UNITED STATES OF AMERICA

BEFORE THE

FEDERAL POWER COMMISSION

El Paso Alaska Company, et al.	)	Docket Nos. CP75-96, et al.
	)	
Order Providing for Suspension of Proceedings, et al.	)	Docket No. RM77-6
	)	

RESPONSE OF EL PASO ALASKA COMPANY TO THE SUBMISSIONS OF ARCTIC GAS AND ALCAN

PAUL R. CONNOLLY
RAYMOND W. BERGAN
J. ALAN GALBRAITH

Williams & Connolly
1000 Hill Building
Washington, D. C. 20006

Of Counsel for
EL PASO ALASKA COMPANY

April 8, 1977

TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd.)

UNITED STATES OF AMERICA
Before the
FEDERAL POWER COMMISSION

El Paso Alaska Company, et al.	)	Docket Nos. CP75-96, et al.
	)	
Order Providing for Suspension of Proceedings, et al.	)	Docket No. RM77-6
	)	

RESPONSE OF EL PASO ALASKA COMPANY TO
THE SUBMISSIONS OF ARCTIC GAS AND ALCAN

The actions of this Commission in accepting submissions of additional materials under Order No. 558-C from Arctic Gas and Alcan, especially the latter's submission of an entirely new proposal, and the attempt to provide an opportunity for the testing of that new material by the interrogatory and response process of Order No. 558-E and by argument offered under Order No. 558-D, are violative of due process of law under the Fifth Amendment to the Constitution if these actions result in the Commission's use of the newly filed materials in the decisional process by which the Commission makes a comparative judgment among proposals for an Alaskan gas transportation system under Section 5(b)(1) of the Alaska Natural Gas Transportation Act of 1976.[1/]

The time afforded and the procedures offered are inadequate to test the newly filed materials for accuracy, candor, bias

---

1/ If it be contended that the procedures adopted are authorized by Section 5(b)(2), then El Paso Alaska submits that such an interpretation would make this latter section unconstitutional. Section 5(b)(2) also provides for a delegation of authority which is itself unconstitutional.

or completeness. We have not been afforded adequate opportunity for discovery, confrontation and cross-examination. The procedure adopted permits a decision or recommendation outside a record made in the course of a due process hearing.

While our responses to many new matters are not complete, and with protest to the procedures adopted, El Paso Alaska nevertheless submits the following in response to the Commission's Orders Nos. 558-C and 558-E.

THE ALCAN PROJECT

The new Alcan 48" project continues to suffer from all the problems which inhered in its original 42" filing. With respect to that 42" filing, El Paso Alaska had made the following observations:

> "As El Paso Alaska noted earlier, the Alcan project is in such an incipient state of development that no real meaning can be given to its schedules, cost estimates or pricing suggestions. At this stage, they are nothing more than an 'educated guess.' Tr. 221/38,538 (Hauser). Given that state of events, there is no way in the world that a fact finder can conclude that the Alcan project can and will complete within the time proposed or within the cost figure suggested.
>
> * * *
>
> " * * * The Alcan project sponsors clearly prepared their schedule before either knowing or solving the problems which a critical path analysis for the proposed Alaskan gas delivery system would have revealed. No lawyers' brief can develop a critical path analysis. The assignment of duration time, probability and interrelating nodes requires an exercise of

> engineering judgment. However, it takes no such expertise to realize that the absence of coordinated and comprehensive engineering judgment for the entire Alcan project is a major defect." Reply Brief of El Paso Alaska Company With Respect to Cost, Scheduling and Economics, filed December 13, 1976, pp. 112-13.

Responsive to that and other criticisms, the Administrative Law Judge arrived at the following well-founded conclusions:

> "Construction is another matter. Assuming that Alcan could demonstrate that it would be permitted to build on the Alyeska right-of-way, it could not say how close to Alyeska's line it would be permitted to come, and construction costs -- when a line cannot be specifically placed -- begin to be vague. Not that its costs elsewhere can be accepted with confidence. Its engineers are excellent; Westcoast's in particular displayed a great knowledge of their art. But, given the time constraints and magnitude of the job to be done and the vagueness of much of the specific alignment at the time their estimates were made, they were not able to support costs in more than a general way in either the U.S. or Canada. Blind faith in its engineers' expertise cannot replace the ability to independently check figures against known plans of pipeline construction on fixed right-of-way." I.D., at 345.

The new 48" filing does nothing to alleviate these problems. It is a totally new system design, with new hydraulics, a new construction schedule, new project planning and a new route over almost 500 miles. Alcan offers no additional project planning evidence and no additional evidence by environmental, geotechnic or engineering consultants to show why any more credence should be given to its 48" proposal than was previously given to its 42" line. Even on the issue of system expansibility, the

Alcan 48" alternative departs from an optimized design and results in an ultimate system of low efficiency with high fuel consumption, which approaches the same inefficiencies of their original 42" system. Moreover, even the most cursory examination of the Alcan filings, together with what materials were submitted in response to interrogatories, reveals the following problems.

A. Preconstruction Schedule

Alcan has seriously underestimated the length of time required for preconstruction activities. This period can be defined as the time between receipt of approval of the application (Congressional approval of the Presidential decision) and the start of construction. The functions that Alcan omitted and must complete are:

1. Prepare a preliminary detailed route selection: The present route selection is merely a line drawn on a map. Details, such as crossings of Alyeska, river crossings, specific locations on terrain features, use of the Alyeska haul road, and utilization of the Alyeska guidelines for distances between pipelines are non-existent.
2. Accumulate field data on a site-specific basis: This includes negotiations for and purchase of existing Alyeska data, geophysical surveys of permafrost limits, environmental studies,

archeological studies, soil borings and laboratory analyses on compressor station sites, at river crossings, and along the pipeline route, weather data and the hydrological data and stream characteristics necessary to design stream crossings.

3. Prepare a final detailed alignment: This includes the preparation of completely detailed alignment sheets on orthophoto mosaics.

4. Acquire rights-of-way and permits for land use: Assuming Congressional approval of the Presidential decision automatically carries with it a permit for right-of-way on federal land, it will still be necessary to determine title to every parcel of land crossed by the pipeline, prepare property plats and obtain easements from the BLM, the State of Alaska, native villages and corporations and private individuals. Mining claims must be settled and the Haines pipeline rights-of-way (including the existing products pipeline) must be purchased from the GSA.

5. Prepare detailed design: This includes a safe and reliable design of the pipeline, compressor stations and all ancillary facilities. Details must be prepared for mitigating permafrost

degradation and protecting the environment. Stream crossings, road crossings and pipeline crossings must be individually designed and drawings and applications for permits must be prepared. The route of the pipeline must be analyzed by use of an acceptable thermal simulation computer model to determine if the proposed mitigative measures are sound and effective. A thorough, effective quality assurance program must be developed.

6. Apply for and obtain authorizations to construct: These must be prepared and submitted to the DOI, DOT, State of Alaska and the various subagencies having jurisdiction such as the State Highway Department, Joint Fish and Wildlife Advisory Team and the State Department of Natural Resources. The most serious aspect of this phase is that a denial of authorization at any level will mean a complete revision of that particular phase, and a major denial from DOI, DOT, or the State could mean a complete revision of the entire project and a return to Item No. 1 on this list for a recycle through the entire process. Prior to issuance of authorization to construct, site-specific field archeological investigation must

take place. A significant archeological discovery on the pipeline right-of-way would require a re-route and a recycle of the pre-construction activities.

Concurrently with the above procedures, the Canadian companies (Foothills, Westcoast and AGTL) will be concerned with similar agencies in Canada plus the time required to settle the Yukon native claims. The time required to settle these native claims is not easily estimated. It can range from several years down to the time frame approximately equal to the time required to process the other permits.

7. Arrange for procurement of long delivery items of materials and equipment: This includes preparation of specifications, bidding, negotiations of purchase contracts, and issuance of purchase orders. The various suppliers must fit the orders into their production schedules, acquire raw materials, convert these raw materials into the basic components such as steel plate, castings, and electronic parts, and manufacture and test the finished products.

Compressors, refrigeration equipment, electrical generators and switch gear, electronics,

and computer controls ordinarily require the longest lead times. However, all these items are installed on the pipeline in the later years of the schedule, and should not be critical items.

Pipe, then, becomes the critical item. This is especially true of the Alcan project because the pipe to be used must be rolled from arctic grade steel in larger than normal size (48") and with greater than normal wall thicknesses. Special items such as this require longer lead times than normal.

But the production of pipe is not the final step in this process. A sample of the finished pipe must be thoroughly tested to the satisfaction of the governmental agencies. Welding procedures must be developed and radiographic inspection techniques set up. A failure anywhere along the time in this process will send the metallurgists and purchasing agents back to the beginning of this item.

The various applicants in these proceedings have indicated that pipe specifications have been drafted and initial contacts have been made with the pipe mills. No one has testified for Alcan that a commitment has been made which will start

the processes described above.

8. Acquire granular materials: This will probably be a combination of purchase of excess materials stockpiled by Alyeska (if any) and mining borrow sources after receipt of permits from the DOI (BLM) and the State of Alaska.

9. Start civil construction: This includes preparation of storage yards, double jointing yards, work pads, access roads, camp sites, and sites for ancillary facilities. This item requires the receipt of many permits described in Item No. 6 above.

10. Select pipeline contractors: This procedure can start after Item No. 6 has proceeded to a point of confidence that permits will be awarded and can be continued during the processing of Item No. 7 -- acquisition of materials and equipment. But this item must be completed prior to the start of Item No. 11.

11. Mobilize pipeline contractors: This is the prelude to the start of construction. It has a controllable flexibility and must be fitted into the critical path whether first pipe delivery or receipt of governmental permits becomes critical. It is, in fact, the "bridge" that connects the

"paths" followed by the two possible critical items, pipe and permits, and they converge on this item.

Thus, it can be seen that preconstruction activities are complicated, detailed, and time consuming. Alcan has done none of them and has scheduled none. The above listed items must be done in sequence except where noted otherwise. The preconstruction schedules of the various proposals can be found in the record in the following references:

Company	Reference
Westcoast	Vol. 1A, Tab 11
AGTL	Vol. 1, Fig. 3-D-1
El Paso	Ex. EP-172
Arctic	Ex. AA-35

From these references, it can be seen that the time required for preconstruction activities should be approximately 24 months to the start of civil construction and approximately 31 months to the start of pipeline construction. Two of the applicants, Alcan and Foothills, have not provided for such time in their project schedule. This conclusion is verified by the cash flow schedules in the capital cost estimates of the applicant. This analysis does not include the time required to arrange financing for the project and obtain approvals of tariffs. It is possible for these two items to require more time than all of the other preconstruction activities described. However, for the

purposes of this analysis, time for financing and tariff approvals has not been included.

Alcan has simply omitted adequate preconstruction time from its schedule. Alcan's claim that it can deliver gas sooner than any other applicant is simply lawyer's puffing.

B. Optimistic Alcan Schedule

1. Pipeline Construction

The Alcan 48" express proposal plans to install the following mileages of pipeline, including Northern Border and PGT-PG&E.

1979 - 561 miles
1980 - 2367 miles
1981 - 1816 miles

By comparison, the total amount of large-diameter pipeline (30 inches and larger) installed in the U.S. and Canada in 1976 was approximately 1900 miles. Alyeska installed 496 miles or 28% of the 1976 total. The total large-diameter pipeline installation planned for 1977 in the U.S. and Canada is only 1055 miles. Thus, Alcan is grand in scale.

The Alyeska project attracted five joint venture companies consisting of most of the major big-inch pipeline contractors operating in the U.S. and Canada. The gathering line construction at Prudhoe Bay required by the Alyeska project attracted three other major pipeline construction companies. These companies committed all available equipment, their best management personnel,

and attracted the most productive manpower available in the North American pipeline labor pool to complete the Alyeska project. The result of this effort was that the large demand for equipment caused equipment prices to increase at nearly twice the national wholesale price index. Management personnel and productive skilled labor were in short supply. Pipeline contractors working in the lower 48 in 1976 experienced productivity much lower than estimated or previously experienced and costs higher than estimated. Labor rates for operators, teamsters and laborers in Alaska increased 51% between January 1, 1974 and January 1, 1977, an annual inflation rate of nearly 15% (compared to an annual increase of the wholesale price index of 8.5%).

The over-optimism of the Alcan construction plan is summarized below.

Proposed Alcan Mileage U.S. Industry
(30-Inch Diameter and Larger)

	Year	Miles	% Alyeska 1976 (496 Miles)	% Total 1976 (1800 Miles)	% Estimate Total 1977 (1055 Miles)
Alcan (Total System)	1979	561	113%	31%	53%
	1980	2367	477%	132%	224%
	1981	1816	366%	101%	172%
Alyeska	1976	496	100%	28%	---

The pipeline construction industry is an extremely cyclical industry. Many pipeline companies are owned by parent companies who achieve financial stability by diversification. Most pipeline contractors own very little equipment, meeting

their requirements by leasing from dealers from each project. Naturally, no pipeline contractor retains hourly labor on the payroll between projects. Second tier supervision also is released to work for other contractors between projects, although many of these people have primary allegiance to a single general superintendent.

A pipeline contractor, then, offers experienced key management personnel, limited owned equipment, a capable organization, knowledge of the labor pool and project financing ability. Second tier supervision (spread superintendents, foremen, administrative help, etc.), skilled hourly labor, and most equipment come from a pool common to the entire industry. The ability to meet industry's requirements from this common pool is not unlimited.

During periods of low economic opportunity, such as will be experienced in 1977 with the shutdown of Alyeska, the pool shrinks. Equipment is junked, sold to foreign markets, converted to other use, deteriorates while idle or becomes obsolete. The labor pool shrinks from diversion to other fields of opportunity and by death or retirement.

During economic buildup the equipment pool is not able to increase as quickly as demand. This results in over-inflated prices and the use of less than efficient equipment. Similarly, the labor pool is not able to expand with trained and experienced manpower until incompetent and inefficient members of the pool are fully employed.

Given the huge demand on the industry planned by Alcan, its construction schedule and cost estimate are not worthy of consideration. The high level of activity that Alcan expects to achieve simply will not commence without a great deal of difficulty. If it is achieved, project completion will only be obtained after massive cost overruns and significant delays. Significant cost overruns on the Alcan project must be assumed.

2. Production Rates

Alcan, based upon the Alyeska experience, has filed a construction plan for installing 48" pipe in Alaska at the rate of 0.43 miles per calendar day. Such a rate compares favorably with the final rate experienced by Alyeska and generates a cost estimate that is comparable with the El Paso Alaska estimate.

However, the Canadian applicants indicate a much higher rate of progress. The Canadian companies, who will not be using a work pad for the most part and plan to snake their line through the rugged Canadian Rockies, plan a winter installation rate for 48" pipe from 79% to 142% of the Alcan Alaska rate and a summer rate of 128% to 212%[2/] of the Alcan Alaska rate. While experience in constructing big-inch pipelines in Canada indicates better performance records by Canadian welders than by their U.S.

2/ Planned by AGTL in the summer working only six days per week. Effective rate per scheduled work day in 247%.

counterparts, this experience does not reflect installing pipelines when the demand on the labor pool exceeds 100% of the supply as stated by AGTL in its application (3.D.5-1). If the industry in Canada is fortunate in training or attracting welders, they may experience a 10% production advantage over the U.S. portion of the project. To plan on anything more is imprudent to say the very least.

The Northern Border project, presumably based on comparable continental U.S. pipeline construction experiences, plans an average rate per calendar day per spread of 0.55 miles for its 42" line. The Canadian applicants again plan a more optimistic rate, ranging from 122% to 182% of the Northern Border rate.

On the 36" western leg, PGT and PG&E plan a rate equal to 147% of the Northern Border rate for their looped line. Westcoast's construction rate on the 36" leg is 191% of the Northern Border rate and AGTL plans 182% in the valley and 113% in the Rocky Mountains. No credence can be given to any such construction scheduling.

3. Cost Impact

Failure to meet production rates will cause increased construction costs and schedule delays. Failure to mobilize 24 pipeline spreads concurrently will impact costs and schedule. Should the Alcan system be planned with a five-year construction schedule instead of the three years now planned, the impact on

the North American pipeline industry would only be twice the impact caused by Alyeska.

Presently the Canadian wage rates used by the applicants in their estimates are approximately 50% of the Alaska wage rates. Present Canadian economic conditions and future pressure by labor to approach parity with their counterparts across the border will result in higher labor costs -- that's what can be expected from projecting historical trends. Foothill's consultant, Canuck Engineers, has predicted exactly this outcome during its cost critique of the Arctic Gas project as filed before the NEB. This increase may be added to the omissions category.

Other omissions are:

1. No provision for work pads in Canada;
2. No cost for air support for mobilization and re-supply of labor and emergency supplies. (Alcan Answers to Interrogatories, Vol. I, pp. 9-12);
3. Only meager provisions for supply of granular material (12 inches for pads in the Yukon Territory) (Ibid., pp. 3-5); and
4. Inaccurate representation of Northern Border cash flow and inconsistent and inaccurate de-escalation of Canadian costs (Ibid., pp. 112, 76, 77).

Three substantial items of cost will impact the compute cost of service for the Alcan 48" project.

1. Rate of construction - overestimated in Canada.
2. Duration of construction - A minimum of five years instead of three, increased AFUDC.
3. Omissions - underestimated in Canada.

The minimum expected impact on cost of service of these omissions would be a 20% increase in costs.

C. Construction Manpower

It is clear that the Alcan project stretches beyond belief the available construction manpower in Canada. The following tables, extracted from the Alcan filing, reveal that in one construction season, the summer of 1981, they require 24 mainline construction spreads, 18 compressor station crews, or a total of 42 separate crews.

Mainline Spread Requirements 1/

Segment	Year/Season 1979 Summer	1979 Winter	1980 Summer	1980 Winter	1981 Summer	1981 Winter
Alcan	-	-	6	-	6	-
Foothills-Yukon	2	2	2	1	-	-
Foothills-Saskatchewan	-	-	1	-	1	-
Westcoast: 48"	-	2	2	1	2	-
36"	-	-	-	-	1	-
TCGTL Canada	-	-	4	2	4	-
TCGT-PGE	-	-	2	-	4	-
Northern Border	4	-	6	-	6	-
Total Mainline Spreads	6	4	23	4	24	-

Compressor Crews 2/

Segment	Year/Season 1980 Summer	1980 Winter	1981 Summer	1981 Winter
Alcan	4	-	4	-
Foothills	4	-	4	-
Westcoast	2	-	2	-
TCGTL Canada	-	-	4	-
TCGT-PGE	-	-	-	-
Northern Border	4	-	4	-
Total Compressor Spreads	14	-	18	-

1/ Does not include catering.

2/ Does not include camp or catering--Alcan indicates eight camps will be needed for two seasons.

ALCAN PROJECT

48" Alternative

Manning Requirements

(Pipeline Spreads and Compressor Crews)

Type	1979 Summer	1979 Winter	1980 Summer	1980 Winter	1981 Summer	1981 Winter	S
Welders	396	330	2,034	295	2,199	-	
Welder Helpers	404	387	2,269	364	2,391	-	
Subtotal	800	717	4,303	659	4,590	-	
Foremen	86	60	407	60	440	-	
Operators & Mechanics	835	867	4,802	700	4,910	-	
Teamsters	240	224	1,389	220	1,434	-	
Laborers	1,049	797	5,399	796	5,984	-	
GRAND TOTAL	3,010	2,665	16,300	2,435	17,358	-	

Their total pipeline manpower requirement during that construction season exceeds 17,000. This is far in excess of even the most optimistic estimates as to availability within the North American labor force. It may be recalled that even Arctic Gas has admitted that its project, requiring only 9 mainline construction spreads in any given season, depends upon marshalling manpower from Canada in a number never before imagined, a number which will require the "upgrading" of existing skills to meet the manpower requirements. Tr. 23/3,385 (Dau). Even accepting the manpower requirements posited by one of the Canadian partners (AGTL), the existing work force is woefully inadequate to meet the necessary manpower. The following table, at page 3.D.5-1 of AGTL's portion of Alcan's 48" alternate filing, makes that point even more clear than we could attempt to do. Note the disparity between the last two columns.

3. FACILITIES

D. CONSTRUCTION PLAN

5. CONSTRUCTION RESOURCES

5.1 INTRODUCTION

The construction program will require the use of four construction spreads during the 1980 summer construction season. Manpower and equipment for this program are not extensive but must be included as a segment of a major project involving construction by other companies simultaneously.

5.2 MANPOWER REQUIREMENTS

The following table shows estimated peak manpower requirements for AGT (Canada) and the estimated manpower requirements for others for pipeline construction in connection with the Alaska Highway Project - 48" Alternative during the 1980 summer construction season and an estimate of the number of experienced people presently available in Canada.

	Applicant	Foothills (Y)	Westcoast	Total Required	Existing* Work Force
Supervision	150	120	150	420	250
Welders	260	210	190	660	350
Operators	505	430	580	1,515	800
Teamsters	195	160	170	525	525+
Skilled Labour	320	200	310	830	480
Others	770	450	700	1,920	1,920+
TOTALS	2,200	1,570	2,100	5,870	4,325+

* Construction Problems - Arctic Pipeline
W. Gant - R. D. Meeres
Canadian Northern Pipeline Research Conference (February 1972)

Upon receiving a permit the Applicant will initiate an extensive training program in conjunction with the Pipe Line Contractors Association of Canada, Unions, Canada Manpower and other government agencies utilizing construction of the AGTL system.

D. Environmental Considerations

At the end of the cross-examination on Alcan's 42" filing, their environmental testimony was left in a shambles. In describing their environmental case, El Paso Alaska wrote as follows:

> "The Alcan presentation in this proceeding shows that the environmental consultants did not have adequate input into the selection of the pipeline route. Further, the environmental consultants acknowledged that the collection of additional baseline data will lead to further environmental assessments which, in turn, may require changes in pipeline alignment. Such changes could affect the engineering design of the Alcan project; the likelihood that there will be such changes makes uncertain the reliability of Alcan's cost estimates. These points emerged during the cross-examination of nearly all the Alcan witnesses.
>
> "Alcan's hydrologist, Dr. R. F. Carlson, who undertook a hydrological reconnaissance between Delta Junction and the Canadian border (Tr. 194/32,748 (Carlson)), testified that about a year would be needed to do the necessary hydrological work at major crossings. Tr. 194/32,767 (Carlson). Such data is necessary both to determine where to cross a river and how to design the crossing. Dr. Carlson had not participated in the costing of the Alcan pipeline. Tr. 194/32,755 (Carlson). In the stretch between Delta Junction and the Yukon Border, Alcan fisheries' biologists have catalogued the streams but have not gathered baseline information on the fish using them. Tr. 193/32,676-32,678 (Holden and Van Hyning). Such information is necessary to arrive at a construction plan that mitigates impact on fish. It could also affect the siting of stream crossings.
>
> "The Alcan environmental witnesses (Gordon, Foster, and Mathewes), who addressed both

Alaskan and Canadian portions of Alcan's environmental report (Tr. 194/32,780 (Mathewes)), had no input into the routing of the pipeline in Canada. Tr. 195/33,039 (Gordon). Alcan did not offer other witnesses to fill this gap. As a result, the alignment in Canada, as far as the record reflects, did not take into account sensitive environmental areas in Canada. If further studies uncover such areas, costly realignments could be the result. Further, the Alcan witnesses could not address the issue of proper construction timing in Canada, as they lacked proper baseline data. Tr. 194/32,984 (Gordon). Dennis E. Baker, of the environmental consulting firm of F. F. Slaney & Co. (Tr. 195/33,067 (Baker)), who discussed land use along the Alcan pipeline (Tr. 195/33,074 (Baker)), testified that there 'has not been sufficient work done on the specific line location' to permit him to make site-specific recommendations on relocation, except that he had advised Alcan to stay generally within existing corridors. Tr. 195/33,112 (Baker). Dr. L. W. Mottus, of C. D. Schultz & Co. (Tr. 195/33,318 (Mottus)), who testified about Canadian impacts, admitted that he lacked the underlying data to advise the engineers on the timing of construction, on mode of construction, on gravel sources, and on blasting schedules. Tr. 196/33,361 (Mottus).

"The foregoing review shows that Alcan has a great deal of site-specific environmental data to collect before it can proceed to final design. Alcan's notion that it can be in operation more quickly than El Paso Alaska in view of the amount of baseline environmental work ahead of it, is just a notion. It has no predictive meaning." Reply Brief of El Paso Alaska Company on the Environmental Issues, filed November 18, 1976, pp. 61, 62.

Judge Litt completely concurred. Describing Alcan's environmental presentation in his Initial Decision, he wrote:

"As far as this record is concerned, Alcan's descriptions on brief of the story it has to tell on its environmental preparation

> far exceeds the contents of the story. From Prudhoe Bay to Delta Junction, as of now, it simply relies on Alyeska work as supervised by JFWAT and a literature search by its consultants (Rebuttal Br. 23). From Delta Junction to the U.S.-Canadian border, it 'follows the Haines pipeline and highway,' even though its environmental witnesses were not sure where the pipeline would go. The corridor concept is argued as if it were on a common pipeline right-of-way -- which it is not -- leaving Delta Junction and as if merely saying the magic word 'corridor' eliminates the problems of site-specific work. In both its Environmental Rebuttal Brief and Economic Brief, Alcan argues that its ongoing studies on environment will be more complete by May 1, 1977, when the Commission's decision will be entered -- an almost bald admission that the record showing it has made so far is deficient on its face. There are no JFWAT studies east of Delta Junction, and there simply is not sufficient biological evidence in this record to find that Alcan has met the Commission's requirements under NEPA. The environmental showing made as to the Canadian portions of its project were not even used by the engineers in Canada in designing the line. On the basis of this record, the only advantage that Alcan can be found to have is that it crosses neither the Wildlife Range nor the Chugach Forest. Other than that, which is a philosophical finding, it has not made a case sufficient to make appropriate environmental findings that it is as satisfactory, and certainly not that it is superior, on environmental grounds as either Arctic Gas or El Paso." I.D. 245 (footnotes omitted) (emphasis supplied).

That description was accurate then and it remains an accurate description of Alcan's 48" alternative. They have done nothing to improve their previous environmental submissions. They were defective then and they are defective now. Moreover, to the extent that Alcan utilizes a new 500-mile

alignment through British Columbia and Alberta, even the preliminary studies made with respect to their 42" alternative are of no help to them. That 500 miles is unstudied, a fact which must disqualify the Alcan project on NEPA considerations.

Indeed, a review of the Alcan environmental filing shows that its environmental consultants are by no means persuaded that the pipeline is routed or that compressor stations are located to avoid environmentally sensitive areas in Canada. The consultants therefore recommend that management undertake further studies, that management either reroute or consider rerouting the pipeline in certain sensitive areas, and that management either relocate or consider relocating compressor stations in certain areas. Our review of the Alcan material suggests that there are a considerable number of miles of pipeline which may have to be significantly realigned and a number of compressor stations that may have to be relocated. These realignments and relocations could result in substantial redesign of the pipeline, with significant cost and schedule impacts.

We here give some specific examples illustrating our comments.

In Document 50, filed by Alcan on March 22, 1977, page 243, it is stated that compressor station C5-64 should be relocated from Hackel Hill (MP 258.5) to a less environmentally sensitive location. On the same page, it is stated that the pipeline should be rerouted around the Ibex River Valley (MP

235.75) to a less environmentally sensitive region. At page 653, it is stated that the proposed alignment from MP 45-175 should be examined to see if alternative routes are available which would avoid the proposed ecological reserves and the Kluane Game Sanctuary. In Addendum C to Volume 3, Section B, filed February 28, 1977, relating to the section of the Alcan line to be built by Westcoast Transmission Co., it is stated at page 418 that:

> "With the construction of the pipeline, a signigicant area of land east of the [Liard] hotsprings that is presently isolated will be opened up. Of special significance is the Grand Canyon of the Liard, an area of high scenic quality . . . . An item of serious concern is the possibility of a compressor station and an all-weather access road into the Nordquist Lake area, a critical winter range for elk, and a waterfowl nesting and possible carnivore denning area. If these concerns are not resolved through avoidance or mitigation measures, a highly negative impact could result, both in the short-term and the long-term."

Indeed, at pages 424-425, this report makes the point that a detailed environmental study is needed along the southern portion of the Alcan route in British Columbia.

Except for minor adjustments, the final alignments of El Paso Alaska and Arctic Gas are known. Their compressor stations have been located to minimize, to the extent practicable, environmental impact. Alcan, on the other hand, is still engaged in the process of aligning its pipeline; the location of many

compressor stations is subject to doubt and change. This uncertainty is one of several reasons that makes suspect the engineering, cost, and schedule proffered by Alcan for its pipeline.

E. Financing the 48-Inch Alternative

1. Negative Impact on Financial Feasibility on All Counts

The Alcan sponsors stated that their 48" alternative proposal "does result in increased capital costs."[3/] More importantly, as capital costs have increased, related external financing needs have increased more than proportionately. Financing difficulties have therefore been generally aggravated. Further, those markets least able to support higher capital demands bear the larger share of these required increases under the new Alcan plan.

The 48" alternative circumvents none of the basic impediments to financeability which beset the earlier proposal. Available capital is still limited. No new financing entities or new sources of capital have been suggested. Other major Canadian federal and municipal government projects would still compete for funds, as would privately financed Canadian natural resource projects. A sound basis of project credit support has

---

3/ Proposal of Alcan Pipeline Company for a 48-Inch Express Line Alternative for an Alaska Natural Gas Transportation System, III A, p. 5.

still not been set forth nor have any significantly stronger assurances been given that the Maple Leaf Project would not compete for labor, materials and capital.

2. Higher Capital Costs

The overall system cost estimate for the 48" alternative is $9,630.6 million, or $583.1 million higher than the 42" alternative. In addition, except for Northwest Pipeline, whose pipeline system would not be expanded under the 48" proposal, none of the component operating and project companies has significantly lower capital costs under the 48" proposal, and most have higher amounts. Both the Canadian and the U.S. portions of the new alternative require increases in capital costs. (See Table 1.)

3. Higher External Financing Requirements

More dramatic than the greater cost of the 48" proposal is the resultant $1.46 billion increase in overall funding requirements. As Table 2 sets forth, the new plan provides no significant decreases in external financing needs for any security category either in the U.S. or Canada. No capital market has been relieved under the new proposal, but the pressure on several has grown significantly.

SUMMARY OF COMPOSITE SYSTEM COST ESTIMATES FOR THE ALCAN PROJECT

Comparison of the 42-Inch and 48-Inch Alternatives

(Dollars in Millions)

	48" Alt. (a)	42" Alt. (b)	Change (c)
Canadian			
Foothills Pipe Lines Ltd. (Yukon)	$1,309.8	$1,366.3	$ (56.5)
Foothills Pipe Lines Ltd. (Saskatchewan)	192.2	-	192.2
The Alberta Gas Trunk Line Co. Ltd.	971.6	978.1	(6.5)
Westcoast Transmission Co. Ltd.	1,293.5	1,201.4	92.1
Canadian Subtotal	3,767.1	3,545.8	221.3
U. S.			
Alcan Pipeline Co.	3,498.5	3,116.3	382.2
Northwest Pipeline Corp.	-	350.7	(350.7)
Pacific Gas & Electric Co.	387.8	366.9	20.9
Pacific Gas Transmission Co.	363.9	140.4	223.5
Northern Border Pipeline Co.	1,613.3	1,527.4	85.9
U.S. Subtotal	5,863.5	5,501.7	361.8
Total	$9,630.6	$9,047.5	$ 583.1

(a) Source: Alcan Pipeline Project 48 Inch Alternative Proposal, Section 6, Exhibit 6-2, p.2.

(b) Source: AP-15, Schedule F2.

(c) Increase (decrease) of the 48-Inch Alternative as compared with the original 42-Inch Proposal.

SUMMARY OF TOTAL ESTIMATED FINANCING REQUIREMENTS OF COMPANIES ASSOCIATED WITH THE ALCAN PROJECT (BY SOURCE OF FUNDS)

Comparison of the 42-Inch and 48-Inch Alternatives (1978-1983)

(Dollars in Millions)

	Canadian Funds			
	48" Alt.(a)	42" Alt.(b)	Change(c)	% Change
Bank Loans	$1,265	$1,306	$(41)	(3.1)%
Long-Term Debt	1,025	1,005	20	2.0
Preferred Stock	525	310	215	69.4
Common Stock	543	448	95	21.2
Total	$3,358	$3,069	$ 289	9.4

	U.S. Funds			
	48" Alt.(a)	42" Alt.(b)	Change(c)	% Change
Bank Loans	$ 966	$ 955(d)	$ 11	1.2%
Long-Term Debt	6,003	4,947	1,056	21.3
Preferred Stock	246	265	(19)	(7.2)
Common Stock	1,410	1,287	123	9.6
Total	$8,625	$7,454	$1,171	15.7

	Total Funds			
	48" Alt.(a)	42" Alt.(b)	Change(c)	% Change
Bank Loans	$ 2,231	$ 2,261	$ (30)	(1.3)%
Long-Term Debt	7,028	5,952	1,076	18.1
Preferred Stock	771	575	196	34.1
Common Stock	1,953	1,735	218	12.6
Total	$11,983	$10,523	$1,460	13.9

(a) Source: Alcan Pipeline Project 48-Inch Alternative Proposal, Section 8, Exhibit C, as amended with Supplemental Financing Information.

(b) Source: AP-15, Schedule C.

(c) Increase (decrease) of the 48-Inch Alternative as compared with the original 42-Inch Proposal.

(d) Adjusted to exclude $400 million of U.S. bank debt for Northern Border Pipeline, originally included in AP-15, Schedule C.

4. Required Financing Expanded Most in Weaker Markets

Not only does the 48" proposal entail $1.46 billion (13.9%) in increased total estimated external financing requirements, but the shift in overall financing burden mix is also unfavorable. Three particularly restricted capital markets would have to supply disproportionately larger amounts of funds under the 48" alternative. Table 2 shows increases in funds to be raised via sale of (1) U.S. long-term debt, primarily representing increased borrowings by Canadian participants (up 21.3%), (2) Canadian preferred stock (up 69.4%), and (3) Canadian common stock (up 21.2%). Northwest Pipeline, among the more financeable of the Alcan project participants, is not among the companies requiring external financing under the 48" alternative. However, this reduced financing requirement is offset several times over the increased capital needs of Alcan Pipeline, a U.S. project company, and the three Canadian project and operating company participants. The increased financing burden of the revised project falls, therefore, on the weaker shoulders.

The U.S. long-term debt market available to Canadian borrowers is severely restricted by the Canadian basket limitation which impacts all major U.S. life insurance companies. In spite of Alcan's arguments that a U.S. funding vehicle could circumvent the 10% Canadian basket limitation, there is no evidence in the record to support the supposition that such a

gimmick would work. This consideration, along with the probability that Alberta Gas Trunk and Westcoast would have to precommit first mortgage bond financing in the private market[4/] means that the 21.3% increase in long-term debt to be raised by Canadian entities in the U.S. would be even more difficult and probably impossible to obtain.

As pointed out previously, the original 42" proposal, along with associated Maple Leaf Project financings, would have placed financing requirements on the Canadian equity market which would have been more than 300% larger than the total amounts of equity raised by all Canadian pipelines in all markets during the six years 1970-1975. The increases in preferred and common stock financing needs required by the change from the 42" to 48" project would by themselves approximately equal the total amount of external equity funds raised by Canadian pipelines in that same six-year period. This enormous demand on the Canadian equity markets is clearly unprecedented and is in no way supported by any Alcan market capacity study.

5. Previous Criticisms Still Valid

It has been shown that the 48" proposal would produce no significant decreases in external financing requirements for

---

4/ See Brief of El Paso Alaska Company Concerning Financing, pp. 91-94.

Comparison of the 42-inch and 48-inch Alternatives

(19[illegible]3)

(Dollars in Millions)

	Total Basic Requirements			Estimated Contingency Requirements			Total Estimated Requirements		
	48" Alternative(a)	42" Alternative(b)	Change(c)	48" Alternative(a)	42" Alternative(b)	Change(c)	48" Alternative(a)	42" Alternative(b)	Change(c)
Alcan Pipeline Co.									
U.S. Banks	$ 563	$ 567	$ (4)	$ 113	$ 113	$ -	$ 676	$ 680	$ (4)
U.S. Long-Term Debt	1,900	1,530	370	380	310	70	2,280	1,840	440
U.S. Common Stock	840	710	130	168	145	23	1,008	855	153
Total	3,303	2,807	496	661	568	93	3,964	3,375	589
Foothills Pipe Lines Ltd. (Yukon)									
Canadian Banks	325	301	24	65	60	5	390	361	29
U.S. Long-Term Debt	475	361	114	95	72	23	570	433	137
Canadian Long-Term Debt	200	200	-	40	40	-	240	240	-
U.S. Preferred Stock	205	171	34	41	34	7	246	205	41
Canadian Common Stock	140	115	25	28	23	5	168	138	30
Total	1,345	1,148	197	269	229	40	1,614	1,377	237
The Alberta Gas Trunk Line Co. Ltd.									
Canadian Banks	300	255	45	400	400	-	700	655	45
U.S. Long-Term Debt	615	275	340	-	-	-	615	275	340
Canadian Long-Term Debt	400	405	(5)	-	-	-	400	405	(5)
Canadian Preferred Stock	300	160	140	-	-	-	300	160	140
Canadian Common Stock	225	110	115	-	-	-	225	110	115
Total	1,840	1,205	(635)	400	400	-	2,240	1,605	635
Westcoast Transmission Co. Ltd.									
Canadian Banks	123	20	103	52	270	(218)	175	290	(115)
U.S. Long-Term Debt	865	740	125	-	-	-	865	740	125
Canadian Long-Term Debt	385	360	25	-	-	-	385	360	25
Canadian Preferred Stock	225	150	75	-	-	-	225	150	75
Canadian Common Stock	150	200	(50)	-	-	-	150	200	(50)
Total	1,748	1,470	278	52	270	(218)	1,800	1,740	60
Northwest Pipeline Corp.									
U.S. Banks	-	-	-	-	- (d)	-	-	- (d)	-
U.S. Long-Term Debt	-	280	(280)	-	-	-	-	280	(280)
U.S. Preferred Stock	-	60	(60)	-	-	-	-	60	(60)
U.S. Common Stock	-	50	(50)	-	-	-	-	50	(50)
Total	-	390	(390)	-	-	-	-	390	(390)
Pacific Gas & Electric Co.									
U.S. Banks	-	-	-	-	-	-	-	-	-
U.S. Long-Term Debt	388	367	21	-	-	-	388	367	21
U.S. Common Stock	-	-	-	-	-	-	-	-	-
Total	388	367	21	-	-	-	388	367	21
Pacific Gas Transmission Co.									
U.S. Banks	-	-	-	-	-	-	-	-	-
U.S. Long-Term Debt	364	141	223	-	-	-	364	141	223
U.S. Common Stock	-	-	-	-	-	-	-	-	-
Total	364	141	223	-	-	-	364	141	223
Northern Border Pipeline Co.									
U.S. Banks	290	275	15	-	-	-	290	275	15
U.S. Long-Term Debt	921	871	50	-	-	-	921	871	50
U.S. Common Stock	402	382	20	-	-	-	402	382	20
Total	1,613	1,528	85	-	-	-	1,613	1,528	85
Total Alcan System (Before Duplications)									
U.S. Funds	7,828	6,780	1,048	797	674	123	8,625	7,454	1,171
Canadian Funds	2,773	2,276	497	585	793	(208)	3,358	3,069	289
Total	$10,601	$9,056	$1,545	$1,382	$1,467	$(85)	$11,983	$10,523	$1,460

any security category in either the U.S. or Canada. In several security categories and on an overall basis, the external funding requirements have been significantly increased.

It follows, therefore, that all of the arguments set forth in EP-279 and in Brief of El Paso Alaska Company Concerning Financing questioning the financial feasibility of the Alcan project can be made even more strongly in the 48" case:

> "Unlike El Paso Alaska, which will finance solely in U.S. markets, the participants in the Alcan Project are U.S. and Canadian entities which must rely upon a wide variety of markets and financing vehicles to supply their very substantial capital needs. Great dependence is placed upon the availability of capital to Canadian-based companies from private and public Canadian markets and from that portion of the U.S. private market available to Canadian companies. Since these are relatively limited sources of capital, the requirement to tap these markets, year after year, raises questions about the financial feasibility of the Project.
>
> "Projected funding requirements for Alcan would press the limits of the U.S. and Canadian private placement markets. It would do as much to the U.S. and Canadian banking systems, as well as the Canadian equity market. In the absence of governmental guarantees from the United States, currently of uncertain definition and availability, there is no proof by Alcan that adequate financing will be forthcoming. Even in markets where adequate capacity seems to exist, Alcan's cost of capital, which must ultimately be borne by the American gas consumer, would be substantially higher than the cost to an American-only project of similar credit standing. Finally, the plan involves timing and coordination among a large number

of companies having various financing requirements and making competing demands in the U.S. and Canadian capital markets." 5/

No significant changes in suggested plans for implementation or in proposed credit support have been set forth by the Alcan project sponsors. The complexity of plan implementation remains. As before, no information has been filed which would suggest that key parties in Alcan's credit support scheme would feel obliged to participate in the manner which Alcan's financial advisers have proposed.

Finally, the competition for funds from the Maple Leaf Project would be even more intense, now that the Alcan project's external financing needs have been increased. The Administrative Law Judge's "Initial Decision" correctly points out that:

> "While Alcan espoused a 13- to 22-month timing gap between projects as a minimum to avoid direct financing competition, the investment and lending communities could well require actual Alcan operations and cash flow before the construction of Maple Leaf to avoid the aggregation of the capital requirements of the two projects. This would mean at least a 4-year timing difference." 6/

In conjunction with this, it should be noted that:

> "Recognition of Maple Leaf's first-born status is set forth for all to see in the agreement

---

5/ Brief of El Paso Alaska Company Concerning Financing, pp. 71-72.

6/ F.P.C. Initial Decision, p. 378.

among the Alcan sponsors; and, even toned down as it was before the record closed, it represents an additional set of risks to the American consumer." 7/

In light of these considerations, the most noticeable recent cosmetic addition to the Alcan Definitive Agreement, stating that the participants "contemplate" a 13-month interval between the two projects, is not compelling. 8/ It certainly does not assure that an Alaska gas delivery system would receive the priority treatment and corporate commitment it deserves.

THE ARCTIC GAS PROJECT

A. New Frost Heave Design

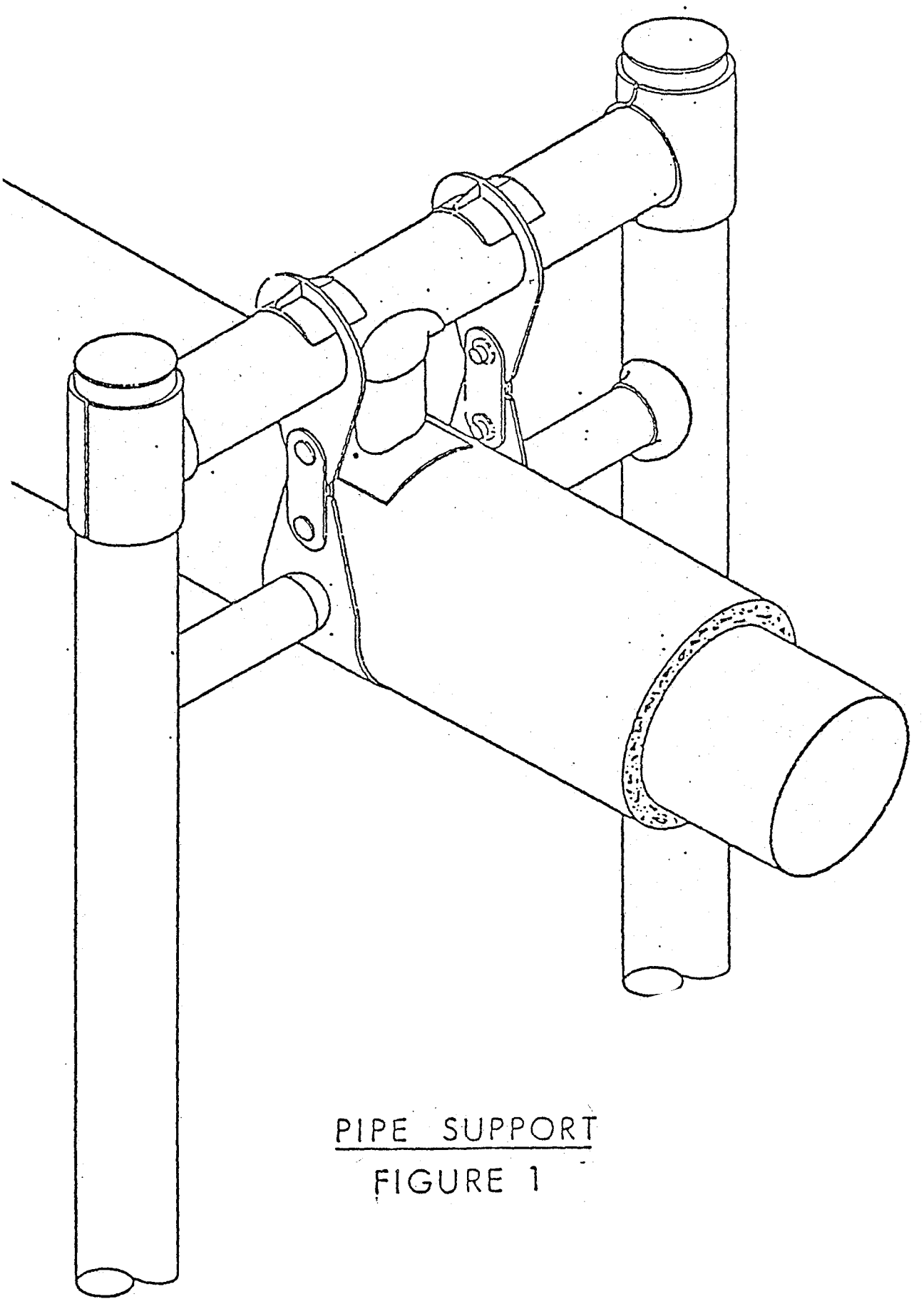
Despite the reassuring words of counsel for the Arctic Gas project, the new so-called frost heave design filed with this Commission is in reality a new construction plan for almost 2,000 miles of their line in Canada. Simply as an example, we note that all of their compressor stations in Alberta have been derated from 55,000 HP to 38,000 HP, that the Caroline to Coleman lateral has been resized from 30" at 1680 psi to 36" at 1440 psi, that gas heaters and propane refrigerator systems have been added. In addition, cursory analysis reveals that in the northern portion of the line, immediately

---

7/ Ibid., App. I-21.

8/ Alcan Pipeline Project 48-Inch Alternative Proposal, Section 10, 2.1(d), p. 5.

south of Tununuk Junction, they have added 400 miles of above-ground power transmission cable and several hundred miles of cable transmission line. In the same 400 mile-stretch of line, there are no fewer that 1,800 mode changes between insulated and heat-traced pipe and non-insulated pipe. The average mode length is no more than 700 feet. Over yet another 200 miles of line, directly to the south, they are installing more than 1,000 underground VSMs similar to those of the Alyeska project. What these changes do to their construction schedule, to their manpower requirements, to their hydraulics and to their overall energy balance cannot be tested. One need only look at the Rube Goldberg design of the underground VSMs to conclude, notwithstanding the facile assertions of Arctic Gas counsel, that the installation of a thousand of them over 200 miles of line must necessarily have an adverse impact upon their already too tightly constricted construction schedule. The following page, extracted from the Arctic Gas filing with this Commission of March 22, shows the design of the underground VSMs.



PIPE SUPPORT

FIGURE 1

In connection with their frost heave filing, Arctic Gas continues the assertion that El Paso Alaska still must confront the frost heave problem. In this regard, we repeat what we have previously said. Judge Litt was plainly wrong when he said, at I.D. 111, that "El Paso has . . . not yet specifically addressed frost heave avoidance in its design." All parties agree that frost heave occurs only under certain discreet soil conditions. There must be a combination of freezing temperature, frost-susceptible soil and an appropriate source of water. To sketch the parameters of this problem, Arctic Gas confronts the type of soil conditions susceptible to frost heave over 200 to 300 miles of its line. This is not the assertion of counsel; this is the testimony of one of the Arctic Gas geotechnical consultants, Dr. John Ivor Clark. Tr. 20/3,148 (Clark). By contrast, El Paso Alaska encounters such conditions for but 50 miles of its line. Tr. 42/6,331 (Wright), Tr. 169/27,758

(Winn).[9/]

El Paso Alaska examined the Alyeska alignment, the mode of Alyeska construction and the Alyeska core logs to make estimates of the mileage of pipeline where frost heave potential may exist. Tr. 169/27,759 (Wright). El Paso Alaska acknowledges that site-specific examination and testing will have to take plac prior to final design, id., and time and money have been provided to effect such site-specific analysis.

El Paso Alaska has recognized the potential for frost heave. At the time of final site-specific design, the suspect areas within that 50-mile range will be assessed utilizing a

---

9/ It should be noted that Arctic Gas witness Clark stated that El Paso Alaska would encounter 100 miles of frost-susceptibl soils along its route. Tr. 154/25,302-06, 25,501-02 (Clark). Dr. Clark's opinion in this regard is apparently based on hi review of the USGS open-file maps, Tr. 154/25,317 (Clark), input from his staff, some of whom had done some work on the Alyeska project but none of whom had even assessed the actua El Paso Alaska alignment in the field, Tr. 154/25,317-24 (Clark), and a limited fixed-wing flight over the Alyeska route for purposes admittedly other than analyzing El Paso Alaska's pipeline route. Tr. 154/25,318 (Clark). Dr. Clark had not reviewed any additional Alyeska core hole information. It is clear that neither Dr. Clark nor any member of his staff conducted anywhere near the analysis of El Paso Alaska's route that Mr. Wright and Pipeline Technologists did. El Paso Alaska witness Wright reached his conclusion with respect to the existence of 50 miles of frost-susceptible soil after extensive field work along the El Paso Alaska route, and after reviewing USGS open-file maps, the Alyeska project description and some 1,200 Alyeska core holes. Tr. 43/6,408 (Wright). Mr. Robert Winn, the Dames & Moore partner who directed Dames & Moore's efforts as Alyeska's geotechnical consultant, confirmed Wright's judgment. Tr. 169/27,758 (Winn).

mathematical model consisting of a series of proven components to determine if, and to what extent, frost heave will exist and what measures may be taken to abate any predicted frost heave. Tr. 41/6,902-04, 6,104 (Wright). The effectiveness of each of the components of this mathematical model have been proven. Tr. 41/6,093, 6,184, 6,185 (Wright). For example, the conduction component has been used to predict the migration of the Mackenzie River, the depression of permafrost in the new channels and the rebuilding of the permafrost in the channels from which the river migrated. Id. Such a conduction component accurately predicted the thickness of the active layer on the North Slope. Tr. 42/6,283 (Wright). The pipe stress component was utilized as the basis for the Alyeska stress analysis. Tr. 42/6,280 (Wright). The soil stress component has been used in the development of projects for the U.S. Navy and other governmental entities. Id. The convection component has been used to trace contaminants in contained aquifiers for the USGS. Tr. 41/6,094 (Wright).

The model enables the pipeline designer to synthesize all aspects of the environment through which the pipeline will be constructed. The operation of the pipeline can then be superimposed on the synthesized environment to determine if the pipeline's operations will cause alterations to the environment, such as frost heave, which will require special design, construction or operation features. Remedial measures to accommodate any alterations to the environment can be proposed and synthesized

by the model to determine their effectiveness. Tr. 41/6,109-10, 42/6,277 (Wright).

When areas of frost heave are predicted by the mathematical model, any of several remedial measures can be examined through the model to determine their effectiveness. One such measure would be to replace the frost-susceptible soils with non-frost-susceptible granular backfill. Tr. 41/6,134, 169/27,758 (Wright); 246/42,918 (Dau). The granular material would be placed in the ditch to completely surround the pipeline (Tr. 42/6,326 (Wright)) and would provide soil with larger pore spaces so that migration of water to the freeze front, would not occur. This method would not necessarily prevent the formation of a frost bulb but would interrupt the exact mechanism needed to produce frost heave. Tr. 42/6,327 (Wright). Although Mr. Wright has ascertained only 50 miles of frost heave potential along the El Paso Alaska route, he had provided enough granular backfill to replace completely over 400 miles of ditch. Tr. 41/6,137, 6,268 (Wright).

Another remedial measure proposed by El Paso Alaska to abate frost heave is deeper pipeline burial. Tr. 41/6,104 (Wright), 169/27,758 (Winn). This method will be particularly effective at locations where the permafrost table is deeper than the normal depth of the ditch. This method will be utilized wherever it is determined to be appropriate and at all road crossings. Tr. 42/6,276 (Wright). Even after the recently

announced Arctic Gas test failures, they still propose to counteract frost heave by increasing the overburden "on some of the soils". Tr. 246/42,916 (Dau).

Insulating the pipe is another method proposed both by El Paso Alaska and by Arctic Gas for abatement of frost heave. Tr. 41/6,104 (Wright); 246/42,916-17 (Dau). This method alters the heat transfer from the soil to the pipeline so that the frost heave mechanism would be interrupted. Tr. 42/6,327 (Wright).

In situations where the frost heave forces are predicted to be of certain magnitude, pipeline anchors could be used to abate the frost heave. Tr. 42/6,323, 6,327 (Wright); 246/42,917-18 (Dau).

We should note at this point that proposals put forth by El Paso Alaska in the Spring of 1975 were once adopted by Arctic Gas to handle its frost heave problems. See Tr. 246/42,916-19 (Dau). One distinction is that while El Paso Alaska has 50 miles with which to cope (Tr. 42/6,331 (Wright)) Arctic Gas has 250 miles. Tr. 246/42,915 (Dau).

Arctic Gas has sequentially proposed three separate and distinct types of frost heave solution. They initially proposed a berm construction mode. They vigorously defended that construction mode through 16 months of hearing, denigrating anyone with the temerity to suggest a different solution. Abruptly, in November of last year, almost at the close of the hearing, they reluctantly and with some embarrassment admitted some insecurity

with the berm construction method. They recommended five other procedures, some of which, as the foregoing text demonstrates, had been planned by El Paso Alaska all along. Now, with the hearing completed, and with no opportunity to cross-examine, they have proposed yet another "solution". Whatever can be said about the Arctic Gas frost heave "solution", one thing is clear. Despite their justifiable pride in the amount of engineering and geotechnical experimentation which they have conducted, they themselves still do not feel comfortable with whatever "solution" they have proposed. And, even if we were to assume (for that is all we can do) that the new "solution" will work, a layman's review of it must suggest that it will have to result in higher cost and lower progress rate.

Moreover, the adverse environmental impacts resulting from these new design concepts include the formation of thermokarsts and thaw ponding along a heat-traced pipeline, together with the easily recognizable aesthetic impact of 400 miles of overhead transmission cables. It is obvious that this heat tracing will create ponding above the pipeline. This ponding could create problems of erosion and siltation. El Paso Alaska is unable to evaluate the extent, if any, of the impact caused by ponding. There has, of course, been no examination of this problem on the record compiled before Judge Litt.

B. Financing

The financial implications of the frost heave filing by the Arctic Gas project are adverse to their overall case. The $475,000,000 estimated additional capital cost simply adds to the bloated demands which Arctic Gas makes on its numerous capital markets, aggravating its already infeasible financial plan. In addition, the frost heave problem's solution highlights the difficult nature of Arctic Gas' construction problems which suggest to all who have made a study of it that the construction schedule of Arctic cannot be met and massive cost overruns are most probable.

C. Mackenzie Delta Gas Supply

El Paso Alaska here comments on the response of the Arctic Gas project to gas supply interrogatories of El Paso Alaska and on the Sproule NEB study Arctic Gas filed with the Commission.

Arctic Gas made no effort to respond to the interrogatories that El Paso Alaska Company filed. It is apparent from a review of the Arctic Gas answers that Arctic Gas did not really undertake to answer the questions that were posed in any meaningful way, but rather dodged the questions by making a reference to nonresponsive materials. For example, in Interrogatory 26, El Paso Alaska asked Arctic Gas to state whether it had any documents in its possession or under its control which reflect

that a Mackenzie Delta producer or operator is, as of this time, unwilling to invest in development wells for field processing facilities necessary to market reserves under its control. Arctic Gas was obviously aware of the statement of counsel for the producers before the NEB of February 17, 1977 that the producers have not made a commitment to invest in the necessary processing facilities. NEB Tr. 24,176 (Ballem). We think this Commission should give no weight to the Arctic Gas answers.

Even on the basis of the Arctic Gas answers, it is clear that all recent wildcat wells have been failures. There have been ten such wells since June 1, 1976; all have been dry and abandoned. This includes two wells in the Beaufort Sea. El Paso Alaska lacks specific information on the well drilled by the Dome Petroleum Corporation, but believes the report to be true that Dome in fact abandoned the well it was drilling in deep water in the Beaufort Sea. While El Paso Alaska concedes that the advent of a pipeline would spur development drilling, El Paso Alaska does not believe that the advent of a pipeline would result in increased discoveries from wildcat drilling. The more promising structures, both onshore and offshore, have already been drilled.

The Mackenzie Delta is clearly a disappointment. We would observe that no new commercial field has been found in

the Mackenzie Delta since April of 1973.[10/] Indeed, as of this time, there are only three fields of questionable commerciability -- Taglu, Parsons Lake, and Niglintgak. The remaining fields are clearly noncommercial. Further, raw gas from these fields cannot be piped to processing facilities in the three fields where processing facilities might be built. There are technical difficulties of significant magnitude if raw gas is piped for any distance in the Mackenzie Delta. Hydrates in the raw gas, for example, could freeze the line; unprocessed gas could corrode the line. Therefore, it would be necessary to develop special engineering techniques to transport raw gas for any significant distance. There is no suggestion in this record that it is technically and economically feasible to develop and implement such techniques. El Paso Alaska adheres to its view, therefore, that it is absurd to schedule gas from the clearly noncommercial fields in the Mackenzie Delta. There is simply no reason to believe that it can be marketed.

Sproule, in scheduling gas reserves, did not make a forecast of gas production based upon the ability of the reservoirs to produce. Like D&M, Sproule scheduled gas on a contract rate-of-take basis. El Paso Alaska in its Brief on Exceptions

---

10/ The discovery dates for the Taglu, Parsons Lake and Niglintgak fields were August 18, 1971, April 19, 1972, and April 7, 1973, respectively.

has adequately discussed the glaring deficiency of this approach But Sproule carried the methodology that it used to an even further, absurd extreme. The methodology is stated on page 189 of the Sproule report:

> "Because the test data available indicated a high degree of damage around the wellbore, it was not possible to use this test data directly to identify the well productivities to be expected from future wells. Deliverability characteristics to be expected from undamaged wells in the Parsons Lake and Taglu areas were calculated from permeability data from cores and logs for the various zones. Insufficient data was available from wells in the other areas to develop their deliverability characteristics."

We make four criticisms. First, as seen, Sproule did not schedule deliverability on a reservoir basis. Second, Sproule ignored all well tests in the Mackenzie Delta. One wonders why the producers ran the tests in the first place if they were to be ignored in calculating reserves. Third, Sproule assumed that wells could be drilled and completed without wellbore damage. There is no reason to believe that the producers can in fact accomplish this with development wells. They have not been able to do so to date. Fourth, Sproule applied theoretical deliverability characteristics; one zone in the Taglu field is applied to all zones in all fields except Parsons Lake. This is apparent from a review of footnote 2 appearing on the deliverability forecast for each of the areas. This is nothing short of astounding. The Commission can, and should, ignore the Sproule deliverability report.

El Paso Alaska does not accept the new, assertedly proved level of reserves at Parsons Lake. The reason is that Gulf has been surprised in the past with development drilling. The L-60 dry hole, a development well, was drilled in an area where D&M had assigned significant proved reserves, and resulted in a net reduction of proved reserves in the Parsons Lake area of about 200 Bcf. The recently drilled F-38 well, a less-than-a-mile step-out, was a dry hole. On the basis of these wells, El Paso Alaska does not think it is prudent to assign large acreage to reservoirs appearing in already drilled wells. Yet, for example, Sproule in the Cretaceous A-1 field studies has assigned 9860 acres -- more than 15 square miles -- to this sandstone found in the F-09 well. Because Parsons Lake is highly faulted, it is imprudent to assign as proven such large acreage to reservoirs on the basis of sparse drilling.

El Paso Alaska adheres to its view that about 500 million a day is all that can be expected from the Mackenzie Delta.[11/] This Commission should know that El Paso Alaska alone scheduled gas production on a reservoir-by-reservoir basis. Further, El Paso Alaska was not niggardly in its approach. El Paso

---

11/ This figure is endorsed by the Department of Interior/ Aerospace Study Team in a recent update to DOI's Report to Congress (Exhibit EP 231), as is hereinafter discussed.

Alaska scheduled gas from all gas-bearing reservoirs. The Commission should understand, however, that the fields in the Mackenzie Delta are lenticular. The producing sands are thin. This is confirmed by the Taglu Field-Dual Induction Lateral Log for the P-03 well appearing at EP 241, Tab 4. Thus, no producer will find it economically attractive to complete in all reservoirs. Many of the stringers are no doubt uneconomic to complete in. El Paso Alaska remains firm in its view, therefore, that thi Commission should assume no more than 500 Bcf in actual productio from the Mackenzie Delta. See Gas Supply Reply Brief of El Paso Alaska filed before Judge Litt.

D. Risk Analyses

The Commission should have the benefit of the three recent analyses, attached as Tabs A, B, and C hereto.

The first is an excerpt from a preliminary discussion draft of a report prepared by Resource Planning Associates, Inc., for the Environmental Protection Agency. The preface states that this discussion draft has been circulated to federal and state agencies for review and comment. El Paso Alaska assumes that the Federal Power Commission has already received a copy, but in the event that the Commission has not, a copy is attached hereto under Tab A. The important conclusions of this paper

appear on page 12. It finds that schedule slippage is significantly more likely for Arctic Gas than for El Paso,[12/] and that there is a 20% to 40% chance that Arctic Gas will not be able to construct in the manner proposed by it, and may be required to abandon its project. This conclusion is clearly warranted in view of Alyeska's inability to construct in the middle of the Alaskan winter, as well as the inaccessibility of much of Arctic Gas' alignment to permanent roads.

The second is an update (March 1977 Supplement) to the early submission of the Department of Interior to the Congress (Exhibit EP 231). EP 231 is the Department of Interior study discussed by Judge Litt at p. 425 of his decision. It is therefore especially important that this Commission have the update, and it is for that reason that the update is submitted under Tab B.

In the update, the Department of Interior/Aerospace Study Team, after reviewing the Arctic Gas comments and criticisms, expressly reconfirms (p. 3-21) the conclusions pertaining to schedule delay and cost overrun appearing in its risk analysis in EP 231, pp. 128-147. In EP 231, p. 143, the study team estimated that an Alaska-LNG system could slip 6-18 months, whereas an Alaska-Canada system could slip 12-36 months. The

---

12/ The draft discussed Alcan's 42" proposal, and therefore is not relevant to Alcan at this stage.

average difference in delay is, therefore, one year. This again confirms the position of El Paso Alaska that schedule slippage, with attendant cost overrun, is considerably more likely for an Alaska-Canada system than it is for an Alaska-LNG system, essentially because the former lacks the construction accessibility (roads) of the latter.

In the update, the Department of Interior/Aerospace Study Team summarizes the NNEB of Alaska-Canada at 7.865 billion, Alaska-LNG at 6.87 billion, and Fairbanks-Alcan at 6.660 billion. In evaluating these figures, however, it is important to remember that the Alaska-Canada system does not include the western leg proposed by Arctic Gas and does not take into account the conclusions of the DOI/Aerospace Study Team estimate that "the average change in NNEB per year of schedule slip and including cost overrun at one billion per year of delay is approximately 1.7 billion." Thus, it is apparent that when schedule slip and cost overrun, as well as the cost of the western leg facilities, are deducted from the 7.865 billion NNEB for an Alaska-Canada system, the real NNEB of that system falls significantly behind that for an Alaska-LNG system. This confirms the argument of El Paso Alaska that it is in the national interest to prefer an Alaska-LNG system over an Alaska-Canada system with or without a west coast leg.

Finally, the DOI/Aerospace Study Team studied reserves in the Prudhoe Bay area and in the Mackenzie Delta area. USGS

geologist Max Taves testified for the DOI/Aerospace Study Team in this proceeding. He was a disinterested evaluator of reserves. He expressed the same skepticism toward Mackenzie Delta reserves that El Paso Alaska has in this proceeding. It is interesting that the DOI/Aerospace Study Team, in its update, has concluded (pp. 1-3) that only 500 million per day will be available from the Mackenzie Delta over twenty years. This is precisely the figure that El Paso Alaska said was reasonable in oral argument before this Commission and also in Exhibit EP 241, tab 5. El Paso scheduled slightly lesser volumes.

El Paso Alaska also attaches a cost overrun analysis which was recently filed before the NNEB by Foothills Pipeline, Ltd. Curiously, Alcan did not file that document before this Commission. We suspect, but do not know, that the reason is that the criticisms of Arctic Gas contained therein could be turned against Alcan. It is filed here under Tab C. It fully supports the Alaska, Department of Interior, and Green risk analyses.

EL PASO ALASKA COMPANY

By: J. Alan Galbraith

J. Alan Galbraith

CERTIFICATE OF SERVICE

I hereby certify that I have this 8th day of April, 1977, served a copy of the foregoing Response of El Paso Alaska Company to the Submissions of Arctic Gas and Alcan, upon each person designated on the official restricted 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.

Copies of the attached tabbed documents have been served on counsel for Arctic Gas, Alcan, Northern Border, Western LNG, Northwest Pipeline, State of Alaska, State of California, California Public Utilities Commission, and the Conservation Intervenors. Copies of the tabbed documents will be made available to other counsel upon request.

J. Alan Galbraith

One of Counsel