guarantee financing approach were used. However, since the delivered cost of gas is equal to the sum of the field price for gas plus the out-of-pocket transportation cost, consumers would receive gas at a delivered cost lower than market value, as compensation for their risk bearing."

To illustrate, the Commission calculated that, under the project sponsor debt guarantee approach, first year pretax cost of capital payments would be approximately $2.3 billion assuming a $10 billion capital cost, a 50/50 debt to equity ratio, an 18% after-tax return on equity, and a 10% interest rate on debt. Under the consumer debt guarantee financing approach, first year pretax cost of capital payments would be approximately $1.5 billion assuming a 75/25 debt-equity ratio and a 15% return on equity. Therefore, at a gas flow rate of 2.25 Bcf/d (or 821 million Mcf per

year), the first year (1983) consumer guarantee fee would be approximately $0.97/Mcf in nominal dollars, or $0.66/Mcf in 1975 dollars. "Such a fee would be equal to approximately 11% of the project's outstanding debt."

In the event a consumer debt guarantee approach were adopted, the Commission urged various actions to protect consumers from bearing unnecessary risks and costs. These included: (1) imposition of limits, if required, on the initial purchase of Alaskan gas reserves to ensure a reasonably broad distribution across domestic markets; (2) project equity investment to be at risk in the case of noncompletion or service interruption; (3) limitation of consumers' noncompletion liability to approximately 75% of total prudently incurred costs; (4) retention of residual power by federal regulatory authorities to terminate prospectively the all-events cost of service tariff, noncompletion agreements, and consumer surcharge arrangements, if extraordinary cost overruns should occur and the project becomes uneconomic to complete; and (5) contractual commitments by producers regarding minimum average daily volumes to be delivered to shippers, so that the extent of the consumer's risk can be better assessed.

The Commission also recommended certain actions to reduce regulatory risk. First, a procedure should be adopted whereby federal authorities would periodically decide whether costs during a given portion of the construction period were prudently incurred and are recoverable through the project's tariff. Second, if all-events cost of service tariffs and/or noncompletion agreements are required, the FPC would support legislation to bind future federal regulatory authorities to maintain and enforce such arrangements. Third, subject to reserving the right to review whether costs were prudently incurred, the FPC would support passthrough of costs on a current basis, as well as legislation binding federal regulatory authorities to maintain this treatment. Finally, the Commission declared, the Federal Government must maintain a dialogue with state utility commissions to discuss financing alternatives, and it should perhaps sponsor a conference in the near future to consider issues of regulatory risk at the state level, possible actions by the states to alleviate investor concerns, and the need for federal legislation to assure flow through of approved costs at the gas distribution company level.

In regard to financing plans proposed by the three applicants, the Commission considered the El Paso Alaska plan to be most feasible because of the anticipated availability of Title XI federal ship financing guarantees, avoidance of so-called "Canadian Basket" limitations on Canadian investments by U.S. life insurance companies, and its operation solely under the regulatory supervision of the United States. "Operating under a single regulatory authority makes it easier to implement innovations such as the variable rate of return on investment or all-events tariff concepts, which may prove to be essential in arranging a private financing."

Competitive Impact Assessment

The FPC's report to the President included a competitive impact assessment pursuant to a provision of the Alaska Natural Gas Transportation Act requiring the Commission to evaluate the "impact upon competition" for "each transportation system reviewed or considered." Because of the lack of information regarding which U.S. pipelines and distribution companies will obtain Alaskan gas, how much this gas will cost and what pricing method will be used, the Commission said any assessment of the competitive impact of the proposed transportation routes must necessarily be "judgmental."

The FPC concluded that certification of a particular Alaskan gas transportation system will not have any significant impact on pipeline competition within the United States. Though the choice of a particular system will affect the cost of

Alaskan gas between regions, that choice will not significantly affect inter-pipeline competition between regions because such competition generally occurs within a region.

The competitive impact of the Alaskan gas transportation system, the Commission continued, will be determined by a complex interaction of economic, regulatory and engineering factors. The two most important factors will be (1) extensive use of displacement procedures, and (2) imposition of a broad distribution of gas.

Transporting Alaskan gas through the Lower 48 States by displacement, the Commission stated, will entail a greater degree of coordination among U.S. pipelines than has existed to date. This need for coordination "could create the potential for collusive market conduct." On the other hand, if the ownership of Alaskan natural gas is to be widespread (as is recommended), "then transportation economics and the location of existing facilities dictate delivery by displacement for some gas under each proposed transportation system." The Commission stated its opinion that displacement procedures proposed by the various applicants are not in violation of the antitrust laws, although negotiations to implement these procedures could produce agreements of a noncompetitive nature beyond those necessary to effectuate the procedures. "The use of displacement cannot be allowed to serve as a vehicle for the proliferation of restrictive practices." Accordingly, the Commission will permit "only those practices which are indispensable to the successful operation of the displacement procedure."

The Commission stressed its intent to ensure widespread distribution of Alaskan gas through its authority to certificate sales. This means that volumes received by any individual pipeline will be limited, and that impact on overall supply costs will be approximately the same for all pipelines. Consequently, Alaskan gas will have a "neutral effect" on competition between pipelines in regional markets.

More difficult to assess, the Commission asserted, is the competitive impact of a broad distribution plan on the Alaskan gas supply market which, considering pre-1976 advance payment agreements which apportioned nearly all North Slope gas to sponsors of the Arctic Gas project, does not appear to have operated competitively in the past. Even though the advance payment program has been terminated, there is no assurance that the market for Alaskan gas will now operate competitively. The Commission, in fact, is "concerned about the potential for noncompetitive side agreements that may result from Alaskan gas sales." For example, with buyers unable to compete for Alaskan gas on the basis of price, "there will be an incentive for the oil companies to favor pipeline and gas distribution companies that can provide other benefits. One of these benefits could include an agreement by the buyer that he will not compete against the oil company or the oil company's affiliates in various energy markets. If these agreements do take place, they are likely to be tacit understandings that are not readily observed by government agencies."

Even though imposition of a plan for widespread distribution of Alaskan gas is an interference with the gas supply market, the Commission concluded, the overall impact "may be competitive if it reduces the likelihood of restrictive agreements in other energy markets."

The Commission added that the Alaska Natural Gas Transportation Act appears to require that the selected transportation system operate as a common carrier. While common carrier status is desirable under most circumstances because of its pro-competitive effect, the Commission declared, such status for an Alaskan gas transportation system is "incompatible" with the goal of effecting a private financing. Specifically, the presence of a common carrier creates an incentive to become a "free rider" and a disincentive to invest in the system. Hence, from a financing perspective, elimination of the common carrier provision may be required.

Other Matters

Section 5(c) of the Alaska Natural Gas Transportation Act directed the FPC to include in its report to the President a discussion of (1) volumes of Alaskan natural gas which would be available under each transportation system to each region of the U.S. -- directly, indirectly by displacement, or otherwise -- for each year of a 20-year period; (2) transportation costs and delivered prices of gas by region, again by year over a 20-year period; (3) the effects of such volumes, transportation costs and delivered prices on projected natural gas supply and demand in each region and on projected supplies of alternative fuels available by region to offset natural gas shortages occurring in such regions in each year; and (4) estimates of the total delivered cost to users of the natural gas to be transported by each system by year over a 20-year period.

In an effort to comply with the above provision, the FPC requested assistance from FEA which, in response, provided a series of long-term energy supply/demand and price projections under a variety of scenarios. These projections were developed from an existing FEA model (Project Independence Evaluation System -- PIES). The model was run for 1980 (as the base year), 1985 and 1990, applying delivered volumes and estimated costs of each project to 10 demand regions. Volumes were apportioned to the 10 regions on the basis of relative historical consumption. The model assumed a $13 price of imported oil and Alaskan field prices of $1 and $1.50/MMBtu. Three alternatives were examined under each price: (1) rolled-in pricing (Alaskan gas rolled-in with other interstate gas, assuming continued regulation of wellhead prices at current FPC-set rates); (2) incremental pricing (gas consumed in the industrial sector priced on an incremental basis, but with gas consumed in the residential and commercial sectors priced on a rolled-in basis); and (3) deregulation of new interstate gas at the wellhead.

The FPC stated that any conclusions possible from the FPC projections were subject to "considerable qualification" in view of the assumptions and methods.

Finally, the FPC report included some 52 recommended environmental and technical terms and conditions.

Alaska State Legislature

Senate

JUNEAU, ALASKA

Tuesday May 24

TO: Sen Rader

FR: Connie

RE: FPC gas route decision - discussion of financing & tariffs

The May 1 FPC document contains 80 pages on the subject of financing and tariffs. Several interesting points:

(1) Although the State's interest in financing is mentioned, no mention is made of the State's sale of its royalty gas (even though reference is made to the unwillingness of producers to sell.)

(2) Rate of Return - The report acknowledges that a higher return will be needed to attract financing due to the high risks. The hearing record concluded that with a 75/25 debt/equity ratio, a 15-17 % return on equity was too low. The TAPS line is referenced, predicting that with a 7-8% return allowed by the ICC on total assets, this will yield a 28-32% return on equity. (p. 44-45)

(3) Field Price for Gas - "Several factors indicate the need for an early resolution of the issue of the field price for Alaskan gas. First, according to Judge Litt, the gas producers have set as preconditions to entering into gas sales contracts, '...the prior establishment of a sale price, a disclaimer of vintage pricing, and a reversal of Commission policies interpreted by the procuers as requiring that they gurarantee future minimum delivery volumes regardless of field production capabilities.' Until such time as gas sales contracts are entered into, it will not be possible to deterimine which gas pipeline and distribution companies will receive the gas and thus which utilities will have an incentive to provide equity financing for a gas transportation system. Without parties willing to supply equity capital, no private financing for the project is feasible, For this reason alone, it is important to determine an appropriate field price as soon as possible...We, therefore, propose to establish in the near future a proceeding to determine an approprate field price for Prudhoe Bay gas as well as to examine the vintaging and throughput agreement issues." (p. 32-33)

(4) Daily volume The FPC notes how important an assured rate of gas flow is for obtaining financing. This leads me to believe that it is especially crucial for Alaska's conservation authority to not be overly optimistic now, nor expect that it will be allowed to halt flow in the future even if ultimate oil production is threatened: "Finally, the economic viability of any of these huge projects require the availability of substantial quantities of gas for shipment. If customers assume the risk or repaying the project's debt financing in the case of extended service interruption, it would be desirable to have a contractual commitment by the producers regarding the minimum average daily volume that will be delivered to the shipper so that the extent of the consumers' risk can be better assessed. We understand that similar through-put guarantees were made in the Alaskan oil pipeline financing. If gas producers are confident about their ability to supply adequate amounts of gas to justify building a gas transportation system then entering into an agreement would pose little risk to these companies. On the other hand, if the producers have significant uncertainties aobut the minimum deliverable volumes of gas, Federal decisionmakers and project sponsors should know the full details of such uncertainties before finally approving the design of the authorized system and proceeding with the project" (p. 69)
Note: I find it a bit disturbing that the FPC appears to think that the producers have full control over the gas volume produced. No where is the State of Alaska's authority to regulate production for conservation purposes ever mentioned, nor is the initial Plan of Operation referenced.

(5) Financing Alternatives - The report cites the testimony of the 3 competing routes, state public utilities and the US Treasury Dept. The FPC makes its recommendation that federal back-stopping should not be used until it becomes clear that private financing cannot be obtained otherwise. (The report notes that lack of a field price is a major reason why private financing has not yet proven up.)

(6) Incremental vs. Rolled-In Pricing - Despite assertions that Alaskan gas will be of a marketable price, the FPC suggests rolled-in pricing (just like Judge Litt), largely in order to induce financing. (p. 31)

(7) Gas distribtuion - The FPC argues strongly that gas sales should be made to a large number of purchasers with broad geographic distribution. This is for maximizing equity financing and to prevent economic disruption in the event of an extended interruption in service. (p. 37-38)