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Update and Restatement
of Alpetco's October 15, 1977
Proposal for the Purchase of
Alaska State Royalty Crude Oil
and Construction of a
Petrochemical Facility in Alaska
February 7, 1978

ALASKA PETROCHEMICAL COMPANY
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February 7, 1978

State of Alaska
Department of Natural Resources
Royalty Oil and Gas Development Advisory Board
323 East Fourth Street
Anchorage, AK 99501

Attention: Dr. Robert E. LeResche, Chairman

Dear Chairman LeResche,

Attached is an Update and Restatement of Alaska Petrochemical Company's proposal to purchase Alaska's royalty crude oil. It updates our earlier proposal by summarizing changes that have been made as a result of discussions and negotiations with various interested parties in Alaska, including representatives of the Department of Natural Resources, consultants to the State of Alaska, and residents in areas where the facility will be located. The update also amplifies other key issues including marketing and Alpetco's business plan.

Following are the major revisions and amplifications to our proposal:

Relating to contractual and financial matters:

1. No risk to the State of Alaska.
2. No subsidy to Alpetco. Actually, Alpetco will pay a premium for the oil by establishing a charitable fund for the benefit of all Alaskans.
3. Definite and substantial benchmarks to measure progress within reasonable time. Among other key benchmarks is Alpetco's \$10 million commitment in the first 18 months.
4. Financing the project. Alpetco and its financial advisors have developed a comprehensive financial plan to provide for all phases of the project, including equity and workable sales contract forms.

Relating to project implementation, including marketing and joint venture considerations:

5. Additional marketing information, including participation by major U.S. chemical companies.
6. Strong expressions of interest by Japanese trading companies and government leaders despite recent Alaskan newspaper stories to the contrary.
7. Alternative configurations for the petrochemical plant. Several alternative product output cases are shown for illustrative purposes.
8. Experienced executive management. Alpetco will hire proven senior executives from positions in the chemical industry to fill key positions in Alpetco.
9. Employment of Chem Systems Inc. Alpetco is working closely with Chem Systems, a firm of petrochemical marketing and technical experts highly respected throughout the industry.
10. Summary of business plan implementation.

Relating to raw materials and alternative feedstocks:

11. Consideration of coal and natural gas liquids. Alpetco will incorporate these forms of energy into its plant operations, if possible.
12. Reconsideration of plant location. Alpetco is reconsidering Valdez and possibly other locations in addition to the Kenai Peninsula.
13. Chem Systems Inc.'s responses to Commissioner LeResche's request for an analysis of "Alaska Versus Middle East Petrochemical Projects".

It is our considered opinion that the royalty oil contract must be first awarded in order to obtain sales contracts, and that the State must award the royalty oil contract now if anything is ever to be done to add value to the royalty crude oil in Alaska, because of time passage and the State's credibility.

Alaska Petrochemical Company recognizes that its program is the most ambitious of the proposals submitted to the State. We believe that our business plan is sound and that selection of our proposal will result in the State of Alaska receiving

maximum benefits from its royalty oil, and without risk to the State.

We look forward to working together with the Royalty Board and with representatives of State and local government to build our proposed petrochemical facility in Alaska.

Sincerely yours,



O. Charles Honig
Chairman

OCH:dk

cc: Don Wold (20 copies)
Joe Moore

Exhibits:

- I. Additional letters from Alpetco's financial advisors
- II. Letters from Japanese industrial and government leaders
- III. Qualifications of Chem Systems Inc.
- IV. Chem Systems Inc.'s critique of Alpetco's proposal, dated January 13, 1978

1. No Risk to the State of Alaska.

Alpetco's contract draft (Section 2.2 "Initiation of First Delivery") provides that Alpetco shall not purchase any royalty crude oil until it has obtained financing commitments for \$1.5 billion toward the construction of the petrochemical facility. This contract language protects the State by ensuring that Alpetco does not purchase any royalty oil until the petrochemical project is "put together" with sales contracts and construction financing in place.

Alpetco's proposal is more ambitious than the three other proposals being considered since it offers all Alaskans significantly greater benefits with no risk. Even if the project were not to be completed, Alaska would still have its asset: the royalty oil.

Alpetco's October 15, 1977 submission provided for royalty oil sales to Alpetco shortly after contract approval; this provision has been dropped.

2. No Subsidy to Alpetco.

Alpetco is not asking for any subsidies from the State of Alaska. The Company proposes to pay the price per barrel for the royalty crude oil that the State would have received had it taken the oil "in value". Alpetco has agreed with the State's negotiators to pay additional costs that the State may incur as a result of selling the

oil to Alpetco that it would not have incurred had the State taken its oil "in kind".

In addition to not asking for any subsidy from the State, Alpetco has agreed to establish the Alaska Endowment Trust for the purpose of furthering social, educational and environmental conditions in the State of Alaska.

The Alaska Endowment Trust shall be established under the terms of a trust instrument approved by the Governor of Alaska and the Trust shall be administered by a Board of Trustees unaffiliated with Alpetco. Alpetco has agreed to contribute 5% of its net after-tax profits to the Trust beginning in the eleventh year after completion of the petrochemical facility.

3. Definite and Substantial Benchmarks to Measure Progress Within Reasonable Time.

To assure performance, Alpetco has agreed to establish rigorous benchmark actions in its contract with the State which provide that if actions are not completed by Alpetco within the appropriate specified time period, the State shall have the right to terminate the contract. The benchmarks require that Alpetco spend specific amounts by certain dates as follows:

- \$2.0 million within six months of contract approval;
- \$3.0 million within twelve months of contract approval;
- \$10.0 million within eighteen months of contract approval.

Within eighteen months, the Company must have taken the following actions:

1. Negotiate sale terms with prospective customers and draft contracts for the sale of products from the facility.
2. Enter contracts for the sale of at least 70% of the product output from the facility.
3. Obtain written commitments for at least \$1.5 billion toward construction of the facility.
4. Obtain commitments for interim financing for the construction of the facility.
5. Complete and file an Environmental Impact Assessment on the facility.
6. Complete and file all material state and federal permit applications.
7. Complete plant design and optimization necessary to obtain a definitive project cost estimate.

After the eighteen month benchmark, there are additional benchmarkes in the form of dollar expenditures or commitments to make expenditures. These benchmarkes are spaced every twelve months through seventy-two months and require the expenditure or commitment of funds as follows:

\$100 million within 24 months;
\$600 million within 36 months;
\$1,000 million within 48 months;
\$1,200 million within 60 months; and
\$1,500 million within 72 months.

4. Financing the Project

Alpetco has been advised by its financial advisors that they believe the proposed project can be financed.

The firms have provided letters to Alpetco stating the conditions under which the project can be financed using project financing techniques; furthermore, Alpetco's co-investment bankers have stated that they believe that equity to support the project can be obtained if necessary. Letters from Alpetco's financial advisors are included in Exhibit I.

Early in its involvement in the competition to purchase Alaska's royalty crude oil, Alpetco retained the services of Kuhn Loeb & Co. Incorporated (now Lehman Brothers, Kuhn Loeb Incorporated following a merger of Kuhn Loeb with Lehman Brothers in December, 1977) and E. F. Hutton & Company Inc. to advise the company in the structuring and procurement of long-term financing for the project. These firms are among the largest investment banking firms in the U.S. and each is thoroughly experienced in international investment banking and project financing of the type appropriate for this project. Chemical Bank (New York) is advising Alpetco with regard to commercial bank financing and will act as lead bank for Alpetco in arranging interim construction financing and other short term borrowing requirements. Chemical Bank is a major New York bank with experience in managing major bank credits similar to the credits contemplated in the Alpetco project.

Project Financing

Alpetco's financing plan is based on matching Alpetco's long-term crude oil purchase contract with long-term sales contracts for products made in the petrochemical facility. Essentially these two sets of contracts guarantee lenders that monies borrowed to finance the project will be repaid. This is called "project financing" and is a commonly used method of financing large scale natural resource projects.

Equity

While Alpetco's financial advisors believe that this project can be 100% project financed (with debt securities), the advisors have informed Alpetco that they believe that equity funds "in amounts sufficient to support the anticipated financial structure of the Complex" can be raised for the project, subject to usual conditions at the time of issue. (See letter from investment bankers dated December 12, 1977 in Exhibit I.)

Short Term Funds

Necessary short term and construction funds for the project will be provided by Chemical Bank and a group of major U.S. banks headed by Chemical. Officers of Chemical Bank have already discussed this project with a group of lenders for the project and each of these banks has

indicated to Chemical its interest in participating in the banking group being formed to loan funds to Alpetco.

Product Purchase Contracts

Alpetco has been advised that in order to satisfy lenders' requirements, sales contracts used as guarantees for project financings must be irrevocable and at a minimum provide for debt service (interest payment and principal repayment) even if for some reason the facility does not produce products for delivery to purchasers.

Alpetco's financial advisors have stated that (see letter dated January 27, 1978 in Exhibit I) these irrevocable long-term sales contracts would provide for two pricing elements including a fixed or minimum payment to be made regardless of the level of output delivered and sold to the buyer(s) as well as a variable payment which would be dependent on the amount and value of output delivered and sold to the buyer(s). It is contemplated that the sales contracts would be the element which secures the lenders and specifies that in any event and under all circumstances an amount will be paid by the buyer(s) which is sufficient to support the mandatory principal and interest payments on the indebtedness incurred by the project.

Project financing and irrevocable sales contracts which are designed to provide for debt service requirements are not uncommon and are considered very appropriate for this project.

5. Additional marketing information, including participation by major U.S. chemical companies.

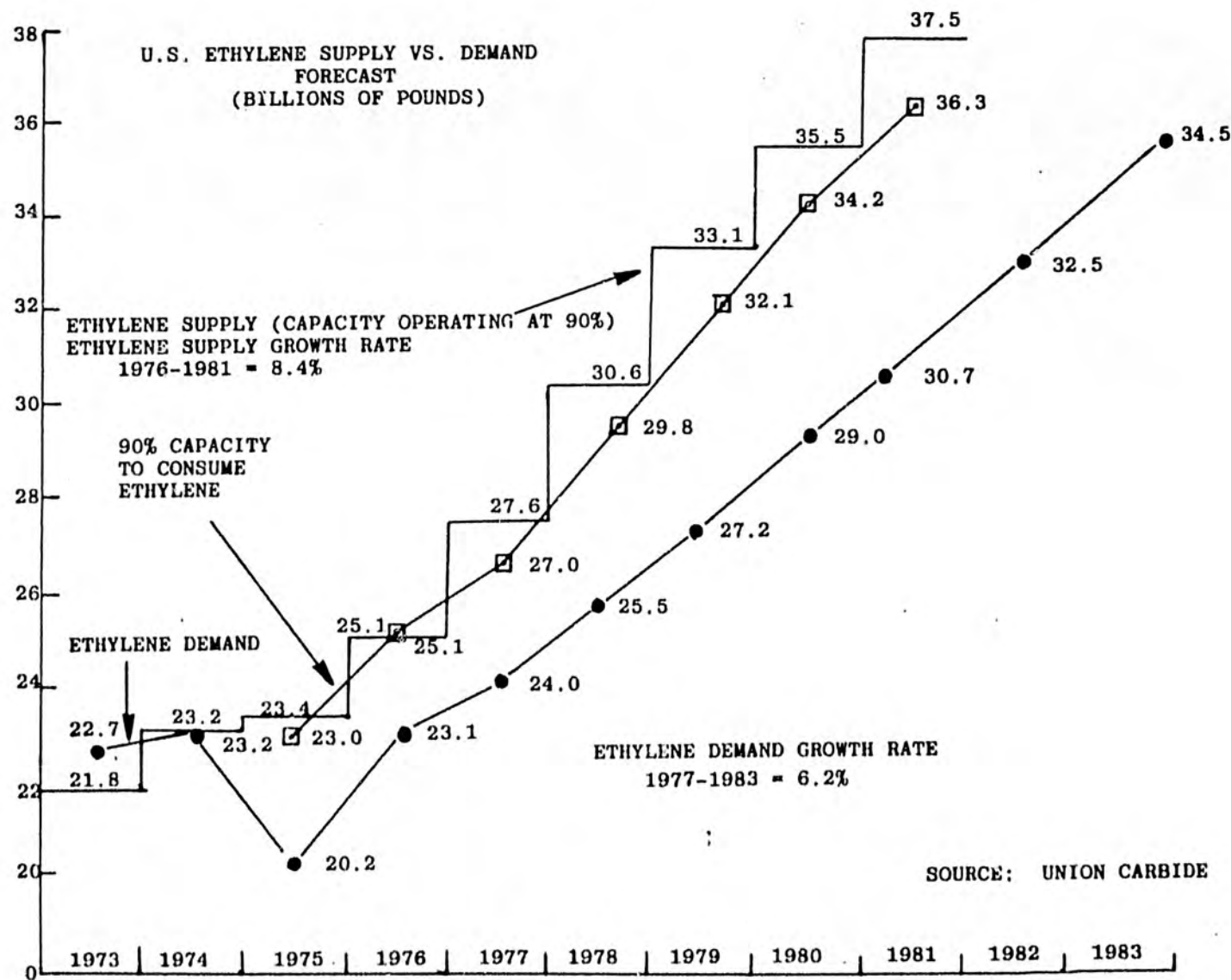
Studies of the U.S. West Coast market by Chem Systems and others have shown that by 1985, this market will require the equivalent of the output of three world-size olefins plants. However, as of this date no such facility is in operation or even in active planning to serve the growing West Coast market. The market for polyethylene, styrene, and cumene on the West Coast is particularly strong, due to a large number of plastics fabricators and wood processing plants in that region. Several U.S. companies have indicated to Alpetco that they have substantial interest in serving their customers from an Alaskan project, as compared to shipping petrochemicals (principally by rail) from the Gulf Coast or other areas in the U.S. The quantities of products being discussed with U.S. chemical companies are substantial and also include exports to South America, the Far East and some products for the Western Canadian market.

Supply and Demand for Petrochemicals

The long term outlook for the period of time relevant to this project is that there will be substantial demand from about 1985 on for products on the West Coast and in Pacific Rim markets which could be manufactured in Alaska.

World demand for petrochemicals is expected to continue to grow at a substantial rate over the next two decades. For example, Chem Systems' published forecasts show that U.S. ethylene demand in 1990 is expected to be about 52 billion pounds, versus projected 1985 effective capacity of 44 billion pounds. While there are several ethylene plants presently under construction or in various planning stages in the U.S., Alpetco and its advisors know of no projects yet approved in the U.S. which are scheduled for completion beyond 1985. Japan's 1990 ethylene demand should reach 18 billion pounds, requiring about 4 billion pounds of new capacity between 1985 and 1990. Japan's export and trading company requirements are in addition to that. Thus, a considerable amount of new ethylene (olefins) capacity will be required by both the U.S. and Japan. These projections (by Chem Systems) are based on relative conservative growth estimates, which are required for facilities planning. While there is currently ample capacity in both countries to serve markets through the end of the 1970's, petrochemical demand growth requires the addition of a great deal of new capacity in the 1980's. It is appropriate that Alaska, which has a proven supply of crude oil, should participate in the world petrochemical business.

The following chart, recently published by Union Carbide, shows installed ethylene capacity of 27.6 billion



pounds in 1977 rising to 37.5 billion pounds per year in 1981, a growth rate of about 8%.

Chem Systems projects ethylene demand to rise to 40 billion pounds in 1985 and 52.9 billion pounds in 1990. There is, therefore, a requirement for approximately 15 billion pounds of additional ethylene capacity in the U.S. between 1981 and 1990.

Ethylene demand on the West Coast is estimated by Chem Systems to reach 2.43 billion pounds (8.2% of total U.S. demand) in 1980. This demand is projected to reach 3.45 billion pounds in 1985 and 5.0 billion pounds in 1990, indicating a requirement of three world scale ethylene plants on the West Coast to supply this increased market by the mid 1980's.

Alpetco's Petrochemical Marketing Plan

Alpetco's marketing activities are directed in two major areas: (1) U.S. chemical companies who are either presently engaged in selling a substantial quantity of petrochemical products in the West Coast market or who desire to enter the West Coast market, and (2) Japanese chemical and trading companies who have long-term petrochemical requirements commencing in the mid 1980's. Discussions by Alpetco have indicated a very substantial level of interest by both U.S. and Japanese firms in the Alaskan project.

In its January 13 report on the Alpetco project, Chem Systems stated:

"We believe that the markets being solicited by Alpetco would, starting in the mid-1980's, be able to absorb sufficient amount of such petrochemicals as polyethylene, polypropylene, butadiene, styrene and cumene to achieve a classical petrochemical refinery configuration in Alaska, though recognizing that the specific product mix and the total amount of petrochemicals may not necessarily be the same as shown on the current flowscheme."

Alpetco does not expect to independently market its products to end users or to compete with those companies who do supply products to end users. Sales of products to ultimate users are normally made by large chemical companies who have established market shares and sales organizations. Alpetco intends to be a supplier to chemical companies which presently market products. Most major chemical companies not only make products in their own facilities or facilities in which they are joint owners or operators, but these companies also purchase products from other manufacturers such as Alpetco.

Possible Participation by Major Chemical Companies

Many major petrochemical complexes involve ownership of certain facilities in the complex by various parties. Joint venture or other partnership arrangements are common in the chemical industry and are definitely contemplated by Alpetco. Such joint ownership in parts of the complex such as aromatics, olefins or derivatives plants would

result in broader based support for development of the project in Alaska and would provide additional means of obtaining experienced executive management and staff personnel for the project. Several major U.S. and foreign companies presently active in the chemical industry in West Coast and Pacific Rim markets have indicated strong interest in participating in the project through joint ownership of certain facilities or through other participation in the project. They are prepared to enter into discussions with Alpetco following the award of the royalty oil contract. Alpetco is confident that participation by leading firms experienced in joint ownership, construction, start up and operations of large petrochemical facilities will greatly enhance the benefits of this facility for Alaskans.

6. Strong expressions of interest by Japanese trading companies and government leaders.

Alpetco's extensive discussions with government and petrochemical industry leaders in Japan are very encouraging, despite recent reports in Alaskan newspapers to the contrary. Alpetco, Chem Systems and Brown & Root, Inc., have developed strong interest on the part of the Japanese, as evidenced by nine letters listed in Exhibit II from very senior government and industry leaders in Japan who represent the hierarchy of Japanese leaders with whom Alpetco will work in the implementation of this project. The interest on the part of the Japanese encompasses a number of facets, including:

- a. Supplying future Japanese markets with petrochemical products based on a politically secure Alaskan feedstock source;
- b. Supplying the Japanese export market. This market will be increasingly difficult to supply from inside Japan due to problems of siting new facilities;
- c. Supplying world-wide materials requirements of large Japanese trading companies;
- d. The desire of the Japanese government to achieve a better overall balance of trade with the U.S.;
- e. Japanese interest in investing surplus U.S. dollars in a major U.S. project; and
- f. Japanese interest in investing in projects in Alaska which will lead to increased trading relations with Alaska.

Obviously not every Japanese chemical company will want to do business with Alpetco. Because of short-term over capacity in certain petrochemicals in Japan for domestic consumption, many companies do not have need of additional supplies at the present time; however, the broader outlook of the Japanese government and industry leaders suggests very strong interest in providing for the long-term requirements of the Japanese economy. Substantial requirements in Japan must be provided for beginning in the mid-1980's and it is this fact that most interests the Japanese leaders with whom Alpetco has met. Several Japanese groups are presently discussing projects with oil-rich but less politically stable governments than Alaska. For objective comment on these projects versus Alaska see Exhibit IV.

It is understandable how one who spends a brief amount of time studying the Japanese market situation or in hurried talks with Japanese whose interests are not well served by this project could gain an impression which does not reflect the potential and depth of interest which Alpetco has determined exists in Japan.

Alpetco believes that the opportunities for participation by Japanese companies in the Alpetco project are very good. Japanese interests have stated that they wish to commence negotiations with Alpetco as soon as Alpetco is selected by the State of Alaska. Understandably, the Japanese government will not become more definitive in negotiations without first receiving a "signal" from Washington. Also understandably, Washington will not send such a "signal" to Japan until the State of Alaska chooses Alpetco.

7. Alternate Configurations for Petrochemical Plant

In planning its proposal, Alpetco examined a wide range of fuel and petrochemical products which could be produced from 150,000 barrels per day of North Slope crude oil. Configurations for the complex thus ranged from a standard fuels products refinery to one producing maximum petrochemical products (after allowing for up to 30,000 barrels per day of fuels products for consumption in the local Alaskan market). Alpetco's analysis shows that an Alaska project using royalty crude oil as its

principal feedstock looks more economically attractive the more high value-added products are produced. Accordingly, Alpetco focused its efforts on production and market cases which would primarily produce high value-added petrochemical products. These products have market prices equivalent to a range of \$20 to \$70 per barrel compared to feedstock cost of approximately \$11.50 and market prices of \$14 to \$20 per barrel for fuels products.

The purpose behind the generation of a number of alternative facilities configurations product cases was to allow Alpetco to evaluate the economics of these cases and to enable Alpetco to discuss specific petrochemical product manufacturing schemes with potential joint venture partners and future customers or marketing partners. The terms of Alpetco's proposed contract with the State of Alaska require Alpetco to determine a final product configuration by the end of eighteen months after contract approval.

The table on the following page lists the products from five alternate cases among those configurations which Alpetco has considered.

The first column, labeled Proposal (HE-1), is that presented as an illustration in Alpetco's proposal of October 15, 1977. This case produces approximately 49% (by weight) petrochemicals from the crude oil processed. This configuration would require two world-scale sized olefins steam crackers, and multi-train world-scale size units for some of the derivative chemicals plants.

ALTERNATE PRODUCT MIXES

		<u>Proposal (HE-1)</u>	<u>LE-1</u>	<u>LE-2</u>	<u>HE-2</u>	<u>LE-3</u>
Crude	MBPCD	150	150	150	150	100
<u>Products</u>						
Fuels Proudcts (Gasol, Jet, Diesel, etc.)	MM gal/yr	460	1000	630	520	290
Ethylene Plant	Billion lbs/yr	2.4	1.2	1.4	2.4	1.2
<u>Chemical Products</u> (Wt.% Crude)		<u>49%</u>	<u>31%</u>	<u>40%</u>	<u>49%</u>	<u>46%</u>
Benzene	MM gal/yr	157	36	100	130	36
Toluene	MM gal/yr	229	85	100	85	60
Xylenes	MM gal/yr	252	204	250	250	190
Ethylene Glycol	MM gal/yr	138	-	-	70	-
Butadiene	MM lbs/yr	(320) *	200	230	350	200
Polyethylene	MM lbs/yr	1433	900	1050	1600	900
Polypropylene	MM lbs/yr	1193	400	400	600	400
Ethylbenzene	MM lbs/yr	-	-	-	900	-
Styrene	MM lbs/yr	-	800	1000	-	800
Cumene	MM lbs/yr	-	560	800	540	540
Acrylonitrile	MM lbs/yr	-	-	-	350	-
Sulfur	MM lbs/yr	110	120	120	120	80
Percent Petrochemicals of Crude Oil		49%	31%	40%	49%	45%

*Not specifically listed in original Proposal

The next column, labeled Case LE-1, is a relatively low conversion case. It uses only one olefins unit, with a capacity of 1.2 billion pounds per year, and produces about 31% (by weight) petrochemicals. However, this case shows more of the aromatics being converted to derivatives rather than being sold as commodity chemicals (i.e., benzene, toluene, xylenes). Styrene manufactured in this case is a product of particular interest to the U.S. West Coast and Japanese markets.

The third column, labeled Case LE-2, uses one olefins plant of slightly larger size than Case LE-1, with a capacity of 1.4 billion pounds per year of ethylene. This case increases petrochemicals production to about 40% (by weight) with larger outputs of all petrochemical products than Case LE-1, and all derivatives plants also with single train world-scale sized units.

The fourth column, labeled Case HE-2, is similar to Case HE-1 (Column 1) in having two world scale ethylene plants. It produces all the products of Cases 1 and 2, but substantially decreases ethylene glycol and polypropylene production, while adding another product, acrylonitrile. This product would be produced from a portion of the propylene plus ammonia, which we believe could be purchased from an existing producer in the Kenai area. Another characteristic of this case involves making ethylbenzene rather than styrene production. Total petrochemical products are, as in the Case HE-1, about 49% (by weight) of crude oil processed.

The last column, labeled LE-3, illustrates one case of what could be made if crude runs were reduced to 100,000 barrels per day in a complex having a 1.2 billion pound per year ethylene plant. In this case, fuel products have been reduced to maintain a high output of petrochemicals, 45% (by weight) of crude oil processed.

These five cases are only a few of an almost limitless number of product mixes which are all technically feasible, many of which may be economically viable. The markets to be served, including flexibility to meet reasonable variations in demand for each product, will finally determine the product mix for which the complex will be designed.

When there are two or more similar plants, or trains within a plant, it is normally most practical and most economical to schedule their completion in sequence. Construction timing is usually related to growth in the product market and to growth in skills of the plant operating personnel. This is contemplated by Alpetco for cases where more than one plant would be built for market reasons.

As a generalization, the higher the percentage of petrochemicals, the more economically viable is the project, until a certain optimum is reached. Higher selling prices per barrel enable the project to support the attendant higher Alaska facilities and operating costs and still earn a satisfactory rate of return on capital employed.

While it is premature to determine precisely what rate of return the project should earn until the final configuration is determined and engineered, Alpetco and its advisors expect this project to demonstrate a rate of return on capital employed of approximately 20 percent (before taxes) over the life of the project, assuming constant dollars, and a rate of return substantially higher assuming current (inflated) dollars.

Inflation is expected to play a positive role in the economics of the Alpetco project. While it is generally expected that actual costs to complete the project in future years will exceed current costs because of year to year inflation, once the project is complete, indebtedness incurred in constructing the facility will be repaid in future years using then current (inflated) dollars for debt repayment. In addition, it is expected that operating costs (including feedstock costs) will increase at a rate somewhat less rapidly than product selling prices; hence there will be a gradual favorable increase in profit margins over the life of the project. Alpetco has used a constant 1977 dollar analysis to develop proforma economics over the life of the project. When analyzed in current, or inflated, dollars over the same time period, the economics of the project are improved.

It should also be noted that 1977 petrochemical prices upon which Alpetco's constant dollar financial

projections are based are considered "depressed" in that they are yielding a lower than normal return to newer producers at this time. This is traditional for the petrochemical industry, which has always experienced supply-demand and pricing cycles. Thus, prices are expected to rise for economic reasons in addition to general inflation.

8. Experienced Executive Management

One of the first steps Alpetco will take after selection by the State is to hire a seasoned petrochemical chief executive to head up the day-to-day activities of the company, including marketing, project planning, and supervision of engineering and construction and, later, operations of the complex. Several candidates for this position have already been identified. Alpetco expects such a chief executive to be presently employed as the number one or two executive in a major U.S. chemical company. It would be unreasonable to expect that someone with the qualifications for this position would leave his present employment to assume responsibilities with Alpetco before Alpetco is selected by the State. Once Alpetco is selected, however, we believe that the project will be a very attractive opportunity for a senior chemical company executive. In addition, Alpetco will hire a nucleus administrative and operating staff from the petrochemical

industry to work alongside this chief executive. Alpetco will also continue to work closely with Chem Systems Inc. as its principal experts. Other experts in such areas as marketing, environmental planning, project management assistance and other functions will be retained as necessary for completion of specific tasks. Reliance on consultants will lessen as more permanent staff is added.

Consultants to be utilized by Alpetco will be selected among firms that have had extensive experience in refinery and petrochemical areas, including the planning and implementation of similar large scale facilities in the U.S. and abroad.

Brown & Root, Inc., Alpetco's project manager, has already assigned a Project Manager and other key personnel to this project and is standing by to fully staff the project as soon as the Alpetco contract is approved in Alaska.

9. Employment of Chem Systems Inc.

In December, 1977, Alpetco retained Chem Systems Inc., an international petrochemical consulting organization, to work in the development of this project. Chem Systems' participation in the Alpetco project presently includes analysis of international and domestic markets for petrochemical products and conceptual business and technical planning, including design of alternative facilities configurations.

Chem Systems' clients include almost all the world's leading oil and chemical companies, as well as several national governments. The firm is experienced in every phase of petrochemical project development and has been actively involved in the organization and implementation of world-scale projects in the United States, Middle East, South America, and the Far East.

Since retained by Alpetco, Chem Systems has had a large staff assigned to Alpetco's project. It's president has met with the State's technical consultants, Alpetco's financial advisors, and petrochemical company managers. Chem Systems prepared a written analysis of Alpetco's proposal, and discussed it in detail with the Commissioner of Natural Resources. See Exhibit IV.

Chem Systems' experience in dealing with world markets for petrochemical products and with Japanese petrochemical interests makes its role in the Alpetco project particularly important.

A summary of Chem Systems' qualifications is included as Exhibit III.

10. Summary of Business Plan Implementation

There are a number of steps which will be taken to implement the Alpetco project. Many of these steps must be taken sequentially and some may be taken concurrently

with other steps at certain stages.

Chem Systems and Alpetco's management have worked to ensure that Alpetco's contract with the State contains reasonable and attainable benchmarks and that the project is scheduled and portrayed to the public realistically. There is a great deal of hard work to be done to complete the task of developing a large scale project; however, Alpetco and its advisors are confident that the resources are in place to implement the project properly and efficiently.

As a means of summarizing Alpetco's business plan and its implementation, the key aspects of Alpetco's business plan are viewed as follows:

Starting Point: Notification that State of Alaska agrees with the contractual terms and notifies Alpetco that it will sign the contract so that Alpetco is "in business".

As a first step, Alpetco plans to hire a seasoned petrochemical executive to head up the day-to-day activities of the company, including marketing, project planning, and supervision of the construction and, later, operations of the complex. Several candidates for this position have already been identified. In addition, Alpetco plans to hire a nucleus operating staff to work alongside this executive.

In the early stages of the project, Alpetco plans to utilize outside consulting services to a substantial degree in such areas as marketing, environmental planning, project planning, project management assistance and other functions. Reliance on consultants will lessen as more permanent staff is added.

The consultants to be utilized by Alpetco will be selected among firms that have had extensive experience in the refinery and petrochemical area, including the planning and implementation of similar large-scale facilities.

Alpetco will now be in a position to approach companies regarding product offtake and including the possibility of joint venture participation. Many of these companies have already been contacted but understandably were not willing to enter into serious discussions and negotiations, since it was not clear that Alpetco would be the successful bidder for the royalty crude oil.

Alpetco plans to use a flexible approach in discussions and subsequent negotiations with U.S. and Japanese companies. This flexibility will include:

- o Types and amounts of products to be manufactured
- o Geographic areas selected for markets
- o Business format and ownership pattern for individual parts of the total complex

In item 7 of this update, Alpetco has presented a number of possible cases for petrochemical plant configurations, i.e., cases indicating a wide range of product types and amounts. There are, however, a number of guiding factors and constraints that will shape the final configuration of the complex to a considerable extent. A number of these are listed below:

1. The olefins plant will be at least the size of the currently largest well-operable single train plant of modern design, i.e., between 1.0 and 1.5 billion pounds per year of ethylene. If sufficient demand is found to exist, two ethylene plants will be planned, but these would be constructed in a phased manner as appears appropriate.
2. Since olefins plants using distillate feedstocks produce large quantities of propylene, butylenes, butadiene, and benzene, all of these materials will be marketed, either as direct product streams (example: butadiene), or as petrochemical derivatives.
3. Since North Slope crude oil is an excellent source of BTX (benzene, toluene, xylene) aromatics, a large aromatics facility will be planned and constructed, including a reformer, extraction unit, appropriate fractionation, etc.
4. Since polyolefin resins can readily be shipped and require large quantities of ethylene and propylene, they are obvious petrochemical derivatives to produce in Alaska. Liquid products that move readily in world trade at this time and that can be made directly without need for other raw materials will be favored as other petrochemical derivatives. Thus, ethylbenzene, styrene, cumene, and ethylene glycol are more obvious products than vinyl chloride or PVC, for example, since the latter requires production of chlorine and by-product caustic marketing. While some

consideration will be given to such alternatives, Alpetco prefers to keep the complex as simple as possible. Another possibility is to produce acrylonitrile using propylene from the project plus ammonia purchased from a producer at Kenai.

5. Finally, in developing a final product slate, Alpetco will obviously be governed, to a considerable extent, by the needs of the world market and, more particularly, the markets in the Pacific Basin in the 1980's, with particular reference to the U.S. West Coast and to Japan. In serving these markets, which effectively means serving the needs of downstream petrochemical plants and plastics fabricators, consideration must be given to making the types of products that can be delivered over ocean supply lines (as compared to products more appropriate to "across-the-fence" delivery). This latter consideration will also affect the types of derivatives more likely to fit an Alaskan location. Many petrochemicals are currently shipped across the Pacific and Atlantic Ocean and from Europe and North America to South America, and the Alpetco project's marketing plan is based on this world trade aspect of the petrochemicals business.

Facilities of the Alpetco complex can effectively be broken down into four parts as follows:

1. Basic plant infrastructure, docks, offsites.
2. Crude and fuels processing facilities.
3. Basic petrochemicals plants, primarily including the cracker for production of olefins and the reformer and associated facilities for the production of aromatics.
4. Petrochemicals derivatives plants, such as individual facilities for producing high and low density polyethylene, ethylbenzene, cumene, styrene, etc.

Under Alpetco's current planning, it would consider participation by other companies in the ownership and operation of plants in category 4, and, possibly, in category 3.

Most likely, this would be in the form of joint ventures, with the percentages of ownership left subject to negotiations. The incentive for Alpetco to bring companies into such joint venture arrangements would be to have them act as marketing partners for the individual products, if this works out to be mutually advantageous. Another advantage would be to add technical experience in the operation of these plants.

The incentive for the other companies participating would be to gain access to a long-term secure supply of petrochemical feedstocks and to participate in the profits of downstream plants in Alaska.

Implementation Program

Planning for the four parts of the Alpetco complex (see above) can proceed sequentially and, to some extent, separately. Thus, a substantial part of the plant infrastructure, offsites facilities, and the crude processing unit, i.e., items 1 and 2, can start being planned in a relatively definitive manner at an early stage and the selection of specific technology choices can be started. Item 3, the olefins and aromatics facilities, must await the result of marketing discussions and negotiations and final derivatives plant sections, but planning for olefins and aromatics facilities can be started in a preliminary manner almost immediately, the main uncertainty being the final size of these facilities. Planning for part 4, the

derivatives units, must await finalization of marketing and possible joint venture negotiations.

The following sequence of events is, therefore, envisaged:

Phase I - Discussions with a number of companies regarding product offtake and possible interest in joint ventures. This phase would also include separate market studies by Alpetco covering supply-demand in targeted domestic and foreign (e.g., Japanese) markets for a number of the most likely derivatives.

Based on these discussions and initial negotiations, a series of alternate design cases would be developed, investments estimated, and likely product selling prices derived. This information would then be available for more detailed discussions and negotiations in Phase II.

The design of part of the basic infrastructure would meanwhile be initiated in accordance with the overall required timetable.

Phase II - Intensification of marketing negotiations and negotiation of the joint venture agreements (where indicated as being beneficial to the project).

Drafting of contractual agreements covering product offtake and joint ventures will take place during this period, thus allowing appropriate progress to be made for obtaining the required financing. During this period, Alpetco's financial advisors would be brought into the marketing and joint venture negotiations, where appropriate.

The design of the olefins and aromatics plants would be commenced during this period in order to provide more definitive cost information for the purpose of arriving at likely product transfer prices to the derivatives plants.

Phase III - Finalization of derivatives product slate and plant sizes, selection of marketing partners and finalization of joint venture agreements and marketing contracts, selection of licensors for technology to be utilized in olefins and aromatics plants and in derivatives units.

The design of the derivatives plants would be commenced during this period.

Construction of a number of Part 1 and 2 facilities would be commenced during this period.

The above schedule is keyed into Alpetco's contractual commitments with the State of Alaska regarding marketing and project financing. It is believed that this schedule is realistic and can be appropriately implemented.

Alpetco plans to bring the complex onstream in stages over a sufficient period of elapsed time to ensure proper planning and supervision over the initial operations of each facility. Such an implementation schedule is typical of most new or major expansion petrochemical projects and is realistic considering the scope of this project in Alaska.

11. Consideration of Coal and Natural Gas Liquids

Coal

Petrochemical complexes are relatively high energy users, both in terms of steam and electricity requirements. In the case of most petrochemical complexes, power needs and steam requirements are provided by unaffiliated independent utility companies. The Alpetco proposal is currently based on self-sufficient operation in that fuels needs for steam and electrical power generation are fulfilled internally through use of fuel streams not converted to petrochemicals. However, consideration is being given to the following alternative possibilities which could both improve the economics of the project and provide a basis for other users of the utilities:

1. Cooperation with a new, independent local utility which would produce steam and power for Alpetco's needs in an energy sufficient manner (e.g., a cogeneration facility) and which would provide service when and if needed to other customers.
2. Use of local coal to produce steam and power for Alpetco's requirements. This could be done by the new utility mentioned above or by Alpetco if the concept of cooperation with a utility does not materialize. If, prior to final design of the petrochemical complex utility requirements, local coal can be shown to be available prior to startup of the facility, then coal could be used for a large portion of the steam and electric requirements.

Natural Gas Liquids

Alpetco's studies indicate that in the mid-1980's 50,000 barrels per day or more of liquid petroleum gases (LPG) can be commingled with North Slope crude oil and shipped in the trans Alaska pipeline to Valdez since by that time LPG injection into the field will probably be discontinued. By the early 1990's, if crude oil production has declined, as expected, up to 100,000 barrels per day of LPG could be sent down the crude pipeline, since the line would then have adequate capacity for this material. To the extent that such LPG's can be economically separated at Valdez, they would be excellent feedstocks for producing ethylene and propylene.

Alpetco has also analyzed production of ethylene and propylene from ethane and propane extracted from the proposed natural gas pipeline, beginning in the mid-1980's. While delivery of ethane and propane appears to be technically feasible, the proposition of liquids extraction in inland Alaska does not presently appear to be of great interest for the following reasons:

1. Ethane/propane mixtures produce primarily ethylene, with only minor amounts of propylene and no aromatics. Thus, the range of petrochemicals that could be produced from cracking ethane/propane mixtures is far more limited than the range of products possible under Alpetco's crude oil feedstock plan.

2. The economics of building an olefins and petrochemicals derivatives plant along the proposed gas pipeline are not as favorable as construction of such facilities at tidewater because of higher inland construction costs and logistical problems coupled with higher shipping costs for getting finished product to markets.
3. Depending on the North Slope wellhead gas price, it is likely that extracted ethane could be a more expensive feedstock for petrochemicals than North Slope crude oil. In this respect, it should be noted that the Battelle study (August 1977) arrived at relatively unfavorable economics for producing petrochemicals from North Slope gas liquids.

Although the proposed design of Alpetco's olefins unit is based on cracking several feedstocks produced from North Slope crude oil, consideration is being given to cracking North Slope gas liquids, should these feedstocks become available. In effect, Alpetco plans to design at least a part of the cracking furnaces to handle light hydrocarbons (e.g., ethane, propane, butane). This can be readily accomplished at only a very modest increase in capital cost.

There are many imponderables regarding the availability of North Slope gas liquids and the economics of converting these petrochemicals. Among the questions for which answers are not known at this time are:

1. The wellhead cost of gas at the North Slope and the consequent cost of gas liquids extracted from this gas.
2. The allowable price of North Slope gas in the lower 48 states (including allowable roll-in provisions) and the effect of this price on the economics of gas liquids extraction from pipeline gas in Alaska.

3. The design of the gas pipeline (e.g., pressure level, required dryness of the gas), and the amount of gas liquids that will be contained and, therefore, theoretically extractable.
4. The requirements for gas liquids to supply fuel needs at Prudhoe Bay and elsewhere, and for reinjection to maintain reservoir pressure.
5. To Alpetco's knowledge, the disposition of the non-royalty share natural gas liquids has not been determined. The State's one-eighth share of gas liquids which would be sent down the gas pipeline is expected to be insufficient to provide sole feedstock to a petrochemical facility.

12. Reconsideration of Plant Location.

Alpetco's draft contract includes a provision which requires Alpetco to notify the State of its final selection of site location within six months after the approval of the contract by the Legislature. This notification will be accompanied or preceded by various site studies and the final site must be approved by the Commissioner of Natural Resources.

Final determination of the location of Alpetco's petrochemical facility is not possible until a much more detailed analysis is conducted by Alpetco's engineers. In addition to considerations of the project's impact on the local community or region, other factors also must be studied including land availability, site soil and water conditions, proximity to the trans Alaska pipeline, feasibility of establishing port facilities nearby, various environmental considerations, infrastructure development and costs and climate considerations.

Alpetco is presently considering two general locations as its preferred site for the facility. These are the Valdez area and the central coastal area of the Kenai Peninsula near Wildwood Military Reservation. Until Alpetco is selected by the State of Alaska it is not practical to commence detailed and costly studies of specific locations nor to begin negotiations to acquire such property for the facility. Alpetco, its project manager and local Alaska consultants are prepared to commence these studies immediately upon being awarded the royalty oil contract.

13.

ALASKAN VERSUS MIDDLE EAST PETROCHEMICAL PROJECTS

In considering proposals for the use of the State of Alaska's royalty share of North Slope crude oil, the question has been raised as to how an Alaskan project can be competitive with a Middle East project in which the host country may "give away", or at least discount, its feedstock and which project, despite such discounts, may nevertheless be uneconomical. This memorandum tries to place into perspective several major factors, which most influence competitiveness between Alaska and Middle East locations.

I. Feedstock ValuesA. Natural Gas Liquids (NGL).

1. In North Africa (Algeria and Libya), there is an immense availability of natural gas. The projects being built are to liquify this gas (LNG) for sale to the U.S.A. and Western Europe. All other projects being discussed are based on the NGL feedstock having a value equivalent to the LNG netback price (in \$/MM BTU), which is substantially higher than the value of gas in locations where it would otherwise be flared. An ethane cracker and associated ethylene derivatives plants are being constructed in Skikda, Algeria.

2. In Kuwait, there is no surplus natural gas because oil fields there require that most of the associated gas produced be reinjected and there is already substantial gas use in the country. The natural gas liquids (NGL's) recovered compete with liquid products from crude oil for local energy use. These crude oil products in turn are valued at their netback prices in Kuwait based on market prices for bulk sales in Rotterdam.

3. In Iraq, the only project being built to use NGL's is an ethylene steam cracker and derivative plants at Basrah. The output of this facility is intended for domestic consumption. No price has been set, but this is not really relevant because these products are not intended for world markets. A study has been awarded to a Japanese group to determine a rational gas price. There is thought to be considerable gas available for future projects.

4. In Saudi Arabia, which is different, there are large quantities of gas that are not needed for reinjection in the oil producing fields, and Saudi Arabia cannot compete in LNG sales because of its much longer shipping distance to major markets. Even so, its gas processing and extraction costs place a value estimated at 40¢/million BTU on NGL, and transportation to an industrial site will add about another 10¢/million BTU. To our knowledge, no price basis for gas or NGL has been set either for feedstock or power generation. Rather, Saudi Arabia, through its agency, Saudia Arabian Basic Industries Corporation, will own the electric power generating plants and will share in the ownership to varying degrees in an olefins cracker and derivative plants. No details have been publicized, but it is believed that end-product plants will all have marketing contracts based on marketing prices (less discounts to the seller) with profits derived to be split through complex negotiated arrangements. Nevertheless, it is a reasonable inference to assume that NGL can be put into these projects by Saudi Arabia at a value substantially below that of crude oil.

The situation in the United Arab Emirates (e.g., Abu Dhabi and Qatar) is generally similar to Saudi Arabia.

B. Petroleum Liquid Feedstocks

Large petroleum refineries exist in Saudi Arabia, Kuwait, Iraq, etc., which currently market petroleum fractions. To our knowledge all

planning for petrochemical projects using liquid petroleum feedstocks are based on pricing calculated from netback prices in European markets, usually Rotterdam. A good example of this is the Kuwaiti aromatics project, which is in advanced planning.

II. Project Construction Costs

It is usual practice to compare investment costs to similar investments on the United States Gulf Coast (USGC). A petrochemical complex even if built from "grass roots" on the USGC will usually require less associated investment than a Middle East (or Alaskan) location because of the much higher developed Gulf Coast infrastructure (roadways, railways, pipelines, public utilities, housing, schools, etc.). In addition, remote locations usually have higher equipment transportation costs, and overall lower labor productivity (wage rates plus work efficiency). The total of all these cost differences is summed up as a "location factor" by which USGC cost is multiplied.

A. Saudi Arabia - Kuwait

If U.S.A. or European plants could just be duplicated in Saudi Arabia or Kuwait, it is estimated they would cost 1.3 to 1.5 times USGC. Experience has shown, however, that actual projects cost 1.7 to 1.8 times USGC in Saudi Arabia. Recent estimates for projects not yet built suggest that the more experienced contractors may be able, with good planning, to reduce this factor to 1.60 to 1.65 using extensive modular construction and worldwide equipment procurement. This factor becomes considerably higher, however, when complete towns and local infrastructures must be built.

B. Alaska

Discussion with U.S.A. contractors experienced in Alaska, shows a fairly wide range of expectation for new projects. Our best judgment is that in

the Kenai area project cost will be 1.35 to 1.5 times USGC. Maximum use of modular construction and lowest cost equipment procurement might reduce costs a little more. Costs in a more northern or inland location will be higher, estimates ranging from 1.5 to 2.0. This range exceeds the costs believed to have been incurred for the recently completed North Pole Refinery. However, the North Pole facility is of much smaller scale and is much less complex than a world scale grass roots petrochemical facility.

III. Transportation to Markets

The rational markets for Middle East projects are Western Europe, Africa, and Southeast Asia. For Alaska, the rational market is the Pacific Basin (including U.S. and Canadian West Coast, Japan, Philippines, and Southeast Asia). Transportation cost, expressed as \$ per pound, is a function principally of the volume in each shipment and the distance shipped plus costs in the harbors at both ends. Harbor costs in the Middle East have been high due to limited dock space. However, for future projects of comparable size, the most dominant cost factor should be the distance shipped.

Alaska is closer to all Pacific Basin markets than are Middle East locations, except that Southeast Asia is roughly equal.

It is also germane to note that transportation cost from Alaska to the U.S. West Coast should be lower than from the U.S. Gulf Coast, which requires shipment either by railroad or via the Panama Canal.

IV. Project Financing

1. Saudi Arabia and Kuwait are wealthy nations which have offered long-term loans at low interest rates to prospective joint venture partners in petrochemical projects. No details have been released, but it is widely assumed that interest rates will be approximately one-half

the work market level, and that over 80 percent of total project financing is available to qualified partners.

2. The other Middle East countries do not have excess capital available to support joint venture projects, or even all their own projects. Each project will depend upon the joint venture partners' own ability to raise investment funds.

V. Petrochemicals Projects Status

Every Middle East country has investigated petrochemicals projects. Chem Systems' best estimate of project status is that despite the announcements and studies made for major projects, only the following ethylene-based complexes are likely to be in operation by the mid to late 1980's.

1. Shell Oil at Jubail, Saudi Arabia with a world scale size olefins steam cracker based on ethane feedstock. Exxon is another likely partner in this venture, owning part of the olefins plant and a derivative chemical plant.
2. Mobil at Yenbu, Saudi Arabia has a much less developed olefins plant complex. It must not be ignored, but is not firm at this time.
3. CdF Chimie in Qatar will have a smaller than world scale olefins project (250,000 metric tons per year).
4. Iraq will have an olefins project primarily for domestic consumption.
5. The ethylene complex in Skikda, Algeria, is based on a small (120,000 metric tons per year plant) ethylene plant with products for local North African consumption.

6. The Japan-Iran petrochemical complex may be partly in operation in the late 1980's.

All other projects (e.g., in Libya, Nigeria, Egypt, etc.) appear to be dormant.

Conclusions

From the foregoing analysis, it can be concluded that:

1. An ethane cracker in Saudi Arabia has potential competitive advantages of discounted feedstock and fuel plus lower financing costs compared to Alaska. This is offset by higher project construction costs and equal or higher transportation costs to expected market areas.
2. No other Middle East petrochemical project is likely to have a significant advantage over Alaska.
3. With the forecast growth in demand for olefins products by the mid to late 1980's, the probability of two or three new world scale size plants in the Middle East will not saturate the world market. There is room for one or more world size plants in Alaska.
4. Thus, the answer to the specific question raised in the Introduction is that only Saudi Arabia and the United Arab Emirates can readily discount their feedstocks, that on this basis, and with the help of low interest loans, two or three projects are now proceeding, but that the impact of these projects on world markets will be very small, and should not hinder an Alaskan project.

EXHIBIT I

Additional letters from Alpetco's Financial Advisors:

1. Letter from co-investment bankers dated December 12, 1977 concerning equity funds for the project.
2. Letter from co-investment bankers dated January 26, 1978 concerning terms for contracts for sale of products from the project.

December 12, 1977

Kuhn Loeb & Co. Incorporated
40 Wall Street
New York, New York 10005

E. F. Hutton & Company Inc.
One Battery Park Plaza;
New York, New York 10004

Mr. John D. Barbour, Sr.
Mr. O. Charles Honig
Alaska Petrochemical Company
P.O. Box 6554
Houston, Texas 77005

Dear Sirs:

This is to confirm to you our opinion that upon your being awarded the contract for Alaska's North Slope royalty crude oil and subject to your signing definitive irrevocable long-term take-or-pay contracts with purchasers of the output of the Alpetco Complex that are satisfactory to you and to our two firms, and to economic and market conditions at the time, we believe we can raise equity funds for The Alpetco Complex in amounts sufficient to support the anticipated financial structure of The Complex.

W. Richard Burgin
Kuhn Loeb & Co. Incorporated

John D. Honig
E. F. Hutton & Company Inc.

Lehman Brothers Kuhn Loeb
Incorporated
40 Wall Street
New York, New York 10005

E. F. Hutton & Company Inc.
One Battery Park Plaza
New York, New York 10004

January 26, 1978

Mr. O. Charles Honig
Mr. John D. Barbour, Sr.
Alaska Petrochemical Company
P. O. Box 6554
Houston, Texas 77005

Dear Sirs:

We understand that Alaska Petrochemical Company (Alpetco) is continuing to negotiate with the State of Alaska for a long-term contract to purchase up to 150,000 barrels per day of the State's North Slope royalty crude oil for a period of twenty-five years. We also understand that Alpetco, if it is awarded the contract, intends to construct and operate a petrochemical refinery complex (the Complex) in Alaska and that the facility would utilize the royalty crude oil as a feedstock to produce refined fuel products for consumption in Alaska as well as a broad range of high value-added petrochemical products.

We are aware of the size and scope of the project under consideration and of Alpetco's desire to finance the Complex on a "project financing" basis including a plan of financing whereby the lenders rely on the economics of the project itself and indirect credit supports from purchasers of products to assure the timely payment of interest and principal.

As financial advisors, we have worked with you over the past months studying the feasibility of financing this project on a long-term basis. In a letter addressed to you dated December 5, 1977, we set forth the steps necessary for securing the financing which we, together with you, have agreed to undertake immediately upon being awarded the contract for the royalty crude oil and stated our view that in order to command the attention, interest and commitment from the various sources of financing for projects of this nature, it is mandatory that you be awarded the contract prior to the undertaking of these steps.

In this respect, you have requested our views of the general nature and terms of the irrevocable long-term contracts which would be required to secure the long-term financing for the Complex.

AGO 560407

Mr. O. Charles Honig
Mr. John D. Barbour, Sr.

January 26, 1978
Page 2

Irrevocable long-term contracts for the sale of the output are often used in project financings. The terms and conditions of the contracts in this instance would be negotiated at arms' length between Alpetco and buyer(s) of the production of the facility. The agreed-upon purchase price of the product to be sold to the buyer(s), as specified in the contract, would provide for two pricing components including a fixed or minimum payment to be made regardless of the level of output delivered and sold to the buyer(s) as well as a variable payment which is dependent on the amount and value of output delivered and sold to the buyer(s) and which would be based on a pricing formula related to prevailing world market price levels and feedstock costs.

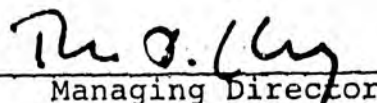
Under this arrangement the fixed payment would be the element which secures the lenders and specifies that in any event and under all circumstances an amount will be paid by the buyer(s) which is sufficient to support the mandatory principal and interest payments on the indebtedness incurred by the project.

It is our view that such a pricing mechanism within an irrevocable long-term contract is general practice in project financings, and we believe that Alpetco could utilize such a pricing formula in its sales contracts to secure the long-term lenders to the Complex.

Sincerely yours,

LEHMAN BROTHERS KUHN LOEB
INCORPORATED

By


Managing Director

E. F. HUTTON & COMPANY INC.

By


Executive Vice President

EXHIBIT II

List of letters from Japanese industrial and government leaders:

1. Senator Kazuo Tamaki, Member of the House of Councillors (Upper House); Member of Farliamentary Group for Energy.
2. Representative Tatsuo Tanaka, Member of House of Representatives (Lower House); Former Minister of MITI; Chairman of Oil Problems Study Council.
3. Dr. Souchi Matsune, Chairman of Committee on Energy of the Keidandren (Japanese Federation of Economic Organizations).
4. Hajime Yamamoto, Chairman of the Board of Directors, The Osaka Petrochemical Union.
5. Kenzo Obata, Chairman of the Board, Sekisui Group of Companies.
6. Kenzo Shibata, President, Sekisui Chemical Company, Ltd.
7. Toshio Iijima, Director and General Manager, Chemical Administration Division, Mitsui & Company, Ltd.
8. S. Mitomi, Director and General Manager, International Department, Marubeni Corporation.
9. Mitsuo Ueda, President, Nissho-Iwai Company, Ltd.

Exhibit III

Qualifications of Chem Systems, Inc.

Chem Systems Inc. provides services to the gas, oil refining and petrochemical industries. Its professional personnel are predominantly chemical engineers supported by economists, and all have many years of experience in these industries.

The company was founded in 1964 primarily as a consulting firm, but has greatly expanded its activities to provide most of the functions and services required for conceiving, planning and implementing new projects. This includes laboratory research and development, market research and other commercial development functions, feasibility and project planning studies, process engineering, computer applications and project management.

Fully integrated consulting offices are in New York, Houston, London and Paris. Offices are also maintained in Beirut, Munich and Sao Paulo, Brazil.

Chem Systems' clients include almost all the world's leading oil and chemical companies, as well as several national governments. The firm has been active in both the industrialized countries of the world, as well as in a number of developing areas, such as the Middle East, Africa and South America.

Confidentiality precludes identification of particular project clients; however, included below is the general scope of work performed by Chem Systems and a partial list of clients.

1. Basic Petrochemicals

The Hydrocarbon Planning Group has carried out extensive technical and economic evaluations dealing with the manufacture of basic petrochemicals from natural gas, light hydrocarbon and petroleum derived feedstocks. This work has ranged from initial planning studies and feasibility evaluations through detailed computer simulation of projects and plant

troubleshooting and debottlenecking.

Chem Systems is thoroughly familiar with the technical and economic aspects of the production of ethylene, propylene, aromatics, C_4 's and the related chemical and fuel products produced in steam cracking. The firm has carried out many chemical refinery studies concerned with optimizing the chemicals/fuels interface.

The group has also carried out many technical and planning studies covering hydrogen, ammonia, methanol and carbon black production from natural gas and liquid feedstocks.

2. Petrochemical Intermediates and Products

Chem Systems' experience in petrochemical intermediates has involved market and technology investigation, as well as feasibility study work of the major monomers, polymers, synthetic fibers, the hydrocarbon, aromatic and oxygenated solvents, and the important elastomers. Detailed marketing studies have been, and continue to be, carried out on a global basis for most chemical products important in world trade. The firm publishes a leading industry marketing research and analysis service for client companies.

3. Corporate Planning and Diversification

Over the last five years, Chem Systems has carried out numerous corporate planning studies for large and medium-sized companies in the petrochemical and energy field. Examples are given below:

- Five-year corporate plan for a plastics company
- Strategic study of the world aromatics business
- Long range planning study for the chemical subsidiary of a major oil company
- Feasibility study of an olefins joint venture in the Ohio River Valley
- Project studies for several companies with large natural gas or gas liquids resources, including:
 - Northern Natural Gas (Northern Petrochemical)
 - El Paso Products Company

- Marathon Oil
- Texaco
- Trintoc (Trinidad)
- Aramco

Client List

Chem Systems' clients include the major oil and chemical companies in the United States, Western Europe, Japan, Africa and the Mid-East.

A partial listing will illustrate the range of the firm's most recent clients:

AKZO	Marathon Oil Co.
Allied Chemical Corporation	Mitsubishi Petrochemical
American Cyanamid	Monsanto
Amoco Chemicals	Olin Corporation
Atlantic Richfield	PASA (Petroquímica Argentina S.A.)
Bayer A.G.	Petroquímica Colombiana S.A.
Chevron Chemical Corporation	PROGIL
Continental Oil	Rohm & Haas
Dow Chemical Co.	Sonatrach
Du Pont	OPEC
ELF	PCI (Kuwait)
Exxon Corporation	Shell Chemical Co.
Gulf Chemical Co.	Sohio
Hess Oil	Solvey e Cie
Nigeria	SNPA

Specific Project Experience

Chem Systems' relevant project experience in planning petrochemical complexes may be summarized as follows:

1. Feedstock and Chemical Raw Materials

- Interrelationships between raw materials (gas and crude oil) availability and price and petrochemical feedstocks (ethane, propane, butane, naptha and gas oil).
- Changes in competing markets for refinery and gas liquids products.

- Supply/demand projections for feedstocks and petrochemicals.
- Changes in by-product evaluations for petrochemical projects.
- Projected prices for petrochemicals related to crude and natural gas liquids prices.
- Changes in pricing mechanisms for refinery and petrochemical products.
- The impact of Government policies on the above evaluations.
- The impact of offshore or Canadian Petrochemical projects.
- The effect of energy prices and availability on the competitiveness between various petrochemicals, i.e., ethylene vs. propylene.
- Projected changes in refinery processing and the impact on petrochemicals.

2. Market Analysis and Trends for Chemical Intermediates and End Products

- Competitive technology.
- Analysis of marketing activities and production economics of competing companies.
- Future market growth for end-use products.
- The impact of new product developments.

3. Economic Considerations

- Profitability of energy projects vs. integrated petrochemical projects.
- Changes in end-use patterns of chemicals as reflected by the energy crisis and subsequent dislocations in the economy.
- The effects of multinationalism.

4. Detailed Process Economics

- Investments
- Operating Costs
- Inflation Effects
- Site location
- Definition of process and offshore units

- LP simulations
- Optimization

5. Technology

- Refineries -- specific process units
- Petrochemical plant -- yield. flow sheeting, heat balances, etc.
- Downstream processing
- Project management

6. A Global Market Study for Selected Petrochemicals, Plastics and Elastomers:

A study prepared for an Iranian joint venture. The study identified target markets on a world-wide basis for such products as HDPE, SBR and PBR Rubbers, ethylene glycol, styrene, o-xylene, and p-xylene among others to be produced in a proposed Iranian venture. The study included determination of pricing for the products on an F.O.B. Iranian basis. The time period was 1979-1988. The market evaluation was based upon a comprehensive investigation of petrochemical trends in both major producing, consuming and developing nations. Extensive field work was done in some 15 countries.

7. A Global Market Study for Aromatics: A study prepared for a Kuwaiti Joint Venture. The study identified world markets for benzene, p-xylene, o-xylene and phthalic anhydride to be produced in Kuwait as part of a naphtha reforming project. The study included price determinations, supply/demand balances, and identification of competing projects. Field work was carried out in Western Europe, Africa and the Far East.

8. The World Market for Selected Olefin Derivatives: A study prepared for Petrochemical Industries Company, Kuwait. The study is limited to products considered feasible for the world market: 1) liquid ethylene, 2) HDPE, 3) LDPE, 4) ethylene glycol, 5) styrene, 6) vinyl chloride and 7) acrylonitrile. Within the report each product is considered worldwide in terms of producer's capacity, the plant location, supply/demand balance in industrialized countries, trade and marketing (industry structure, product range and distribution). AGO 560414

9. Petrochemical Feedstocks and Derivatives Availability and Pricing: 1975-1985. A study for a major Japanese Petrochemical Producer. This was a feasibility study that evaluates new petrochemical manufacturing ventures in the Middle East and the potential exportation of products from the Mid-East to the United States, Canada and Western Europe. Examined in depth are current and projected prices and availability of feedstocks and derivatives in these countries.

10. Chemical Raw Materials for Nylon Manufacture: A study of the supply, demand and pricing in Eastern Canada. This study was specifically concerned with an appraisal of the supply, demand and probable pricing of petrochemicals utilized for manufacture of nylon 6/6 fiber polymer. Some of the petrochemicals evaluated were cyclohexane, butadiene, propylene, ammonia, acrylonitrile, natural gas and hydrogen. Since a large part of the appraisal was dependent upon cost of production economic analyses, considerable effort was devoted to forecasting the availability and pricing of basic hydrocarbon feedstocks in the U.S., Canada and Western Europe.

11. The South American Chemical Industry: Opportunities for Investment -- A Multiple Subscriber Study. The purpose of this study was to examine present and historical consumption patterns in the chemical industry, and develop future chemical and petrochemical demand patterns. The public and private sector interface was examined and potential investment opportunities through 1975-76 were indicated. The countries analyzed included Venezuela, Columbia, Brazil, Argentina, Chile and Peru. The general economic and political backgrounds of these areas are also considered within the study.

12. Planning of a Petrochemical Complex for Petroquímica Argentina. This report covered a feasibility study for a new 200,000 MTPA ethylene plant based upon naphtha feedstock. Included were economic

studies for setting the design basis, detailed financial analysis, contractor evaluations and market studies for petrochemicals and derivatives including styrene, SBR and PBR rubbers.

13. Other Planning and Feasibility Studies -- Latin America.

- Economic Studies for Petroquimica Uniao in Brazil
- Acrylonitrile Feasibility study in Venezuela for IVP
- Multi-purpose resin plant in Brazil
- VCM and PVC venture for Petroquimica Colombiana
- A Maleic Anhydride project for Sharmex-Mexico
- A specific world market study for ammonia, methanol and LNG based on natural gas discovered in Colombia.

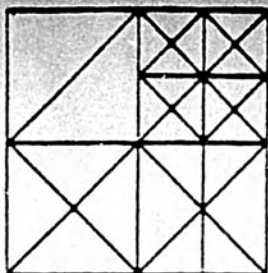
14. Strategic Considerations for Planning Business Relationships with Oil Rich Nations. This report evaluates opportunities for a specific company to establish an international base for its high volume chemical business. Included is an examination of the feasibility of investment in a hydrocarbons rich country, with the prime goal being the marketing of products in a hydrocarbon lean region.

15. The Canadian Petrochemical Industry -- Multiple Subscriber.

This study examines in detail the future of the Canadian petrochemical industry. Some of the factors considered were demand for petrochemical intermediates, potential foreign markets for Canadian products; availability and cost of indigenous natural gas, gas liquids, and crude oil derived feedstocks; availability and cost of manpower, capital, technology and other resources required for petrochemical production; and the attitude and policies of the petrochemical producers.

EXHIBIT IV

Chem Systems Inc.'s critique of Alpetco's proposal
dated January 13, 1978.



ALPETCO PETROCHEMICAL REFINERY PROJECT

CHEM SYSTEMS INC.
747 Third Avenue
New York, NY 10017

January 13, 1978

AGO 560418

ALPETCO PETROCHEMICAL REFINERY PROJECT

At the request of the principal shareholders of Alaska Petrochemical Company, we have reviewed (a) the documents describing their proposed project for a petrochemical refinery in Alaska, and (b) a number of comments on this project attributed to the firm of Bonner and Moore, as appeared in two articles in the January 4, 1978 issues of The Anchorage Times, and The Anchorage Daily News. This brief report represents our views regarding the proposed Alpetco project and comments published in the referenced newspaper articles.

Chem Systems Inc., has, over the last ten years or more, carried out a large number of refinery and petrochemical studies. Our firm has been engaged by many of the world's largest oil and chemical companies, as well as by agencies of several oil-rich countries contemplating world-scale petrochemical complexes. We have also carried out numerous market studies for fuels and petrochemicals projects, as well as feasibility studies and technical evaluations, and we have participated in the commercial realization of many major petrochemical plants. As a result of our specialized activities in the refining and petrochemical field, Chem Systems has gained a reputation of being expert technical, economic, and marketing consultants for such projects, including assistance to major oil companies, government agencies of OPEC nations planning petrochemical projects, proposed joint ventures in petrochemicals, etc. Chem Systems is also experienced in Japanese chemical supply-demand issues. The Alpetco project falls well within the range of our company's consulting expertise.

REVIEW OF ALPETCO PROJECT

The project's objective is to purchase 90 percent of Alaska's royalty crude oil up to a limit of 150,000 BPCD for a period of 25 years, and to process that crude oil in facilities, to be newly constructed in Alaska,

primarily into petrochemicals for export to Pacific Basin markets, including the lower 48 states. A relatively small proportion of product (about 30,000 BPCD) would be refined into conventional fuel products for use in Alaska. The proposal also expresses a preference for a plant location in the Kenai area. The proposal's economic basis requires "project financing"; that is, financing for both investment and working capital would be essentially 100 percent with little or no equity capital contributed by Alpetco. Another condition is that there is assumed to be no natural gas available for purchase, nor any electric power. Hence, the facility built must be self-sufficient for its energy requirements.

1. General Processing Scheme

The flowsheet in the proposal represents a petrochemical refinery that will produce fuels and petrochemical derivatives. The relative amount of chemicals versus fuels products is relatively high but is within the range of cases studied for other such projects. It is realistic from the standpoint of being able to build process units of proven technology to accommodate this product mix. The principals of Alpetco have stated to us that the specific product mix and plant configuration is only illustrative in that it represents one case, i.e., one possible such mix and configuration (see also below). The final configuration of processing units may vary considerably from that shown, while still producing petrochemicals. The process units used in the flowsheet in the illustrative case in the proposal are based on work carried out by the respected engineering-construction firm of Brown & Root and check closely with what Chem Systems would recommend for achieving the product mix shown in the proposal.

Our preliminary check of Brown & Root's work on the flowsheet material and energy balances, as available to Chem Systems, showed the following:

- (a) The information presented, including that obtained in our discussions with Brown & Root staff members, is typical of

that available at this stage of project development. However, it should in no way be considered an optimized or finalized proposal, and Alpetco recognizes this to be only an illustrative case among a number of possible cases.

- (b) The sequence of process units from crude unit through desulfurization, hydrocracking, catalytic reforming, steam cracking for olefins, and derivative plants to produce polyethylene and polypropylene can be constructed using proven technologies. They can also be expected to produce approximately the volume of end products shown by Brown & Root.
- (c) The Brown & Root heat and energy balance clearly has not been optimized, although when checked by CSI in the same preliminary fashion, our results do not differ substantially from those of Brown & Root. CSI is confident that a more rigorous optimization would use substantially less fuel for the two purposes of process heat input and generating electric power. This improvement will make the project more economical by producing more product for sale.

2. Project Cost Estimate

We have made an independent quick check of Brown & Root's estimate for the onsite and offsite portions of the project as depicted in the illustrative configuration and agree reasonably well with their numbers on a Gulf Coast basis. We have insufficient experience regarding construction costs in Alaska to check Brown & Root's estimate of 2.5 billion dollars on an Alaska basis, which assumes a substantial amount of Japanese equipment purchases and "modular" construction methods. On this basis, their estimate would result in a plant cost in Alaska bearing a closer relationship to Gulf Coast costs than is normally assumed by a number of major contractors.

It is almost impossible to develop a detailed estimate for this type of project at this stage. For upper limitations on financial planning and for careful analysis of production costs, Chem Systems believes that, as the project progresses, more definition and better capital estimates will be required, as would be normal during the course of any project development.

Separately from the above, and referring to Article IX of the draft agreement between ALPETCO and the STATE OF ALASKA's Department of Natural Resources, we confirm that regardless of the specific final configuration of Alpetco's petrochemical refinery, in terms of ultimate product quantities and amounts (i.e., product mix), an expenditure of more than 1.5 billion dollars will be required to construct a plant of this special type, including the required offsite facilities.

3. Product Marketing (Incl. Contractual & Financing Considerations)

Since the lighter fuels products from the Alpetco facility (i.e., gasoline, jet fuel, diesel fuel) are required by the State of Alaska, we will comment only on the petrochemical products.

The Alpetco facility is scheduled to be on stream in the mid-1980's. Alpetco's marketing plan involves sale of roughly half of the petrochemical output in Japan and the other half in the United States (largely the West Coast) and in other countries in the Pacific Basin (e.g., Indonesia, the Philippines, Hong Kong, Malaysia, West Coast of Latin America, etc.). Alpetco recognizes that, while they have conducted extensive discussions with companies and government agencies regarding the project, they can only finalize their marketing plans when they are in a position of being able to make definitive project plans as well as detailed engineering studies, estimates, and product cost projections. Our comments should be viewed in the context of this aspect of the marketing plans for a new petrochemical complex.

World demand for petrochemicals is expected to continue to grow at a fairly substantial rate over the next two decades. For example, U.S. ethylene demand in 1990 is expected to be about 52 billion pounds, versus projected 1985 effective capacity of 44 billion pounds. Japan's 1990 ethylene demand should reach 18 billion pounds, requiring about 4 billion pounds of new capacity between 1985 and 1990. Thus, a considerable amount of new ethylene capacity will be required by both countries.

We believe that the markets being solicited by Alpetco would, starting in the mid-1980's, be able to absorb sufficient amount of such petrochemicals as polyethylene, polypropylene, butadiene, styrene and cumene to achieve a classical petrochemical refinery configuration in Alaska, though recognizing that the specific product mix and the total amount of petrochemicals may not necessarily be the same as shown on the current flowscheme. Our opinion regarding the marketability of these products is based on (a) Currently unsatisfied West Coast markets, which continue to grow at a substantial rate with no major production of olefins and olefin derivatives practiced or currently planned in this area, (b) Discussions, reported to us, which have been held by Alpetco's principals with high officials of the Japanese government, which give Alpetco strong reason to believe that Japanese interests fully intend to take half or more of the petrochemical products from the proposed complex and to market these in Japan and elsewhere, and (c) The growing world market for petrochemicals, in general, including the less developed countries.

It is our opinion that as a result of market and project optimization studies, as well as discussions and contract negotiations subsequent to signature of an agreement regarding the royalty crude oil, Alpetco may find that it will be preferable to market smaller quantities of polyolefins and ethylene glycol and, instead to substitute certain other petrochemicals (e.g., cumene and styrene). This appears to be consistent with Alpetco's own planning.

In connection with the Japanese interest in the Alpetco project, it is relevant to note that Japanese companies, acting with their central government planning agencies, have made similar long-term commitments in the past, when in Japan's view these commitments provide economic, political, logistic, or security of supply benefits. Examples of long term financing include LNG supply from Alaska and Indonesia, Iron ore projects in Australia, Peru, and Brazil, and coal mining projects (e.g., a Canadian project involving a 15 year supply contract).

4. Crude Oil Supply

Alpetco's proposal is based on obtaining 150,000 BPCD of North Slope crude oil. CSI understands that the contract will call for the right to 90 percent of royalty oil available from the North Slope or future discoveries up to 150,000 BPCD. We understand that the State of Alaska has not asserted its ability to deliver any minimum volume either in any years or on average over the 25 year contract period.

There has been considerable controversy over the amount of oil the North Slope fields will produce, and whether or not all the associated gas produced will be needed for reinjection to "drive" the field. CSI has no expertise in assessing the long range production capability of the North Slope field or in predicting the potentially discoverable oil.

If it were known that less than 150,000 BPCD of royalty oil were available, and that of the order of 150,000 BPCD were necessary for an economic facility, it seems reasonable that the deficit could be obtained under long term contract from other producers of North Slope crude oil. The likely amount of royalty oil available, the price and terms of alternate crude oil supply, and any relationship this volume might bear to commitment by Alpetco to invest in facilities in Alaska, will, according to Alpetco, be examined in more depth, if Alpetco is selected and this project proceeds. Depending on the above, as well as the finalization of the marketing of the products, an evaluation of the project with a lesser quantity of crude oil feedstocks may become necessary.

A very positive aspect of this project, as far as Alpetco's position as a long term supplier of petrochemicals is concerned, is the assured availability of crude oil in sufficient quantities.

Chem Systems' forecasts show 6-7 percent per annum growth in petrochemicals products, and 2-3 percent in oil fuels products in the 1990's. Thus, petrochemicals will require an increasing percentage of domestic petroleum cuts. Demand for refinery feedstocks for the production of olefins is estimated to increase from 200,000 B/D in 1976 to 1,800,000 B/D by 1990, while refinery crude runs should increase from 13.4 to 20.1 MM BPCD. From an increase in crude runs of 6.7 MM BPCD over this period, 1.6 MM BPCD will have to be earmarked for olefins. This will make it difficult to meet both the demand for fuels and petrochemicals. Accordingly, a petrochemical project having an assured feedstock supply would be in an advantageous position, particularly vis-a-vis its long term customers. This, of course, also explains one reason for the Japanese interest in the Alpetco project.

5. Location Factors

The specific site at which a plant is located influences the cost of construction, cost of operation, and transportation costs of crude oil and products. Alpetco's proposal expresses a preference for a site on the Kenai peninsula, but leaves its final selection to be made during its project development program. The experience in Kenai with present plants, with proven requirements for "winterization", and with construction and operating personnel, should all lead to lower construction and operating costs, than for other potential Alaskan locations.

Chem Systems has also examined Alpetco's plans for bulk movement of crude and products in new, appropriately sized, foreign flag and U.S. flag vessels. These plans were developed by Seatrain, which has direct

current experience and expertise. Until the project's product mix and destinations are better developed, firm conclusions on relative transportation costs cannot be drawn. However, it seems likely that if the costs developed by Seatrain, which appear reasonable, can be obtained, transportation costs associated with a Kenai location should not detract from developing the project.

6. Economic Viability of Alpetco Project

Alpetco made available to Chem Systems its computer model on the project and the various runs made on the project. Our review of the model, i.e., the basis of calculations made, inherent assumptions, etc., indicates that the model accurately calculates and prepares representative statements.

As part of our review, we have recalculated the revenues, costs, year-by-year cash flows, and debt repayment schedules, based on the current product mix and plant configuration and using Chem Systems' own data base for world petrochemical prices, which are lower in some cases than Alpetco's prices. This review has confirmed that the Alpetco basis of project financing appears viable, provided that certain of Alpetco's assumptions can be validated during the next 18 months, when the company will negotiate contracts for product offtake. The most important point concerns product prices. It is impossible at this time to judge whether potential customers will agree to take products from Alpetco at world market prices (less any transportation cost differential) as has been assumed in all the economic projections for the Alpetco plant. While petrochemical prices are depressed at this time, many sources feel that the late 1980's will see the start of a petroleum shortage and that demand for chemicals will have caught up with capacity. As stated before, availability of petrochemicals from a facility having a secure feedstock supply may well be a very desirable "selling point" for a project in the late 1980's and 1990's.

We also believe, based on our experience with projects of this type, that some of the potential marketing partners may wish to enter into joint ventures on some of the derivatives projects. This may well facilitate negotiation of sound marketing contracts at mutually agreeable prices.

While we have not had any direct contact with the Japanese regarding this project, it is well known that Japan is attempting to protect its future by making deals or participating in offshore projects. Japan's petrochemical industry is suffering from severe environmental problems and, as a matter of stated policy, is planning to depend on offshore capacity for some of its future growth (viz. Japanese activities in the Middle East, Singapore, Alberta, etc.). Japanese trading companies market on a worldwide basis and would, in our judgment, be very interested in marketing products from Alaska.

According to information available from Alpetco, the company has strong reason to believe that it may obtain Japanese backing for this project in a number of ways, including product offtake, financing, etc. Assuming this to be the case, Alpetco would find it considerably easier to sign marketing and/or joint venture agreements covering other markets during the time period allowed under the draft contract with the State of Alaska.

The economic viability of the Alpetco project cannot be finally determined until offtake contracts have been negotiated, a final product mix is determined, plant design is optimized and a detailed estimate prepared covering the installed cost of the entire project, and financing basis secured. We can say, however, that the planning and engineering studies carried out by Alpetco are adequate for this stage of project development. The company should be able to approach potential market outlets and marketing partners with a sound project proposal, including the flexibility to alter the ultimate design of the petrochemical refinery facility.

It should be noted that all of Alpetco's financial projections have been stated in 1977 dollars without allowance for any inflation. Since this is a long term venture, the effects of inflation are expected to be significant. Our preliminary check using Chem Systems' own forecasts of inflation rates on construction costs, operating costs, and crude oil and product prices, improves the economic viability. In simplest terms, the total dollar margin between sales revenue and operating costs becomes larger in inflated dollars versus the costs of investment in facilities which are largely fixed in less inflated dollars.

COMMENTS ON ISSUES RAISED IN THE NEWSPAPER ARTICLES, ATTRIBUTED TO BONNER AND MOORE

1. "Low Chance Of Success For Project"

This type of general remark is not a specific criticism and therefore cannot be refuted with hard facts. We can say, however, that many petrochemical refinery projects have historically been proposed and only some have gone through. Quite recently, one such announced project on the Gulf Coast by Du Pont and Arco "fell through", while another by Monsanto and Conoco went ahead. The success for an Alaskan petrochemical refinery would be due to a combination of favorable factors, including assured raw materials supply, product pricing, and acceptance by product off-takers. We do not believe it is helpful to project odds for likelihood of success for any project of this type.

2. "Alpetco's Principals Had No Previous Petrochemical Experience"

While this statement is, in general, correct, we do not believe this to be a valid criticism of the project at this stage. Alpetco plans to secure on a permanent basis, a senior staff with a great deal of experience in projects of this kind. The process and construction contractors engaged to design and build the plant would be the same types

of companies that have successfully built similar plants. Moreover, we would anticipate, as stated earlier, that one or more major petrochemical companies could, if desired by Alpetco, become joint venture partners in some of the petrochemical plants, thus adding technical experience to the venture.

Over the last ten to fifteen years, a number of companies have built new grass roots petrochemical facilities without any previous such experience, in many cases with considerable success (Examples: Northern Petrochemical, a subsidiary of Northern Natural Gas Company, SAGA Petrochemical in Norway.)

3. Use of Natural Gas Liquids or Natural Gas

In both articles, there are references to the possible use of natural gas and/or natural gas liquids for an Alaskan petrochemical project. This also appears to be the basis for the comment regarding a potential location near Fairbanks, where the proposed ALCAN line would conceivably provide a source of natural gas and gas liquids, the latter presumably via extraction of ethane.

While gas liquids, such as propane, or propane-ethane mixtures are well suited for the production of ethylene, the most important first-stage petrochemical, it is far from obvious that such feedstocks will be available in Alaska at the right place, time and cost.

- If a natural gas pipeline is built, we believe that most of the gas liquids will undoubtedly be removed at Prudhoe Bay to make it possible to transport the gas in an unheated pipeline without condensation in the line. Thus, in order to market the liquids, it would probably be necessary to ship the gas liquids removed there in a separate line to southern Alaska or to build a petrochemical plant on the North Slope.

- The extraction of ethane in the Fairbanks area appears to have little merit. The State's one-eighth share of the gas would contain insufficient gas liquids for a world scale ethylene plant. Moreover, if reasonable assumptions are made regarding the value of extracted ethane at Fairbanks, this material (projected to have a value of about \$2.50 per million BTU in 1975 dollars) would have no economic advantage over cracking petroleum feedstocks in a coastal Southern Alaska location, considering also the serious transportation problem for products shipped from landlocked Fairbanks to the coast.

For these reasons, we believe there is insufficient basis to plan for production of olefins from the North Slope gas liquids. Should the situation change at a later point, the cracking furnaces proposed by Alpetco could be designed at modest extra cost to allow cracking gas liquids at a later date.

4. Likelihood For "Take-or-Pay" Contracts

Established practices in the petrochemical industry call for "requirements" contracts with periodic price redeterminations, based on market price or an agreed formula of some kind. "Long term" contracts are frequently limited to a period of five to eight years. The Alpetco project, however, is a relatively unique situation and in the proposed contract between ALPETCO and the STATE OF ALASKA, Alpetco must "enter contracts for the sale of at least seventy percent (70%) of the product output from the Petrochemical facility". Chem Systems believes that the proposal made by Alpetco is reasonable, i.e., that it will attempt to place 70 percent of the plant output within 18 months, which can be extended to 24 months. Whether Alpetco will succeed in this endeavor cannot reasonably be evaluated in terms of "long odds" or "likely

success". As mentioned in earlier sections of this report, we believe that the keys to this project will be found in (a) the willingness of Japanese interests to support the marketing and, directly or indirectly, the financing efforts for the project, and (b) the ability of Alpetco to move product to the U.S. West Coast market, which, by 1985, should be able to support the equivalent of two or three world scale olefins plants.

5. "Alpetco's Willingness To Operate On A Very Low Rate of Return On Small Equity"

While the illustrative financial model included in the Alpetco proposal of October 15th indicated a capital structure of essentially 100 percent debt financing, this is not normal practice in the U.S.A., except for certain "off balance sheet" projects, such as those using "lease back financing". Nevertheless, it is certainly possible to put a deal of this kind together. Alpetco's financial advisors, including two of the largest U.S. investment firms and a major multinational U.S. bank, have spelled out the conditions under which they believe Alpetco's financing could be handled. Alpetco has received a letter from its investment bankers stating that, subject to certain conditions, "we believe we can raise equity funds for the ALPETCO COMPLEX in amounts sufficient to support the anticipated financial structure of the COMPLEX". Chem Systems has met with representatives of these financial institutions and confirms their support of the financing mechanism of the Alpetco project.

It is our experience that some equity is usually required for projects of this kind. We believe that Alpetco and its financial advisers recognize this, and, as indicated above, have provided for this, if necessary. In view of the high amount of proposed debt financing, the return on a small percentage of equity would then undoubtedly be quite high, not "very low", again assuming that Alpetco can meet the marketing and sales price criteria assumed in the current projections.