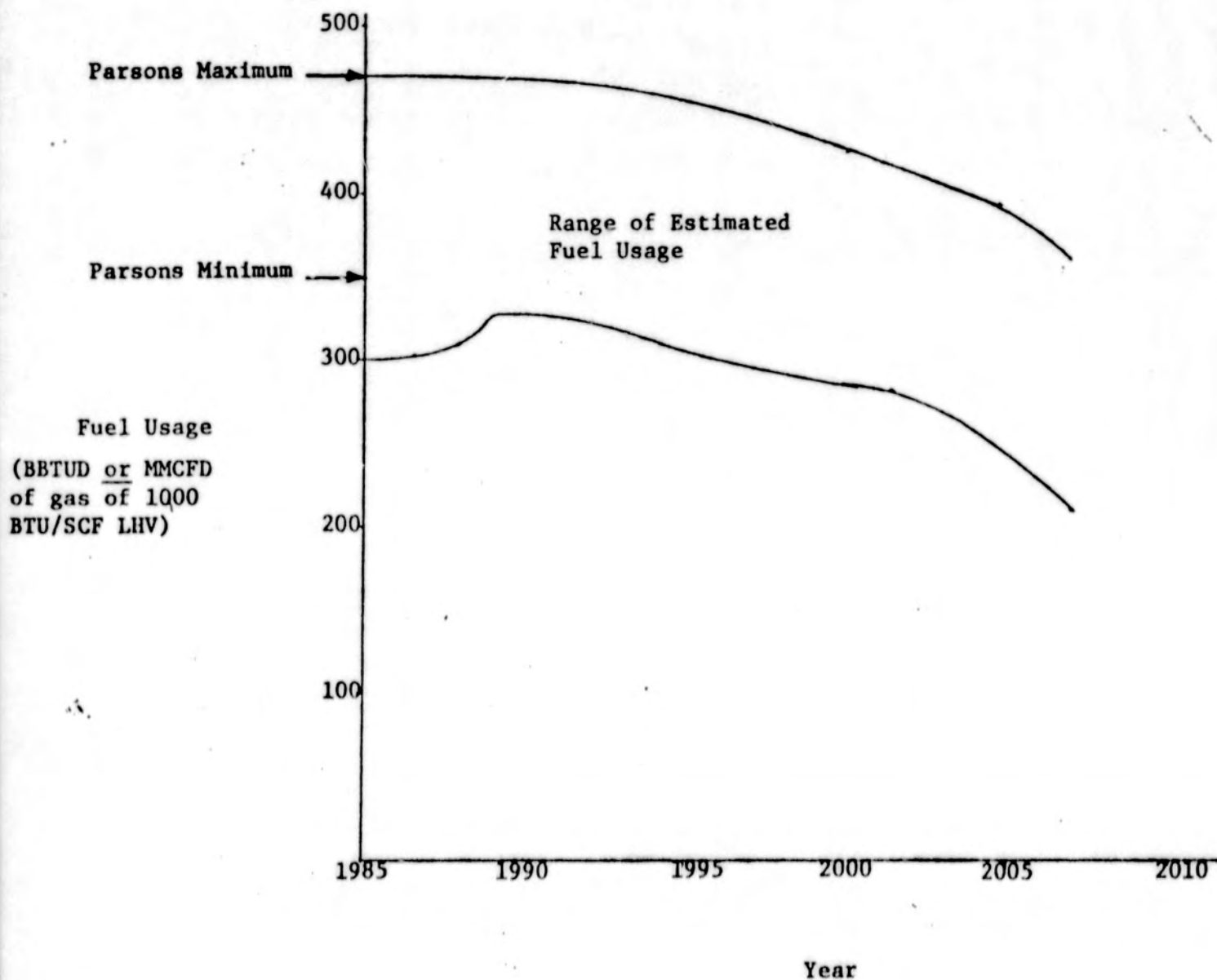


ALASKA LEGISLATURE SPECIAL COMMITTEE / SUBJECT FILES 8672

1043 SCOMM 28: JOINT GAS PIPELINE COMMITTEE. 1981-82

1043

FIGURE 2
ESTIMATED PRUDHOE BAY
FUEL GAS USAGE INCLUDING GAS CONDITIONING PLANT



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**PLEASE NOTE: THE FOLLOWING PAGES WERE TREATED
AS A UNIT IN THE ORIGINAL DOCUMENT**

ARCO Oil and Gas Company
Prudhoe Facilities Project Group
Bin 89
Pasadena, California 91109
Telephone 213 440 3674

W. S. Dickinson
Manager

CONDITIONING PLANT
-GASLINE



January 3, 1980

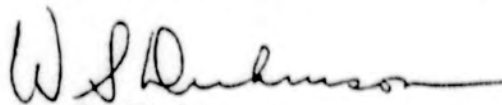
Mr. Arlon R. Tussing
Arlon R. Tussing & Associates, Inc.
2710 Rainier Bank Tower
Seattle, Washington 98101

Dear Mr. Tussing:

On December 3, 1979, you sent a series of questions concerning Prudhoe Bay gas handling to both myself and K. R. Dickerson at Dallas. The attachment to this letter will serve to answer those questions for both of us.

If, after reviewing the answers provided, you feel that further clarification is required, we would be happy to arrange a meeting at Pasadena for this purpose.

Very truly yours,


W. S. Dickinson

WSD:el

Attachment

cc Connie Barlow
K. R. Dickerson

RESPONSES TO ARLON R. TUSSING
LETTER OF DECEMBER 3, 1979

Question #1:

(a) What is the expected composition and daily production rate of total raw gas (less whatever is reinjected to maintain reservoir pressures)? How much uncertainty accompanies anybody's best guesses about this matter?

Answer: The expected gas composition for the initial sales gas conditioning facility inlet was shown in the September 1978 report prepared by The Ralph M. Parsons Company (Vol. I, p. 6-2). There is not a great deal of composition difference between the gas cap gas and the oil rim gas (free plus dissolved); therefore, the uncertainty accompanying the composition of the initial inlet gas stream is not large. The maximum annual average gas offtake rate for the field is 2.7 billion SCF per day pursuant to Rule 15 of Conservation Order Number 145. There is no uncertainty regarding this field rule at this time.

(b) How is the daily production rate and composition expected to change through time, particularly when oil production begins to drop off? (Specifically, is there a significant difference in composition of solution gas versus gas cap gas, and is the ratio of produced volumes of solution and gas cap gas affected by time?)

Answer: Once gas sales commences, the annual average gas offtake rate for the field will remain essentially constant with time at the maximum of 2.7 billion SCF per day to meet the planned nominal 2.0 billion SCF per day to the gas pipeline plus field fuel gas requirements and conditioning plant shrinkage. The composition of the gas production will become slightly leaner in NGL hydrocarbons as the field is depleted. The gas production will tend to approach the composition of the gas cap gas as the oil rim gas rate decreases and the proportion of gas cap gas increases. For instance, after about 25 years of gas sales the mole fraction of methane in the gas stream is expected to be about 3% higher than it was initially, and the mole fraction of NGL components is expected to be about 17% lower.

(c) Of these produced hydrocarbons, how much of each will be consumed to meet North Slope total fuel requirements? How will field fuel requirements change through time as oil production and transportation drop?

Answer: The Ralph M. Parsons Company September 1978 Report shows the initial composition of the central gathered field gas production and the disposition of the products that could be made initially from the sales gas conditioning facility (Vol. I, Section 6). The facility recovery is such that each component is shown in volume of avails and the BTU content of butane and lighter components. The field fuel requirements shown in the report are those to meet what was considered to be a maximum fuel requirement

(363 MMBTU/D) and a minimum fuel requirement (131 MMBTU/D) that might occur during some period of sales gas conditioning facility operation. Table 6-4 (Volume I) of The Ralph M. Parsons Company report shows the fuel stream compositions for the maximum field fuel requirement case. We currently believe that this is the more representative of the two cases for the majority of the gas conditioning facility life considering the most likely scenario of field development events and their timing. Under this scenario, field fuel requirements will hold relatively constant ($\pm 10 - 13\%$) through time even though oil production and transportation requirements will drop.

(d) Hence, what volumes of methane, ethane, propane, butane, and pentanes+ will actually be available through time for delivery to some transportation system?

Answer: The volume of methane and NGL avails can be determined over time using the gas production and composition data referred to in Parts (a) and (b) above and the fuel requirements data referred to in Part (c) above. Products will be available in relation to recovery percentages that can be derived from Section 6 of Volume I of The Ralph M. Parsons Company reports (maximum field fuel case).

Question #2:

(a) For each pipeline pressure specification under consideration (1080 psig in Canada and 1260, 1440, and 1680 psig in Alaska), what temperature and pressure combinations constitute "upset" conditions, "normal minimum operating" conditions, or whatever terminology you use to signify the most troubling conditions (from the standpoint of condensation) that gas may encounter during the journey south?

Answer: The 1260 gas pipeline hydrocarbon dewpoint specification of -10°F at 1000 psig is assumed to be the troublesome and minimum condition that would be encountered as the gas travels through permafrost and discontinuous permafrost areas of the pipeline route. It is our understanding no condensing is expected in the Canadian 1080 psig line operating south of permafrost areas. The pipeline is intended to operate only in the single gas phase and would be operated to not encounter any condensation for possible two-phase operation. A pipeline operated at 1680 psig per Gas Arctic FERC filing had a gas hydrocarbon dewpoint of -10°F at 1200 psig. We do not know of an actual 1440 psig design but a -10°F at 1100 psig dewpoint was used in the Parsons report.

(b) Are the phase characteristics of probable gas mixtures such that the temperature and pressure combinations of most concern represent the lowest temperature and the lowest pressure likely to be encountered?

Answer: The area of concern is that which represents the lowest temperature and the lowest pressure that is likely to be encountered in the pipeline. Phase characteristic curves were developed for the probable gas that would be delivered to this pipeline and shown in the Parsons report.

(c) At least in the documents we have seen, there appears to be some difference of opinion on the answer to the above questions. For example, I believe Exxon has indicated that a 0 degree F upset temperature is appropriate in Alaska, and 30 degree F for the sections south of Whitehorse, while Sohio lists -10 degrees and +42 degrees respectively. With regard to pressure, Sohio appears to assume that a 1680 psig line will have a 1300 psia upset while ARCO assumes a 1200 psia upset. What might be the reasons behind these differences of opinion (e. g., compressor spacing, which compressor station is assumed out, duration of outage, immediacy of response in reducing throughput, normal station outlet temperature of the gas, ambient air or ground temperatures, etc.)?

Answer: There have been numerous comments made on the phase characteristics of the probable gas that would be delivered to a gas pipeline from Prudhoe. These comments were made by various parties with different assumptions and bases for calculations. The most consistent and one with a common base of assumption is that which is reported in the Parsons September 1978 report. The report makes no attempt at speaking to the conditions on the gas pipeline. It only reflects the gas specification as set out by the gas pipeline consortium, i. e., -10°F @ 1000 psig for 1260 psig, -10°F @ 1200 psig for 1680 psig, and the assumed -10°F @ 1100 psig for the Parsons study at 1440 psig. The Sales Gas Conditioning Facility was designed to process the produced gas to any of these controlled conditions. No attempts in the Sales Gas Conditioning Study were made at predicting the gas pipeline configuration such as compressor spacing, outages, ambient air, or ground temperatures, etc.

Question #3:

(a) What is the lowest TAPS inlet temperature that might safely be considered? What are the physical considerations that determine this (i. e., what worst case assumptions about ambient air temperature and duration do you make with regard to TAPS shutdown or pump station outage?). Are there absolute physical limitations on the minimum inlet temperature, or is it primarily an economic matter of the costs and aggravation of frequent pigging?

Answer: Limitation on TAPS inlet temperature would primarily be a function of effect on throughput and wax deposition. Lower temperatures significantly reduce TAPS capacity due to increased friction and static head losses. TAPS has been designed for restart after a three-week shutdown during the winter with -40°F and 20 MPH wind. The economic limitations on the minimum inlet temperature to TAPS deal with the approximate 100°F wax point of the crude.

(b) Approximately how much would it cost to add chilling facilities to bring the inlet temperature down to the level indicated above?

Answer: The Ralph M. Parsons Company report of September 1978 discusses the facilities and costs needed to chill the crude to about 112°F to allow blending of the butanes and gasolines for delivery to TAPS during high oil production. The cost is approximately \$60MM based on 1978 dollars. Cooling the oil in TAPS to temperatures below waxpoint of about 100°F has been considered impractical due to the huge heat exchanges required and the problems of wax deposition in the exchangers and subsequent wax disposal problems.

(c) Are light hydrocarbons such as butane and pentane useful in reducing oil pipeline viscosity and friction, thereby increasing throughput capabilities with existing equipment? Would one part of additional butane, therefore, require leaving behind maybe less than one part of heavier hydrocarbons if the line were already functioning at capacity? Given the likely timing of gas production for sale, and given the likely oil production scenario, is it a realistic prospect that throughput limitations of the line and pump stations might make it impossible to ship butanes and pentanes separated from the raw gas unless oil shipments are cut back?

Answer: Addition of light hydrocarbons to the crude would reduce viscosity and friction losses. Drag reducing chemicals are being used in TAPS to reduce friction losses and provide for meeting stated shippers' needs for a sustained 1,515 MBD capacity in 1980. TAPS capacity can be further increased in the future, by increments, to the ultimate 2.0 MBD. To expand TAPS above current capacity levels requires construction of new pump stations and additional pumps at existing stations. The TAPS owners would have to decide upon future expansions based on shippers' requirements. If the oil pipeline were operating at full capacity, the addition of butanes and pentanes would require the cutback of approximately one to two barrels of oil for every two barrels of butanes and pentanes+ added.

(d) What volumes of oil production for each year of field operation should one assume when trying to ascertain TAPS throughput capabilities? To your knowledge, did the other parties commenting on the ability of TAPS to carry light hydrocarbons assume similar production schedules?

Answer: Table I shows a crude oil production forecast by year for the Prudhoe Bay Unit Main Area Sadlerochit reservoir. We submitted this forecast to the Division of Oil and Gas (May 17, 1977) to become part of the record of the State of Alaska Prudhoe Bay Unit Pool Rules Hearing that was held on May 5, 1977. The peak rate of 1500 MBOD was used as the basis for the Ralph M. Parsons report. For purposes of ascertaining TAPS NGL throughput capabilities, production (volumes and vapor pressures) from other reservoirs, both at the Prudhoe Bay Unit (Sag, Shublik, West End), and elsewhere (Kuparuk, and possible Beaufort Sea reservoirs) should be added to the forecast. This additional production will extend the period of plateau oil rate.

We have no knowledge of what production schedules may have been used by other parties in their studies to determine the ability of TAPS to carry light hydrocarbons.

(e) Given the oil production scenario noted above and the volume of butanes and pentanes implied in your answer to Question 1(d), how much butane and pentane could be transported through TAPS, (noting time as a variable) at the minimum inlet temperature you have specified in your answer to Question 3(a) at the existing TAPS inlet temperature?

Answer: Given the oil production forecast shown on Table I, all of the pentane+ production can be shipped with the crude with a modest chilling to meet vapor pressure limitations of about 5°F depending on crude volume. All of the butanes can be shipped with the crude during current high oil production from the field when subcooled to 112°F. Low oil throughput rates in future years will cause vapor pressure limitations and cutback in butane shipping to meet the 11.1 psia limit at destination storage tank temperatures.

(f) Currently, what (if anything) is being done at Valdez to ensure that oil shipped through TAPS (at 140 degrees F and 14.7 psia) meets tanker and lower 48 storage specifications for vapor pressure? How would those activities change if the TAPS inlet temperature were lowered to the point mentioned in your answer to Question 3(a)?

Answer: Nothing is done at Valdez to control temperature of the crude. At the 1.5 MBD current throughput rate, oil arrival temperature is about 85°F at Valdez. EPA rules for floating roof tanks limit vapor pressure to 11.1 psia at storage tank temperature. That limit is not approached by the current north slope crude vapor pressure (14.7 psia at 142°F) and receipt temperatures.

If TAPS inlet temperature were lowered there would be no need to change the current practice at Valdez. Oil below 40°F has been loaded on ships.

Question #4:

(a) Given the likely oil and gas production schedules you have indicated previously, how will the required amounts of field fuel change through time?

Answer: Field fuel requirements are expected to hold relatively constant (±10 - 13%) through time even though oil production and transportation requirements will drop (reference Answer 1(c)).

(b) What are the physical and economic principles that limit flexibility in choosing the BTU content, dewpoint, and overall composition of field fuel? (e. g., the need to ensure a certain level of precision in combustion characteristics, dewpoint limitations imposed by exposure to ambient air temperatures en route, BTU specifications of existing equipment, and the cost of changing or expanding that range.)

Answer: The existing gas turbines in the field were designed to operate with a fuel of approximately 875 BTU per cubic foot net. These turbines generally have a plus or minus 10% fuel BTU variation capability without modification of their combustion system. The Sales Gas Conditioning Study considered this when designing a minimum of 825 BTU net fuel gas for delivery from the facility during its operation. The hydrocarbon dewpoint limitations of the field fuel were considered when developing the fuel gas blends. They were maintained as low as possible while still utilizing the high CO₂ blends from the Sales Conditioning Facility. Only propane was used for blend stock. Blending butane with the high CO₂ gas resulted in a hydrocarbon dewpoint higher than that considered acceptable in the field fuel system.

Miscellaneous Questions . . .

Question: When you speak of BTU's, do you mean gross or net BTU's? When calculating the BTU values of various compositions of gases, what assumptions do you use with respect to the BTU content per mcf and per barrel for each hydrocarbon type (C₁ through C₅). What phase diagrams do you use for the following pure substances: C₁, C₂, C₃, C₄, C₅, CO₂, H₂O?

Answer: The BTU of various streams reported in the Sales Gas Conditioning Study by Ralph M. Parsons were based on net BTU calculations. The residue gas to the gas pipeline were reported on a gross BTU basis compatible with FERC specifications. Gas Processors Association standards for BTU contents of hydrocarbons were used in our calculations of the various stream BTU contents. Gas Processors Association K&H Mod. II Program which uses Soave Redlich-Kwong equations were used for all equilibrium and material heat balances made in the process study instead of individual component phase diagrams.

Question: How does the addition of CO₂ affect the dewpoint characteristics of any particular gas composition, assuming that the composition of the mixture remains unchanged?

Answer: The addition of CO₂ to a fixed hydrocarbon content gas tends to slightly lower (less than 5°F) the hydrocarbon dewpoint of the resultant mixture.

Question: On a very approximate basis, how much more money would it cost to isolate most of the produced ethane from the CO₂ rich stream during the conditioning process? Does this represent, say, the added cost of using a Sulfinol or similar process with required dehydration facilities? What other options are available?

Answer: To isolate most of the produced ethane would require a different process. The only process studied at this time that would do so would require a Sulfinol CO₂ removal system followed by an expander cryogenic type, ethane plus recovery facility. Based on studies made in mid-1974 for the Gas Arctic Group, this cost would add approximately 300 to 400 million dollars more to the cost of the Sales Gas Conditioning Facility.

Question: Has anybody done any work yet on the added cost of transporting a gas of 13% CO₂ compared to the cost of transporting a 1% or 3% mixture, holding the pipeline operating pressure constant?

Answer: Northwest Alaskan Pipeline prepared a report on the added cost for transporting a 3% CO₂ gas and a 13% CO₂ gas versus the base filing of 1% gas. No doubt others have made such studies, but to our knowledge none have been published.

Question: General questions on the effect of CO₂ content on the hazards of carbonic acid and hydrate corrosion and erosion at the pipeline operating pressures and temperatures under consideration.

Answer: Numerous comments have been made on the subject of pipeline corrosion. Sohio, Exxon, and ARCO prepared statements and filed such statements with FERC. Northwest Alaska Pipeline did likewise. These responses fairly well speak to the problems of corrosion or erosion in the pipeline when operating with CO₂. In essence, no corrosion is possible as long as the gas is above water dewpoint temperature, so the gas must be maintained with a low water dewpoint.

TABLE 1

OIL PRODUCTION FORECAST
MAIN AREA SADLERECHIT RESERVOIR
PRUDHOE BAY UNIT

(From the record of the State of Alaska Pool Rules Hearing of 5-5-77)

<u>YEAR OF PRODUCTION</u>	<u>OIL RATE MBOD</u>
1	1200
2	1350
3	1500
4	1500
5	1500
6	1500
7	1500
8	1500
9	1360
10	1020
11	910
12	850
13	860
14	840
15	790
16	710
17	570
18	450
19	410
20	330
21	300
22	250
23	260
24	220
25	190
26	160
27	140
28	130
29	110
30	100

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Meeting w Exxon - Houston. Jan 15, 1980 - GASLINE ①

Tussing & Barlow

Judd Miller (mgr under Ray Boock?)

Ed Travis (lawyer)

Charlie Parr (engineer)

Jimmy Shanks (engineer)

Harold Gallowsay (head of gas engineering production dept.)

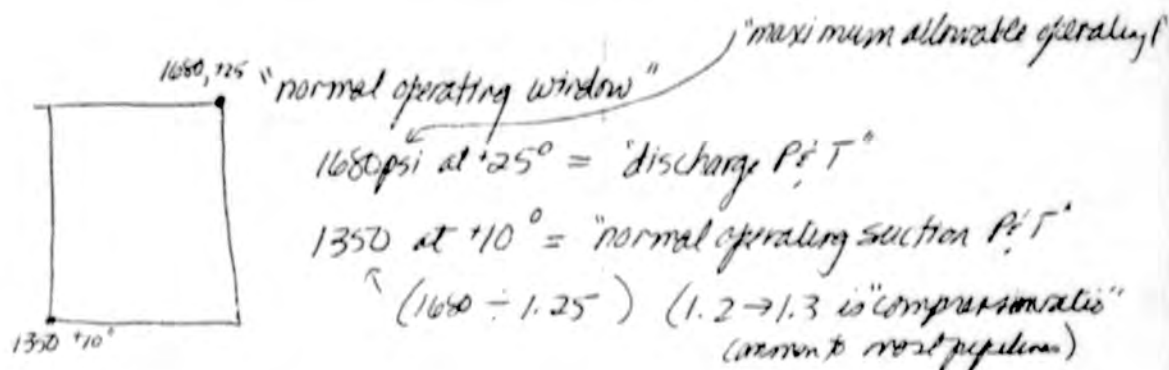
Overall:
vibes

① pc - very interested in getting the word out on pc. Exxon can't say because looks like trying to stifle competition. Why doesn't it realize gas condensing / pc is capital intensive? Not long-term jobs.

② liquids sale - emphasized Exxon has sold liquids. State has to deal w. purchasers.

③ condit pl ownership - interested in no subtle hints or references made that Exxon owns or has anything to do w condit.

pressure -



* upset = 1250 at -10°

~~1260 at 25° - discharge~~
~~1080 at 10° - normal operating suction P & T~~

For "operating windows" of 1260 & 1440 use same Temps as above and divide discharge pressure by 1.25.

FERC's role is to be concerned about operating pressures; let pipeline deal with safety specs for upset.

upset conditions: assume 1 compressor down & as a last resort reduce throughput when that happens; but try not to.

What if some sections above ground & shut-in in winter. Appeared hadn't thought about it, but pipeline could handle. Not insurmountable. Sew, liquid forms, but figure it happens once every 3 years so don't worry. Have to pig periodically anyway & have scrubbers & drains.

Pipe diam & pressure -

(most gas pipeline companies were for 1080
not 1260)

Exxon's position - advocated 2160 in 42". The problem is when have 48" at high pressures. No line like that before. Exxon believes even 1260 at 48" need crack arrestors. Cheaper to install crack arrestors ^(not pipe high quality) rather than super expensive pipe. The problem is not that the pipe bursts, but somebody runs into it w a tractor & the crack runs 2-3 miles to the next valves. The concern in AK is it happens in a remote area at a time of year when hard to fix quick. Canada specs not so great - figures more cost effective to let crack once in a while & fix quick than do super hi quality.

48" pipe hasn't been built before.

"Great Lakes pipeline" (Mich-Wisc) is 1440 at 36" (has had probs w/ long shear fracture (ductile fracture).

Exxon's Shell have a 2000° 36" somewhere in North Sea?

Exxon gave us a chart showing Great Gas, Fuel, Sales Gas all the way thru in barrels. Only diff fr. Parsons is excludes empty FFGV. uses gross BTU's. Based on Parsons max fuel fuel case (which includes fuel for artificial lift, waterflood, etc.).

Fuel - TAPS fuel gas line goes to first 4 pump stations. Buried. Design comp = 800 psi at -40° (so very light HC comp).

IMP - producers have right to take whatever volume of gas need for fuel fuel & TAPS before goes to condit. This is why ~~producers~~ Exxon companies sold all gas liquids. So producers take care of their TAPS & fuel fuel. Includes 307 billion BTU/d more fuel fuel on chart because that's what gas production causes.

2 phase flow: — is in gathering line¹⁰⁰. Sized really huge tho so won't be a problem. Also, very large separators at the end serve same function as slug catcher.

Efficiency of flow (cost of pumping & compression) —

- ① most efficient = liquids line like TAPS
- ② much less efficient = gas line
- ③ far less efficient = 2 phase flow.

Use of CCP compressors for gas sales boost vs. new "stand alone" facilities:

EXXON can't answer when it's too decade. Working interest owners will have to decide whether to sell CCP to gas purchasers.

Seems to think gas purchasers would be wiser to install new machinery that would be designed for gas density, because so much more fuel efficient. Didn't indicate any reason why producers might not want to sell CCP.

Condit re-design

Be'm up on throwing in a "de-ethane" (doesn't list costs) & using all propane doesn't make sense. Must re-design whole process, if different goals in order to optimize. Can't just add facilities. Plus if goal is to separate liquids for liquids line it becomes a "processing plant" not conditioning.

If state wants all propane can't use Selepol because must then design a process that leaves a ~~clean~~ totally lean CO₂ plant — not something that must be enriched & used as fuel.

Carbonic acid / corrosion probs

absolutely no concern of carbonic acid in AK sections because if any water is found as ice; and acid can only form if H_2O is in water phase ~~if~~ in presence of CO_2 .

Hydrates - is stupid to worry about carbonic acid corrosion because if any problem at those low temp will be a hydrate prob. And unlike corrosion which eats away slowly, hydrates cause instantaneous probs. (Hydrates = H_2O ice crystals with HC molecules inside which junk things up. CO_2 has nothing to do w hydrates).

carbonic acid may be problem in Canada in the 40° Temp line there if Canada adds gas with hi H_2O . (Exxon appeared worried that Canada might do that. ^{appears 11,000 spms for line in Canada are high} Pipeline in Canada can be "looser" about acid & crack probs because can fix easily, unlike across AK.

Production - even when gas production starts well not drill any specifically gas cap wells. Figure gas cap well expand down & inevitable enter oil well production. Depending on how soon that happens, may need to perforate oil well higher up if need to produce more gas.

"gas cap gas", "oil", "solution gas" & "condensate" are artificial terms. Really only accurate for "oil" & "gas".

For terms of ownership assume diff amounts of gas cap gas vs. solution, but all comes out of same wells together.

Arco & Exxon say solution & gas cap NGL content essentially the same (because own more gas cap gas), while Sotia probably says solution is richer because owns more.



HAROLD R. GALLOWAY

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EXXON COMPANY, U.S.A.

1800 AVENUE OF THE STARS
LOS ANGELES, CALIFORNIA 90067

Figure 2

Comments on Data Used in Parsons Process Design*

The physical and thermodynamic data used in the design of the SGCF is generally Parsons' normal design data. Where possible, vapor-liquid equilibrium data were verified with test data from the Prudhoe Bay facilities. Allied Chemical Corporation's proprietary data were used for the SELEXOL CO₂ removal system. These SELEXOL data were incorporated in Parsons' process simulator which was used to model plant configurations.

Parsons' Soave-Redlich-Kwong vapor-liquid equilibrium data and associated computer-generated enthalpy data were used for all hydrocarbon and CO₂-hydrocarbon multicomponent systems. Correlations of the available data with tests of operating Prudhoe Bay facilities were found to be in good agreement; however, portions of the process are at temperatures, pressures, and compositions where no current operations exist and field verification of data in these areas could not be made.

The Elliott Company pressure-enthalpy diagram for Propane was used for the refrigeration system design. Heating values and general physical data are from or in agreement with the Engineering Data Book of the Gas Processors Suppliers Association and, where applicable, with the API Data Book.

* These comments are also made in Volume II, Section 1.1.6, Page 1-7 of the Parsons Study.

PHYSICAL CONSTANTS FOR CALCULATIONS

Data from NCPSA - Ninth Edition - 1972

	METHANE	ETHANE	PROPANE	ISO BUTANE	N BUTANE	ISO PENTANE	N PENTANE	N HEXANE	N HEPTANE	N OCTANE	N NONANE	N DECANE	CARBON DIOXIDE	HYDROGEN SULFIDE	NITROGEN
Atomic Formula	CH ₄	C ₂ H ₆	C ₃ H ₈	C ₄ H ₁₀	C ₄ H ₁₀	C ₅ H ₁₂	C ₅ H ₁₂	C ₆ H ₁₄	C ₇ H ₁₆	C ₈ H ₁₈	C ₉ H ₂₀	C ₁₀ H ₂₂	CO ₂	H ₂ S	N ₂
Molecular Weight	16.043	30.070	44.097	58.124	58.124	72.151	72.151	86.178	100.205	114.232	128.259	142.286	44.010	34.076	28.013
Boiling Point °F, 14.696 psia	-258.69	-127.49	-43.67	10.90	31.10	82.12	96.92	155.72	209.17	258.22	303.47	345.48	-109.3	-75.6	-320.4
Critical Temperature °F	-116.63	90.09	206.01	274.98	305.65	369.10	385.7	453.7	512.8	564.22	610.68	652.1	879	212.7	-232.4
Critical Pressure lbs. abs.	667.8	707.8	616.3	529.1	550.7	490.4	488.6	436.9	396.8	360.6	332	304	1071	1306	493.0
Critical Volume cu. ft. / lb. mol	1.590	2.370	3.250	4.208	4.080	4.899	4.870	5.929	6.924	7.852	8.775	9.661	1.505	1.564	1.440
Critical Density lbs. / cu. ft.	10.09	12.69	13.57	13.81	14.25	14.73	14.81	14.53	14.47	14.49	14.62	14.73	29.24	21.79	19.46
LIQUID DENSITY DATA															
Specific Gravity at 60°F	0.5	0.5564	0.5077	0.563	0.5814	0.6247	0.6310	0.6690	0.6882	0.7068	0.7217	0.7342	0.627	0.79	0.808
API Gravity at 60°F	390	265.5	147.2	119.8	110.6	95.0	92.7	81.6	74.1	68.7	64.6	61.2	39.6	47.6	43.8
lbs. / gal. at 60°F in air	2.5	2.962	4.223	4.686	4.865	5.199	5.251	5.526	5.728	5.883	6.008	6.112	6.89	6.58	6.73
Fraction of mol. / lb.	0.0233	0.0326	0.0268	0.0170	0.01720	0.01386	0.01386	0.0160	0.00998	0.0075	0.00700	0.00703	0.0272	0.0235	0.0370
Gallons of liquid / lb. mol	6.4	10.12	10.42	12.36	11.93	13.85	13.71	15.57	17.46	19.39	21.32	23.24	6.36	5.17	4.18
lb. mol. / gal. of liquid	0.156	0.988	0.960	0.808	0.838	0.722	0.729	0.642	0.573	0.516	0.469	0.430	1.57	1.934	2.404
VAPOR DENSITY DATA STP (Assuming perfect gases)															
Specific Gravity of Air = 1	0.5539	1.0382	1.5225	2.0068	2.0068	2.4911	2.4911	2.9755	3.4596	3.9439	4.4282	4.9125	1.5195	1.1763	0.9672
lbs. / 1000 cu. ft.	42.28	79.24	116.20	153.16	153.16	190.13	190.13	227.09	264.05	301.01	337.98	374.94	115.97	89.79	73.82
Ratio Gas to Liquid Volume	4.43	2.805	2.7251	2.2950	2.3798	2.0433	2.0700	1.8237	1.6256	1.4645	1.3318	1.2213	4.448	5.487	6.827
cu. ft. of Gas / gal. Liquid	89	37.5	36.43	30.65	31.81	27.39	27.67	24.38	21.73	19.58	17.80	16.33	59.5	73.3	91.3
Combustion Data MBTU / gal.	59.829	65.938	91.065	99.022	102.989	108.790	110.102	115.060	116.666	121.419	123.613	125.444	-	-	-
Gross Heat BTU / cu. ft.	1009.7	1768.8	2517.5	3252.7	3262.1	4000.3	4009.6	4756.2	5502.8	6249.7	6996.5	7742.1	-	637	-
Abs. V.P. at 100°F psia	(5000)	(800)	190	72.2	51.6	20.44	15.570	4.956	1.620	0.537	0.179	0.0597	(1200)	394.0	-

NOTES:

1 lb. mol. = 379.495 cu. ft. at STP
 GPM 150 M.W. Oil = mols. / hr. x 0.393
 GPM 200 M.W. Oil = mols. / hr. x 0.4795
 GPM 180 M.W. Oil = mols. / hr. x 0.437

7.480 gal. = 1 cu. ft.
 Mol. Wt. of Air = 28.964
 1 gal. of Water Weighs 8.328 lbs.
 MSCFD = Mols. / hr. x 0.10780

1000 cu. ft. of Air Weighs 76.32 lbs.
 1000 cu. ft. of Gas = 2.63508 mols. Perfect Gas, STP
 Values in Parentheses Approximate

DEK MATTER 5-14-75

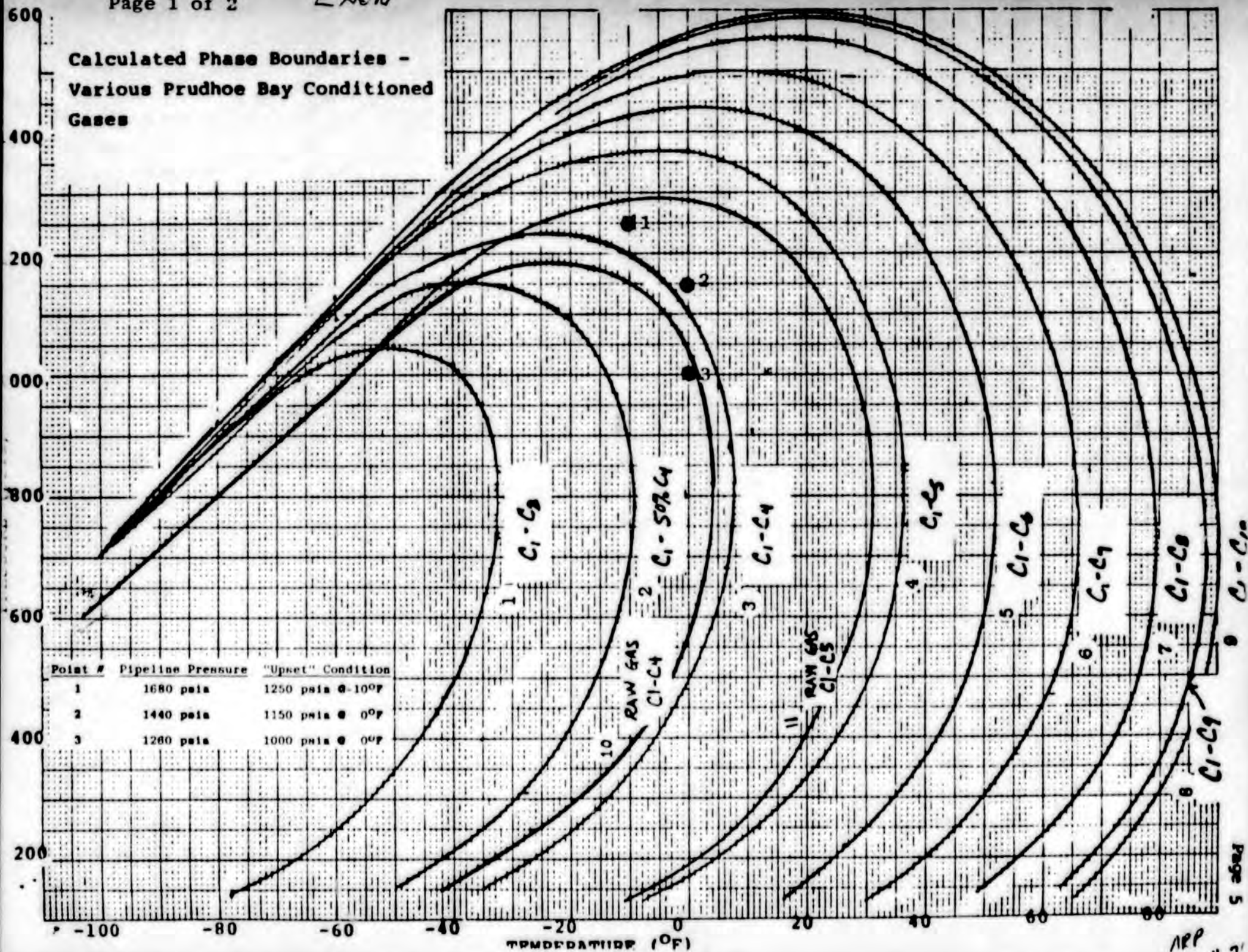
PARSON'S Used this for higher heating value BTU's. Note: EXXON will confirm w/ parson's send me lower heating value chart too.

FIGURE 1

Page 1 of 2

EXXON

Calculated Phase Boundaries - Various Prudhoe Bay Conditioned Gases



EXXON

VARIOUS PRUDHOE BAY CONDITIONED GAS COMPOSITIONS
(Mole Percent)

Some HC
mixed
the CO₂

Component	Unconditioned Separator Off-Gas	① C ₁ -C ₃	② C ₁ -50% C ₄	③ C ₁ -C ₄	④ C ₁ -C ₅	⑤ C ₁ -C ₆	⑥ C ₁ -C ₇	⑦ C ₁ -C ₈	⑧ C ₁ -C ₈	⑨ C ₁ -C ₉	⑩ Off-Gas C ₁ -C ₄
N ₂	0.484	0.564	0.559	0.554	0.551	0.550	0.549	0.549	0.549	0.549	0.488
CO ₂	12.659	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	12.773
C ₁	74.706	87.053	86.296	85.554	84.964	84.818	84.742	84.695	84.679	84.676	75.382
C ₂	6.428	7.491	7.426	7.362	7.311	7.299	7.292	7.288	7.287	7.287	6.486
C ₃	3.340	3.892	3.859	3.826	3.799	3.793	3.789	3.787	3.786	3.786	3.370
i-C ₄	0.450	--	0.260	0.515	0.512	0.511	0.511	0.510	0.510	0.510	0.454
n-C ₄	1.038	--	0.600	1.189	1.181	1.179	1.178	1.177	1.177	1.177	1.047
i-C ₅	0.217	--	--	--	0.247	0.247	0.246	0.246	0.246	0.246	--
n-C ₅	0.383	--	--	--	0.435	0.435	0.434	0.434	0.434	0.434	--
C ₆	0.148	--	--	--	--	0.168	0.168	0.168	0.168	0.168	--
C ₇	0.081	--	--	--	--	--	0.091	0.092	0.092	0.092	--
C ₈	0.047	--	--	--	--	--	--	0.054	0.054	0.054	--
C ₉	0.016	--	--	--	--	--	--	--	0.018	0.018	--
C ₁₀	0.003	--	--	--	--	--	--	--	--	0.003	--
Molecular Wt.	22.7	18.5	18.8	19.2	19.5	19.7	19.8	19.8	19.8	19.9	22.2
Heating Value (Btu/cf*)	1027	1095	1113	1131	1150	1156	1160	1163	1164	1164	996

*Gross, Wet, Actual @ 60°F., 14.73 psia

3-7-78

note: Tables here assume no traces of heavier
HC's for each column, but in reality will
be traces.

gross BTUs used here.

uses Parsons
Max Field Fuel CaseExxon
translation of Parsons
into Barrels

MATERIAL BALANCE PRUDHOE BAY CONDITIONING PLANT

Parsons
1440 psi P/L
-10° F at 1100 ft1260 psi P/L
-10° F at 950 ft

	Inlet Gas		Field Fuel		Plant Fuel		Del. to TAPS		Sales Gas		Total Out
	Mol %	MB/D	Mol %	MB/D	Mol %	MB/D	Mol %	MB/D	Mol %	MB/D	
C ₁	74.00	-	30.12	-	2.42	-	-	-	90.72	-	-
C ₂	6.53	111.4	18.25	39.2	9.18	14.5	-	-	4.41	58.1	111.8
C ₃	3.52	61.8	10.14	22.5	10.31	16.7	-	-	1.72	23.3	62.5
iC ₄	0.50	10.3	0.30	0.8	0.51	0.3	0.17	-	0.59	9.4	10.5
nC ₄	1.18	23.7	0.35	0.9	0.08	0.1	5.84	1.4	1.41	21.9	24.3
iC ₅	0.27	6.2	0.02	0.1	-	-	19.89	5.5	0.05	0.8	6.4
nC ₅	0.49	11.4	0.02	0.1	-	-	42.13	11.5	0.01	0.2	11.8
C ₆ ⁺	0.36	9.7	-	-	-	-	31.98	10.20	-	-	10.2
CO ₂	12.68	-	40.74	-	77.85	-	-	-	0.49	-	-
N ₂	0.47	-	0.06	-	-	-	-	-	0.60	-	-
Total	100.00	234.5	100.00	63.6	100.00	31.6	100.00	28.6	100.00	113.8	237.5
MMcf/D	2686		339		248		32		2071		2690
Btu/cu.ft.	1055		905		454		4350		1106		1059
Bil Btu/D	2834		307		113		139		2291		2850

- Notes: (1) Based on Parsons' September 1978 Study, maximum field fuel case.
 (2) Existing Field Fuel Gas Unit volumes are excluded.
 (3) Btu balance is off less than 1%.

HRG:cg
9/28/79Add FFUG to this
get Parsons figures for Field Fuel
less TAPS

* Gas Vol will decrease
 $2077 + 1.8\% = 2063 \text{ MMcf/D}$
 or 0.4% less
 than 2071 MMcf/D

SOURCE OF FIELD FUEL

in use =
(already 800-900 BTU gas)

PRUDHOE BAY CONDITIONING PLANT

50 design 825 BTU gas to field

	LTS Vapor		DeC ₂ Overhead		Flash Vapors		Propane		Total Field Fuel	
	Mol %	MB/D	Mol %	MB/D	Mol %	MB/D	Mol %	MB/D	Mol %	MB/D
C ₁	75.88	-	42.33	-	19.66	-	-	-	30.12	-
C ₂	5.59	0.9	28.13	20.0	15.32	17.6	6.41	0.9	18.25	39.2
C ₃	1.95	0.3	0.41	0.3	7.58	9.0	91.58	12.9	10.14	22.5
iC ₄	0.14	-	-	-	0.37	0.5	1.44	0.2	0.30	0.8
nC ₄	0.24	-	-	-	0.56	0.8	0.56	0.1	0.35	0.9
iC ₅	0.02	-	-	-	0.04	0.1	-	-	0.02	0.1
nC ₅	0.03	-	-	-	0.05	0.1	-	-	0.02	0.1
C ₆ ⁺	-	-	-	-	-	-	-	-	-	-
CO ₂	14.65	-	29.09	-	56.41	-	-	-	40.74	-
N ₂	0.50	-	.04	-	0.01	-	-	-	0.06	-
Total	100.00	1.2	100.00	20.3	100.00	28.0	100.0	14.1	100.00	63.6
MMcf/D	25		112		181		22		339	
Btu/cu.ft.	939		935		694		2484		905	
Bil Btu/D	23		105		126		55		307	

HRG:cg

9/28/79

note: turbines to be designed
for ~~400~~ BTU gas
and heaters too
(even the Pauson's shows
only 200 BTU gas for heaters)
[stray out of LFF]

SOURCE OF PLANT FUEL
PRUDHOE BAY CONDITIONING PLANT

	Local Fuel		Flash Vapors		Propane		Total Plant Fuel	
	Fractionator O.H.							
	Mol %	MB/D	Mol %	MB/D	Mol %	MB/D	Mol %	MB/D
C ₁	1.46	-	19.65	-	-	-	2.42	-
C ₂	9.04	12.1	15.30	1.4	6.41	0.9	9.18	14.5
C ₃	2.29	3.2	7.59	0.7	91.58	12.8	10.31	16.7
iC ₄	-	-	0.37	-	1.44	0.2	0.51	0.3
nC ₄	-	-	0.55	0.1	0.56	0.1	0.08	0.1
iC ₅	-	-	0.06	-	-	-	-	-
nC ₅	-	-	0.06	-	-	-	-	-
C ₆ ⁺	-	-	-	-	-	-	-	-
CO ₂	87.21	-	56.43	-	-	-	77.85	-
N ₂	-	-	-	-	-	-	-	-
Total	100.00	15.3	100.00	2.3	100.00	14.0	100.00	31.6
MMef/D	212		15		21		248	
Btu/cu.ft.	232		695		2484		454	
Bil Btu/D	49		10		52		113	

HRG:cg

9/28/79

**PLEASE NOTE: THE PRECEDING PAGES WERE TREATED
AS A UNIT IN THE ORIGINAL DOCUMENT.**

SCOMM

28:15

**PLEASE NOTE: THE FOLLOWING PAGES WERE TREATED
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~~THROUGHT~~
GASLINE : PHASE I
AGREEMENT

Wittow

COOPERATIVE AGREEMENT
FOR DESIGN AND ENGINEERING
OF ALASKA GAS PIPELINE AND CONDITIONING PLANT

BETWEEN

The Alaskan Northwest Natural Gas
Transportation Company, a partnership of:

Northwest Alaskan Pipeline Company
Northern Arctic Gas Company
Pan Alaskan Gas Company
Calaska Energy Company
Pacific Interstate Transmission Company
United Alaska Fuels Corporation
American Natural Alaskan Company;

AND

Prudhoe Bay Natural Gas Producers

AND

The State of Alaska

June 1980

TABLE OF CONTENTS

Page No.

ARTICLE I - DEFINITIONS

Section 1.1 - Effect of Definitions.....	2
Section 1.2 - Terms	
1.2.1 - Affiliate.....	2
1.2.2 - Alaska Natural Gas Transportation System or ANGTS.....	2
1.2.3 - AFUDC.....	2
1.2.4 - Capital Account.....	2
1.2.5 - Capital Investment.....	2
1.2.6 - Design and Engineering.....	2
1.2.7 - Design and Engineering Board or Board.....	3
1.2.8 - Operator.....	3
1.2.9 - Partnership Agreement.....	3
1.2.10- Partnership.....	3
1.2.11- Partnership Commitment Date.....	3
1.2.12- Party.....	3
1.2.13- Person.....	3
1.2.14- Pipeline.....	3
1.2.15- Plant.....	3
1.2.16- Plant Commitment Date.....	4
1.2.17- Project Advisor.....	4
1.2.18- Project Management Contract.....	4
1.2.19- Project Management Contractor.....	4
1.2.20- Sponsor.....	4
1.2.21- Project.....	4

ARTICLE II - WORK TO BE PERFORMED

Section 2.1 - Scope of Agreement.....	4
Section 2.2 - Access to Data; Assignment and Delegation from the Partnership.....	4

Section 2.3 - Effect of Assignment and Delegation.....	5
Section 2.4 - Limitation on Assignment.....	5

ARTICLE III - PARTICIPATION

Section 3.1 - Initial Participation.....	5
Section 3.2 - Revised Participation.....	6
Section 3.3 - Contributions by New Parties.....	7

ARTICLE IV - CAPITAL INVESTMENTS

Section 4.1 - Initial Capital Investments.....	7
Section 4.2 - Further Capital Investment.....	8
Section 4.3 - Payment of Capital Investment.....	8

ARTICLE V - MANAGEMENT OF DESIGN AND ENGINEERING

Section 5.1 - General Management Structure.....	11
Section 5.2 - Design and Engineering Board.....	12
Section 5.3 - Actions of the Board.....	15
Section 5.4 - Authority of the Board.....	15
Section 5.5 - Committees to Advise the Board.....	16
Section 5.6 - Accounting Committee.....	17
Section 5.7 - Audit Committee.....	17
Section 5.8 - Technical Committee.....	18
Section 5.9 - Resident Auditors.....	18
Section 5.10- Project Advisors.....	19
Section 5.11- Costs of Committee Representation.....	20
Section 5.12- Operator.....	20

Section 5.13 - Operator's Compliance with Applicable Laws.....	22
Section 5.14 - Contractors' Compliance with Applicable Laws.....	22
--Section 5.15 - Operator's Project Management Organization.....	22

ARTICLE VI - BUDGETS AND ACCOUNTING

Section 6.1 - Submission and Approval of Budgets.....	23
Section 6.2 - Budget Details and Changes.....	23
Section 6.3 - Maintenance of Accounts: Monthly Statements.....	24
Section 6.4 - Allocation of Charges.....	24
Section 6.5 - Advances.....	25
Section 6.6 - Audits.....	25
Section 6.7 - Allocation of Expenditures.....	25

ARTICLE VII - TIMETABLE

Section 7.1 - Timetable.....	25
------------------------------	----

ARTICLE VIII - EXPANSION OF DESIGN AND ENGINEERING

Section 8.1 - Approval of Expansion.....	26
Section 8.2 - Participation in Expansion.....	26

ARTICLE IX - TERMINATION AND RIGHT OF WITHDRAWAL

Section 9.1 - Term of Agreement.....	26
Section 9.2 - Withdrawal Rights.....	27
Section 9.3 - Right to Withdraw.....	27
Section 9.4 - Termination.....	29
Section 9.5 - Continuing Rights and Obligations.....	29

ARTICLE X - RELATIONSHIP OF PARTIES

Section 10.1 - No Partnership.....	29
Section 10.2 - Liabilities.....	30
Section 10.3 - Indemnification.....	30
Section 10.4 - Contracts to Limit Liability.....	30

ARTICLE XI - FEDERAL INCOME TAX ELECTION

Section 11.1 - Election to be Excluded from Partnership Regulations.....	31
---	----

ARTICLE XII - TECHNICAL INFORMATION, INVENTIONS & PATENTS

Section 12.1 - Technical Information.....	31
Section 12.2 - Patent Infringement.....	32
Section 12.3 - Inventions by Third Parties.....	33
Section 12.4 - Inventions by Parties.....	33
Section 12.5 - Party Employees.....	34
Section 12.6 - TAPS License to Sponsors.....	34

ARTICLE XIII - THE STATE OF ALASKA

Section 13.1 - Special Status.....	35
Section 13.2 - Representation on the Board.....	35
Section 13.3 - Representation on Committees.....	35
Section 13.4 - No Capital Investments.....	35
Section 13.5 - Access to Information.....	36
Section 13.6 - No Liability.....	36
Section 13.7 - Commitments.....	36
Section 13.8 - Option to Change Status.....	36

ARTICLE XIV - TRANSFER OF PARTICIPATION

Section 14.1 - Limitation on Transfer.....37

Section 14.2 - Permitted Transfers.....37

ARTICLE XV - RELATION TO PARTNERSHIP ACTIVITIES

Section 15.1 - Partnership Activities to Continue.....37

Section 15.2 - Partnership Regulatory Filings.....37

ARTICLE XVI - GENERAL

Section 16.1 - Effective Date.....38

Section 16.2 - Notices.....38

Section 16.3 - Applicable Law.....38

Section 16.4 - Counterparts.....38

Section 16.5 - Headings.....39

Section 16.6 - Waiver.....39

Section 16.7 - Time for Execution.....39

COOPERATIVE AGREEMENT
FOR DESIGN AND ENGINEERING
OF ALASKA GAS PIPELINE AND CONDITIONING PLANT

This Cooperative Agreement (this "Agreement") is made and entered into by the undersigned parties ("Parties") consisting of the Alaskan Northwest Natural Gas Transportation Company ("Partnership") represented herein by its general partners; those persons herein identified and referred to as "Producers", which term means the owners and affiliates of owners of interests in natural gas produced from the Prudhoe Bay Unit of Alaska; and the State of Alaska.

PRELIMINARY RECITALS

X The Partnership owns a conditional certificate of public convenience and necessity issued by the Federal Power Commission (now the Federal Energy Regulatory Commission, the "FERC") in its Order of December 16, 1977, Docket No. CP78-123, et al., for the construction and operation of that portion of the Alaska Natural Gas Transportation System ("ANGTS") which is to be located within the State of Alaska. The Partnership has certain rights and obligations under and by virtue of such certificate, the Alaska Natural Gas Transportation Act of 1976 ("ANGTA"), and the "Decision and Report to Congress on the Alaska Natural Gas Transportation System" ("Decision") issued by the President on September 22, 1977 and subsequently ratified by Congress, which will continue without being affected by this Agreement. The Partnership's objective is to complete construction and commence operation of the ANGTS by November 1, 1985.

The Producers own interests in the natural gas produced from the Prudhoe Bay Unit of Alaska.

The purpose of this Agreement is to describe the terms and conditions under which the Parties shall participate in the design, engineering, construction planning, data gathering and cost estimating of the gas pipeline and the gas conditioning facilities to be constructed within the State of Alaska. For convenience and ease of reading, such pipeline and plant facilities are sometimes referred to collectively herein as the "Project", but such reference shall not be considered for any other purpose.

NOW THEREFORE, in consideration of their common desire to expedite and facilitate the construction and operation of the Project and in consideration of the mutual covenants herein contained, the Parties hereto agree as follows:

ARTICLE I Definitions

1.1 Effect of Definitions.

Unless otherwise required by the context, the terms defined in this ARTICLE I or elsewhere in this Agreement shall have the respective meanings assigned to them.

1.2 Terms.

1.2.1 Affiliate. Any person which, directly or indirectly, through one or more intermediaries controls or is controlled by or is under common control with another person. The Partnership is not an "Affiliate" of any Partner, nor is any Partner an "Affiliate" of the Partnership.

1.2.2 Alaska Natural Gas Transportation System or ANGTS. The natural gas transportation system to be constructed and operated to transport natural gas from Alaska and Canada to the contiguous United States.

X 1.2.3 AFUDC. Allowance for funds used during construction.

1.2.4 Capital Account. The total Capital Investment credited to the account of a Party in accordance with this Agreement, exclusive of any AFUDC which may be reflected on a memorandum basis or otherwise for various purposes of this Agreement.

1.2.5 Capital Investment. The contributions made by a Party pursuant to ARTICLE IV hereof.

1.2.6 Design and Engineering. All of the activities within the scope of this Agreement, including design,

engineering, construction planning, data gathering and cost estimating.

1.2.7 Design and Engineering Board or Board. The Board provided for in ARTICLE V hereof, the "Board".

1.2.8 Operator. The Operator provided for in Section 5.12 hereof.

1.2.9 Partnership Agreement. The General Partnership Agreement effective as of January 31, 1978, as amended on the effective date hereof, for the Alaskan Northwest Natural Gas Transportation Company, a partnership formed under the laws of New York.

1.2.10 Partnership. The Alaskan Northwest Natural Gas Transportation Company formed under the Partnership Agreement.

1.2.11 Partnership Commitment Date. The date as of which the Partnership Commitment Agreement (as that term is defined in the Partnership Agreement) shall have become effective by its terms.

1.2.12 Party. The Partnership, each of the Producers which executes this Agreement and the State of Alaska.

1.2.13 Person. Any individual, corporation or public entity; and the term is used herein without capitalization, as "person".

1.2.14 Pipeline. The gas pipeline and related transportation facilities to be constructed in the State of Alaska as a part of the ANGTS; and the term is used herein without capitalization, as "pipeline".

1.2.15 Plant. The gas conditioning facilities to be constructed in the State of Alaska to condition gas for transportation by the ANGTS; and the term is used herein without capitalization, as "plant".

1.2.16 Plant Commitment Date. The date as of which the participants in the ownership of the plant commit to provide the funds necessary for the construction of the plant; in the absence of any written agreement establishing such commitment, such commitment shall be deemed to have been effected on the first date on which such participants contribute funds for on-site building of the plant or the purchase of the materials and supplies necessary for such building.

1.2.17 Project Advisor. Each person so designated as provided in Section 5.10.

1.2.18 Project Management Contractor. The person or persons having responsibility for performance of Design and Engineering under a Project Management Contract.

1.2.20 Sponsor. A Partner as defined in the Partnership Agreement.

1.2.21 Project. The pipeline and the plant.

ARTICLE II Work to be Performed

2.1 Scope of Agreement.

During the term of this Agreement, the Parties shall assume (a) the responsibilities of the Partnership delegated pursuant to Section 2.2 with respect to the Design and Engineering for the pipeline and (b) the responsibility for Design and Engineering for the plant. The Board may further define the scope of the Design and Engineering to be accomplished under this Agreement.

2.2 Access to Data; Assignment and Delegation from the Partnership.

The Partnership hereby agrees that, prior to the first to occur of payment by Producers of Capital Investments

aggregating \$70,273,000 pursuant to Section 4.1 or the termination of this Agreement, each other Party, except the State of Alaska, may avail itself for the purposes of this Agreement of all benefits, assets and data (subject to any obligations which are related thereto) which have accrued to the Partnership as a result of expenditures to date by the Partnership for Design and Engineering for the pipeline. Effective upon such payment by Producers, the Partnership hereby assigns to the Parties, except the State of Alaska, in undivided interests, the right to use all such benefits, assets and data. By this Agreement, and to the limited extent herein set forth, the Partnership delegates to the Parties, except the State of Alaska, for the term of this Agreement, the responsibility for Design and Engineering for the pipeline which is hereafter to be accomplished. Each of the Parties shall own an undivided interest equal to its percentage share of total participation under this Agreement in all Design and Engineering for the Project hereafter accomplished under and during the term of this Agreement.

2.3 Effect of Assignment and Delegation.

Neither the assignment and delegation set forth in Section 2.2 nor any other provision of this Agreement shall impair or limit the rights of the Partnership or any successor thereto to use at any time and in any manner it deems appropriate, Design and Engineering accomplished prior to or under this Agreement.

2.4 Limitation on Assignment.

No provision of this Agreement shall constitute or be construed as requiring the Partnership to make any assignment of any interest in, or rights under, the Partnership's certificate of public convenience and necessity, the ANGTA, or the Decision.

ARTICLE III Participation

3.1 Initial Participation.

Each of the Parties shall participate in the cost, management and ownership of the Design and Engineering for

the Project accomplished under and during the term of this Agreement on the basis, as follows:

X 3.1.1 The Partnership shall participate to the extent of fifty percent (50%) of such cost, management and ownership. Each of the Sponsors shall have voting representation as to its per capita share of the Partnership's fifty percent (50%) of participation and, with respect to any action which, in accordance with this Agreement, requires the affirmative vote of representatives of persons having a percentage of the total participation in this Agreement, each of the Sponsors shall be considered to have a percentage participation that equals its per capita share of the Partnership's fifty percent (50%) of participation. The term "per capita share", as applied to any Sponsor under this Section 3.1.1, shall mean fifty percent (50%) divided by the number of Sponsors.

^ 3.1.2 Each of the Producers shall participate to the extent of a share (to be determined by the Producers) of fifty percent (50%) of such cost, management and ownership. Appendix "A" attached to this Agreement reflects the initial participation of the Producers. Subject to the provisions of Sections 3.2 and 9.3, at no time may a Producer reduce its participation in this Agreement unless, after giving effect to such reduction and corresponding increases in the participation of one or more of the other Producers, the total participation of all Producers in this Agreement shall continue to be fifty percent (50%).

3.1.3 Notwithstanding the provisions of Sections 3.1.1 and 3.1.2, the Partnership shall continue to own all benefits, assets and data which have accrued to the Partnership as a result of the expenditures to date by the Partnership for Design and Engineering for the pipeline, but the Producers shall have the right to use or own all such benefits, assets and data on the terms set forth in Section 2.2.

3.2 Revised Participation.

The Partnership will attempt to enlarge participation in the Partnership to include others, including persons owning rights to purchase natural gas produced from the Prudhoe Bay Unit, and shall, for a period of thirty (30)

days after issuance of notice by FERC with respect to the application filed by the Partnership on February 6, 1980, in Docket No. CP78-123, et al., permit joinder of the Partnership on terms which, after giving effect to changes in the Partnership's capital accounts after the admission date to the Partnership of American Natural Alaskan Company to the effective date of such joinder, are no less favorable than those extended to American Natural Alaskan Company. The Producers who join herein initially will attempt to include in their participation in this Agreement other owners of the natural gas produced from the Prudhoe Bay Unit, and will attempt to encourage purchasers of Prudhoe Bay natural gas to join the Partnership. Any new producer participant so admitted by the Producers shall have a participation share of the Producers' aggregate fifty percent (50%) of total participation in this Agreement. In the event that any person not initially a Party to this Agreement becomes a Party, the participation of the Producers shall be reapportioned, and Appendix "A" to this Agreement shall be revised accordingly. Further, in the event that any Producer should withdraw from this Agreement, as hereinafter provided, the participating interests of the Producers and Appendix "A" shall be revised accordingly.

3.3 Contributions by New Parties.

Upon the admission of any new Party to this Agreement, such new Party shall be required to contribute funds required thereafter for the work hereunder until the Capital Account of such new Party bears the same proportion to the Capital Accounts of all Parties as its participation share bears to the total participation under this Agreement.

ARTICLE IV Capital Investments

4.1 Initial Capital Investments.

The contributions made by a party under this Agreement shall be credited to its Capital Account established for the purposes of this Agreement. The initial Capital Account balance of the Partnership is agreed to be \$70,273,000, which represents, all Parties agree for purposes of this Agreement, one hundred fifteen percent (115%) of the total direct costs

expended (cash expenditures plus accrued liabilities) by the Partnership through March 31, 1980, for Design and Engineering for the pipeline. The initial Capital Account of each Party other than the Partnership is agreed to be zero. For the period commencing with April 1, 1980, and ending on such date as the Capital Accounts of all Parties, other than the Partnership, shall total \$70,273,000: (a) each Producer agrees to contribute its proportionate share of all funds required for the work under this Agreement up to, but not in excess of, said \$70,273,000; and (b) the Partnership shall not be required to make any contribution of funds under this Agreement. At the expiration of such period, the Partnership's Capital Account shall be credited with one hundred fifteen percent (115%) of all direct costs expended (cash expenditures plus accrued liabilities) by it for Design and Engineering for the pipeline from April 1, 1980, to the effective date of this Agreement, and the amount of such credit shall be applied to reduce the contributions of funds required to be made by the Partnership pursuant to Section 4.2. As used in this Section 4.1, the term "proportionate share", as applied to any Producer, shall mean its percentage participation in this Agreement multiplied by two.

4.2 Further Capital Investment.

After payment of initial capital contributions as required in Section 4.1, each Party agrees to contribute to the Design and Engineering of the Project over the term of this Agreement, in cash, its participating share of the funds required to defray the expenditures for such Design and Engineering for the Project, provided that each Party shall have the right to withdraw from this Agreement at the times and under the circumstances as described in Section 9.3.

4.3 Payment of Capital Investment.

4.3.1 Within expenditure limitations approved as provided in ARTICLE VI, the Operator shall issue a written request for payment of each contribution to be made under this Agreement at such times and in such amounts as the Operator shall deem appropriate in light of the ensuing thirty (30) days' cash requirements for the Design and Engineering of the Project. All amounts received by the

Operator pursuant to this Section 4.3 on or before the dates specified in 4.3.2(v) shall be credited to the respective Capital Account of the Party as of such specified date and all amounts received from a Party after the date specified in Section 4.3.2(v) by the Operator pursuant to this Section 4.3 shall be credited to such Party's Capital Account as of the date of receipt thereof.

4.3.2 Each written request issued pursuant to 4.3.1 shall contain the following information:

- (i) the total amount of funds requested from all Parties;
- (ii) the amount of funds requested from the Party to whom the request is addressed;
- (iii) the purpose for which the funds are to be applied in such reasonable detail as the Board shall direct;
- (iv) the budget authorization pursuant to which the funds are requested; and
- (v) the date on which payments of the funds shall be made (which date shall not be less than 15 days following the date the request is given) and the method of payment, provided that such date and method shall be the same for each of the Parties.

4.3.3 Each Producer's Capital Account under this Agreement, and the Partnership's Capital Account under this Agreement (to the extent that such Capital Account reflects expenditures for plant Design and Engineering) shall be credited on a memorandum entry basis at least quarterly with an AFUDC calculated at the rate allowed by the FERC to the Partnership or its successor; provided, that no such credit shall be made under this Section 4.3.3 to any Party's Capital Account for any period from and after the first to occur of the date that such Party withdraws from this Agreement or this Agreement terminates.

4.3.4 Each Party agrees that it shall make payments of its respective contributions in accordance with the request

issued pursuant to Section 4.3.1; subject, however, to the right to withdraw from the Agreement as provided in Section 9.3.

4.3.5 Any Producer which does not participate in the ownership of the pipeline (directly or through an Affiliate) on the Partnership Commitment Date shall be entitled to receive compensation for its contributions under this Agreement (to the extent that such are approved by the FERC or its successor for inclusion in the pipeline owner's rate base) from the Partnership or any successor to the Partnership in accordance with this Section. Any such Producer shall be entitled to receive after the ANGTS is completed and has become operational and at a time when the Partnership or its successor determines payment may be made without undue hardship:

(a) an amount equal to such portion of its Capital Account on the first to occur of (i) the date of withdrawal of such Producer from this Agreement, (ii) the Partnership Commitment Date, or (iii) the date of termination of this Agreement as reflects expenditures for pipeline Design and Engineering, plus the AFUDC then applicable to such portion on a memorandum basis; and

(b) return on such amount from the date applicable in (a) above to date of payment, calculated at the rate permitted by the FERC to the Partnership or its successor as such entity's AFUDC. The Partnership agrees that the amounts payable pursuant to clause (a) above and this clause (b) shall be recorded as a contingent liability of the Partnership from and after the Partnership Commitment Date. The right of reimbursement shall be subordinate to the rights of any creditor of the Partnership or its successor.

4.3.6 Any Party which does not participate in the ownership of the plant (directly or through an Affiliate) on the Plant Commitment Date shall be entitled to receive compensation for its Capital Account contributions under this Agreement for plant Design and Engineering (in the event that such Design and Engineering is used to construct the plant) from the owner of the plant in accordance with this Section. Any such Party shall be entitled to receive after the ANGTS is completed and has become operational and at a time when the owner of the plant determines payment may be made without undue hardship:

(a) an amount equal to such portion of its Capital Account on the first to occur of (i) the date of withdrawal of such Party from this Agreement, (ii) the Plant Commitment Date, or (iii) the date of termination of this Agreement as reflects expenditures for plant Design and Engineering plus the AFUDC then applicable to such portion on a memorandum basis; and

(b) return on such amount, from the date applicable under (a) above to date of payment, calculated at the rate, if any, used by the plant owner as an AFUDC component in the determination of its lawfully permitted charges for its services; provided, however, should the plant owner collect for its cost of capital only on a portion of the gas conditioned in the plant, the rate used in calculating the return on the amount included in clause (a) above shall be the product of multiplying the rate (as collected) times a fraction representing gas conditioned as to which the plant owner collects over total gas conditioned. The amounts payable pursuant to clause (a) above and this clause (b) shall be recorded as a contingent liability of the plant owner from and after the Plant Commitment Date, and each Party that participates (or whose Affiliate participates) in the ownership of the plant on such date agrees to make a good faith effort to cause the plant owner to perform as provided in this Section. The right of reimbursement shall be subordinate to the rights of any creditor of the plant owner. If the plant is or becomes subject to the ratemaking jurisdiction of the FERC so that the plant owner's accounts and charges are subject to such jurisdiction, the amounts payable pursuant to this Section in respect of funds contributed for plant Design and Engineering shall be limited to those amounts which must be and are approved by the FERC for inclusion in the plant owner's charges for its services.

ARTICLE V

Management of Design and Engineering

5.1 General Management Structure.

5.1.1 The major decisions of the Parties in performing this Agreement shall be made by a Design and Engineering Board which, except as otherwise expressly provided in this Agreement, and subject to Sections 2.3, 15.1 and 15.2, shall have exclusive authority with respect to all matters to be

performed under this Agreement relating to the Design and Engineering for the pipeline as otherwise, except for this Agreement, would be subject to the control of the "Board of Partners", as provided in Section 8.2 of the Partnership Agreement, and shall also have corresponding authority with respect to all matters to be performed under this Agreement relating to Design and Engineering for the plant.

5.1.2 The day-to-day management and control of the Design and Engineering for the Project, and other activities as determined by the Parties under this Agreement, shall be the delegated responsibility of the Operator subject to redefinition of the Operator's duties by the Board.

5.1.3 The Partnership and the "Operator" for the Partnership have executed contracts for the Design and Engineering of the pipeline, including the Project Management Contract (defined in ARTICLE I), which contracts are listed on Appendix "B" attached hereto. Such contracts shall be binding upon the Parties to the same extent the same are binding upon the Partnership, and during the term of this Agreement the Board, on behalf of the Parties, shall assume responsibility for supervision of the performance of any such contracts whereunder payment is to be made by the Parties hereunder for direct costs of Design and Engineering, to the extent only of the Design and Engineering performed under such contracts during the term of this Agreement. Such supervision will be performed for the Board by the Operator, as provided in Section 5.12.5. During the term of this Agreement, the Partnership agrees that modifications or cancellations of such contracts, including, after the initial effectiveness thereof, the Project Management Contract with Fluor and/or its Affiliates now being negotiated by the Partnership, shall be sought and obtained as the Board may direct, but only with respect to Design and Engineering subject hereto and only if the resulting cost or expense of any such modification or cancellation (including, without limitation, cancellation charges) is borne by all the Parties in accordance with their respective participations in this Agreement, and the Board may authorize additional contracts on behalf of the Parties for the Design and Engineering of the Project.

5.2 Design and Engineering Board.

5.2.1 The Board shall be composed of members designated by the Producers, the Sponsors and the State of Alaska.

Each Producer, each of the Sponsors and the State of Alaska shall designate one representative as its member ("Member") on the Board and shall designate one representative as an alternate ("Alternate"), who shall represent such person on the Board in the absence of the designated Member. Appendix "C" hereto contains the name, address and telephone number of each Member and Alternate on the Board. Each person entitled to representation on the Board reserves the right from time to time to change its Member or Alternate and their respective addresses and telephone numbers by giving written notice of any such change to the Secretary of the Board ("Secretary").

5.2.2 The Chairman of the Board shall be the Member representing Northwest Alaskan Pipeline Company ("Northwest"), and the Board shall designate a Member representing one of the other Sponsors as Co-Chairman. The Board shall designate a Member representing one of the Producers as Vice-Chairman. The Co-Chairman shall preside at meetings of the Board, prepare agendas and perform such other duties as the Board may determine, and the Vice-Chairman shall so preside and act in the absence of the Co-Chairman.

5.2.3 The Board shall hold monthly meetings, and such other meetings as may be requested by any Member or by the Operator, at which meetings the Operator shall present recommendations, reports and information as hereinafter provided in this Agreement. Any request for a meeting shall be made in writing, or by telephone confirmed in writing to the Secretary and shall state the matters to be considered at such meeting. The Secretary shall notify each Member at least three (3) days in advance of any meeting of the date, time, place and purpose of the meeting. If such notice is given by telephone, it shall be confirmed in writing, by telegram, cable or letter, to the Member so notified. Failure to give such notice shall not nullify any action taken at any meeting if each Party not represented at such meeting by its Member or Alternate shall waive such notice in writing signed by said Party's Member or Alternate, either before or after the meeting. The Board shall establish rules and procedures for the conduct of meetings, including but not limited to the tenure for its Chairman and Co-Chairman and attendance of advisors; provided that such rules and procedures shall not contradict any provisions of this Agreement.

5.2.4 It is recognized that matters requiring the immediate decision of the Board may arise from time to time. Any Member may propose that any matter upon which the Board is authorized to act be decided pursuant to the informal procedure established hereunder by giving notice to the Secretary, which notice may be given in writing, by letter, telegram or cable, or by telephone, confirmed in writing. The Secretary shall immediately notify each Member by telephone of the matter to be decided and shall confirm such notice by telegram. If the Secretary is unable to contact a Member by telephone, he shall immediately notify that Member's Alternate, which notice shall be confirmed in writing to both the Member and his Alternate. Each Member or Alternate, as the case may be, shall notify the Secretary in writing, by letter, telegram or cable, or by telephone confirmed in writing, of his approval or disapproval of the matter for decision. As soon as the Secretary shall ascertain that a matter has been approved or disapproved, he shall notify all Members of the result, which notification, if made by telephone, shall be confirmed in writing to each Member.

5.2.5 The Board shall appoint a Secretary, who shall not be an employee or representative of the Operator, and an Assistant Secretary. In addition to the functions assigned to the Secretary in the above subsections of this Section 5.2, he shall prepare and retain custody of the original record book which will contain the minutes of all meetings, notices, written confirmations, certificates and, as the Board shall direct, all other documents and communications relating to the Board. Duplicate copies of all materials in the record book shall be promptly mailed by the Secretary to each Member. The record book shall be kept available for inspection by duly authorized representatives of the Parties hereto at all times and, upon termination of this Agreement, shall be delivered to one of the Parties (or to the Partnership) for safekeeping under such terms as the Board shall approve. All expenses incurred in connection with the performance of the duties of the Secretary shall be borne by the Parties. The Secretary shall serve at the pleasure of the Board. The Assistant Secretary shall perform the duties of the Secretary in the event of the absence of the Secretary.

5.2.6 The Secretary may issue certificates with respect to actions of the Board. Contractors engaged in the Design and Engineering for the Project and other third

parties shall be entitled to rely on such certificates if they are countersigned by any Member or Alternate (other than the Member or Alternate, if any, representing the Party employing the Secretary).

5.2.7 Except as provided in subsection 5.2.5, each Party shall pay all expenses incurred by it relating to its representation on the Board.

5.3 Actions of the Board.

5.3.1 All matters presented to the Board for action shall be approved only upon the affirmative vote of Members or Alternates, as the case may be, representing persons having in the aggregate at least sixty-six and two-thirds percent (66-2/3%) of the total participation in this Agreement; provided, however, that decisions of the Board concerning expansion of the Design and Engineering of the Project to provide access for transportation of gas from other sources or facilities to receive additional gas shall be made only by Members or Alternates, as the case may be, representing Sponsors, and such decisions shall require approval only of the affirmative vote of a majority of such Members or Alternates, as the case may be.

5.3.2 Any and all decisions which the Board is authorized to make under this Agreement shall be conclusively binding on all Parties to this Agreement and shall have the same effect as a separate agreement on the matter by and among all Parties signatory.

5.4 Authority of the Board.

Without modification of its general authority under Section 5.1, the approval of the Board shall be necessary before any of the following actions can be taken by the Operator or contractors or subcontractors on behalf of the Parties:

Subject to the provisions of Section 6.1,
establishment of Design and Engineering
cost estimates and operating budgets
for the work under this Agreement;

Approval of any financial commitment not in an approved budget;

Establishment of accounting, budget and tax policies related to work under this Agreement consistent with the FERC's accounting and tax methodology and generally accepted accounting principles;

Selection of depositories for funds contributed by the Parties and establishment of policy for withdrawal of funds;

Selection and retention of the Project Management Contractor for plant Design and Engineering;

Selection and retention of a Certified Public Accountant;

In addition, the Board shall have exclusive authority, during the term of this Agreement, on behalf of the Parties, under this Agreement, to do the following:

Approve on behalf of the Board the final design and cost estimate for the Project;

Change the scope of the Operator's duties and authorities, and the specific basis for compensating the Operator for services rendered to the Parties;

Change the authority and responsibility delegated in this Agreement to any Committee, to the Project Management Contractor or to the Operator;

Select a successor Operator or Project Management Contractor for pipeline Design and Engineering, if such becomes necessary.

5.5 Committees to Advise the Board.

There shall be an Accounting Committee, Audit Committee, and Technical Committee to aid and advise the Board in the

exercise of the Board's authority under this Agreement. In addition, the Board may establish such other advisory committees as it deems necessary. Each Producer and each Sponsor is entitled to designate one member to serve as its representative on each of the Committees and to designate one alternate who may attend meetings in the absence of the member, except that the Operator shall not have representation on the Audit Committee. The Board shall appoint from the membership of each of the Committees one member to serve as the Chairman of such Committee until his successor is appointed. Each Chairman may designate another member of the Committee to be the Vice Chairman of that Committee. The meetings of each Committee shall be held at such time and place as designated by the Chairman, or the Vice Chairman at the Chairman's request. The Chairman or, in his absence, the Vice Chairman shall record and report to the Board the comments and recommendations that the Committee wishes to submit to the Board, in response to requests from the Board or on the initiative of the Committee. The members of any Committee may submit comments and recommendations to the Board singly or in any combination as they severally shall determine, and no action taken by any Committee or member thereof in his capacity as such shall be binding on the Parties or the Board.

5.6 Accounting Committee.

The purpose of the Accounting Committee shall be to furnish to the Board services and advice as may be requested by the Board from time to time concerning accounting methods, records, support data requirements and the preparation of reports to the Board by the Operator, to assure that each member of the Board (and each Party) will have sufficient financial and statistical data related to the work performed by the Operator.

5.7 Audit Committee.

The purpose of the Audit Committee shall be to render advice and service to the Board regarding the adequacy and reliability of the system of internal controls, financial recording and reporting of transactions, budget administration and contract compliance of the Operator, contractors, subcontractors and consultants engaged in work under this Agreement. The Audit Committee, with the advice of the Operator's audit staff director, shall recommend to the Board the scope and coverage of the audit program, the

staff's plan of operation and activities, and its reporting procedures, giving careful attention to maintaining sound and efficient working relations with the Operator. The scope and coverage so recommended may include, but not be limited to, audit review of proposed and executed contracts and subcontracts, reports on contract provisions and rates, work-performance, and custodial and financial controls and audits by outside agencies. The Committee and the staff shall be mindful of the Operator's responsibilities and needs, will appropriately alert the Operator to any problem areas observed in activities reviewed, and render appropriate assistance to the Operator when requested to do so by the Operator. The Audit Committee shall also submit recommendations to the Board regarding the selection, scope and retention of independent public accounting firms engaged to audit the financial records and reports required under this Agreement.

5.8 Technical Committee.

The purpose of the Technical Committee shall be to advise the Board with respect to the technical aspects of the work hereunder. The Technical Committee shall be composed of the Project Advisors or such other persons as may be designated by the Producers and Sponsors.

5.9 Resident Auditors.

Each Producer and each Sponsor, may assign a qualified auditor to work with Operator's existing audit staff as a resident auditor during the term of this Agreement, but the salary, costs and career administration of each auditor as assigned shall remain with the Producer or Sponsor so assigning such auditor. The Operator shall provide timely, full access by the resident auditors to such records, personnel, facilities, contractors, suppliers, and job sites related to or involved in the Design and Engineering for the Project as the Parties have contributed funds to under this Agreement, and the Operator will cooperate with the resident audit staff by timely response to its reasonable requests. Each of the Producers and Sponsors reserve the unrestricted right as to scope and access hereunder to conduct their own audits, at their sole expense, of any aspect of the costs charged to the Parties for Design and Engineering performed under the terms of this Agreement, provided, however, that written notice of the desire to exercise this right shall be given thirty (30) days in advance to the Audit Committee

members, the resident audit staff director and the Operator. In exercising this right, it will be recognized that it is the intent of this Agreement to minimize duplication of audit coverage to the fullest extent possible. Accordingly, the Audit Committee and resident audit staff are expected to be responsive to the needs of each Producer and Sponsor.

5.10 Project Advisors.

Each Producer and each Sponsor and the State of Alaska may designate a Project Advisor who may serve on the Technical Committee and communicate with the Operator's Project Management Organization and, in cooperation with the Operator, communicate with the Project Management Contractor(s). The Project Advisor so designated by a person will report to such person as to the status of work under the Agreement and will advise the Operator's Project Manager of such person's views on matters affecting the work. When requested by the Operator, any Project Advisor will seek to provide specially qualified persons employed by the person who designated such Project Advisor (or an Affiliate) to assist the Operator or Contractors in carrying out the scope of work being performed under this Agreement. The costs for services of any such specialist used by the Operator shall be billed to the Operator by the person supplying the specialist. Each person shall bear the cost of its Project Advisor.

Each Project Advisor shall have access in cooperation with the Operator to all records and engineering data relative to the work hereunder and may with the concurrence of the Operator communicate with the Operator's managers and supervisors on matters relating to the work. Such access and communications shall not be unreasonably denied. Each Project Advisor shall also be available to perform specific tasks relative to the work as requested by the Operator's Project Manager, to the extent that such does not unreasonably interfere with his primary responsibilities. Each Project Advisor who so requests shall be provided appropriate office space at the location(s) of the Operator's Project Management Organization and at the location(s) of the Project Management Contractor(s), and the cost of such space and facilities provided shall be charged to the person by whom the Project Advisor is designated.

5.11 Costs of Committee Representation.

Each person shall pay all costs related to its representation on Committees established hereunder.

5.12: Operator.

5.12.1 The Operator shall be Northwest; subject to the power of the Board to remove Northwest from the office of Operator upon an affirmative finding by vote of Members representing sixty-six and two-thirds percent (66-2/3%) of total participation in this Agreement that the Operator has failed or refused to carry out its duties hereunder or has otherwise acted in a manner detrimental to the objective of this Agreement.

5.12.2 To the extent that contracts with others are necessary to the performance of work hereunder, the Operator shall negotiate contracts on behalf of the Parties for such services as are required under this Agreement to perform the Design and Engineering for the Project and shall execute the same upon authorization of the Board; provided, however, that the Project Management Contract for the pipeline now being negotiated by the Partnership with Fluor and/or its Affiliates shall not require Board authorization prior to execution by or on behalf of the Partnership.

5.12.3 The Operator shall, on behalf of the Parties, during the term of this Agreement, manage the Design and Engineering for the Project, and shall have all powers and authorities reasonably necessary to the discharge of such responsibilities subject, however, to the requirements for Board approval as described in this ARTICLE V. The Operator shall prepare and submit to the Board the Operator's recommendations with respect to those matters requiring Board approval.

5.12.4 The Operator shall advise the Board regularly with respect to Operator's actions as "Operator" for the Partnership in proceedings with governmental agencies and authorities having jurisdiction over permits, authorizations or certificates necessary for the pipeline. As directed by the Board, the Operator may, on behalf of the Board, establish and maintain liaison with all governmental

agencies and authorities, in the United States and Canada having jurisdiction over permits, authorizations or certificates necessary to the construction and operation of the Project and the ANGTS, for the purpose of obtaining information, rendering reports and coordinating the work hereunder with the work being conducted by the Operator as "Operator" for the Partnership.

5.12.5 Subject to the provisions of Section 5.1.3, the Operator shall, on behalf of the Board supervise the performance of the Project Management Contractor or Contractors and all other independent contractors involved in Design and Engineering for the Project, to achieve contract compliance, timely completion of the Design and Engineering for the Project and to insure the development of acceptable quality and cost control systems.

5.12.6 The Operator shall report fully to the Board at each regular meeting of the Board, and shall render special reports as necessary to inform the Board of the progress of affairs.

5.12.7 The Parties shall reimburse the Operator for all reasonable costs, including overhead and administrative expense, incurred in providing services to the Parties under this Agreement in accordance with Appendix "D" hereto.

5.12.8 The Operator's records for all work performed under the terms of this Agreement shall be retained for audit for a period of no less than twenty-four (24) months after the termination of this Agreement. Any audit claims that may be developed by the resident audit staff or any Party to this Agreement shall be submitted to the Operator within such twenty-four (24) month period.

5.12.9 The Operator shall include in each contract executed under this Agreement that each Party shall have the equal right to audit the contractor's records, but only with respect to Design and Engineering subject hereto and only at the cost of the Party performing such audit. With respect to any contract listed on Exhibit "B" attached hereto, Operator shall use its best efforts to include a similar

provision in such contracts for the term of this Agreement; provided, that the costs of such efforts shall be borne by all the Parties in accordance with their respective participations in this Agreement.

5.13 Operator's Compliance with Applicable Laws.

The Operator shall comply with all applicable laws and regulations in the conduct of the work under this Agreement. All financial settlements, reports of all types, and billings rendered to the Parties will reflect properly the facts about all activities and transactions handled for the Parties. The Operator shall report to the Parties any violations of the foregoing requirements.

5.14 Contractors' Compliance with Applicable Laws.

The Operator shall include in all contracts executed under this Agreement a requirement that all financial settlements, reports of all types, and billings rendered to the Operator or the contractors shall properly reflect the facts about all activities and transactions handled for the Parties; and a requirement that the contractors and sub-contractors will comply with all applicable laws in the performance of services for the Parties.

5.15 Operator's Project Management Organization.

The Operator has established and staffed a project management organization to supervise the Project Management Contractor and other contractors employed to accomplish Design and Engineering of the pipeline, and will make such changes and additions to its organization as necessary to insure coordination and optimization of Design and Engineering for the Project.

It is intended that the Operator's project management organization be staffed with highly qualified persons selected by the Operator. Each Producer and Sponsor will be notified of any vacant or new senior level design and engineering professional position within the project management organization and may nominate a qualified person to fill such job. The Operator may elect to fill any staff position with its own employee or a person nominated by one

of the Producers or Sponsors. If a nominee of a Producer or Sponsor is selected, the nominee will continue in the employment of such Producer or Sponsor, but he will work under the direct supervision of the Operator, and the costs for his services shall be billed to the Operator.

ARTICLE VI Budgets and Accounting

6.1 Submission and Approval of Budgets.

By execution of this Agreement, the Partnership's 1980 budget for the direct costs of Design and Engineering of the pipeline, as reflected on Appendix "E", plus fifteen percent (15%) of such costs, is approved by the Parties, subject to the power of the Board to revise and expand budgets. The Operator shall revise and update the total budget for Design and Engineering of the Project by appropriate budget amendments at least quarterly beginning in the third calendar quarter of 1980 based upon the best information then available as to the ultimate cost to complete the work included within the scope of this Agreement. Except for specific items of expenditure which have been previously approved by the Board, the Operator shall make no commitments for the expenditure of funds under this Agreement, unless the projected expenditure has been included in an approved budget or budget amendment and is within the approved budgeted costs of that component of the work.

6.2 Budget Details and Changes.

The budgets required hereunder will provide projected expenditures separated or broken down and approved by components. The Board shall advise the Operator of the components to be included in the initial 1980 budget for plant Design and Engineering and of the additions thereto for pipeline Design and Engineering, and shall advise the Operator of the components to be included in subsequent annual budgets. The Operator, with the approval of the Board, shall select a Project Management Contractor to perform Design and Engineering for the plant. The Operator will cause the Project Management Contractor for plant Design and Engineering to recommend to the Board a site for plant location and the process which the plant is to employ.

Upon determination by the Board of the plant location and process, the Operator shall prepare and submit to the Board for approval a final budget for plant Design and Engineering in 1980, as soon as possible; provided, however, that such budget shall not exceed \$12 million in expenditures and commitments, and provided further that a budget for 1981 shall ~~not~~ contain authorizations for expenditures or commitments in connection with plant Design and Engineering in an amount in excess of \$43 million, unless the Board shall authorize the Operator to prepare and submit such a 1980 or 1981 budget for plant Design and Engineering in excess of such amounts.

6.3 Maintenance of Accounts: Monthly Statements.

The Operator shall maintain accurate accounts of all expenses, costs and liabilities incurred by it during the term of this Agreement on behalf of the Parties in the Design and Engineering of the Project. During the term of this Agreement, on or before the thirtieth (30th) day of each month, the Operator shall transmit to each Party a statement showing the total charges and credits to the account of the Party during the preceding calendar month. Such statement shall be sufficiently detailed to set forth the basis of allocation of such expenditures and liabilities between the Parties and to permit each Party to charge its proportion thereof to its proper account. Any Party shall have the right to question the accuracy of the statement. In addition, the Operator will submit, by the thirtieth (30th) day of each month, a report indicating, for each major component of the work hereunder, the commitment against budget and expenditures (cash expenditures and accrued liabilities) for the year to date.

6.4 Allocation of Charges.

Subject to Section 6.7, all expenses, costs and liabilities incurred hereunder shall be allocated monthly among the Parties in accordance with their respective participation during the period such expenses, costs and liabilities accrued. In the event any Party's participation in this Agreement changes during the accrual period of any expense, cost or liability, such expense, cost or liability shall be prorated accordingly.

6.5 Advances.

Each Party shall advance its contributions to the performance of the work hereunder when requested to do so by the Operator in accordance with Section 4.3 of this Agreement.

6.6 Audits.

The Board shall have an audit made of the Operator's accounts under this Agreement, as to each calendar year's work, during which this Agreement is in force. Each Party shall be furnished a copy of the report of each calendar year's audit on or before March 15 of the year following the year covered by such audit. The audit shall be made by a certified public accounting firm selected by the Board, and the expense thereof shall be charged to the Parties on the basis of their respective participation in this Agreement.

6.7 Allocation of Expenditures.

The Operator shall maintain books of account under this Agreement which segregate the costs of pipeline Design and Engineering from the costs of plant Design and Engineering. The Parties agree that the costs of pipeline Design and Engineering (including all costs reflected in the Partnership's initial Capital Account balance as provided in Section 4.1 and the amount to be credited against the Partnership's Section 4.2 contributions as provided in Section 4.1) shall be deemed to have been paid, first, through contributions by the Partnership and, then, through contributions by the other Parties in proportion to their respective participations in this Agreement.

ARTICLE VII Timetable

7.1 Timetable.

The Parties will make a good faith effort to reach agreement upon a final design and cost estimate for the Project by July 1, 1981.

ARTICLE VIII
Expansion of Design and Engineering

8.1 Approval of Expansion.

Section 5.3.1 of this Agreement permits the Design and Engineering of the Project to be expanded upon an affirmative vote of Members or Alternates, as the case may be, of the Board representing a majority of the Sponsors. Any such expansion, however, shall be accomplished in accordance with the provisions of this ARTICLE VIII.

8.2 Participation in Expansion.

In the event that a majority of the Sponsor Members of the Board approve an expansion of the Design and Engineering of the Project to provide access for additional gas, such decision shall be binding upon the Parties hereto; provided, however, that each Producer shall have the right to elect not to participate in the cost and management of the Design and Engineering for the additional facilities necessary for such expansion. If any Producer elects not to participate, such Producer shall give notice of its election to the other Parties within sixty (60) days following the decision to expand, and thereafter the additional facilities for expansion shall be treated as a separate and distinct project, not within the scope of this Agreement, and the participation in the Design and Engineering for such additional facilities for expansion shall be determined by agreement of the participants in such additional facilities.

ARTICLE IX
Termination and Right of Withdrawal

9.1 Term of Agreement.

This Agreement shall continue from the effective date until terminated pursuant to the provisions of this ARTICLE IX.

9.2 Withdrawal Rights.

A Party may not withdraw from this Agreement except as provided in Section 9.3 of this Agreement.

9.3 Right to Withdraw.

9.3.1 Each Party shall have the right to withdraw from this Agreement at the times and under the circumstances as follows:

- (i) after receipt of notice of the anticipated cash requirements for the calendar year 1981 or any year thereafter (such notice to be given on or before December 1 of 1980 and each year thereafter) by notice of withdrawal given on or before the December 15 preceeding 1981 or any year thereafter; or
- (ii) following future governmental or judicial action which will have significant adverse effect upon the financing or economic viability of the Project.

9.3.2 A Producer shall have the further right to withdraw from this Agreement at the times and under the circumstances as follows:

- (i) following future governmental or judicial action which, in the opinion of the Producer, finally excludes the plant from the ANGTS; or
- (ii) following future governmental or judicial action which excludes Producers from participation in ownership of the ANGTS.

9.3.3 The Partnership shall have the further right to withdraw and terminate this Agreement at any time.

9.3.4 A Party exercising its right to withdraw under this Agreement shall give fifteen days' advance notice of such withdrawal to the other Parties. If any obligations shall be incurred by or on behalf of the Parties during such notice period pursuant to the budget hereunder (including any amendments thereto) as approved by the Board prior to the giving of such notice for the calendar year in which such notice is given, the Party giving such notice shall be obligated to contribute funds hereunder to pay its proportionate share of such obligations for work performed prior to the effective date of withdrawal as if such notice had not been given, but shall not be obligated to contribute any funds required to meet obligations arising after the expiration of such notice period; provided, however, that if the withdrawal of such Party results, in and of itself or in combination with withdrawals by other Parties, in a termination of this Agreement, such Party shall be obligated to pay that portion of any cancellation or other charges required to be paid to third parties by reason of such termination which equals its percentage participation in this Agreement immediately prior to such Party's withdrawal. Upon withdrawal by any Producer, the participation of the Producers in their respective aggregate fifty percent (50%) of total participation shall be reapportioned among them so that the entire fifty percent (50%) shall be held by the remaining Producers. Withdrawal by any Producer or Producers holding more than a fifteen percent (15%) share of the Producers' aggregate fifty percent (50%) of the participation in this Agreement shall automatically entitle each other Party to withdraw from this Agreement at any time thereafter, after fifteen (15) days' advance notice to all other Parties. A withdrawing Party shall have those rights stated in Section 4.3.5 and Section 4.3.6 hereof. Withdrawal from this Agreement shall relieve the withdrawing Party from further liability and obligations, except for payment for work then performed, and shall forfeit all of such Party's voting rights under this Agreement and terminate all of its representation on the Board, committees and management staff. Subject to Section 2.2, any such withdrawing Party shall have the right to use or license any Affiliate of such withdrawing Party to use the Design and Engineering accomplished to the date of withdrawal, but shall not be entitled to access to Design and Engineering thereafter accomplished, and shall not have any claim or right with respect to use of the Design and Engineering by the Parties or the Partnership.

9.4 Termination.

This Agreement shall be terminated, except for certain rights and obligations hereinafter stated, upon the happening of one of the events as follows:

9.4.1 Mutual agreement of the Parties.

9.4.2 Withdrawal, pursuant to Section 9.3, of all of the Producers or of the Partnership.

9.4.3 Completion of the Design and Engineering for the Project and approval by the Board of the final design and cost estimate.

9.5 Continuing Rights and Obligations.

Notwithstanding withdrawal from or the termination of this Agreement, the obligations of any Party incurred during the term of the Agreement, and unsatisfied, shall continue as obligations enforceable under this Agreement; provided, however, that, subject to the provisions of Section 4.3.4, any obligation of a Producer to make initial capital contributions under Section 4.1 shall cease upon such withdrawal or termination. Further, the entitlement of any Party to payment for its contributions pursuant to Sections 4.3.5 and 4.3.6 shall continue as an enforceable entitlement under this Agreement. Except as provided in this Section 9.5, termination of this Agreement shall terminate the delegations of authority and responsibility made herein and liabilities and obligations assumed under this Agreement.

ARTICLE X Relationship of Parties

10.1 No Partnership.

The duties, obligations and liabilities of the Parties hereto are intended to be several and not joint or collective. This Agreement is not intended to create, and shall not be construed to create, an association or trust, or to impose a Partnership duty, obligation, or liability with

regard to any one or more of the Parties hereto. Each Party hereto shall be individually responsible for its own obligations as herein provided.

10.2. Liabilities.

Any liability incurred hereunder to contractors and third parties shall not be joint or joint and several, but each Party hereto shall be separately liable for a portion of such liability calculated in accordance with its participating interest. Except as otherwise provided in this Agreement, no Party shall have the right or power to bind any other Party without the other's express written consent.

10.3 Indemnification.

The Parties shall indemnify and save harmless the Members of the Board, the members of the Accounting, Audit and Technical Committees and of other committees as may be designated, and the Operator against all actions, claims, demands, costs and liabilities arising out of the acts (or failure to act) of such persons in good faith within the scope of their authority in the course of the performance of their duties under this Agreement, and such persons shall not be liable for any obligations, liabilities or commitments incurred by or on behalf of the Parties as a result of such acts (or failure to act).

10.4 Contracts to Limit Liability.

Without the written consent of all Parties, no contract or other obligation on behalf of the Parties shall be entered into unless there is contained therein an appropriate provision limiting the claims of all parties to such instrument and beneficiaries thereunder to the assets created or established under this Agreement and expressly waiving any rights of such parties and other beneficiaries to proceed against the Parties or the Sponsors individually.

ARTICLE XI
Federal Income Tax Election

11.1 Election to be Excluded from Partnership Regulations.

Each Party hereto hereby elects that it and the operations covered by this Agreement be excluded from the application of Subchapter "K" of Chapter 1 of Subtitle "A" of the Internal Revenue Code of 1954, as permitted and authorized by Section 761 of such Code and the regulations hereinafter enacted or promulgated; provided, however, that nothing in this ARTICLE XI shall, or shall be construed to, affect in any way the treatment of the Partnership as a partnership for federal income tax and other similar purposes. The Parties hereby agree to execute such evidence of the election as may be required by regulations issued under said Subchapter "K". Should the regulations require each Party to execute additional evidences, each Party agrees to execute or join in the execution thereof. The election hereby made and the other provisions of this Section shall apply in like manner to applicable state laws, regulations and rulings now in effect or hereafter enacted that have an effect similar to the Federal provisions referred to herein.

ARTICLE XII
Technical Information, Inventions & Patents

12.1 Technical Information.

During the term of this Agreement, each Party shall have access to all Technical Information generated or received by the Operator under this Agreement or by any Party, contractor or agent performing work under this Agreement. As provided in Section 2.2, the Parties shall have the right to use Technical Information of the Partnership heretofore acquired, subject to a limitation on such use until the Producers shall have contributed the aggregate amount required under Section 4.1 hereof. Technical Information hereafter acquired relating to the Design and Engineering of the Project shall be owned by the Parties in undivided interests. Each Party shall own an undivided interest in such Technical Information equivalent to its participation share in this Agreement and shall have

the right to use and dispose of said Technical Information in any manner it, in its sole discretion, deems appropriate. Any Party may provide, in writing, its proprietary Technical Information for use in the Design and Engineering of the Project and shall identify such information as proprietary and confidential. With regard to such proprietary information of any Party, the other Parties each agree:

- (i) to maintain said proprietary Technical Information in confidence so long as it is not part of the public knowledge or not otherwise available to a Party or Parties and to exercise the same degree of care regarding said proprietary Technical Information as it exercises with regard to its own proprietary Technical Information;
- (ii) to disclose said proprietary Technical Information referred to herein only to those of its Affiliates which are obliged to exercise the aforesaid degree of care;
- (iii) to disclose said proprietary Technical Information referred to herein only to third Parties who are participants in a joint operation (which is directly related to the Project) with said Party or its Affiliates and who are obligated to exercise the aforesaid degree of care; and
- (iv) to disclose said proprietary Technical Information to a representative of the government, as required by statute, regulation, rule, or order.

Nothing in this Section 12.1 shall grant or convey or be deemed to grant or convey any right whatsoever under any patent.

12.2 Patent Infringement.

With reference to, but only with reference to, the work conducted pursuant to this Agreement, each Party agrees

to hold each other Party free and harmless from any and all claims of patent infringement which are based on any patents owned or controlled by it or any of its affiliates and which are based upon inventions conceived or made prior to or during the period that it is a Party to this Agreement. Such undertaking to hold harmless shall remain in effect after the granting Party ceases, for any reason, to be a Party to this Agreement.

12.3 Inventions by Third Parties.

Each Party agrees that any patent or patent application covering an invention, discovery or improvement which arises out of any research or development program carried out for the Parties and paid for by the Parties by any contractor or other agent (but as to Fluor Corporation and its Affiliates, subject to contractual commitments binding upon the Parties) for the Design and Engineering of the Project shall belong jointly to the Parties and each of said Parties shall have an undivided interest in each such patent and patent application equivalent to each Party's participation in this Agreement. The ownership interests in patent rights acquired under this Section 12.3 by any Party which ceases to be a Party shall pass to such Party's transferee, as provided in ARTICLE XIV of this Agreement; provided, however, that in assigning its ownership interest in such patents the Party may reserve for itself and its Affiliates a royalty free license to use in its own operations the inventions covered by such patent rights. The Parties agree that title to any such patent or patent application may be held in the name of one Party for the benefit of all Parties.

12.4 Inventions by Parties.

The Parties agree that any patent or patent application covering an invention, discovery or improvement which arises out of any separate research or development program carried out by one of the Parties or one of its Affiliates, the costs and expenses of which have been paid for by the Operator as agent for all the Parties, shall belong to said Party or said Affiliates but each of the other Parties shall have:

- (i) a nonexclusive, world-wide, irrevocable, royalty free, nontransferrable right under said patents and patent applications

to use the inventions or discoveries or improvement covered thereby in such of its own operations including oil and gas production, pipeline and related operations; and

- (ii) an irrevocable right to extend to its Affiliates a nonexclusive, world-wide, irrevocable, royalty free, non-transferable right under said patents and patent applications to use the inventions or discoveries or improvements covered thereby in such of its own operations, including oil and gas production, pipeline, and related operations.

12.5 Party Employees.

To facilitate the procurement of an experienced staff, it is contemplated that employees of the Parties and of their respective affiliates may be assigned to work for the Operator pursuant to service contracts between the Party and the Operator. Each Party hereto agrees on behalf of itself and its Affiliates that any and all of its employees who become Party Employees will be released from such portion of such Party Employees' obligation to assign inventions to such Party or Affiliates as may be required to enable such Party Employee to accept the obligation imposed by Operator upon its employees with respect to inventions conceived or made by the Operator's employees relating to or useful in the Project during their term of employment by the Operator.

12.6 TAPS License To Sponsors.

The terms and obligations of that certain license agreement dated August 17, 1978, as amended prior to the effective date hereof, between the Partnership and certain Producers or Affiliates of certain of the Producers shall not be altered or construed as altered in any way by this Agreement.

ARTICLE XIII
The State of Alaska

13.1 Special Status.

The State of Alaska is included as a Party to this Agreement, but its participation shall be limited as provided in this ARTICLE.

13.2 Representation on the Board.

The State shall designate a Member on the Board as its representative, and also designate an Alternate who shall represent the State in the absence of the State's Member. The State's Member, or its Alternate, shall not be entitled to vote on any matter presented to the Board for decision. Except for the absence of a vote, the State's representative may participate as any other Member in the business of the Board.

13.3 Representation on Committees.

The State may designate a Project Advisor and Alternate (to act in his absence) as its representative, who shall serve on the Technical Committee established pursuant to Section 5.8 of this Agreement and participate in its work. The State's representative shall participate as any other Member in the work and responsibilities of the committee, but shall not be entitled to vote on any matter presented for decision. The State shall not be entitled to representation on the Accounting and Audit Committees and shall not be entitled to designate a Member of the audit staff, unless it elects to participate fully in this Agreement in accordance with Section 13.8.

13.4 No Capital Investments.

The State shall not contribute, and shall not be obligated to contribute, any Capital Investments or any other funds with respect to the efforts undertaken pursuant to the Agreement. Accordingly, the State will not have nor will it acquire any ownership rights with respect to the Design and Engineering, including Technical Information

acquired by reason of, or prepared pursuant to, the Agreement.

13.5 Access to Information.

The State shall have the same access as any Party to all Technical Information received by the Operator or by any Contractor performing work under this Agreement, except that, with respect to material identified as proprietary and confidential within the meaning of Section 12.1, the State shall be provided access to such material after it has furnished satisfactory assurances that it can maintain the confidentiality of such material.

13.6 No Liability.

In view of its special status in the organization established by this Agreement, the State shall not have any liability with respect to the acts or omissions performed by the Board, the Committees established hereunder, or by Contractors or third parties hereunder. The State shall not be bound, except as provided herein, without its express written consent. Only the Governor of the State or its Attorney General may grant its consent.

13.7 Commitments.

The State pledges its support for, and its cooperation and good faith in the exercise of its regulatory functions with respect to, the Project, the ANGTS and related facilities. The State shall continue its study of forms in which it may participate financially in the pipeline, plant or both. The State may elect to pursue its present intention to develop a plan for financing the plant within the time frame of this Agreement.

13.8 Option to Change Status.

Should the State so elect, it may participate fully with respect to this Agreement pursuant to the terms of Sections 3.2 and 3.3, and, if it so elects, it shall have the full rights and responsibilities of any other Party, including the right for its representative to vote as a Member of the Board.

ARTICLE XIV
Transfer of Participation

14.1 Limitation on Transfer.

Except with the consent of the Board or as permitted by Section 14.2 or as contemplated by Section 3.2, a Party may not sell, assign, pledge, hypothecate or otherwise transfer in any manner all or any part of its right, title or interest in this Agreement; provided, that any assignment or transfer of any right or interest of a Partner of the Partnership in this Agreement which may result from the admission of a Partner to the Partnership or the withdrawal of a Partner from the Partnership or the transfer by any Partner in the Partnership to any other Partner in the Partnership of any of its rights, title of interest in the Partnership may be effected, and shall be effective, without obtaining the consent of or giving prior notice to any Party (other than the Partnership) or the Board.

14.2 Permitted Transfers.

Nothing herein shall prevent the transfer by any Party of all of its right, title and interest in the Design and Engineering of the Project and in this Agreement to an Affiliate of such Party.

ARTICLE XV
Relation to Partnership Activities

15.1 Partnership Activities to Continue.

The Parties hereto anticipate that the Partnership shall continue its operations with respect to ANGTS and pursuant to its certificate, and that Northwest shall continue to function as Operator for the Partnership.

15.2 Partnership Regulatory Filings.

It is anticipated that the Partnership shall make such filings with governmental authorities as it determines are

necessary and appropriate to the conduct of its activities, including but not limited to supplements in pending Department of Interior and FERC certificate proceedings (such as the Certification Cost Estimate required by FERC Order No. 31).

ARTICLE XVI
General

16.1 Effective Date.

This Agreement shall be effective upon its execution by all of the Sponsors for the Partnership and such of the Producers as follows: Atlantic Richfield Company, Exxon Corporation, and The Standard Oil Company (Ohio), or Affiliates of such companies. The Effective Date shall be the latest of the dates of execution by the required Parties.

16.2 Notices.

Any written notice or other communications shall be sufficiently given or shall be deemed given on the third (3rd) business day following the date on which the same is mailed by registered or by certified mail, postage pre-paid, addressed to each of the Parties and Sponsors at the address set forth in Appendix "C" or at such other address as may be designated from time to time by any Party or Sponsor by written notice to each other Party and Sponsor.

16.3 Applicable Law.

This Agreement shall be governed by and interpreted in accordance with the laws of Texas.

16.4 Counterparts.

This Agreement may be executed in counterparts each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

16.5 Headings.

The headings contained in this Agreement are for reference purposes only and shall not affect the meaning or interpretation of this Agreement.

16.6 Waiver.

No waiver by any Party of any default by any other Party or Parties in the performance of any provision, condition or requirement herein shall be deemed to be a waiver of, or in any manner release the other Party or Parties from performance of any other provision, condition or requirement herein; nor deemed to be a waiver of, or in any manner a release of the other Party or Parties from future performance of the same provision, condition or requirement. Any delay or omission of any Party to exercise any right hereunder shall not impair the exercise of any such right, or like right, accruing to it thereafter. No waiver of a right created by this Agreement by one or more Parties shall constitute a waiver of such right by other Parties except as may otherwise be required by law with respect to persons not Parties hereto. The failure of one or more Parties to perform its or their obligations hereunder shall not release the other Parties from the performance of such obligations.

16.7 Time for Execution.

This Agreement shall be submitted for review by the Department of Energy and the Department of Justice, and shall be signed after approval thereof by such Departments. Further, it is understood that the Department of Energy shall arrange for the review of this Agreement by the FERC.

IN WITNESS WHEREOF, the Parties have executed this Cooperative Agreement on the dates indicated below.

ALASKAN NORTHWEST NATURAL GAS
TRANSPORTATION COMPANY

By each of its Partners:

ATTEST:

NORTHWEST ALASKAN PIPELINE COMPANY

By _____
Date: _____

ATTEST:

NORTHERN ARCTIC GAS COMPANY

By _____
Date: _____

ATTEST:

PAN ALASKAN GAS COMPANY

By _____
Date: _____

ATTEST:

CALASKA ENERGY COMPANY

By _____
Date: _____

ATTEST:

PACIFIC INTERSTATE TRANSMISSION
COMPANY (ARCTIC)

_____ By _____

Date _____

ATTEST:

UNITED ALASKA FUELS CORPORATION

_____ By _____

Date: _____

ATTEST:

AMERICAN NATURAL ALASKAN COMPANY

_____ By _____

Date _____

PRODUCERS

ATTEST:

ATLANTIC RICHFIELD COMPANY

_____ By _____

Date _____

ATTEST:

EXXON CORPORATION

By _____

Date _____

ATTEST:

THE STANDARD OIL COMPANY (OHIO)

By _____

Date _____

ATTEST:

MOBIL OIL CORPORATION

By _____

Date _____

ATTEST:

PHILLIPS PETROLEUM COMPANY

By _____

Date _____

ATTEST:

CHEVRON U.S.A., INCORPORATED

By _____

Date _____

• ATTEST:

AMERADA HESS CORPORATION

_____ By _____

_____ Date _____

ATTEST:

GETTY OIL COMPANY

_____ By _____

_____ Date _____

ATTEST:

HUNT INTERESTS

_____ By _____

_____ Date _____

ATTEST:

MARATHON OIL COMPANY

_____ By _____

_____ Date _____

ATTEST:

LOUISIANA LAND & EXPLORATION COMPANY

_____ By _____

_____ Date _____

ATTEST:

PLACID OIL COMPANY

By _____

Date _____

AND

THE STATE OF ALASKA

Date _____

By _____

AND

NORTHWEST ALASKAN PIPELINE COMPANY
(as Operator under this Agreement)

ATTEST:

By _____

Date _____

APPENDICES
TO
COOPERATIVE AGREEMENT

**PLEASE NOTE: THE PRECEDING PAGES WERE TREATED
AS A UNIT IN THE ORIGINAL DOCUMENT.**



STATE OF ALASKA
OFFICE OF THE GOVERNOR
JUNEAU

Instate

JHC

ANG-TS

October 26, 1978

The Honorable John Carlson
Borough Mayor
Fairbanks North Star Borough
Box 267
Fairbanks, Alaska 99707

Dear John:

I am writing in reply to your letter of October 11, 1978, to me.

Since I discussed this matter last week in Fairbanks I believe it not necessary for me to go into considerable detail here. It should suffice to say that we are not postponing our efforts to include a sale of royalty gas if such sale is feasible. Commissioner LeResche's statement does indicate that a delay in the original timetable projected is likely and I must concur with that conclusion in light of the considerable delay taken by Congress in passing federal legislation relating to gas pricing. It is of course true that at the time the solicitation was announced gas prices were unknown as well, but the limitation on our ability to put together a sale is not so much ours as it was the reluctance of purchasers to engage in anything more than conceptualization until the pricing matter was resolved by Congress.

I have asked Commissioner LeResche to work closely with you and others from the Fairbanks North Star Borough in evaluating all potential gas sales projects, and hope that through such cooperative action we will be able to determine what projects are feasible and what projects are not.

Sincerely,

A handwritten signature of Jay S. Hammond in dark ink, featuring a large, stylized 'J' and 'H'.

Jay S. Hammond
Governor

MEMORANDUM

TO: John A. Carlson, Borough Mayor

FROM: Ben Harding, Community Information

THROUGH: Tom Dean, Staff Director

SUBJECT: Relocation of State Pipeline Coordinator's Office to Fairbanks

DATE: October 25, 1978

Amos Matthews, State Pipeline Coordinator, was in Fairbanks this (Wednesday) morning to talk to the Fairbanks media about the relocation of his office to Fairbanks.

Matthews had interviews with the News-Miner, KTVF/KFRB, KFAR, and supplied a previously taped interview to KIAK on this subject. (I have a taped copy of the interview.)

He said the reason for his being in Fairbanks was seek consolidated office space for Pipeline Office personnel already in town. The personnel are: Larry Dietrich (detailed from Environmental Conservation), Dick Scheider (detailed from Fish and Game) and Al George (detailed from the University to work on land management). Matthews is looking for an office that would hold these three, plus a secretary, and have space for Margaret Ferrant (socio-economic research) and himself when he visited Fairbanks.

Some of Matthews' other comments--

- 1) His office moving to Fairbanks is "totally dependent" on Northwest's activity. When Northwest's activity is predominantly in Fairbanks, he will move up.
- 2) At its peak during gas line construction, the State Pipeline Office will employ "around 80 people" but the majority of those will be field surveillance workers, most of whom will work out of Fairbanks.
- 3) There will be a sizeable Fluor engineering staff in Fairbanks for the gas line and the combined corporate/operating staff for Northwest in Fairbanks should be "in the hundreds."
- 4) The tentative timetable for the completion of the gas line has now slipped from the winter of 1983/84 by a year to 1984/85, but he needs to see a definitive schedule.
- 5) Northwest would probably not move to Fairbanks in any size until, at most, a year before construction start-up, and probably less than a year before start-up. (Note: Northwest is now estimating an early 1981 start-up. BPH)
- 6) The State Pipeline Coordinator probably won't move up to Fairbanks until that time.

Oct. 23, 1978

To: Mayor Carlson

From: Ben Harding, Community Information

Through: Tom Dean, Staff Director

Subject: Meeting with Gov. Hammond Oct. 20 on Royalty Gas Sale

A large turn-out of businessmen and political candidates turned up Friday morning to hear Governor Hammond talk to the Economic Development Committee on the postponement of the State's Royalty gas sale.

The Governor indicated that he had not been aware at the time that LeResche had in fact postponed the sale until he received your letter and the letter sent by North Pole Refinery. At that time, he said he talked to LeResche, who assured him that the delay in the royalty gas sale was the result of congressional delay in passing President Carter's Energy Bill and that the Department of Natural Resources had no intention of delaying the gas sale indefinitely.

Hammond came under considerable criticism for LeResche's actions and he, Hammond, was unable to answer most of the procedural and technical questions involved in royalty gas sale and use in Alaska. He urged that the group talk instead to LeResche directly about this. As a result, a meeting has been arranged with Le Resche for this Thursday, October 26, from 3:00 to 5:00 PM, presumably in the Polaris Building Arctic Room.

Some of the points Hammond made:

- 1) The State was determined to use the Royalty gas in-state, and he expressed anger that any other State officials would say otherwise. However, on further questioning, he said that the State would only agree to in-state gas use if in fact additional studies showed it to be economical.
- 2) The State would locate its Pipeline Coordinator's Office in Fairbanks in the near future. If Matthews objected, he would be out of a job. In the interim, Hammond would see if some of Matthews' staff could be established in Fairbanks.
- 3) The State would attempt to schedule more construction projects in Fairbanks before the start-up of the gas line project to take up employment slack, and to avoid over-burdening the Fairbanks economy during gas line construction.

Phil Younker and I were present from the Borough side. Bob Dempsey gave Hammond a run-down on the Borough's efforts to secure local petrochemical use.