

ALASKA LEGISLATURE SPECIAL COMMITTEE / SUBJECT FILES 8672

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RESOURCE: HYDROELECTRIC POWER

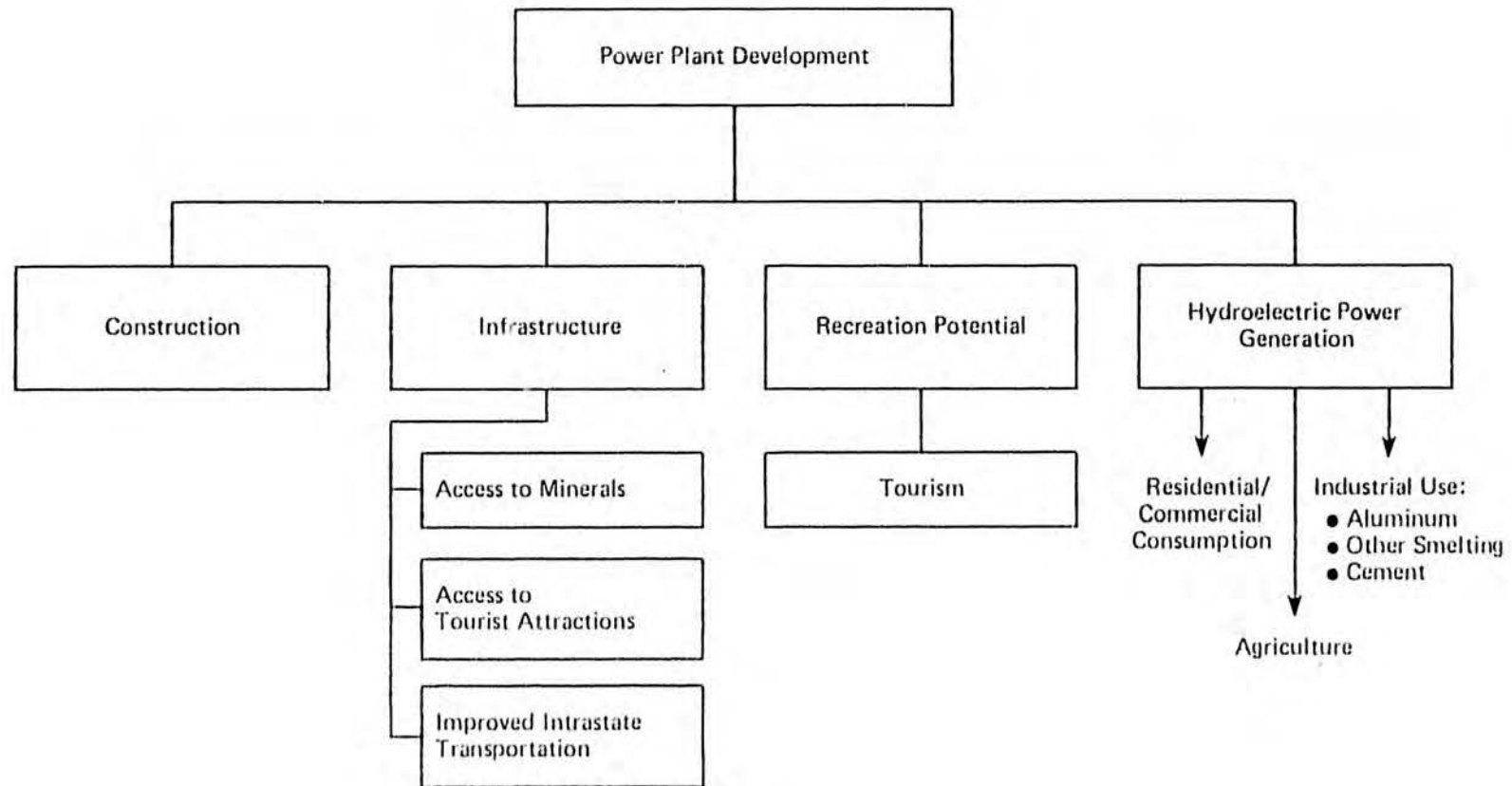


FIGURE III-15

DOWNSTREAM DEVELOPMENT POTENTIAL – HYDROELECTRIC POWER

Geothermal energy would have only limited possibilities in Alaska. Geothermal energy is heat energy from the interior of the earth. There are four major types of geothermal systems: hot water, vapor dominated, geopressurized reservoirs, and hot dry rock systems.

Geothermal generating plants require a greater amount of fluid than conventional power plants to generate the same amount of electricity. This is due to the fact that the lower steam and hot air temperature and pressures naturally associated with geothermal power plants reduce the thermodynamic efficiency of the plant.

There are currently 54 locations where the possibility of geothermal power could be developed. These locations have two indicators which show geothermal possibilities: existence of a hot spring, and existence of calderas.

A statewide overview shows basic volcanic indicators on a band from the Anchorage-Valdez areas through the Aleutian chain. Another major hot spring band lies across central Alaska between 64 degrees and 66 degrees north latitude.

It will be necessary to conduct extensive additional field surveys followed by drilling programs before these resources can be adequately evaluated. This must be followed by an economic study which would compare the alternate methods of energy generation at a particular location. In general, due to relatively high construction costs in isolated areas of Alaska, it would appear that development of geothermal resources in outlying areas will be limited compared with other possible means of energy generation for the next few years. The cost of long-range transmission would indicate that major emphasis should be initially concentrated in areas close enough to established electrical loads, resulting in a higher probability of developing economically competitive systems. This could provide a basis for developing geothermal expertise in Alaska with possible future expansion into more remote areas having access to other power sources.

IV. ALASKA'S MARKETS - THE UNITED STATES AND JAPAN

As discussed in Chapter II, the major markets for Alaskan products have been the rest of the United States and Japan. This is not likely to change over the next 10-15 years. Therefore, the trends in the economies of these two countries are extremely important in determining the prospects for economic development in Alaska. This chapter presents an overview of the outlook for the U.S. economy and a discussion of the current and future links between Alaska and Japan.

A. OUTLOOK FOR THE U.S. ECONOMY

Real growth of U.S. GNP averaged 3.4% per year from 1960-76. Growth was greatest in 1962-66 (reflecting new social programs and the military spending for the Vietnam War) and 1972-73 (reflecting the effects of fiscal and monetary policy actions taken to combat the recession of 1970). Cyclical downturns have occurred periodically, and the OPEC oil embargo of 1973-74 produced the worst worldwide recession since World War II. Real GNP declined in both 1974 and 1975. The economy grew by 6% in 1976, and the 1977 level was above 4%.

Over the 1977-90 period, real growth in GNP is expected to average 3.0%. This average growth incorporates years of relatively high growth (more than 4%) as well as years of recession, most probably in the early and late 1980s. In other words, the historical patterns of cyclical economic growth will not be substantially altered over the foreseeable future.

Underlying this projection of U.S. economic growth is the assumption that there will be no major disruptions in the economy -- wars, major strikes, proliferation of world cartels and embargoes, or government actions such as wage and price controls. The projection is based on several demographic and economic trends that will become more evident and significant over the course of the projection period.

The growth of the labor force will slow due to a more moderate expansion of the working age population (and a general decrease in the rate of population growth) and a leveling of the female participation rate. The share of total population and total labor force in the 25-45 year age group will increase, with a decrease in the teenage and young adult groups. As the age composition of the labor force shifts to workers with more skills, experience, and education, the trend toward lower productivity growth will be reversed. Furthermore, as the labor force grows more slowly and shifts away from younger and less experienced workers, the long-term unemployment rate will decline, although not to the 4-5% levels of the 1960s and early 1970s.

Over the long term, the rate of inflation is expected to continue in the range of 6-7%, and even with cyclical swings it is not likely to fall below 5% or exceed 10% for any significant period.

Between 1977 and 1990, business capital spending is projected to grow at a somewhat faster rate than GNP, although not at the high rates of the 1960s. This capital spending will be needed to replace physically and economically outmoded plants and equipment, particularly since much of the capital investment in recent years has been for pollution control equipment and energy use and safety improvements rather than increases in productive capacity. Such factors as uncertainty about government policies, high capital costs, slower population growth, and maturing of some technologies will slow the rate of plant and equipment expansion from that of earlier years. Factors which will stimulate business capital investment will include legislation encouraging investment in new capacity to create jobs (continuation of the investment tax credit, corporate tax rate reductions, etc.), the need to introduce labor and energy savings to increase productivity, increased foreign investment in U.S. business, and new production technologies.

Over the long term (through 1990), capital equipment spending will grow more rapidly in the manufacturing than the non-manufacturing sectors. Within manufacturing, growth will be greatest in nondurable goods, particularly chemicals, plastics, and textiles. To a large extent, capital equipment spending growth in these industries will result from the need to continue spending for pollution control and the need to substitute basic raw materials (i.e., coal and oil for natural gas) because of rising energy costs.

The U.S. merchandise trade deficit position, caused by faster economic expansion in the United States than in its major trading partners, and by greater dependence on foreign oil, is not expected to improve until the mid-1980s. The reasons for improvement in the long term include a slowing of U.S. economic growth from the fast pace of 1976-77, reducing the growth of import demand, relatively slower inflation in the United States than in its major trading partners, the likelihood of protectionist actions, and reduced dependence on foreign oil with increased production from the North Slope and OCS areas and greater energy conservation.

Over the long term, the United States will continue to have a strong export market for selected products where price, quality, and technical superiority are the main criteria. The share of total exports accounted for by agricultural and food products and industrial supplies such as chemicals and wood products will rise while the share of exports of fuels, minerals, and metals will decrease. Imports of oil will continue to increase, but, as indicated above, additional domestic production will slow the rate of import growth. Relative gains in shares of total imports are expected for lumber, textiles, and chemicals, with slower growth for automobiles, metals, and machinery.

Table IV-1 shows the historical and projected rates of growth for key industrial sectors of the U.S. economy. Projected growth rates are based on the trends described above. The greatest growth will be in plastics (polypropylene and polyethylene), computers, electronic components (integrated circuits), and basic chemicals (particularly industrial organics and cyclic intermediates). The slower growing industries are expected to be agricultural and food products, lumber and metals.

TABLE IV-1

PROJECTED GROWTH OF SELECTED
INDUSTRIAL SECTORS OF THE U.S. ECONOMY
(average annual real growth)

	Historical 1963-74	Projected 1977-90
Agriculture, Fertilizers, and Farm Equipment	2.2%	2.2%
Processed Foods and Equipment	2.0	2.2
Energy and Related Equipment Industries	3.9	3.4
Textiles	4.1	3.3
Lumber and Paper Mills and Equipment	3.4	2.7
Packaging	4.1	3.2
Printing and Publishing	4.3	3.4
Basic Chemicals	5.8	5.3
Specialty Chemicals	5.1	4.3
Plastics	10.5	7.1
Rubber	4.5	3.4
Metals and Mining	3.9	2.5
Building Materials	2.3	2.4
Fabricated Construction Products	2.5	3.0
Miscellaneous Machinery and Equipment	4.2	3.3
Computers and Office Equipment	11.2	5.8
Electronic Components	5.4	5.3
Instruments	5.8	4.4
Communications Equipment and Services	5.1	4.2
Watches, Photography, and Miscellaneous Products	5.4	3.5
Consumer Household Durables	5.9	4.6
Consumer Transportation Equipment	4.4	3.4
Other Transportation Equipment	1.2	2.4

Source: Arthur D. Little, Inc., Economic Advisory Service.

While these projections present the outlook for the United States as a whole, they cannot be applied directly to Alaska. That is, the economics of Alaskan operation may alter an industry's growth prospects in the state to a level higher or lower than the U.S. growth rate. Prospects for industrial development in Alaska are discussed in greater detail in Chapter V.

B. THE ALASKA-JAPAN ECONOMIC RELATIONSHIP: CURRENT STATUS AND FUTURE PROSPECTS

1. The Significance of Japan to Alaska

Over the past decade, economic links between Alaska and Japan have grown and intensified to the point that future economic conditions in Japan may play a key role in determining future growth trends in Alaska and the future shape of the Alaskan economy. Japan at present buys an overwhelming majority of Alaskan exports. Moreover, Japanese direct investments in Alaska have grown to more than \$300 million. But economic development in Alaska can also have an important influence on the future health of the Japanese economy, particularly in the area of Japanese natural resource import requirements.

There are several reasons for the existing links between Alaska and Japan. The most basic reason is geography: the shipping distance between Anchorage and Tokyo is only 3900 miles, compared with 5200 miles between Seattle and Tokyo, 4900 between Vancouver and Tokyo, and 5223 between San Francisco and Tokyo. In addition, the U.S. Merchant Marine Act of 1920, the so-called "Jones Act," stipulates that all interstate maritime trade in the United States be carried on U.S.-made ships. The higher construction and operating costs of U.S. ships relative to costs of foreign flag carriers significantly increase the attractiveness of exporting Alaska's natural resource materials to Japan (rather than to the lower 48 states) on foreign flag carriers. Furthermore, Japanese firms have consistently outbid U.S. buyers of Alaskan raw materials.

A fourth reason for the close Alaskan-Japanese economic ties lies in Japan's heavy import dependence on a variety of natural resource raw materials to maintain its economy, and the consequent Japanese national economic policy of maximum geographic diversification of sources of imported raw materials. Alaska has been particularly attractive to Japanese investors because of its large and varied resource potential existing in a politically stable environment.

Finally, during the last several years of domestic economic stagnation in Japan, Japanese industry has turned increasingly to export growth as a means of maintaining some degree of growth momentum in the domestic economy. While the Japanese have been largely successful with this policy, this very success has threatened the stability of Japan's international trading relationships through creation of a massive Japanese surplus in the balance of trade. In the short to medium term, Japanese attempts to reduce this surplus are likely to focus on increasing imports and investments rather than decreasing the overall scope of the export drive. Raw material commodities, such as lumber and fish, which Alaska exports to Japan are typical of the imports which Japan is likely to try to stimulate as a means of dealing with the balance of trade surplus problem.

2. Trade Links Between Alaska and Japan

a. Alaskan-Japanese Imports/Exports

The Japanese economy looms large to Alaska simply because Japan purchases such a large proportion of total Alaskan exports. As shown in Table IV-2, Japan in 1976 imported \$231.3 million worth of goods from Alaska or 78.1% of total Alaskan exports. Over the past several years, Japan has consistently taken 77-87% of total Alaskan exports to foreign destinations. The second largest national importer of Alaskan goods and services -- Mexico -- took only \$14.0 million or 4.8% of total Alaskan exports in 1976.

TABLE IV-2
EXPORTS FROM ALASKA BY COUNTRY OF DESTINATION,
ANCHORAGE CUSTOMS DISTRICT - 1976

<u>Country</u>	<u>Value</u> (millions of current dollars)	<u>Percentage Share</u> <u>of Total</u>
Japan	\$231.3	78.1%
Mexico	14.0	4.8
South Korea	10.0	3.4
India	7.7	2.6
Canada	7.4	2.5
Other	<u>25.5</u>	<u>8.6</u>
Total	\$295.9	100.0%

Source: U.S. Department of Commerce.

Perhaps more importantly, with the exception of petroleum since mid-1977, a larger proportion of Alaskan goods exported is channeled to the Japanese market than is sent to the lower 48.

Between 1970 and 1976, Japanese imports from Alaska in current dollar terms grew at an average annual rate of about 10.1%. This compares with a growth rate of 13.9% for overall U.S. exports to Japan during the same period. While comparison of current dollar trade flow figures is tenuous at best due to differing rates of inflation, the data indicate that growth in Alaskan exports to Japan over the past six years has probably kept pace with the growth of overall U.S. exports to Japan.

In 1976, the leading commodity sectors among Alaskan exports to Japan were natural gas, lumber, wood pulp, fish and shellfish, simply shaped or worked wood products, and logs. As indicated in Table IV-3, exports of these commodities to Japan accounted for the overwhelming majority of all Alaskan exports of these commodities. One hundred percent of natural gas exports, nearly 100% of lumber exports, 64% of wood pulp exports, 90% of exports of fish and shellfish, 100% of wood product exports, and almost 90% of all Alaskan log exports were shipped to Japan. There were only two other commodity exports from Alaska which accounted for a significant proportion of total Alaskan exports worldwide: these were urea (with 16.6% of total Alaskan exports) and ammonia (with 13.9% of total exports). Urea exports were channeled primarily to India, Mexico, and Brazil. The bulk of ammonia exports went to Mexico and Western European countries.

TABLE IV-3

EXPORTS FROM ALASKA TO JAPAN BY PRINCIPAL COMMODITY,
ANCHORAGE CUSTOMS DISTRICT - 1976

<u>Commodity</u>	<u>Value</u> (millions of current dollars)	<u>Percentage Share of Total</u>	<u>Exports to Japan as a Percentage of Total Alaskan Exports of the Commodity</u>
Natural Gas (341)	\$ 91.2	39.4%	100.0%
Lumber (243)	66.8	28.9	99.6
Wood Pulp, Chemical Dissolving Grade (251)	42.9	18.5	64.4
Fresh and Processed Fish and Shellfish (031, 032)	12.8	5.5	90.2
Hoopwood and Pulpwood Chips, Poles, etc. (631)	9.6	4.2	100.0
Logs (242)	5.2	2.2	89.7
Other	<u>2.8</u>	<u>1.3</u>	11.4
Total	\$231.3	100.0%	78.1%

Source: U.S. Department of Commerce.

Alaskan exports of fish and shellfish to Japan are significantly higher than the \$12.8 million indicated in Table IV-3, because a large proportion of fish caught by the state's fishing industry is sent to the Seattle area for processing before shipment to Japan through the Seattle Customs District. Exports of fish and shellfish through the Seattle Customs District in 1976 totaled \$60 million; there are no data available, however, on the proportion which originated in Alaska.

Alaskan imports from Japan increased sharply in the early 1970s with the advent of construction work on the oil pipeline, but growth in imports has slowed as work on the pipeline has drawn to a close. In 1976, Alaska imported \$68.8 million worth of goods and services from Japan; this was 38% of Alaska's total imports of \$182.2 million. As shown in Table IV-4, the bulk of imports from Japan were in the form of manufactured goods consumed in construction of the pipeline: hangers and prefabricated buildings, metal tanks, steel pipe and oil well casings, industrial machinery, and the like.

TABLE IV-4
IMPORTS TO ALASKA FROM JAPAN BY PRINCIPAL COMMODITY,
ANCHORAGE CUSTOMS DISTRICT - 1976

<u>Commodity</u>	<u>Value</u> (millions of current dollars)	<u>Percentage Share</u> <u>of Total</u>
Hangers, Buildings, etc.	\$23.3	33.9%
Metal Tanks over 75 Gallons	6.7	9.7
Steel Pipe and Oil Well Casings	9.2	13.4
Automobiles	5.3	7.7
Industrial Machinery and Parts	6.3	9.2
Columns, Pillars, Posts	6.5	9.4
Other	<u>11.5</u>	<u>16.7</u>
Total	\$68.8	100.0%

Source: U.S. Department of Commerce.

b. Alaskan Exports to Japan in the Context of Overall Japanese Imports and Overall U.S. Exports to Japan

In analyzing present and future trends in economic interdependency between Alaska and Japan, it is important to understand trading patterns between Japan and the world as a whole and Japan and the United States, since future trading prospects will be closely linked with trends in these overall trading patterns.

With imports of \$64.9 billion and exports of \$67.3 billion in 1976, Japan was the third most active trading nation in the industrialized world, ranking only after West Germany and the United States. The ratio of Japan's imports to gross national product is one of the lowest among the world's major economies, about 11.7% in 1976. However, Japan's qualitative dependence on imports is as high if not higher than any other major developed economy: more than 60% of Japanese imports in 1976 were critical raw materials and fuels without which Japan's heavy industrial complex could not function.

Japan's traditional dependence on foreign sources of raw materials and energy has led to a characteristic trading pattern in which raw materials and semi-processed manufactures are imported, value is added in domestic processing, and goods are then exported as finished products. While only 21% of Japanese imports in 1976 were of manufactured products, nearly 97% of Japanese exports consisted of manufactured products.

Table IV-5 provides a commodity breakdown of selected principal Japanese imports. Overall, foodstuffs, raw materials, and mineral fuels accounted for 78.5% of total imports. Foodstuffs, including fish and shellfish and cereals, accounted for 14.5% of the total. Raw materials, totaling 20.3% of the total, included metallic raw materials at 7.1% and wood and lumber with 5.4% of the total. Mineral fuels made up nearly 44% of the total, the bulk of that consisting of crude and partially refined oil (33%). Coal accounted for 5.5% of imports. Among imports of manufactures, chemicals accounted for 4.1%, machinery and equipment for 7.1%, and processed metals for 3%.

On a geographical basis, about 69% of Japan's 1976 imports originated in Southeast and South Asia, while about 18% originated in the United States. The United States, however, is Japan's single most important overseas national trading partner, as is Japan for the United States.

As shown in Table IV-6, the largest proportion of U.S. exports to Japan in 1976 consisted of food, industrial raw materials, and mineral fuels -- about 60% altogether. Manufactured goods made up the remaining 40%. Thus, the overall pattern of U.S. exports to Japan was quite similar to the pattern of Japanese imports from the world as a whole. By sector, foodstuffs made up about 22% of total U.S. exports, with cereals and grains the largest component at 15.5%. Raw materials accounted for nearly 26%, with the most important components being soybeans and other oilseeds at 7%, and wood and lumber at nearly 9%. Pulp exports made up nearly 2% of the total.

TABLE IV-5

OVERALL JAPANESE IMPORTS BY SELECTED PRINCIPAL COMMODITIES - 1976

Commodity	Value (millions of current dollars)	Percentage Share of Total
Foodstuffs	\$ 9,375.8	14.5%
Fish and Shellfish	1,762.0	
Cereals and Cereal Preparations	1,440.6	
Raw Materials	13,185.1	20.3
Metallic Raw Materials	4,578.7	7.1
Iron Ore	2,331.8	3.6
Non-ferrous Metal Ores	1,913.3	2.9
Wood and Lumber	3,531.9	5.4
Wood Pulp	394.0	0.6
Mineral Fuels	28,287.3	43.7
Coal	3,560.3	5.5
Crude and Partially Refined Oil	21,184.9	32.7
Petroleum Products	2,101.5	3.2
Liquefied Natural Gas	550.3	0.8
Chemicals	2,661.5	4.1
Organic Compounds	625.1	1.0
Plastic Materials and Artificial Resins	225.5	0.4
Wood Products	548.1	
Machinery and Equipment	4,608.2	7.1
Metals	1,945.1	3.0
Other	<u>11.7</u>	<u> </u>
Total	\$64,799.0	100.0%

Source: Japanese Ministry of International Trade and Industry,
White Paper on Japanese Trade, 1977.

TABLE IV-6

JAPANESE IMPORTS FROM THE UNITED STATES
BY SELECTED PRINCIPAL COMMODITIES - 1976

<u>Commodity</u>	<u>Value</u> (millions of current dollars)	<u>Percentage Share of Total</u>
Foodstuff	\$ 2,194.5	21.9%
Fish and Fish Preparations	93.9	0.9
Cereals and Cereal Preparations	1,558.6	15.5
Raw Materials	2,588.4	25.8
Oil Seeds, Oil Nuts, Oil Kernals, etc.	697.3	6.9
Wood and Lumber	894.5	8.9
Wood Pulp	166.2	1.7
Mineral Fuels	1,234.4	12.3
Coal	1,032.5	10.3
Natural Gas	91.2	0.9
Chemicals	851.8	8.5
Chemical Elements and Compounds	373.7	3.7
Synthetic Resins and Plastic Materials	98.2	1.0
Machinery and Transport Equipment	1,727.3	17.2
Metals	253.2	2.5
Wood Manufactures	190.1	1.9
Other	<u>987.8</u>	<u>9.9</u>
Total	\$10,027.5	100.0%

Source: U.S. Department of Commerce.

Coal was the largest component of mineral fuel exports, with 10.3% of a total 12.3%. Electrical and nonelectrical machinery and transport equipment made up the largest segment of manufactured goods exports, at 17.2%. Chemical products -- the other major manufactured goods sector -- accounted for 8.5% of total U.S. exports to Japan.

Table IV-7 compares principal Alaskan exports to Japan with total U.S. exports to Japan and with Japanese import requirements. Alaskan exports of three commodities -- natural gas, lumber, and wood pulp -- are of critical importance to Japan's economy. Other Alaskan exports to Japan are somewhat less critical, but still of substantial significance.

Alaska supplied \$91.2 million worth of liquefied natural gas to Japan in 1976; this represented 100% of U.S. LNG exports to Japan and 15% of total Japanese LNG imports. The remaining 85% of Japanese LNG imports came from one geographical area -- Brunei, on the island of Borneo. Imported LNG accounted for about 35% of total Japanese consumption of LNG in 1976.

The \$66.8 million worth of lumber supplied by Alaska to Japan represented 59% of total U.S. lumber exports to Japan and nearly 20% of total Japanese lumber imports. Japan's remaining lumber imports came from four sources: Malaysia, Indonesia, the USSR, and Canada. Imports of lumber into Japan make up about 50% of Japanese total lumber consumption.

In a similar fashion, Alaskan exports of woodpulp to Japan -- \$42.9 million -- accounted for almost 59% of U.S. pulp exports to Japan and nearly 10% of total Japanese consumption. This comparison includes sulfite pulp as well as wood pulp of a chemical dissolving grade. If the latter alone is compared, Alaskan exports form a much larger percentage of total U.S. exports and total Japanese imports. The remainder of Japanese pulp imports come from just two countries: New Zealand and Canada.

Because of transshipment through the Seattle Customs District, Alaskan exports of fish and shellfish to Japan are significantly more important than indicated in Table IV-7; even so, recorded shipments of \$12.8 million represented 13.6% of total U.S. fish exports to Japan and slightly less than 1% of total Japanese consumption.

3. Japanese Direct Investment in Alaska

Historically, foreign direct investment in Alaska has remained limited because of the climate, small population, and lack of accessible markets for goods and services. Japanese investors, however, have been attracted to Alaska since the early 1950s by Alaska's rich resource potential. The bulk of Japanese direct investment has been in the state's two leading manufacturing industries: forest products and fish processing. Outside of the large investments in petroleum exploration and development by British Petroleum, the bulk of foreign investment in Alaska has been Japanese.

TABLE IV-7

PRINCIPAL ALASKAN COMMODITY EXPORTS TO JAPAN RELATIVE TO
TOTAL U.S. EXPORTS TO JAPAN AND JAPANESE IMPORT REQUIREMENTS

	1976 <u>Export Value</u> (millions of current dollars)	<u>Percentage of</u> Total U.S. Exports of Commodity to Japan	<u>Percentage of</u> Total Japanese Imports of Commodity
Natural Gas (341)	\$91.2	100.0%	15.0%
Lumber (243)	66.8	59.3	19.6
Wood Pulp, Chemical Dissolving Grade (251)	42.9	58.8	9.5
Fish and Shellfish (031, 032)	12.8	13.6	0.7*
Hoopwood and Pulpwood Chips, Poles, etc. (631)	9.6	5.3	1.8
Logs (242)	5.2	0.7	2.0

*Understated due to exclusion of transshipments via Seattle; total 1976 U.S. exports of fish and shellfish equal 5.3% of Japanese imports.

Source: Arthur D. Little, Inc., U.S. Department of Commerce, and Japanese Ministry of International Trade and Industry.

There are no accurate up-to-date figures on total Japanese direct investment in Alaska. Neither the U.S. Government nor Alaskan state officials have maintained ongoing procedures for timely surveying of Japanese direct investments in the state, and the latest studies completed on the subject are admittedly incomplete and three to four years out of date.

However, current estimates by state officials and outside observers put the total current book value of Japanese direct investment in Alaska in the \$300 million range. A 1974 survey by the U.S. Government reported Japanese direct investment of \$192 million in property, plant, and equipment: \$180 million in mining and manufacturing; \$6 million in the commercial sector; \$2 million in lodging, residential, and recreational investments; \$1 million in timberland; and \$4 million in other types of direct investment. A survey by the Alaska State Department of Commerce and Economic Development in 1974 indicated \$176 million of reported investment, with the size of several Japanese companies' investments unknown.

A 1975 study on foreign direct investment in the United States by the U.S. Department of Commerce analyzed Japanese direct investments in Alaska by subsidiary company, location of facilities, Japanese parent, percentage ownership, and date of initial investment. A summary of these data is shown in Table IV-8. The study found that there were 32 foreign-owned manufacturing plants with 20 or more employees in the state, and that these plants represented 33.3% of all Alaskan plants with 20 or more employees. Thirty of the 32 plants were Japanese owned; 25 were involved in the processing of fish and shellfish, while five had operations involved in forest products. Data on these plants are summarized in Table IV-9.

Research of announced new foreign investment projects in the U.S. since 1974, as well as personal communication with the Director of the Alaska State Office in Tokyo, indicate that there have been no major new Japanese direct investment projects in Alaska since 1974.

While it would appear at first glance that Japanese direct investment must have a large impact on the state's economy, it should be remembered that much of the employment provided in the fisheries plants is of a seasonal nature, and that the manufacturing sector as a whole continues to be of limited significance in the economy compared with the government and services sectors.

Japanese direct investments in Alaska date back as far as the early 1950s when the Alaska Pulp Company of Tokyo made its initial investments in the forest products industry in Alaska. While several of the current Japanese direct investments in Alaska were made in the early 1970s simultaneous with the upsurge in Japanese direct investment elsewhere in the United States and on a worldwide basis, a number of investments date back to the mid-1960s or earlier.

TABLE IV-8

JAPANESE FOREIGN INVESTMENT IN ALASKA

<u>U.S. Company</u>	<u>Location of Facilities</u>	<u>Japanese Owner</u>	<u>Percentage Ownership (1975)</u>	<u>Date of Initial Investment</u>
Forest Products				
Alaska Lumber and Pulp Company	Sitka	Alaska Pulp Company of Tokyo, Ltd.	100%	1954
Alaska Pulp America, Inc.	Wrangell	Alaska Pulp Company	100	1954
South Central Timber Development Company	Icy Bay Jakolof Bay	Iwakura-Gumi Lumber Company, Ltd., Japan		1967
Kodiak Lumber Mills, Inc.	Afognak, Tyonek	Mitsui & Company, Japan		1973
Fish Processing				
Whitney-Fidalgo Seafoods, Inc.	Anchorage, Ketchikan, Kodiak, Naknek, Petersburg, Port Graham, Uyak, and others	Kyokuyo Hogeji Co., Japan	98	1973
Bering Sea Fisheries	Yukon River	Marubeni Corporation, Japan	25	1972
Juneau Cold Storage	Juneau	Marubeni Corporation, Japan	40	1973
Kodiak King Crab, Inc.	Kodiak, Port Williams	Marubeni Corporation, Japan	49	
North Pacific Processors	Kodiak, Cordova	Marubeni Corporation, Japan	50	
Togiak Fisheries, Inc.	Togiak, Quinhagak	Marubeni Corporation, Japan	49	
Wards Cove Packing, Inc.	Egegik	Marubeni Corporation, Japan	10	
B&B Fisheries, Inc.	Kodiak, Valdez	Taiyo Gyogyo, Japan	100	1967
Western Alaska Enterprises, Inc.	Statewide	Taiyo Gyogyo, Japan	100	1963

TABLE IV-8 (Continued)

<u>U.S. Company</u>	<u>Location of Facilities</u>	<u>Japanese Owner</u>	<u>Percentage Ownership (1975)</u>	<u>Date of Initial Investment</u>
Adak Aleutian Processors, Inc.	Adak	Nichiro Gyogyo, Japan	30	1973
Orea Pacific Packing	Cordova	Nichiro Gyogyo and Mitsubishi, Japan	50	1965
Morpac, Inc.	Cordova	Nippon Suisan and Mitsui, Japan	38	1973
Universal Seafoods, Inc.	Floating plant	Nippon Suisan, Japan		1974
Harbor Seafoods	Wrangell	Alaska Pulp Company of Tokyo, Ltd.	100	
New Northern Processors, Inc.	Kodiak, Dutch Harbor	Hokuyo Suisan and C. Itoh, Japan	49	1974
R. Lee Seafoods, Inc.	Soldotna	Kanai Fisheries, Japan	25	1974
Petrochemicals				
Urea Plant of Collier Carbon & Chemical Company	Kenai	Mitsubishi Gas Chemical Company, Japan	50	1966
Natural Gas				
Marathon Oil and Phillips Petroleum	Port Nikiski	U.S. ownership, natural gas sold under long-term contract to Tokyo Electric Power and Tokyo Gas Companies		1967
Transportation				
International In-flight Catering Company	Anchorage	Japan Air Lines	100	
Japan Air Lines	Anchorage	Japan Air Lines	100	

Source: Arthur D. Little, Inc., based on data from State of Alaska, Department of Commerce and Economic Development, and The Conference Board.

TABLE IV-9

JAPANESE-OWNED MANUFACTURING PLANTS IN ALASKA - 1975

<u>City/U.S. Company</u>	<u>Industry/Product</u>	<u>Employment</u>
Adak		
Adak Aleutian Processors, Inc.	Fish Processing	N.A.
Anchorage		
Whitney-Fidalgo Seafoods, Inc.	Salmon cannery and cold storage plant for freezing fish	Seasonal*
Cordova		
Morpac, Inc.	Fish processing	N.A.
North Pacific Processors	Fish processing	N.A.
Orca Pacific Packing	Fish processing	N.A.
Dutch Harbor		
New Northern Processors	Fish processing	N.A.
Egegik		
Wards Cove Packing, Inc.	Fish processing	N.A.
Jakolof Bay		
South Central Timber Development Company	Sawmill	40
Juneau		
Juneau Cold Storage Company	Fish processing	N.A.
Kenai		
Urea Plant of Collier Carbon and Chemical Co.	Prilled urea	N.A.
Ketchikan		
Nefco-Fidalgo Packing Company	Salmon cannery	Seasonal*
Kodiak		
B&B Fisheries, Inc.	Fish processing	N.A.
Kodiak King Crab, Inc.	Fish processing	N.A.
New Northern Processors, Inc.	Fish processing	N.A.
North Pacific Processors	Fish processing	N.A.
Whitney-Fidalgo Seafoods, Inc.	Fish processing	Seasonal*

TABLE IV-9 (Continued)

<u>City/U.S. Company</u>	<u>Industry/Product</u>	<u>Employment</u>
Nanek		
Whitney-Fidalgo Seafoods, Inc.	Fish processing	Seasonal*
Petersburg		
Whitney-Fidalgo Seafoods, Inc.	Salmon cannery and cold storage plant for freezing fish	Seasonal*
Port Graham		
Whitney-Fidalgo Seafoods, Inc.	Salmon cannery	Seasonal*
Port Williams		
Kodiak King Crab, Inc.	Fish processing	N.A.
Quinhagak		
Togiak Fisheries, Inc.	Fish processing	N.A.
Sitka		
Alaska Lumber & Pulp Company	Pulp mill	550
Soldotna		
R. Lee Seafoods, Inc.	Fish processing	N.A.
Togiak		
Togiak Fisheries, Inc.	Fish processing	N.A.
Tyonek		
Kodiak Lumber Mills, Inc.	Chip mill	None
Uyak		
Whitney-Fidalgo Seafoods, Inc.	Salmon cannery	Seasonal*
Valdez		
B&B Fisheries, Inc.	Fish processing	N.A.
Wrangell		
Harbor Seafoods	Fish processing	Seasonal**
Alaska Pulp America, Inc. (Wrangell Lumber Company, Alaska Wood Products Co.)	Sawmill	220

TABLE IV-9 (Continued)

<u>City/U.S. Company</u>	<u>Industry/Product</u>	<u>Employment</u>
Yukon River Bering Sea Fisheries	Fish Processing	N.A.

*Whitney-Fidalgo employs a total of 700-800 machinists and cannery workers at its plants in season, and a small number of workers year-round.
 **Perhaps 20-30 during season.

N.A. = Not available.

Source: Arthur D. Little, Inc., based on data developed by The Conference Board.

a. Fish Processing Industry

Japanese direct investments in the fish processing industry in Alaska have been substantial and have provided Japanese corporations with a significant influence on activities in the industry. The 1974 Alaska Department of Commerce and Economic Development study concluded that Japanese corporations controlled at least 20% of seafood production in the state. Other observers in the industry, however, have suggested that the actual degree of control is significantly higher. A 1975 study by the National Marine Fisheries Service within the U.S. Department of Commerce indicated that 22 of 23 Alaskan fisheries firms with foreign capital invested in them were Japanese-owned.

The most frequent pattern of ownership among foreign firms in the fish processing industry has been the establishment of joint ventures with American firms, although a few companies are wholly or almost wholly owned by Japanese parent companies. However, a number of U.S.-owned companies have operating arrangements with Japanese firms in which the Japanese provide short-term financing in return for options on future production. Also, Japanese firms frequently provide U.S.-owned processors with Japanese technicians to supervise the processing of roe in Alaskan plants. Roe is a former waste product which has been marketed successfully in Japan since the early 1960s.

The largest Japanese-owned fish processing operation is Whitney-Fidalgo Seafoods, Inc., with at least seven canneries, two freezing plants, and a floating shrimp production facility in Alaska. Whitney-Fidalgo is also the largest fish processing company in Alaska, with annual sales totaling more than 15% of total Alaskan seafood production in recent years (as well as about 15% of all salmon canned in Alaska). The company is 98% owned by Kyokuyo Hogeii, a large Japanese fishing company.

Marubeni Corporation, one of the 10 largest Japanese trading firms, owns at least seven joint ventures in Alaska, and purchases products from other processors in the state. Taiyo Gyogyo, the world's largest fishing company, has a wholly owned roe-processing subsidiary, Western Alaska Enterprises, Inc., which in turn owns B&B Fisheries, Inc.

A number of Japanese firms without investments in the state are active in purchasing and marketing fish products from Alaska. In addition, fishing companies with active investments in the Alaskan industry also operate fishing vessels in U.S. territorial waters off the Alaskan coastline.

b. Forest Products Industry

Japanese firms have been dominant in Alaska's forest products industry, both as actual investors in forest resources and processing facilities and as purchasers of Alaskan exports of forest products. Three Japanese parent companies hold six major direct investments in the forest products industry in Alaska. Alaska Pulp Company of Tokyo, Ltd., owns 100% of Alaska Lumber and Pulp Company, a joint venture of major Japanese chemical fiber, pulp and paper, lumber, and trading companies. Alaska Pulp Company has invested more than \$100 million in Alaska Lumber and Pulp and its pulp mill and surrounding

facilities in Sitka. Alaska Pulp has an additional \$23 million invested in Wrangell Lumber Company which operates two sawmills in Wrangell, one directly and one through a subsidiary, Alaska Wood Products Company.

Iwakura-Gumi Lumber Company, Ltd., Japan's largest lumber company, owns a majority share of South Central Timber Development Company, with an estimated \$3.7 million investment in facilities at Icy Bay and Jakolof Bay as of 1974. South Central has been Alaska's third largest timber producer in recent years. Mitsui and Company, another of the largest Japanese trading firms, has investments in Kodiak Lumber Mills, Inc., and Afognak Timber Corporation totaling a reported \$12.5 million as of 1974. However, Kodiak and other Japanese forest products companies have been expanding facilities over the past three years, and actual dollar amounts invested as of 1977 are almost certainly considerably in excess of those reported as of 1974.

c. Petroleum, Natural Gas, and Petrochemicals

Japanese firms invested about \$1.2 million in exploratory projects on the Arctic Slope in the early 1970s before the Federal Government ban on export of trans-Alaska pipeline oil. Since then, activity by Japanese in petroleum exploration has been nil. Japan does have two major direct investments related to natural gas production from the Cook Inlet and Kenai gas fields. Mitsubishi Gas Chemical Company has a 50% interest in a prilled urea plant at Kenai, part of a petrochemical complex owned by Collier Carbon and Chemical Company, a subsidiary of Union Oil of California. Collier owns an ammonia plant which provides the urea plant with ammonia feedstock and carbon dioxide. Mitsubishi Gas Chemical provided about \$10 million of an initial \$60 million investment in the complex. Also, Tokyo Gas Company and Tokyo Electric Power Company have a 15-year contract with Marathon Oil and Phillips Petroleum for delivery of liquefied natural gas from an LNG facility at Port Nikiski. There is no direct ownership of the plant by Japanese interests, however.

d. Minerals and Other Industries

Japanese companies have invested small amounts of capital in exploration and research for coal and hard-rock minerals, but large-scale Japanese investments in the production of metallic and industrial minerals have yet to take place.

In addition, Japan Air Lines, Inc., owns ground facilities at Anchorage International Airport and a catering service for its airplanes, International In-flight Catering Company. There is also a small number of Japanese-owned wholesalers or travel agencies incorporated in Alaska.

4. Prospects for Future Growth in Trade and Investment Links Between Alaska and Japan

a. General Economic Outlook for Japan

In order to assess the future prospects for trade and investment between Alaska and Japan, it is necessary to estimate future growth in the Japanese economy as a whole. The rate of economic expansion will be the single most

important determining factor in the rate of growth of Japanese imports; similarly, the pattern of growth will be a major influence in the timing and degree of Japanese direct investments abroad in the future.

Before 1974, Japan had been one of the world's fastest-growing national economies. Japanese gross national product grew at an average annual rate of 12.1% between 1965 and 1970; between 1970-1974 however, this growth rate slowed to 6.2%. In fiscal year 1974 ending in February 1975, real growth declined by a drastic 1.2%. FY 1975 growth remained stagnant by Japanese standards at 3.2%; in FY 1976, real growth was slightly over 5%. In FY 1977, real GNP growth should not exceed 5.8% because of a leveling off of export expansion (which has been supporting a stagnant domestic economy) and faster import growth.

Over the 1977-90 period, Japan's economy is expected to grow at an average annual rate of between 4.3-6.0%, with a most likely growth rate of approximately 5.6% (Table IV-10). Moreover, in light of expected economic developments in the United States and the rest of the world, it is entirely possible that Japan will experience one or more cyclical downturns in the economy during the late 1970s and early 1980s, although such recessions are expected to be significantly less serious in depth and duration than the 1974-75 recession.

TABLE IV-10
HISTORICAL AND PROJECTED GROWTH
OF JAPANESE GROSS NATIONAL PRODUCT, 1970-90
(average annual percentage change in real terms)

Historical Growth in GNP		1976 GNP (billions of constant 1970 dollars)	Projected GNP Growth Rates - 1977-90		
1970-74	1974-76		Low	Most Likely	High
6.2%	4.4%	\$329.5	4.3%	5.6%	6.0%

Source: Arthur D. Little, Inc.

The triple shock of rampant inflation in 1973, the oil crisis, and the subsequent 1974 recession exposed a number of underlying economic and social constraints on a continuance of Japan's past growth performance. The most important growth constraints are international in nature, associated with Japan's great dependence on foreign sources of energy and industrial raw materials and Japan's needs for continually expanding foreign export markets.

The increasing economic interdependence between Japan and the outside world has made it impossible to make future predictions for the Japanese economy without first assessing the future of the world economy.

The rapid economic growth of the Japanese economy in the 1960s may be attributed to rapid expansion of the domestic market and strong investment in plant and equipment. More fundamentally, however, developments in the world economy provided a favorable environment for Japan. The world economy was in a sustained period of expansion, world trade continued to grow steadily, and the supply of relatively cheap natural resources was stable.

The industrialized countries today, however, are faced with urgent problems of inflation and balance of payments deficits. They are most likely to find themselves constrained to orient their policies toward management of aggregate demand rather than toward economic growth, and they will most probably have to put up with continued high rates of unemployment and lower rates of growth. In a mature, industrialized economy, investment decisions nowadays must usually take into account a number of new problems such as decreased benefits from economies of scale and the need for environmental protection. Private investment in plant and equipment, therefore, tends to follow the path of cyclical demand recovery rather timidly. And the persistence of "built-in" cost-push inflation keeps the economy in a state of "stagflation."

The projections for the Japanese economy are based on a middle-of-the-road scenario for the world economy as a whole, which assumes a continuation of economic instability and periodic "adjustment crises" among the world's major economies, but also assumes that the governments of the industrialized nations will be able to avoid a drastic runaway inflation, a plunge into worldwide depression, or a chaotic breakup of the international monetary and trading system.

Real gross world product is expected to expand at an average rate of between 4.5% and 5.5% per year through 1990. Inflation will remain high by historical standards, with rates in the industrialized countries averaging in the range of 6-8% per year through 1990. Demand for and costs of mineral resources will expand very rapidly during the next 13 years. We do not expect absolute shortages of any key mineral resources by 1990.

The outlook for expansion of international trade is somewhat provisional and uncertain, but overall world trade is expected to expand at an annual rate of 5-7% in real terms through 1990. This compares with a real growth rate of 8.1% annually between 1963 and 1974. However, the growth in trade will be fastest between the industrialized nations and the relatively advanced developing countries; growth in trade among the world's more mature industrial economies such as Japan and the United States should be somewhat slower.

Beyond international constraints of higher prices for energy and mineral resources, slower growth in demand for Japanese exports, and even active moves to inhibit the growth of Japanese exports in importing countries, there are a number of domestic constraints of a structural nature which will slow Japanese economic growth during the next 13 years. Labor will be even scarcer than it has been since the early 1960's;

slower growth in the Japanese labor force will result in a slow-down in the growth of labor productivity. In addition to higher wages, labor is expected to demand a reduction in the work week and longer holidays, which will also contribute to the lower growth in labor productivity. Finally, the most rapid growth in the labor force is expected to occur not in the manufacturing sector, but in the service sector which has historically experienced a lower level of labor productivity.

Environmental pollution and the limited availability of suitable land for new industrial plants will also act to limit growth. Japan's past growth has been concentrated in iron and steel, oil refining, petrochemicals, and paper and pulp -- industries that consume enormous quantities of water and generate a large volume of toxic waste. These industries are chiefly responsible for the rapid, destructive spread of pollution throughout the Japanese land and coastal waters. In order to maximize the efficient combination of raw materials processing with the production of finished products, these industries have been concentrated in sprawling complexes along the Tokyo-Osaka corridor on the Pacific Coast of Japan.

Growth in Japanese GNP will also be slowed by a shifting pattern of resource allocation in the economy, stimulated by both public demand and policy targets set by the Japanese Government. Personal consumption expenditures are expected to account for a greater proportion of gross national expenditure (GNP measured from the expenditure rather than the production side) than has been true in the past. More importantly, government expenditures on social welfare and on capital projects such as environmental and sanitation facilities and housing development will increase substantially.

Domestic political developments in Japan over the next decade are much less easily projected than economic trends. General agreement exists among both Japanese and foreign political observers, however, that the long-term decline in strength of the pro-Western conservative Liberal-Democratic Party (LDP) will continue, eventually resulting in the formation of a coalition government or a series of coalition governments involving liberal factions of the LDP, the Social-Democratic Party, and the Socialist Party, with perhaps some representation in the Cabinet given to the Japan Communist Party and the Komeito Party. Such a coalition government could come into power as early as the next two to three years.

The disruptive impacts on the economy of the installation of such a coalition government are expected to be temporary, reflecting initial uncertainties on the part of business circles until overall policies of the new government (or governments) begin to clearly take shape. In the longer term, the economic growth rate is unlikely to be seriously affected by a switch to coalition government.

TABLE IV-11

PROJECTED GROWTH OF SELECTED INDUSTRIAL SECTORS
OF THE JAPANESE ECONOMY, 1976-90
(average annual percentage change in real terms)

<u>Sector</u>	<u>Growth Rate 1965-75</u>	<u>Growth Rate 1976-90</u>
Agriculture, Forestry, Fishery Products	0.9%	2.5%
Mining	5.7	2.4
Food and Beverages	5.3	5.7
Wood Products and Furniture	5.7	6.3
Pulp and Paper	7.1	5.8
Petrochemicals	13.1	6.1
Chemical Products	8.1	5.6
Petroleum and Coal Products	10.7	5.7
Nonmetallic Mineral Products	9.5	6.5
Iron and Steel	9.7	7.3
Nonferrous Metal Products	10.3	6.0
Metal Products (except machinery and transport equipment)	10.3	6.8
Machinery (except electrical machinery)	13.4	8.0
Electrical Machinery and Appliances	13.9	9.5
Motor Vehicles	16.9	4.5
Precision Equipment	8.8	7.4
Building Construction and Repairing	7.0	8.1
Other Construction	6.2	7.1
Gross National Product		5.5

Sources: Arthur D. Little, Inc., and The Industrial Bank of Japan.

b. The Structure of Future Growth in the Japanese Economy

With the overall decline in the Japanese economic growth rate, private housing investment and government current expenditures are likely to contribute more to maintaining economic expansion than private plant and equipment investment. Owing to a decline in the rates of increase in sales and revenues of manufacturing industries, plant and equipment investment is expected to grow at rates substantially lower than the overall growth in GNP.

Japan's industrial structure is unlikely to be significantly altered over the next 13 years, in spite of the stated policy of the Japanese Government to increasingly focus on the domestic development of technology- and knowledge-intensive, high value-added, low energy-consuming industries such as electronic computers, instrumentation, aircraft, nuclear-energy-related industries, new synthetic materials, and the like. While there will be some movement of investment in heavy and bulk chemical industries to overseas locations, the heavy and chemical industries are expected to grow slightly faster at home than the rest of manufacturing. Manufacturing as a whole will increase its share of total output slightly, with the service sector's share of total output remaining nearly constant, and the primary sector's share of production continuing to decline.

Table IV-11 provides past rates of growth and future estimates of growth for a number of key industrial sectors of interest in the Japanese economy. These estimates assume the most likely projection for overall economic growth, and are based on the results of an input-output model developed by the Industrial Bank of Japan. The fastest growth sectors are expected to be electrical machinery and appliances at 9.5% per annum, building construction and repairing at 8.1% per annum, nonelectrical machinery at 8%, precision equipment at 7.4%, iron and steel at 7.3%, other construction at 7.1%, and metal products at 6.8%. Nonmetallic mineral products, wood products and furniture, and petrochemicals will also do relatively well. Sectors expected to grow at or below the overall rate of increase in GNP include agriculture, forestry, and fisheries; mining; food and beverages; pulp and paper; chemical products; petroleum and coal products.

Only four sectors are expected to grow in the future at rates in excess of those experienced during the 1965-75 period. These are agriculture, forestry, and fisheries; food and beverages; building construction and repairing; and other construction. But the first two of these are likely to grow at depressed rates relative to other industrial sectors and the economy as a whole.

c. Outlook for Growth in Alaskan Exports to Japan

Table IV-12 provides high, low, and most likely estimates of the overall growth of Alaskan exports to Japan in real terms over the 1976-90 period. The most likely estimate is for exports to Japan to grow at an average annual rate of 5.2%, increasing from \$231.3 million in 1976 to \$470.9 million in 1990. Growth of exports could be as low as 3.8% per year or as high as 5.7% during this period.

TABLE IV-12

PROJECTED GROWTH IN ALASKAN EXPORTS TO JAPAN, 1976-90,
WITH NO CHANGE IN PRESENT COMMODITY STRUCTURE
(exports in millions of 1976 dollars)

1976 Exports to Japan	1990 Exports to Japan			1976-90 Annual Average Percentage Growth Rate		
	Low	Most Likely	High	Low	Most Likely	High
\$231.3	391.1	470.9	503.0	3.8%	5.2%	5.7%

Source: Arthur D. Little, Inc.

The high, low, and most likely estimates of growth in exports to Japan are correlated with estimates of growth in Japanese GNP over the period. An overall Japanese import elasticity relative to growth in GNP of 1.11 has been assumed; in other words, a 1.0% increase in GNP will cause a 1.11% increase in imports. This is the same import elasticity coefficient used by the Japanese Government in its long-range economic planning for Japan. In addition, no change in the current commodity structure of Alaskan exports to Japan has been assumed. Finally, Alaskan exports to Japan as a percentage of total Japanese imports will decline slightly over the next 13 years, continuing a trend observed since 1970. Obviously, the assumption of no change in the commodity structure of Alaskan exports to Japan is unrealistic; but the degree to which any dramatic change will come about depends for the most part on the chosen pattern of industrialization in Alaska over the coming decades.

With regard to the overall Japanese import structure, the share of raw industrial materials -- which has accounted for the major part of imports in recent years -- is expected to decline somewhat as Japanese heavy industry is increasingly shifted to overseas locations. The fastest growing import sectors are likely to include iron and steel, nonferrous metals, electrical machinery, chemicals, textiles, natural gas, and wood pulp.

In terms of U.S. exports to Japan, the share of food and raw materials in total imports from the United States is expected to remain above 50%. Japan will remain heavily dependent on the United States for imports of cereal grains, soybeans, lumber and pulp, and coking and heating coal. Increasingly, raw materials imports will be processed initially at overseas facilities before export to Japan. Thus, for example, whereas Japan has traditionally imported logs from the United States for manufacture into pulp in domestic Japanese factories, increasingly pulp processing will be undertaken at locations within the United States before export.

While a large proportion of U.S. exports to Japan will thus remain in the food and raw and semi-processed industrial materials categories, the fastest-growing sectors may well be the electrical and nonelectrical machinery

sectors, which will benefit from relatively lower production costs in the United States. These two sectors will thus probably increase somewhat their proportional share of total U.S. exports to Japan at the expense of the raw materials sector.

Industrial sectors providing potential opportunities for Alaskan exports to Japan fall into four groupings:

- Current Alaskan commodity exports to Japan,
- Other raw or semi-processed natural resource materials such as hardrock minerals,
- Resource-based and manufactured products, such as petrochemicals, and
- Tourism.

Demand for current Alaskan commodity exports to Japan should continue to be strong. The Japanese heavy dependence on imported energy will ensure strong demand for LNG imports; in addition, Japan presently has only one other source -- Brunei -- for LNG imports. Although the forest products industry will be growing at a depressed rate relative to the Japanese economy as a whole, the relatively strong growth in the construction industry -- particularly in residential construction -- should maintain healthy demand for Alaskan exports of lumber. The wood products industry in Japan is expected to grow at rates in excess of those occurring for the general economy as well.

U.S. restrictions on foreign vessel fishing within 200 miles of the U.S. coastline could stimulate increased Japanese direct investment in seafood processing operations in Alaska and the Pacific Northwest and increased exports of fish and shellfish to Japan. The heavy reliance of Japan on Alaska for exports of wood pulp of chemical dissolving grades will ensure continued growth in demand for this export as well.

Because of Japan's heavy import dependence on a number of vital raw materials, demand for Alaskan exports of these natural resource raw materials, if and when they become available, should be strong. These materials include coal, copper, iron ore, zinc, fluorides, tungsten, and molybdenum. In addition, Japan will be anxious to continue to diversify sources of these raw materials from politically unstable or sensitive areas.

Demand for resource-based manufactures such as petrochemicals and nonferrous metal products will be strong. Chemicals is expected to be one of the leading import growth sectors in Japan because of the environmental difficulties experienced in expanding the industry in Japan and because of the relative competitiveness of the U.S. chemical and petrochemical industries vis-a-vis the Japanese industry. The Japanese will increasingly favor processing of raw materials such as nonferrous metals before their import into the domestic Japanese economy. Direct investment abroad -- particularly in energy-intensive industries such as aluminum -- will be undertaken by the Japanese in support of this aim.

Finally, Alaska can expect to experience moderate growth in demand for Japanese tourism in Alaska, although an explosion in Japanese tourist travel to Alaska similar to that experienced by Hawaii and Guam in the early 1970s is not expected.

d. Outlook for Growth in Japanese Direct Investment in Alaska

As mentioned previously, no major new Japanese direct investment projects have been announced in the State of Alaska since the end of 1974. The channeling of new investment funds into current Japanese holdings in Alaska has probably been continuing, however, during this period. To some extent, the slowdown in Japanese direct investment activity in Alaska has been in response to the continued slump in capital spending and overall economic growth in the Japanese economy. Japanese firms have been unwilling to invest heavily in domestic operations, let alone in many foreign investment projects. At the same time, however, Japanese investment in the lower 48 has continued at a rate in excess of that occurring before 1975 (in terms of both dollar volume of investment and the number of announced projects). A large proportion of these direct investments have been motivated by a desire to obviate protectionist trends in the United States directed against Japanese exports and/or to provide a manufacturing or assembly base closer to large-volume export markets for Japanese goods in the United States.

For the most part, Japanese direct investment in Alaska has been and will probably continue to be motivated by a desire to secure sources of raw materials and to provide manufacturing opportunities for resource-based products produced for import and sale in the domestic Japanese market. Outside of the fish processing industry, such investments require for the most part very large amounts of capital. The Japanese are likely to be attracted to investments in Alaska via the consortium and joint venture approaches over the next 13 years, but because of the required size of investments, the level and degree of investment activity may fluctuate sharply from year to year depending on available investment opportunities and economic conditions in Japan.

V. THE MANUFACTURING SECTOR - CANDIDATE INDUSTRIES FOR ALASKA

A. INTRODUCTION

The focus of the candidate industry selection process has been the manufacturing sector. In general, it is the manufacturing sector which will provide the stability, diversification, and value added sought by the state as goals of its economic development program.

The initial step in choosing candidate industries was to develop a framework for industry screening. All manufacturing industries (at the 4-digit Standard Industrial Classification [SIC] code level) were considered in terms of Alaska's resources and economic characteristics. The result of this screening was a list of 30 potential candidate industries which could locate in Alaska.

The potential industries were matched against characteristics of Alaska considered to be inhibitors to development in order to determine whether industries were likely to develop or grow in Alaska and what would be needed to encourage development -- infrastructure, utilities, or institutional or regulatory modification. Industries were also linked to market growth characteristics -- that is, whether growth would be dependent on increased local demand or demand external to Alaska.

While the state's economic development goals will not determine industrial growth, they will help to determine which specific industries the state should encourage. Accordingly, each of the potential candidate industries, as well as the non-manufacturing sectors, was rated on its likely ability to meet each of 13 social and economic criteria. No industry met all goals. It then becomes clear that it is not possible for the state to select specific industries or industry groups as targets until it determines which of its often contradictory goals are the ones it wishes to emphasize.

The screening process described above resulted in a list of short- and long-term candidate industries for development in Alaska. This screening is based on conditions in Alaska without regard to markets for industry products. For the candidate industries aimed primarily at the local market, the principal growth determinants will be total population and economic growth, and industries expected to grow relatively slowly at the national level may have excellent prospects in Alaska. However, these industries will generally not be significant generators of employment or income because of the relatively small size of the local market to which they are linked. Large-scale new industry will depend on export markets, either U.S. or foreign.

In order to make a better estimate of the likelihood and timing of new industry in Alaska, the export markets for industry products were examined. Industries were examined in terms of U.S. production growth,

capacity conditions, industry expansion plans, and the Japanese market. Those industries for which relatively strong growth and capacity expansion are indicated may well be candidates for Alaska. However, even an industry which is not expected to experience significant growth over the next several years may be a good candidate for Alaska. A possible example would be metals processing operations, where an Alaskan location near the mineral resource might be attractive even though the industry was not expected to undertake significant capacity expansion.

B. FRAMEWORK FOR INDUSTRY SCREENING

Figure V-1 presents the logic of the industry screening process. In essence, all manufacturing industries were screened to determine potential candidates based on the characteristics of Alaska and the characteristics of each industry. The relationship of Alaskan inhibitors to each industry led to a determination of likely development timing. Finally, industries were rated in terms of their ability to meet state goals. When the state has determined which of its several goals it wishes to emphasize, it will be possible to select target industries for attraction to Alaska.

1. Principal Location Requirements

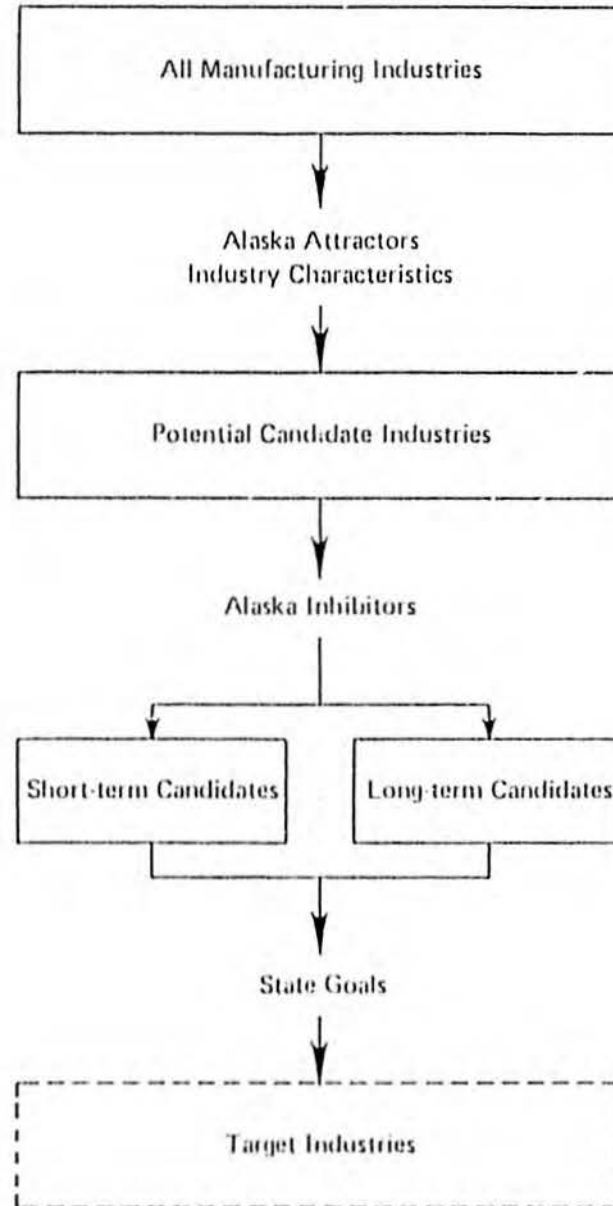
The initial step of the industry screening process was to look at the principal location requirements of each industry. These location requirements are based on general industry practices and are not necessarily limiting factors; that is, case-specific circumstances may cause a firm to locate in an area which does not conform to its general industry requirements.

The principal factors which a firm considers in its location decision are those which are likely to reduce operating costs and therefore increase competitiveness and profits. These include proximity to suppliers or markets to reduce shipping costs, access to labor, access to appropriate transportation and distribution networks, and the availability and cost of utilities and land. These location requirements are ranked in importance based on the specific product manufactured, the company's operating practices, and current market factors (e.g., the relative costs of various items). For example, the cost of power and fuel has been rising much more rapidly than transportation costs; therefore, a plant location which provides a stable and/or low-cost energy supply may outweigh a slight disadvantage in shipping costs. Similarly, some companies may be willing to pay higher labor costs in order to be closer to raw materials if the costs of transporting these materials to a plant in a less expensive labor market are substantial.

Industries have been defined according to their location requirements as follows:

Raw Materials Orientation - industries which tend to locate near sources of principal raw materials because these materials must be processed quickly to retain quality (seafood or fruit) or because primary processing

FIGURE V-1
FRAMEWORK FOR INDUSTRY SCREENING



of crude materials near the source substantially reduces transportation costs to the secondary processing facility (sawmills, pulp, ceramic, and clay products, primary metals).

Industrial Market Orientation - intermediate product industries which tend to locate near industrial or commercial purchasers of their products (packaging manufacturers, commercial printers, concrete products, metal forgings).

Consumer Market Orientation - final product industries which tend to locate near end users (perishable food processors, soft drinks, newspaper and related printers).

Highly Skilled Labor - industries which require substantial amounts of special professional, technical, or craft skills (this is a location requirement for almost no industries).

Other Labor - labor-intensive industries and other industries which employ large labor forces in their plants (apparel, primary metals, machinery and equipment).

Transportation - industries for which transportation costs of raw materials shipped to plants, or finished products shipped to purchasers, are high relative to product price; whose products require bulk handling or other special transportation facilities; or for which frequent transportation from suppliers or to market is required (fresh food, wood products, furniture, chemicals, primary metals, industrial machinery and equipment).

Distribution - consumer or industrial market-oriented industries which need a system providing frequent and widespread access to many customers (this is a requirement for almost all industries).

Power - industries which require stable supplies and/or large amounts of electricity in their manufacturing operations (apparel, pulp and paper, primary and fabricated metals).

Fuel - industries which require stable and/or low-cost supplies of oil, gas, or coal as process fuels or as feedstocks (food processing, pulp and paper, petrochemicals, primary and fabricated metals).

Water - industries which require significant amounts of process water (food products, particularly beverages, pulp and paper, chemicals).

Site - industries which need large sites to accommodate plants and facilities (most intermediate product manufacturers and bulk material makers).

Location requirements for all manufacturing industries are presented in Appendix A.

2. Industry Characteristics

In order to screen industries against conditions in Alaska and their relationship to the state's goals, it is necessary to provide more detail on each industry's characteristics in addition to location requirements. As was true for the location requirements, the industry characteristics shown in Appendix B represent general industry averages and practices. Specific characteristics will depend on the product made, plant configuration, markets served, individual company procedures, etc. Principal industry characteristics include:

Labor-intensive or Capital-intensive - Labor-intensive industries require significantly greater inputs of labor than capital, and capital-intensive industries require significantly greater inputs of capital. In general, extractive and primary processing operations are less labor-intensive than final product manufacture.

Economies of Scale - Industries achieve economies of scale when the cost per unit of output decreases as the level of production increases. While this is true to some extent in all industries, industries designated as having economies of scale achieve significant unit cost reductions with increasing output.

Special or Standard Products - In special products industries, each firm makes a separate product which is rarely interchangeable with those of other firms; these include printing/publishing, industrial machinery, and some apparel industries. Standard product industries are those in which each firm's products are essentially standard or interchangeable. This does not encompass quality or brand differences: standard product means that each firm makes products of the same general type (e.g., motor vehicles is a standard product industry).

Forward and Backward Links - Industries which are forward-linked locate near their customers, while those that are backward-linked locate near suppliers. Forward-linked industries are mainly intermediate product makers, located near their principal users, and smaller operations which are linked to a single industrial customer. Backward-linked industries tend to be located near their principal suppliers of semi-processed materials or parts (e.g., clothing manufacturers located near textile mills). Some industries are neither forward- nor backward-linked, and some industries may be both (e.g., the U.S. steel industry is concentrated in an area which includes both its principal suppliers and consumers).

Concentration Dependence - An industry which is concentration-dependent is able to realize cost savings by locating near its own industry. The majority of these industries are forward- or backward-linked and begin to achieve economies of scale when a concentration of firms attracts suppliers or customers. The concentration of a group of firms may also achieve savings by the ability to attract industry-specific services.

Urban Orientation - These are industries which achieve cost savings when located near industry in general. This group includes almost all concentration-dependent industries. Cost savings are achieved through availability of industrial infrastructure -- suppliers of general industrial equipment and services, transportation and distribution network, experienced industrial labor force, etc.

Labor - All industries require a combination of professional, skilled, semi-skilled, and unskilled labor. Many labor-intensive industries rely on relatively lower-cost semi-skilled or unskilled labor. Table V-1 shows the U.S. occupational distribution of employees for 3-digit SIC manufacturing industries.

Transportation Cost - Industries whose transportation costs are low relative to the value of product have more flexibility in location decisions than industries where transportation costs are high relative to value of product. The latter industries must try to minimize high transportation costs by locating near their principal markets. Industries with relatively low transportation costs may instead choose locations which minimize power, labor, or other costs.

Port Facilities - Industries which require access to port facilities are those whose raw materials or products are bulky and are most feasibly and economically shipped by water. Pulp, chemicals, and primary metals are all industries which typically require waterborne transport access.

Local, Regional, and National Market Orientation - Industries generally serve local, regional, or national markets depending on the type of product and the economics of operations. Some industries serve primarily local markets because of product type (milk, bread, and newspapers) or transportation costs (packaging materials or concrete products). Industries which serve regional markets are those for which transportation cost is a factor, but the market is not limited to a local area. These industries are usually distributed among the major regional markets. Industries for which there is a national market orientation are those which are not severely constrained by transportation costs, for which there may be significant economies of scale, and in which there are very few firms. Many consumer goods industries are aimed at a national market. (Many industries combine local and regional or regional and national markets, depending on the size of the firm and the specific product[s] manufactured.)

3. Alaska Attractors and Inhibitors

Alaska's principal economic attractors are its raw materials and resources and fuel and power availability. To a lesser extent, the availability of capital from several sources may also be an attractive factor. Against these attractors must be weighed the several inhibiting factors of the Alaskan economy, some of which will preclude certain types of development in the state for the foreseeable future.

TABLE V-1

OCCUPATIONAL DISTRIBUTION BY INDUSTRY

SIC Code	Industry	Professional, Technical, and Kindred Workers	Managers and Administrators	Clerical Workers	Sales Workers	Craft and Kindred Workers	Operatives	Service Workers	Laborers
201	Meat Products	22	72	112	42	82	592	22	72
202	Dairy Products	5	12	20	5	8	45	1	4
203	Canned, Cured, and Frozen Foods	5	8	15	3	11	48	2	8
204	Grain Mill Products	7	11	12	5	16	39	1	9
205	Bakery Products	1	6	10	8	29	42	2	2
206	Sugar, Confectionary, and Other Food Products	5	9	16	5	14	43	2	6
208	Beverages	5	13	14	7	14	40	1	6
210	Tobacco Manufacturers	5	6	12	6	17	45	3	6
220	Textile Mill Products	4	4	11	2	11	64	1	3
230	Apparel and Other Textile Products	2	5	9	2	5	75	1	1
241	Logging Camps and Logging Contractors	4	10	2	1	7	15	1	60
242	Sawmills and Wood Products	3	7	8	2	18	46	1	15
250	Furniture and Fixtures	3	7	11	3	20	52	1	1
261	Pulp, Paper, and Paperboard	11	6	11	2	24	40	2	4
264	Converted Paper Products	8	6	18	6	17	42	1	2
265	Paperboard Containers and Boxes	7	4	13	4	17	51	1	1
270	Printing and Publishing	12	10	24	12	26	14	1	1
281	Industrial Chemicals	21	7	15	3	18	32	2	2
282	Plastics Materials and Synthetics	21	2	9	1	22	62	2	1
284	Drugs	15	9	10	5	10	19	2	1
285	Paints and Allied Products	17	12	22	7	8	28	1	5
291	Petroleum Refining	29	6	17	2	22	21	1	2
295	Other Petroleum Products	8	8	24	1	17	31	1	6
301	Rubber Products	9	6	14	2	12	52	1	4
307	Miscellaneous Plastics Products	5	7	14	2	16	53	1	2
411	Leather Tanning and Finishing	2	9	7	2	13	57	1	9
412	Leather Products, Except Footwear	2	10	17	2	8	58	1	2
413	Footwear	1	4	13	1	8	70	1	2

TABLE V-1 (Continued)

SIC Code	Industry	Professional, Technical, and Kindred Workers	Managers and Administrators	Clerical Workers	Sales Workers	Craft and Kindred Workers	Operatives	Service Workers	Laborers
321	Glass	8%	5%	9%	2%	17%	54%	1%	4%
324	Cement and Concrete Products	5	14	12	5	16	39	1	8
325	Structural Clay Products	5	8	10	4	12	34	2	25
326	Pottery and Related Products	6	5	13	2	12	57	2	3
328	Miscellaneous Nonmetallic Mineral Products	10	7	14	4	18	42	1	4
331	Blast Furnaces and Basic Steel Products	8	2	12	1	33	28	2	14
332	Iron and Steel Foundries	6	4	11	2	33	36	1	7
331	Primary Nonferrous Metals	9	6	13	3	22	41	1	5
340	Fabricated Metal Products	13	7	13	2	23	38	1	3
351	Industrial Machinery	14	7	11	2	27	36	1	2
352	Farm Machinery	11	5	12	2	24	42	1	3
357	Office and Computing Machines	37	8	15	4	11	23	1	1
360	Electrical Equipment and Supplies	24	4	14	2	16	38	1	1
371	Motor Vehicles and Equipment	9	4	8	1	19	56	2	2
372	Aircraft and Parts	26	3	13	1	25	28	1	1
371	Ship and Boat Building and Repairing	10	3	9	1	49	22	1	5
374	Other Transportation Equipment	6	4	10	1	28	43	2	6
381	Instruments and Related Equipment	24	6	17	2	17	32	1	1
387	Watches and Clocks	8	5	12	2	20	51	1	1
390	Miscellaneous Manufacturing Industries	5	9	16	5	16	45	1	3

Source: U.S. Department of Labor, Bureau of Labor Statistics, Tomorrow's Manpower Needs.

a. Attractors

Alaska's resources have been discussed in detail in Chapter III. It is these resources which will serve as the basis of the state's development. (Historically, the economic development process in any relatively undeveloped area has begun with some type of resource extraction.) Mineral resources which have not yet been extensively developed can become the basis for primary processing industries -- cement, smelting, etc. Timber and fishing resources have supported most of Alaska's manufacturing activity to date; however, it is likely that manufacturing based on these resources can be expanded.

A special category of natural resources includes fuel and power, which can serve as raw materials as well as fuels for manufacturing processes. The state has already recognized the potential of its oil and gas as industrial feedstocks by asking for proposals for in-state processing of royalty oil. As oil and natural gas become more expensive and scarce, the availability of petroleum feedstocks will become an increasingly more attractive factor. While oil and particularly natural gas have traditionally been used as industrial process fuels, this use will become less widespread as costs continue to increase and probable legal actions encourage use of other fuels (primarily coal). In this regard, Alaska also has vast quantities of low-sulfur steam coal available for industrial use. In addition to these mineral fuels, Alaska has immense undeveloped hydroelectric potential (see Chapter III). Development of hydroelectric generation facilities could be used to provide electricity-intensive industries (e.g., primary aluminum) with dependable (non-interruptible) and possibly lower-cost power than is available in the lower 48.

In addition to the usual private sector sources of capital, there are two unique sources of financing in Alaska -- the Permanent Fund and the native corporations. Traditional sources of capital (banks, insurance companies, securities markets) are not extensively developed in Alaska. Out-of-state institutions may be reluctant to finance Alaskan business because they are unfamiliar with the state's industry. Funding from these sources is therefore more likely to be available for larger out-of-state corporations with established borrowing relationships than to small, locally owned businesses.

The native regional corporations created under the Alaska Native Claims Settlement Act have received some \$300 million of the scheduled \$1 billion in cash grants to date. Nearly half of this has been invested in various businesses -- banking, hotels, construction, fish processing, etc. As additional monies are paid to these corporations, capital will be available for investment in wholly owned businesses and joint ventures. While the specific legal provisions have not yet been determined, the Permanent Fund is also expected to provide capital for economic development in some form -- equity, long-term loans, or possibly debt guarantees.

b. Inhibitors

There are many factors which act to inhibit industrial development in Alaska. These arise from the state's economic and regulatory environment described in Chapter II. There are also industry-specific resource development constraints (described in Chapter III) which will affect any downstream processing activities. Inhibiting factors are generally those which raise the costs of operating in Alaska, making Alaska-produced goods less competitive in U.S. and world markets, or which contribute to a poor business climate (e.g., highly publicized environmental lawsuits and Teamsters Union activities have convinced corporations that attempts to expand into Alaska may not be worth the effort). Furthermore, it is possible that some inhibiting factors, particularly institutional/regulatory issues, may in fact become completely limiting factors, precluding development entirely in some areas or industries.

The principal inhibitors to development in Alaska are:

- Lack of transportation and other infrastructure,
 - High labor costs/lack of skilled labor,
 - High transportation costs,
 - Remoteness,
 - Limited local market,
 - Lack of significant utility development,
 - Institutional and regulatory issues
 - Uncertain land status
 - Environmental constraints
 - Uncertain tax policies
 - Lack of coordinated state development plan
 - Federal government influence
- and
- Weather.

The limitations and problems of Alaska's transportation infrastructure were described in Chapter III. Until additions to this infrastructure are made, most development will be limited to the coastal and rail-belt areas. Only projects with immense economic potential will be able to finance their own transportation facilities (e.g., the oil/gas pipelines) and those projects will occur only as dictated by world market and national policy considerations. In addition to the lack of road, rail, industrial port, and related facilities, there is also little other infrastructure to serve industries and their employees. Any mining or manufacturing activities outside of the Southeast region and the Anchorage/Fairbanks corridor will have to provide housing and other population-serving infrastructure -- either temporary camps or permanent new towns -- for workers. In addition, the various providers of specialized industrial supplies and services are

not currently present in Alaska so that packaging, repair services, machine shops, etc., will have to be established concurrently with industrial development or such supplies and services will have to be imported at high costs.

The Alaskan wage structure was described in Chapter II. Wage rates in manufacturing in Alaska are about 50% higher than those in the lower 48. Prevailing wage rates in Alaska will be an inhibiting factor to any industry which requires large amounts of labor and to those which typically employ primarily unskilled and semi-skilled (relatively low-cost) workers. At the same time, Alaska does not have a large pool of highly skilled workers who could command high salaries. As noted in Chapter II, many of the recent unemployed have been construction workers; workers with specific skills in the oil industry and other specialized skills are generally recruited outside of the state. Moreover, the oil pipeline had a significant impact on wages in all industries in Alaska. As future large projects are undertaken, experienced workers will be drawn away from manufacturing operations by premium construction or oil industry wages, increasing the competition for labor and statewide wage rates. Labor costs will therefore be an inhibiting factor to any industry which does not gain an offsetting advantage by locating in Alaska (e.g., lower materials or energy costs).

Transportation costs are high both within Alaska and between Alaska and its markets/suppliers. Because, as discussed above, the state's transportation infrastructure is limited, there is little low-cost intra-state transportation. Many areas can only be reached by air and/or sea in ice-free months. This means that the costs of transportation to areas outside Anchorage, Fairbanks, and the Southeast are very high to begin with and tend to be higher because of small quantities shipped and lack of backhaul. The cost of shipping equipment to or product from a mine or plant off the established transportation route would likely be prohibitively high. In addition to high in-state transportation costs, the Jones Act increases costs of shipping between Alaska and the lower 48. Therefore, any industry in the state which must bring in materials and supplies or which must market its products in the lower 48 will be required to pay premium shipping costs. This is one of the principal factors linking Alaska's current export-based industry to Japan and making its products less competitive in other U.S. markets.

Alaska is remote from the contiguous United States, and this remoteness contributes to high shipping costs and other problems. In addition, the vast area of the state will make many future developments remote from the state's population centers or from the principal resource base. (For example, if a primary processing facility is located near a mine to minimize ore handling and shipping, provisions will have to be made to provide housing and related facilities for workers. Alternatively a firm performing processing near the population centers will have to transport bulk ores from the mine.) Similarly, the distance from Anchorage, the commercial center, to the many outlying towns and villages will make it very difficult for even an Anchorage-based producer to supply the in-state market at reasonable prices. In addition, Alaska's remoteness from the lower 48 may affect perceptions, discouraging small or medium sized firms from even considering Alaska as a potential site.

Alaska's local market is quite small (approximately 400,000 people), and is further limited by the difficulties of distributing products to the more remote areas. Furthermore, unlike other states with relatively small markets, there are no neighboring states to absorb excess production of local market-oriented goods. The most basic local market industries do exist in Alaska -- bakeries, newspapers -- but the population is too small to support other consumer product makers. Furthermore, there is currently no local industrial market for products such as packaging, which are normally manufactured locally. For example, even though timber is a major product of the Alaskan economy, many basic wood products (such as flooring) are imported because local demand will not support an efficient manufacturing facility. The need to ship excess production to the lower 48 at high cost will inhibit development of locally oriented consumer or industrial suppliers until there is sustained local demand to support such industries.

As discussed in Chapter III, Alaska has enormous hydroelectric potential which could, over the long term, provide stable and relatively low-cost power for industry. (While construction costs for hydroelectric plants would be quite high in Alaska, the abundance of resources could make Alaska competitive over the long term as power costs in the lower 48 continue to increase.) However, the various hydro power sites identified or under discussion remain potential power sources only and would require about 10 years to bring on line. Until such power plants are developed, or at least underway, there will be little incentive for development of energy-intensive industries.

It is likely that all of the above inhibiting factors to economic development can be overcome in time. These are basically all conditions which will increase industry's operating costs and which can be offset by sufficiently high demand and prices for the product. However, such market factors will generally not overcome the inhibiting effects of institutional and regulatory policy.

Federal influence and action in Alaska, particularly the d-2 and environmental issues, were described in Chapter II. The d-2 selections and environmental laws will not only prohibit certain types of development in certain areas but also contribute to an unfavorable business climate. It is less the specific requirements of these laws than the controversy surrounding them that has convinced companies that it may not be worth the time and money required to pursue new ventures in the state. Such actions as the U.S. Forest Service's 10-year lease limit make investment in all but the smallest wood-processing facilities (e.g., sawmills) an unacceptable risk.

The state's policies, or lack thereof, also exert inhibiting influences on new industry. One area of uncertainty is the state's eventual mineral tax policy. The question of whether royalties and severance taxes (similar to those on oil and gas) should be imposed on hardrock minerals, and the rates of such taxes remain unresolved. Probably more important, however,

is the apparent lack of a coordinated economic development policy in the state. As discussed below, persons and agencies in Alaska have expressed many different opinions on what the state should seek to gain through industrial development. Moreover, economic development and growth are political issues both in Alaska and outside it. (That is, there are strong pressures to limit growth in Alaska from national environmentalist groups.) There is no coordinated policy to encourage and direct industrial development, with issues such as renewable versus non-renewable resources, tax incentives versus higher taxes, and the degree of environmental protection above and beyond legal minimums yet to be resolved. Until potential new businesses "know where they stand" in Alaska, they will be reluctant to make even initial feasibility studies for new projects.

Alaska's climate is also an inhibiting factor, basically because it limits most construction and extraction activities to the summer months and curtails shipping to northern parts of the state in the winter. The limitations imposed by the weather raise the overall cost of doing business in the state (e.g., creating a need for substantial summer overtime hours and premiums in construction or for costly air freight transport in the winter). However, weather conditions will not be a severe inhibitor to manufacturing industries beyond hampering resource extraction activities on which they are based.

4. Screening Criteria

Having defined the basic characteristics of industries and described the attractive and inhibiting factors of Alaska's economy, the next step in the screening process is to select the industrial location requirements and characteristics which best match conditions in Alaska.

Based on the economic attractors which exist in Alaska, the industrial location requirements of greatest importance are raw materials orientation, power, and fuel (process fuels and petroleum raw materials). Industries with raw materials orientation as a principal location requirement fall into six major groups -- food products; lumber and wood products; pulp and paper; chemicals; stone, clay, and glass; and primary metals. The primary processing industries in these groups (i.e., those which involve initial handling of the resource rather than fabricating semi-processed materials into finished products) which rely on raw materials available in Alaska thus become logical candidates. Many of these industries are already present -- canned seafood, sawmills, pulp mills, manufacture of ammonia and urea. In most cases, the high cost structure of the Alaska economy will limit manufacturing beyond primary processing to products for the local market (e.g., millwork or other wood products would be sold to the local construction industry rather than exported). In general, as manufacturing proceeds down the processing chain from basic resource to finished product, products become more consumer market-oriented and also more labor-intensive, both of which limit these industries' ability to locate in Alaska.

Oil and natural gas are industrial raw materials for the petrochemical industry. As petroleum feedstocks become scarce, the state's royalty oil and gas will become more attractive to industry. Petroleum-based chemical manufacture has taken place in Alaska for several years, and the state is currently negotiating purchase of its 12.5% share of North Slope oil tied to in-state processing. The oil and gas resources controlled by the state will provide a basis for chemical (particularly petrochemical) industry growth in Alaska.

In addition to chemical industry feedstocks, oil and gas as well as coal and potential hydroelectric developments will provide fuel and power for energy-intensive industries. Primary aluminum production and cement manufacture are two of the most energy-intensive industries.

An additional location requirement affecting industry in Alaska is market orientation. That is, industries which tend to locate near either consumer or industrial markets will, of necessity, be limited in the state. Industries in this group which are not heavily dependent on economies of scale may be established to serve local consumers (e.g., bakeries) or industries (e.g., cement). Market-oriented industries which require large operations to be economically feasible will not be established in Alaska until population and/or business growth generates sufficient demand.

Industry characteristics of particular significance to Alaskan location include labor- or capital-intensiveness, reliance on economies of scale, forward or backward links, urban orientation, and market orientation. The relationship of these characteristics to Alaska has been alluded to above. In general, industries which are labor-intensive and enjoy significant economies of scale (e.g., cellulosic fiber manufacture) will be constrained by Alaska's high labor costs. Industries in this group will only locate in Alaska if other economic considerations (e.g., access to scarce resources) outweigh labor costs.

Industries with substantial forward or backward links are not likely candidates for Alaska because of the state's limited industrial base. That is, industries which require inputs of materials and equipment from other industries (fabricated products rather than raw materials) or make products to supply other manufacturing firms will be hampered by the transportation, access, and cost of problems in Alaska. Similar problems will inhibit location in Alaska of industries which are concentration-dependent or which have an urban orientation. Furthermore, as noted above, industries with a local market orientation will only develop in Alaska on a very limited scale.

The location requirements and characteristics of industries, when screened through Alaska's attractors and inhibitors, indicate which industries could potentially locate in the state. They also indicate potential timing and development requirements for these industries.

Industries which currently exist in Alaska or could develop under existing conditions are obviously short-term candidates unless, of course, they are based on upstream industrial development (e.g., a concrete products business based on the development of a cement plant). Many of the longer-term candidates will require some alteration of the current economic environment before they will develop. The principal alterations are expected to be development of transportation and/or utility infrastructure and institutional/regulatory modification. The infrastructure development necessary for manufacturing industries may be provided by government, by the industry itself, or by other industries (e.g., roads or ports built by mining companies may also serve manufacturing plants). It can generally be stated that development of the necessary industrial infrastructure will not be an insurmountable problem; rather, infrastructure requirements will delay specific industrial projects until demand and prices can support infrastructure as well as operating costs.

As discussed repeatedly throughout this chapter, institutional and regulatory requirements may be a more significant impediment to specific industrial development than any or all economic factors. Existing environmental laws may well prohibit certain developments entirely or make costs for development substantially higher because of pollution control and related requirements. U.S. Forest Service regulations will tend to limit the attractiveness of timber industry investments. These and other institutional issues will raise overall development costs, thereby requiring higher prices to justify industry investment. To the extent that regulations can be modified or compromises reached with regulatory agencies, industry will be more likely to locate in Alaska. (However, over the long term, it is possible that material shortages or national priorities may dictate specific exemptions from regulations -- for example, the "energy crisis" produced legislation prohibiting further court challenges to construction of the trans-Alaska pipeline.)

The market orientation of a given industry and its expected orientation in Alaska (i.e., local or export) will determine the forces that will influence its growth. Local market-oriented industries will grow along with population or local business and industry. Export-based industries will depend on world demand and prices for their growth. (As discussed in Chapter IV, world demand for Alaskan products is primarily Japanese demand, which exerts a much greater influence on the state's economy than demand in the rest of the United States.)

The industry screening process set forth above will yield a list of candidate industries for Alaska. It should be reiterated that the industry characteristics used in this analysis are based on overall industry averages and practices. Within many industries there are a variety of products and processes, some of which might be suitable for Alaska. (An example is direct reduction steelmaking; as discussed below, while the steel industry in general does not have characteristics that indicate a potential Alaskan location, a direct reduction facility might be possible.) Similarly, while an industry may appear to be a candidate on the basis of its general characteristics, product mix, facility design, plant location, and other project-specific factors will determine the feasibility of each individual

development. That is, specific studies will be necessary to determine such things as financial feasibility, employment generated, etc. Furthermore, expected demand growth will affect new industry development in Alaska. Export-based industries will not be established unless sufficient market growth is foreseen to justify investment. On the other hand, industries which are not expected to grow significantly at the national level may have rapid growth potential in the state.

This industry screening, while presenting the most likely manufacturing sectors for development in Alaska, should not be taken to mean that no consideration should be given to other industries. Alaska's economy will continue to change and expand rapidly over the next several years. Changing conditions will provide additional opportunities for new industries which would not be candidates today. For example, significant agricultural development could provide a basis for many types of food processing activities; infrastructure built for mining or oil operations (roads, rail lines, or ports) could provide lower costs for additional manufacturing operations. In other words, changing economic conditions will require frequent re-evaluation of industrial development opportunities.

C. CANDIDATE INDUSTRIES

Table V-2 presents the list of industries considered to be candidates for Alaska based on the industry screening process described in Section B. About one-third of these 30 industries are already present in Alaska to some extent -- fish processing, logging and sawmills, pulp, chemicals, petroleum refining, and concrete products. Of the six raw materials-oriented industry groups, only primary metals manufacturing is not currently present in the state. In the other groups, likely new candidate industries are primarily those directly related to existing industries. (Cement manufacture is the only exception, in that it represents an upstream rather than downstream development from existing industry.)

The industry groups considered likely candidates for Alaska are:

- Fish Processing - This industry is already the largest manufacturing employer in the state. With the 200-mile fishery conservation zone (see Chapter III), this industry will continue to grow and expand into new areas (i.e., bottomfish processing).
- Lumber and Wood Products - Logging and sawmill operations are already plentiful in Alaska. While Forest Service regulations and slack Japanese demand have constrained the industry somewhat in recent years, the opening up of state and/or native corporation lands to logging should provide growth opportunities, particularly in expanding exports to Japan. (As discussed in Chapter IV, the Japanese Government expects significant home-building activity in the next several years.) Other wood product industries are likely to be aimed at the local market -- specialty sawmills

TABLE V-2

POTENTIAL CANDIDATE INDUSTRIES

- Canned Seafood
- Fresh/Frozen Seafood
- Logging
- Sawmills
- Specialty Sawmills
- Millwork
- Wood Containers
- Wood Preserving
- Miscellaneous Wood Products
- Pulp Mills
- Paper Mills
- Paperboard Mills
- Cyclic Intermediates
- Organic Chemicals
- Inorganic Chemicals
- Fertilizers
- Fertilizer Mixing
- Agricultural Chemicals
- Petroleum Refining
- Asphalt and Paving Materials
- Cement
- Concrete Block and Brick
- Other Concrete Products
- Ready-mixed Concrete
- Nonmetallic Minerals Processing
- Copper Smelting
- Lead Smelting
- Zinc Smelting
- Primary Aluminum Production
- Other Nonferrous Smelting

and millwork for residential construction, wood containers for agriculture and industry, wood preserving for heavy construction, and miscellaneous wood products for consumers and tourists (e.g., handicrafts).

- Pulp and Paper - The two pulp mills in the state currently produce dissolving pulp for rayon and other cellulosic fibers and bleached pulp for paper (see Chapter III). Possible increased demand for paper and paper-board could stimulate new integrated mills to take advantage of Alaska's timber resources and provide additional economies of scale.

- Chemicals - The development of a chemical industry in Alaska will be based on the state's oil and gas resources. One chemical plant currently exists (producing ammonia and urea from natural gas), and the state is currently considering proposals for a plant to process its royalty oil. As petroleum feedstocks become more expensive and scarce, and as the state controls larger amounts of royalty oil and gas, Alaska may become an attractive location for basic petrochemical producers. However, intermediate and final chemical products will continue to be produced near consumer markets.

- Petroleum Refining - This is being and will be expanded in Alaska to meet the fuel needs of population and business. The state currently imports a significant portion of its refined products. One non-fuel refinery product with an obvious local market is asphalt, which can be used by the state's construction industry.

- Cement Manufacturing - This is an industry which has been proposed for Alaska repeatedly; the limiting factor has been local demand. As the construction industry expands, local cement manufacture will become feasible, particularly if the new state capital and large hydroelectric power projects are built. Downstream concrete products (e.g., block and brick for construction) are currently manufactured in the state with imported cement. The nonmetallic minerals processing component of the stone, clay, and glass group includes industries which grind or treat various minerals (barite, stone, limestone) for sale to other industries or for construction use. These industries will also grow as construction demand increases.

- Primary Metals - Primary metals industries have not been established in Alaska. To date, there has been relatively little mining of metals, although mining companies are active in exploration. Obviously, these industries will not be established in the state until mining operations are made feasible by rising demand and prices. At that time, processing facilities may be built to minimize ore transportation costs or because resource owners (the state or native corporations) tie mining leases to primary processing operations. The availability of power and fuel in the state may also aid in the attraction of primary metals industries. (Primary aluminum production is the most energy-intensive of all manufacturing industries.)

Table V-3 shows the principal location requirements of the candidate industries. Half of them have raw materials as a principal requirement, and another six are directly related to these resource-based industries (downstream developments). The remaining nine industries are based on oil and gas (chemicals and petroleum refining) and other minerals (nonferrous smelting) as basic materials. Again, half of the candidate industries have power and fuel as principal requirements. It can thus be seen that all of these industries are directly related to resources available in Alaska. Even though transportation and distribution are also requirements for all of these industries, the availability of resources in the state which are not available in other areas with better infrastructure will, over the longer term, probably outweigh transportation and distribution considerations.

Table V-4 shows the key characteristics of the candidate industries and the growth outlook for each industry for the 1977-90 period. (It should be remembered that this growth projection pertains to the United States as a whole and does not necessarily determine an industry's potential growth in Alaska.)

Table V-5 shows the relationship between the candidate industries and the Alaskan inhibitors, ranked high, medium, or low on the basis of the estimated degree to which each factor will constrain an industry's growth or development. For example, labor costs, transportation costs, and weather would not be serious problems for a cement plant; lack of infrastructure and remoteness would be moderate problems; and the limited local market, lack of utility (electric power) development, and institutional (environmental) issues could seriously hamper this industry. Table V-5 also estimates the seriousness of the inhibiting factors to the non-manufacturing sectors discussed in Chapter III. For example, there are many factors which seriously constrain hardrock mineral development, but few constraints for the fishing industry.

The result of the consideration of industry characteristics and inhibitors is Table V-6, which contains estimates of timing and requirements for candidate manufacturing industries and the non-manufacturing sectors. During the short term (to about 1985), industry development and growth are likely to be concentrated in existing industries -- fish processing, logging and sawmills, some chemical production, and petroleum refining. The only new manufacturing industry which is a short-term prospect is cement manufacture. Other, more downstream manufacturing industries (paper, petrochemicals, metals) are long-term prospects, although the outlook for paper and petrochemicals, which are related to existing operations, is better than for entirely new industries (metals), particularly since hardrock mining is itself a long-term prospect. (It is estimated that getting a new mine into production would require about 10 years.)

Once again, it must be remembered that these are estimates based on existing and foreseeable economic conditions. For example, if a particular mineral were subject to shortages and price increases (similar to oil in

TABLE V-3

PRINCIPAL LOCATION REQUIREMENTS FOR CANDIDATE MANUFACTURING INDUSTRIES

Candidate Industries	Location Requirements										Key: X = Yes	
	I Raw Materials	I Industrial Market	I Consumer Market	I Highly-skilled Labor	I Other Labor	I Transportation	I Distribution	I Power	I Fuel	I Water		I Site
Canned Seafood	X						X		X	X	X	
Fresh/Frozen Seafood	X		X			X	X			X	X	
Logging	X	X			X	X						
Sawmills	X	X			X	X					X	
Specialty Sawmills	X					X	X					
Millwork					X	X					X	
Wood Containers	X	X			X	X	X				X	
Wood Preserving		X					X				X	
Miscellaneous Wood Products		X			X		X					
Pulp Mills	X				X	X	X	X	X	X	X	
Paper Mills	X				X	X	X	X	X	X	X	
Paperboard Mills	X				X	X	X	X	X	X	X	
Cyclic Intermediates		X			X	X	X				X	
Organic Chemicals						X	X		X	X	X	
Inorganic Chemicals					X	X	X			X	X	
Fertilizer		X				X	X		X		X	
Fertilizer Mixing		X				X	X		X		X	
Agricultural Chemicals						X	X		X	X		
Petroleum Refining					X	X	X			X	X	
Asphalt		X				X	X		X			
Cement	X				X	X	X	X	X		X	
Concrete Block and Brick		X				X	X				X	
Other Concrete Products		X				X	X				X	
Ready-mixed Concrete		X				X	X				X	
Nonmetallic Minerals Processing	X	X				X	X	X	X	X	X	
Copper Smelting	X				X	X	X	X	X		X	
Lead Smelting	X				X	X	X	X	X		X	
Zinc Smelting	X				X	X	X	X	X		X	
Aluminum Smelting	X				X	X	X	X	X		X	
Other Nonferrous Smelting					X	X	X	X	X		X	

TABLE V-4
KEY CHARACTERISTICS OF INDUSTRIES

Candidate Industries	Characteristics																National Growth Outlook 1977-90						
	High Environmental Impact Potential	Labor-intensive	Capital-intensive	Economies of Scale	Social Product	Standard Product	Intermediate Product	Final Product	Forward Link - Locates Near Consumers	Backward Link - Locates Near Suppliers	Concentration Dependence	Urban Orientation	Professional Labor	Skilled Labor	Semi-skilled Labor	Unskilled Labor		Transport Cost Low Relative to Value	Transport Cost High Relative to Value	Port Facilities Generally Required	Local Market Orientation	Regional Market Orientation	National Market Orientation
Canned Seafood	X	X				X	X									X	X						3.4%
Fresh/frozen Seafood	X					X	X									X	X						3.4
Leopling		X				X	X									X	X						2.2
Sawmills		X				X	X									X	X						1.9
Specialty Sawmills		X				X	X									X	X						1.9
Millwork						X	X									X	X						1.5
Wood Containers		X				X	X									X	X						2.3
Wood Preserving		X				X	X									X	X						3.2
Miscellaneous Wood Products		X				X	X									X	X						3.2
Pulp Mills	X					X	X									X	X						2.3
Paper Mills	X					X	X									X	X						3.1
Paperboard	X					X	X									X	X						3.3
Cyclic Intermediates	X					X	X									X	X						5.3
Organic Chemicals	X					X	X									X	X						6.0
Inorganic Chemicals	X					X	X									X	X						4.5
Fertilizer	X					X	X									X	X						3.2
Fertilizer Mixing	X					X	X									X	X						3.2
Apparel Chemicals	X					X	X									X	X						3.9
Petroleum Refining	X					X	X									X	X						4.7
Asphalt	X					X	X									X	X						2.6
Cement	X					X	X									X	X						1.5
Concrete Block and Brick		X				X	X									X	X						1.7
Other Concrete Products		X				X	X									X	X						2.8
Ready-mixed Concrete			X			X	X									X	X						1.7
Nonmetallic Minerals Processing	X					X	X									X	X						4.0
Copper Smelting	X					X	X									X	X						2.3
Lead Smelting	X					X	X									X	X						1.6
Zinc Smelting	X					X	X									X	X						0.2
Aluminum Smelting	X					X	X									X	X						4.0
Other Nonferrous Smelting	X					X	X									X	X						3.3

Key:
X = Yes

TABLE V-5

IMPORTANCE OF ALASKAN INHIBITORS TO CANDIDATE INDUSTRIES

Candidate Industries	Alaskan Inhibitors							
	I Infrastructure	I Labor Costs/Skills	I Transportation Costs	I Remoteness	I Limited Local Market	I Utilities	I Institutional/Regulatory	I Weather
Canned Seafood	L	L	L	L	L	L	L	L
Fresh/Frozen Seafood	L	L	L	L	L	L	L	L
Logging	M	L	M	M/H	L	L	H	M
Sawmills	L	L	L	L	M	L	M	L
Specialty Sawmills	L	L	L	L	M	L	L	L
Millwork	L	L	L	L	M	L	L	L
Wood Containers	L	L	L	L	M	L	L	L
Wood Preserving	L	L	M	M	M	L	L	L
Miscellaneous Wood Products	L	L	M	L	M	L	L	L
Pulp Mills	L	M	M	M	L	L	H	L
Paper Mills	L	M	M	M	L	L	H	L
Paperboard Mills	L	M	M	M	L	L	H	L
Cyclic Intermediates	L	M	M	H	M	L	M	L
Organic Chemicals	L	M	M	H	M	L	M	L
Inorganic Chemicals	L	M	M	H	M	M	M	L
Fertilizer	L	L	M	M	H	M	M	L
Fertilizer Mixing	L	L	L	L	L	L	L	L
Agricultural Chemicals	L	L	L	L	L	L	L	L
Petroleum Refining	L	M	M	M	L	L	H	L
Asphalt	L	L	L	L	L	L	L	L
Cement	M	L	L	M	H	H	H	L
Concrete Block and Brick	L	L	M	M	L	L	L	L
Other Concrete Products	L	L	M	M	M	L	L	L
Ready-mixed Concrete	M	L	M	M	L	L	L	L
Nonmetallic Minerals Processing	H	H	H	H	H	M	H	M
Copper Smelting	M/H	H	H	H	L	M	H	M
Lead Smelting	M/H	H	H	H	L	M	H	M
Zinc Smelting	M/H	H	H	H	L	M	H	M
Aluminum Smelting	H	H	H	H	L	H	H	M
Other Nonferrous Smelting	M/H	H	H	H	L	M	H	M
Nonmanufacturing								
Agriculture	M	L	H	H	H	L	M	H
Fisheries	L	L	L	L	L	L	L	M
Tourism	H	L	H	H	L	L	M	H
Oil and Gas	L	L	L	L	L	L	H	M
Coal	M/H	L	M	M	M	M	H	L
Hardrock Minerals	H	M	H	H	L	M	H	M
Special Projects Construction								
Gas Pipeline	L	M	M	M	L	L	M	M
Move	H	M	M	L	L	L	H	L
Hydroelectric Development	H	H	H	H	M	L	H	M

Key:

L = Low
M = Medium
H = High

TABLE V-6

TIMING AND REQUIREMENTS FOR INDUSTRIAL DEVELOPMENT IN ALASKA

Key:
X - Yes

Candidate Industries	Development Timing		Development Requirements					
	Short-term	Long-term Only	Under Existing Conditions	With Infrastructure Development	With Utility Development	With Institutional/Regulatory Modification	With Increased Local Demand	With Increased World Demand/Price
Canned Seafood	X		X					
Fresh/Frozen Seafood	X		X					
Logging	X					X	X	X
Sawmills	X					X	X	
Specialty Sawmills	X		X				X	
Millwork	X		X				X	
Wood Containers	X		X				X	
Wood Preserving	X		X				X	
Miscellaneous Wood Products	X		X				X	
Pulp Mills	X					X		X
Paper Mills		X				X	X	X
Paperboard Mills		X				X	X	X
Cyclic Intermediates	X					X		X
Organic Chemicals	X					X		X
Inorganic Chemicals		X			X	X		X
Fertilizer	X					X	X	X
Fertilizer Mixing	X						X	
Agricultural Chemicals		X	X				X	X
Petroleum Refining	X					X	X	
Asphalt	X						X	
Cement	X			X	X		X	
Concrete Block and Brick	X		X				X	
Other Concrete Products	X		X				X	
Ready-mixed Concrete	X		X				X	
Nonmetallic Minerals Processing		X		X		X	X	X
Copper Smelting		X		X		X		X
Lead Smelting		X		X		X		X
Zinc Smelting		X		X		X		X
Aluminum Smelting		X		X	X	X		X
Other Nonferrous Smelting		X		X	X	X		X
Non-manufacturing								
Agriculture	X			X		X	X	X
Fisheries	X		X					X
Tourism	X			X				X
Oil and Gas	X					X		X
Coal	X			X		X	X	X
Hardrock Minerals		X		X	X	X		X
Special Projects Construction								
Gas Pipeline	X		X					X
Capital Move	X					X		
Hydroelectric Development		X		X		X	X	

1973), there would be a change in the economics of Alaskan production and likely timing of development; however, such events are not predictable, and cannot be considered as part of the state's industrial development program.

Table V-6 indicates that some change from existing conditions will be necessary for establishment of new industries. In fact, even some industries currently present (logging and sawmills, for example) will require some modification of regulatory constraints to achieve significant growth. In most cases, it is institutional issues which will affect industry growth. In addition, the non-manufacturing sectors will not grow without infrastructure development and institutional modification. Therefore, manufacturing industries based on resource extraction activities will be constrained.

The final two columns of Table V-6 indicate whether local demand or world demand and prices will contribute to each industry's growth based on the industry's market orientation. There are some industries and sectors (e.g., coal) in which growth would result from local or world demand. The market orientation of the industry (i.e., local, export, or both) will determine the scale of development.

The overall outlook for each industry is described in greater detail below.

D. INDUSTRY OUTLOOK

1. Fish Processing

Canned and frozen seafood are currently the principal manufacturing industries in the state. With passage of the Fishery Conservation and Management Act of 1976, and federal and state efforts to improve fishery resource management, the outlook for the fish processing industry appears excellent. In the United States as a whole, production of canned and frozen foods is expected to increase at 3.4% per year, about the historical growth rate. However, the biggest market for the Alaskan fish processing industry will be Japan. The 200-mile limit has provided an opportunity for Alaskan fishermen to expand operations; shore-based processing will also increase, particularly if proposed regulations give U.S. processors priority over fish caught within the 200-mile limit.

Investments by native corporations and state hatchery programs will ensure growth of the traditional salmon and shellfish industries. As the U.S. fleet expands to include bottomfishing, there will be room for expansion of the fish processing industry. Bottomfish products (fish sticks, etc.) are currently imported into the United States. Therefore, a domestic market exists in addition to the almost "captive" market in Japan and other countries created by limitations on foreign fishing in U.S. waters.

2. Logging, Sawmills, and Wood Products

The outlook for industries in this group is mixed. In the immediate future, U.S. Forest Service policies -- lease limits and high stumpage fees -- will constrain growth in logging and sawmill operations. However, as state and native corporation lands are opened to logging, it may be possible for the industry to obtain more favorable lease terms.

The growth outlook for logging and sawmill operations for the United States is not optimistic, with production expected to grow more slowly than GNP. However, the lower 48 has never been the principal market for Alaskan timber because of well established, lower-cost operations in the Pacific Northwest. Alaska's timber market is Japan. The Japanese demand for timber is expected to grow fairly rapidly, particularly with the expected focus on housing and related "social infrastructure" over the next several years. Therefore, the overall outlook for growth in Alaskan logging and sawmill operations will be good after short-term regulatory constraints have been overcome.

The wood products industries in this group are expected to serve the local market only; Alaskan labor costs prohibit export to either the lower 48 or other countries. Specialty sawmill products (e.g., shingles) and millwork (doors, windows, etc.) will serve the local building construction sector. Both industries are generally relatively small-scale (averaging about 30 employees), so that the limited local market will not prohibit establishment of such plants, particularly around Anchorage. However, development of these industries is likely to be limited to only few operations for the foreseeable future.

The wood container industry includes such products as crates, boxes, and barrels. Establishment of firms manufacturing these products in Alaska would be tied to the development of local industrial consumers. Agriculture, in particular, uses wood shipping crates for fresh products. Other manufacturing industries may also purchase various wood containers either from independent suppliers or dedicated operations. However, because of the local market orientation of this industry, its development in Alaska will be quite limited.

The wood preserving industry includes establishments engaged in treating timber for mine props, pilings, railroad ties, etc. The applications in Alaska are obvious. Given the availability of timber, the establishment of preserving operations (which are generally fairly small) will be related to the heavy construction market.

Miscellaneous wood product industries manufacture everything from fencing to toothpicks. Most operations in this group are small (averaging 20 employees) and any established in Alaska would be aimed at the local market. In particular, this group includes handicrafts industries which would be linked to the tourism sector.

Overall, the various wood product industries will follow the growth of Alaska's local market. Even in combination, however, the many industries in this group will not have a significant impact on the state's economy because of their small size.

3. Pulp and Paper

If the problems affecting logging operations are resolved, pulp and paper (particularly pulp mills) are likely to experience moderate growth in Alaska. The state's existing pulp mills are currently processing Canadian logs because of Forest Service stumpage rates. The principal product of the industry is dissolving pulp for rayon and other cellulosic fibers, although there are plans to expand paper pulp production capacity to make the industry more market-responsive.

The U.S. pulp and paper sector is expected to experience moderate growth through 1990 as slower demand growth (e.g., a shift to plastic packaging materials) is offset by declining imports from Canada. During the 1980s, the industry's present excess capacity is likely to be absorbed and new plants will be built, particularly if additional export markets open up. More important for Alaska, the Japanese pulp and paper sector is expected to grow more rapidly than that country's GNP. As discussed in Chapter IV, environmental and other concerns in Japan will encourage primary resource processing before raw materials are imported to that country. Particularly if pulp mill capacity is built with Japanese investment, an integrated plant (pulp and paper or paperboard) dedicated to the Japanese market might be feasible. Specialty paper products (e.g., coated papers) are not likely to be manufactured in Alaska because of high costs and market orientation.

Overall, it is reasonable to expect additional pulp mill capacity aimed at the Japanese market to be built in Alaska during the 1980s. (However, it is also possible that such a development, while economically feasible, might be blocked by environmental constraints or timber sale restrictions.) Alternatively, an integrated plant to produce pulp and paper (or paperboard) might be built, particularly because this industry is relatively energy-intensive. Overall, the Japanese pulp and paper market appears to be an excellent opportunity for Alaska. Pulp processing capacity is likely to increase over the short-term, while paper or paperboard production will be a longer-term development. This is also a sector in which there is likely to be significant Japanese interest and investment.

4. Chemicals

The chemicals group covers a vast number of products. Of particular interest to Alaska are the basic chemical industries which rely on petroleum feedstocks. As discussed in Chapter III, the state expects to sell its royalty oil to a company that will process it into refined products (gasoline and jet fuel) and primary petrochemicals (benzene, ethylene).

The single existing chemical plant produces ammonia (inorganic) and urea (organic) from natural gas. While the current U.S. and world petrochemical plant capacity oversupply is expected to continue well into the 1980s, the availability of feedstocks in Alaska may attract some basic industry development.

Both cyclic intermediates and basic organics are produced almost entirely from oil and gas feedstocks. Aromatic chemicals and the cyclic intermediates derived from them are co-products of re-forming operations at refineries or of ethylene production based on heavy feedstocks such as naphtha and gas oil. Ethylene and propylene, the largest volume basic organic chemicals, are produced by steam cracking or pyrolysis of hydrocarbon feedstocks. These primary petrochemicals are converted in turn to a large number of aliphatic intermediates which serve as the raw materials for a variety of plastics, resins, synthetic rubbers and fibers, and other final products.

The primary petrochemical industry is feedstock sensitive and consequently has developed largely in the U.S. Gulf Coast where raw materials have been readily available at attractive prices. Currently about 90% of U.S. ethylene capacity is in Petrochemical Allocation District III and much of this capacity is located in the Gulf Coast regions of Texas and Louisiana. The concentration of the primary petrochemical industry in these states has resulted in a well developed infrastructure which tends to encourage further development of the industry here. In fact, at the primary and basic intermediate level, many plants are interconnected by product and raw material pipelines.

As the basic petrochemical intermediates are upgraded to finished products, proximity to markets becomes a much more important determinant of plant location. Many of the plants for finished products derived from cyclic intermediates and basic organics are located in the heavy population centers of the East North Central and Middle Atlantic states.

As with industry, locational considerations vary widely depending on the industry level being examined -- e.g., for extractive operations, location of the primary industry close to adequate raw materials supplies is a primary consideration. In the inorganic chemical industry, sodium chloride, sulfur, chlorine, and phosphoric acid are all primary examples of this phenomenon. For intermediate and end chemicals, location near important markets becomes the dominant factor. For the inorganic chemical industry as a whole, good transportation links are essential while labor cost is relatively unimportant except in the case of a few end chemicals.

There is little doubt that there will be increasing production of basic chemicals in Alaska. Cyclic intermediates, organics, inorganics, fertilizers, and other agricultural chemicals which are primary products of oil and natural gas have been and will continue to be produced in the state. To a large extent, the state government's decision to accept oil and gas royalties in kind for sale to in-state manufacturers will be behind the growth of this industry. (That is, the one-eighth share of North Slope oil and gas controlled by the state will not be available for processing in lower 48 plants even though the industry is expected to have excess capacity there.) In addition, Alaskan oil cannot be exported to other countries to be refined into fuels or chemicals..

As noted in Chapter IV, the basic chemical industries will be among the most rapidly growing in the United States through 1990 despite present plant capacity oversupply. Even greater growth is expected for the plastics industry, which uses petroleum-based basic chemicals as its principal raw material. Furthermore, Japan is expected to increase its imports of primary petrochemicals as part of its economic redirection toward cleaner industry and less domestic primary processing. Overall, the outlook for basic chemical manufacturing in Alaska is good if specific projects are designed to allow competitive pricing on the world market. (The basic chemicals industries are capital- rather than labor-intensive, so that Alaskan labor costs will not significantly affect product prices. The principal inhibitors to Alaskan petrochemical marketing are likely to be higher transportation costs and high plant construction costs which will be reflected in product prices.)

Longer term, there may also be an opportunity to manufacture inorganic chemicals in Alaska in addition to inorganic products of oil and gas (e.g., ammonia or sulfur recovered during crude refining). As noted above, some inorganics are raw materials-oriented and may follow specific mineral extraction activity. However, the petroleum-based chemicals will be the basis of this industry's development and growth in Alaska.

5. Petroleum Refining and Refinery Products

Alaska's current refinery capacity is limited, and the state still imports most of its refined products. However, North Slope oil will support additional refineries, such as the new North Pole refinery outside Fairbanks. In addition, each of the proposals for processing the state's royalty oil calls for the manufacture of gasoline, jet fuel, and heating oil. Given the expected growth of Alaska's population and economic base and the availability of crude oil resources, there will undoubtedly be additional refinery capacity added over the next several years to serve the local market.

Petroleum refineries will not be built to serve export markets. Federal legislation prohibits the export of domestic crude and products, so that refined products not absorbed by the local market would have to be shipped to the lower 48. The export market for Alaskan refinery products would thus be the U.S. West Coast. Since the West Coast appears to have sufficient refinery capacity over the near term, and possibly into the late 1980s, there is little incentive to build refineries in Alaska to serve this market. At most, the export market may absorb relatively small amounts of excess production from the state's local-market-oriented refineries.

In addition to gasoline and fuel oils, refineries produce other products which may be absorbed by local industry or exported. Given the substantial amount of construction likely to occur in Alaska -- private, public, and special projects -- there should be a market for refinery asphalt used in roofing, paving, and other construction materials. Other refinery by-products include sulfur used in paper making and electrode coke used by the aluminum industry.

6. Cement and Concrete Products

Cement manufacture is an industry which has frequently been proposed for Alaska. The construction industry uses large quantities of cement which must be imported at relatively high cost. Since the industry's principal raw material (limestone) is available in the state, and the industry is both electricity- and fuel-intensive, it is a very attractive candidate. The principal factor inhibiting its development to date has been the size of the local market, which has not been large enough to support an economic-sized facility on a sustained basis. It is likely that a firm schedule for one or more of the large construction projects planned for the state (the capital move, OCS support facilities, or a major hydroelectric project) would provide the impetus for construction of a cement plant.

The concrete products industries (block and brick and other structural concrete products and ready-mixed concrete) are already present in Alaska, since these industries are generally oriented toward the local construction sector. The same factors contributing to establishment of a cement plant will contribute to the growth of these industries. However, concrete products will be made in the state to serve the construction sector even without in-state cement production.

7. Nonmetallic Minerals Processing

This industry performs crushing, grinding, etc., of stone and other nonmetallic minerals for sale to mining, construction, and manufacturing sector users. Principal markets in Alaska for these industry's products would be oil and gas (barite for drilling mud), construction (gravel and other ground stone), cement and concrete (crushed limestone and aggregate), and agriculture (limestone). High costs of operation -- labor and bulk material transportation -- will most likely restrict this industry to the local market, although shortages or high prices for specific products could open up some export markets, particularly if mining activities are already underway for local use.

8. Primary Metals

The primary metals industries (the manufacture of metals from ores) are generally raw materials-oriented and relatively energy-intensive, making them potential candidates for Alaska. At the same time, these industries generally operate large-scale plants employing substantial amounts of labor and tend to be forward-linked, limiting the attractiveness of Alaskan location. Therefore, even in the industries which will require capacity additions, the likelihood of Alaskan location will have to be determined by weighing higher labor and product transportation costs against lower raw materials transportation and energy costs.

Development of any primary metals industry in Alaska will depend on the mining of the necessary metal ores. Hardrock mineral mining is, in turn, dependent on market conditions which will make such ventures economically feasible, as well as resolution of d-2, environmental, and related issues. Since the conventional estimate is 10 years to bring a mining project to full production, there will not be any metals manufacturing in Alaska over the short term.

With the exception of aluminum, the U.S. primary metals industry is expected to experience relatively slow growth over the foreseeable future. This industry group will be hampered by excess capacity, rising energy and pollution control costs, and competition from government-supported foreign imports. In addition, less developed countries with mineral resources are attempting to establish primary metals industries as a basis for economic development, contributing to world overcapacity and lower prices. On the other hand, the Japanese are likely to increase imports of primary metals as a result of high energy costs and environmental problems.

Overall, it appears that the U.S. metals industry will not be a significant generator of metals production activity in Alaska. However, Japan will be a market for Alaskan mineral ores and possibly primary metals.

The major resource-based primary metals industries are copper, lead, zinc, and aluminum. The outlook for the first three in Alaska, and in the United States as a whole, is not good. The copper industry has substantial excess plant capacity, and is expected to continue losing markets to aluminum as it has for the past 30 years. In addition, new fiber optics technology will begin to affect a major copper market (cable). Use of lead in paints and gasoline will continue to decline, although there will be some growth in lead production for batteries. The zinc industry will experience almost no growth through 1990. Zinc has lost much of its principal market (automobile castings) to plastics, and about 60% of U.S. consumption is provided by imports. (In fact, no new zinc smelter has been built in the United States since 1941, and nine have been closed.) It therefore appears that even if copper, lead, and zinc are mined in Alaska, there will be little incentive to add new smelting capacity there.

The outlook for primary aluminum is somewhat better. This is the only metals industry in which growth is expected to exceed GNP growth in the United States. Significant new demand will be generated by the automobile industry as it attempts to build lighter, more fuel-efficient cars. In fact, the aluminum industry will begin to experience capacity shortages in the early 1980s. In addition to the increasing U.S. demand, Japan will be seeking sources of primary aluminum as high energy costs restrict domestic production.

Primary aluminum production is a raw materials-oriented industry, but the resources which determine its location are both bauxite and electricity. U.S. aluminum production is concentrated in the Pacific Northwest, where the industry has been able to obtain hydroelectric power at rates two to five times lower than those in other parts of the country. Recently, however, uncertainty has arisen about the continued availability of low-cost industrial power. It is likely that electricity prices charged aluminum producers will be increased substantially (200-300%) and the interruptible component of industrial power increased, as long-term contracts expire during the 1980s. If Alaska's hydroelectric resources are developed and are able to provide relatively low-cost and stable power, the state might become attractive to the aluminum industry.

The Japanese are also looking for sources of aluminum. (Electricity costs in Japan are currently about 10 times higher than those of Pacific Northwest producers.) Japanese companies are expected to invest in U.S. aluminum capacity, directly or through joint ventures, and the Alaska-Japan trade link may make an aluminum plant in Alaska more attractive.

Overall, while primary aluminum production in Alaska will be dependent on the development of large-scale hydroelectric projects, this industry may be a good long-term development candidate.

Other nonferrous smelting industries perform primary refining of non-ferrous metals other than copper, zinc, lead, and aluminum. While many of these metals are present in Alaska (e.g., antimony, gold, nickel, tin, uranium), there are currently no plans for the large-scale mining operations which could lead to primary processing. At best, industries in this group may be developed at some time after mining is undertaken, but this would not occur in the next 10-15 years.

As mentioned above, while the steel industry's principal characteristics and location requirements do not indicate likely Alaskan location, a direct reduction plant is a possibility. Overall steel industry characteristics indicate no raw materials orientation and forward and backward links, as well as concentration dependence and urban orientation. A direct reduction facility, however, would take iron ore mined in Alaska and use substantial amounts of natural gas to produce sponge iron. This iron could be shipped to existing steel plants which process scrap iron or could be processed into crude steel shapes in an integrated facility.

The process of direct iron ore reduction is still considered to be in the experimental stage by most U.S. steel producers. If the natural gas used in reduction is priced at its fuel equivalency value, direct reduction would not be competitive with other iron producing processes (e.g., use of scrap metals). Therefore, when coupled with the rather modest growth expected for U.S. steel production, there will not be any significant demand for reduced ores in the lower 48 over the next 10-15 years. All such production would have to be exported, with Japan as the principal market.

Steel industry growth in Japan is expected to be substantially below the historical level but above the country's GNP growth. As Japan begins to import more raw materials in a semi-processed stage, it may become an excellent market for Alaskan sponge iron or crude steel shapes. (Mitsubishi has been studying mining iron ore in Alaska, and Japanese industry could invest in an Alaskan reduction plant to support its mining operations.)

The most likely configuration for an iron/steel facility would be a shoreline steel mill (integrated through the production of crude steel shapes) located to minimize transportation costs. However, economies of scale would dictate a large facility with a 3-4 million ton capacity and a work force between 3000 and 8000 employees. Even with total employment at the low end of this range, Alaskan labor costs would be a serious inhibitor to such a facility. (Moreover, the state's labor market would

probably not be able to supply so many workers to a single plant, necessitating in-migration of new population.) However, if Alaskan labor costs were offset by substantial energy and pollution control costs in Japan, such a facility could be developed.

E. STATE OF ALASKA ECONOMIC DEVELOPMENT GOALS

In order to help determine target industries for attraction or investment, the state will also want to consider the extent to which each industry or development meets various economic development goals. That is, if two possible investments are equally attractive in terms of financial criteria (rate of return, etc.), the ability to meet state goals will establish the preferred alternative.

The state's principal economic development goals, drawn from interviews and published statements, are:

- Diversification of the economic base to provide a more stable economy less subject to industry-specific problems (poor fishing seasons or supply/demand imbalances) and to lessen the impacts of seasonality and cyclicity.
- Increased employment opportunities to offset high unemployment rates.
- Increased resident employment -- that is, new jobs created should be able to be filled by present residents rather than requiring special skills which are not available in the resident labor force.
- Increased business ownership by residents, either directly or in partnership with other investors, to retain more of the value added in manufacturing in the state and provide further stimulation to economic growth.
- Retention of value added in the state to provide Alaskan residents and state and local government with a greater share of the value of renewable and nonrenewable resources.
- Vertical integration of resource-based activities from extraction through primary processing to intermediate and final products. Each additional step in the processing chain increases value added and employment generated.
- Reduction of seasonality.
- Reduction of cyclicity.

- Import substitution to reduce the high costs of consumer and other goods transported from the lower 48 or from other countries.
- Regional diversification to provide private sector employment opportunities outside the Anchorage-Fairbanks corridor and the Southeast.
- Additional state tax and other (royalties, etc.) revenues to help provide services to population and business.
- Reliance on renewable resources to develop a long-term stable economy which will continue to provide jobs and tax revenues "when the oil runs out."
- Minimum environmental impact to prevent damage to Alaska's wildlife and scenic resources.

Table V-7 shows the relationships of each of the candidate industries and the non-manufacturing sectors to the state goals. Each industry has been ranked high, medium, or low based on its likely ability to meet each goal.

Manufacturing activities already carried out in the state (fish processing, logging, pulp mills) will provide little diversification. The greatest opportunities for economic diversification exist in paper and paperboard, chemicals, and primary metals. These latter industries would broaden the economic base not only because they are substantially different from existing industry but also because they include such a large variety of possible products and hence markets.

Industries were considered to be significant generators of employment either because a single operation would require a relatively large work force (pulp mills or metal smelters) or because there was a potential for several operations employing fewer employees (e.g., fish processing or logging and sawmills). Local market-oriented industries (wood products or ready-mixed concrete) would probably be small operations and generate relatively little employment. However, in almost all industries, the opportunities for resident employment (that is, the share of jobs generated that could be filled by residents) are great. Only in chemicals and petroleum refining would a significant number of jobs require in-migrant workers to provide professional and technical skills.

There are opportunities for resident business ownership in almost all industries, particularly in the form of joint ventures between resident owners of resources (i.e., native corporations) and large corporations with the technical and financial ability to develop those resources. Smaller businesses may be wholly owned by Alaska residents, since these would be

TABLE V-7

RELATIONSHIP OF CANDIDATE INDUSTRIES TO STATE GOALS

Candidate Industries	State Goals												
	Diversification	Increased Employment	Increased Resident Employment	Resident Business Ownership	Retention of Value Added	Vertical Integration	Reduction of Seasonality	Reduction of Cyclicity	Import Substitution	Regional Diversification	Additional State Revenues	Reliance on Renewable Resources	Minimum Environmental Impact
Canoe/Seafood	L	H	H	M	M	L	L	L	L	M	M	H	H
Fresh/Frozen Seafood	L	H	H	M	M	L	L	L	L	M	M	H	H
Logging	L	H	H	H	L	L	L	L	L	M	M	H	M
Sawmills	L	H	H	H	L	L	L	L	L	M	M	H	H
Specialty Sawmills	L	L	H	M	M	M	L	L	M	L	L	H	H
Mills/Work	M	M	H	M	M	H	M	L	H	L	L	H	H
Wood Containers	M	L	H	M	M	M	L	L	L	L	L	H	H
Wood Processing	L	L	H	M	M	L	L	L	L	L	L	H	H
Miscellaneous Wood Products	M	L/M	H	M	L	M/H	M	L	M/H	L	L	H	H
Pulp Mills	L	H	H	M	M	M	M	H	M	L	L	H	H
Paper Mills	H	H	H	M	M	H	H	H	M	M	M	H	H
Paperboard Mills	H	H	H	M	M	H	H	H	M	M	M	H	H
Cyclic Intermediates	H	M	M	M	M	M	H	H	M	L	M	H	L
Organic Chemicals	H	H	M	M	M	H	H	H	M	L	M	H	L
Inorganic Chemicals	H	H	M	M	M	H	H	H	M	M	M	H	L
Fertilizer	H	M	H	M	M	M	H	H	M	M	M	H	L
Fertilizer Mixing	H	L	H	M	M	M	H	H	H	L	M	H	L
Agrochemicals/Chemicals	H	M	H	M	M	H	H	H	H	L	M	H	L
Petroleum Refining	H	M	H	M	M	H	H	H	H	L	M	H	L
Asphalt	M	M	M	M	M	H	H	H	H	L	M	H	L
Cement	M	N	H	M	M	H	H	H	H	L	M	H	L
Concrete Block and Brick	M	N	H	M	M	H	H	H	H	L	M	H	L
Other Concrete Products	M	N	H	M	M	H	H	H	H	L	M	H	L
Heavily mixed Concrete	M	L	H	H	H	H	H	H	M	L	L	H	L
Reinforcing Materials/Processing	H	M	H	M	M	M	M	M	L	L	N	L	L
Loggers/Sawing	H	H	H	M	M	M	H	H	H	L	L	L	L
Lead Smelting	M	M	H	M	M	M	H	H	L	L	M	L	L
Zinc Smelting	M	H	H	M	M	M	H	H	L	L	M	L	L
Aluminum Smelting	H	H	H	M	M	M	H	H	H	L	M	L	L
Other Nonferrous Smelting	H	M	H	M	M	M	H	H	H	L	M	L	L
Nonferrous Refining	H	M	H	M	M	M	H	H	H	L	M	L	L
Agrochemicals	H	M	H	H	M	M	L	H	H	L	M	L	M
Fertilizer	L	M	H	H	M	M	L/M	H	H	L	M	L	M
Iron/Steel	M	H	H	H	M	M	H	H	H	L	M	L	M
Oil and Gas	L	L	L	L/M	M	L	M	H	L	L	M	L	L
Coal	M	L	M	L	M	L	M	H	L	L	M	L	L
Hardrock Minerals	H	H	H	L/M	M	L	M	H	L	L	M	L	L
Special Projects/Construction	L	H	H	L	M	L	M	H	L	L	M	L	L
Gas Pipeline	L	H	H	H	M	L	L	L	L	L	M	L	L
Capital Move	L	H	H	H	M	L	L	L	L	L	M	L	L
Hydro Electric Development	L	H	H	M	M	L	L	L	L	L	M	L	L

Key:
L = Low
M = Medium
H = High

less likely to attract outside investors. While there will probably be substantial resident investment in the fish processing industry, resident business ownership for this industry is rated only medium because of the current and expected future participation of Japanese firms.

Value added in manufacturing is the difference between the price of the product and the cost of raw materials. The principal components of value added are payroll and profits. Therefore, resident employment and business ownership will increase the share of each industry's value added retained in the state.

Vertical integration refers to the stage of the processing chain represented by an industry. As raw materials proceed from extraction through primary processing to final products, vertical integration increases, as do employment, wages, and value added derived from the particular resource. The industries likely to provide the greatest vertical integration are pulp and paper, chemicals, and concrete products, although the first two will be much greater sources of jobs and value added.

Almost all manufacturing industries would contribute to the reduction of the economy's overall seasonality because they are year-round activities. Fish processing, logging, and wood preserving (which is expected to follow the heavy construction industry) are seasonal activities and would thus tend to increase overall seasonality of employment.

Reduction of cyclicity will depend on the establishment of large-scale operations (or many smaller operations) which will not be affected by natural cycles (such as fishing is) or by the swings created by major construction projects. (However, these industries will all be affected by national and international economic cycles.) Industries which would reduce cyclicity are pulp and paper, chemicals, and metals all of which would serve export markets and not be affected by the state's population, employment, and business swings.

Import substitution is the replacement of goods currently purchased outside Alaska with locally produced goods. The principal opportunities here are chemicals (particularly fertilizers), petroleum products, and cement. While there might be some in-state use of products from other industries (e.g., metals), opportunities for import substitution would not be significant.

There are few industries likely to provide significant regional diversification of economic activity. Local market-oriented businesses, and large manufacturing plants, will tend to locate near the largest concentration of population and workers -- the Southcentral region. Fish and timber resources will attract some primary processors to other regions, but the Kenai Peninsula and Anchorage areas are likely to be the sites of most new industry.

Industries which create jobs and profits will provide income and business tax revenues to the state (and property tax revenues to local governments). The level of state revenues will generally depend on the size of an industry. However, manufacturing industries will not have the revenue-producing power of extractive operations (particularly oil and gas) which pay royalties and severance taxes.

Fish processing, lumber and wood products, and pulp and paper are industries which rely on renewable resources. Other candidate industries are based on "non-renewable" petroleum and mineral resources. The single exception is primary aluminum. The resource which would attract this industry to Alaska is hydroelectric power, and in this context aluminum would be a renewable resources industry.

The final state goal is to minimize adverse environmental impacts. In general, the farther down the processing chain an industry is, the less likely it is to create air and water pollution and similar impacts. The candidate industries most likely to meet this goal are fish processing, wood products, and concrete products. Logging has the potential to create some adverse environmental impacts, but these would not be as severe as impacts of other industries. More than half of the candidate industries are likely to have severe environmental impacts, and even if plants are designed to meet pollution control standards, these industries may have trouble obtaining necessary development permits.

Overall, it is clear that none of the candidate industries meets all of the state's goals. Fish processing will use renewable resources to create jobs, but will provide little diversification or moderation of seasonality. The chemicals industries will create jobs and diversify the economy, but will rely on nonrenewable petroleum feedstocks and tend to create air and water pollution problems. Similar conflicts exist for the other industry groups.

In order to select its "target" industries, the state will have to determine which of these goals are most important. Reliance on renewable resources may limit opportunities for diversification and reduction of seasonality. Creating jobs not subject to seasonal or cyclical swings may increase the potential for adverse environmental impacts. The resolution of these issues will be based on political and social, rather than economic, decisions.

VI. CONCLUSIONS

A. OVERALL OUTLOOK FOR ECONOMIC DEVELOPMENT IN ALASKA

Because of its resources, Alaska has substantial potential for economic growth and several paths which development could follow. The most likely pattern will be moderate growth of the basic sectors of the economy with gradual expansion of the economic base and development of new industries. As these basic sectors -- agriculture, forestry, fisheries, mining, and manufacturing -- expand, the support sectors -- construction; trade; transportation, communications, and utilities; finance, insurance, and real estate; and services -- will also expand to serve the needs of population and business.

The state's economy will continue to be impacted by discrete events -- gas pipeline construction, OCS development, the proposed capital move, potential large mining projects -- which will produce fluctuations in population, employment, the rate of inflation, and similar problems. The expansion of the economy will, over the long term, help to moderate some of the adverse impacts.

While the state will be able to exert some influence over the direction of economic development, either through the Permanent Fund or other actions, many of the principal influences will be outside its control. Long-term development of minerals, agriculture, and other resources will depend to a large extent on world demand and prices. Federal actions -- particularly the resolution of the d-2 lands issue -- will also help to determine Alaska's economic future.

B. SHORT-TERM DEVELOPMENT

Over the short term (through 1985), there is not likely to be significant development of new economic activities. Principal industries will be fishing and fish processing, lumber and pulp, and oil and gas extraction and processing. There will also be moderate growth of tourism and possibly agriculture. Increasing local demand may lead to additional coal mining to supply power plants and development of a cement plant to serve the construction market. The major construction project will be the gas pipeline (scheduled to employ a peak work force of 9000); the capital move will also generate significant construction employment and related activity if it is undertaken.

The best short-term prospects for economic growth will be in fishing and fish processing. The 200-mile fishery conservation zone has provided several expanded and new opportunities for Alaska in this industry. Recent data indicate significant improvements in the salmon fishery. The shellfish harvest is also increasing. There will thus be continued growth in both fishing and processing operations related to Alaska's traditional resources.

More important will be the expansion into bottomfishing, a new industry for Alaska fishermen. Initially, this will be only a fishing operation, with the catch sold to foreign processors with available floating or shore-based factories. However, U.S. operations will soon begin processing as well. Opportunities include factory ships or shore-based facilities for freezing and canning and facilities to process fish into products such as frozen fish sticks.

Bottomfishing can be carried out year-round, so that employment generated by such activities will not have the seasonality of existing fishing and fish processing. Opportunities for resident investment (particularly by native corporations) in both fishing boats and processing plants are excellent, although Japanese firms will likely continue to have a significant presence in Alaska's fishing industry.

Lumber and pulp operations will begin to experience growth as soon as institutional problems are resolved. Japanese demand for both logs and pulp is expected to be strong. Therefore, when state and native corporation lands become available for logging, or if federal restrictions in the Tongass National Forest are lifted, there should be a ready market for lumber for export and for processing into pulp. It is also possible that another pulp mill may be built in the state, probably with significant Japanese investment.

The oil and gas industry will continue to contribute to Alaska's economy, although there will be little new direct employment generated. (The gas pipeline and possible OCS support facility construction would, of course, create a large amount of short-term employment.) Principal oil and gas exploration activities will be undertaken offshore and on native corporation lands, and there will probably be continued opposition to OCS oil production.

The processing plant based on the state's royalty oil should be in operation by 1985. The ALPETCO proposal recently approved by the Alaska Royalty Oil and Gas Advisory Board envisions about 1800 permanent jobs in plant operation, maintenance, and shipping and an additional 2600 construction jobs. If this project is carried out as currently planned, the direct and spinoff impacts on employment and income would be substantial. The principal problem will be finding markets for the plant's products. If a less ambitious project is undertaken, which would operate as a fuel refinery without significant petrochemical production, employment and other impacts will be considerably less (about 400 permanent jobs). Over the short term, this may be a more realistic appraisal of petroleum refining/petrochemical industry growth.

Promotion in the U.S. and Japanese markets and possible charter air packages will produce moderate growth in tourism. However, vacation travel to Alaska is likely to remain highly seasonal. Business travel will continue to be a very important part of the total visitor industry, and its principal component in the off-peak season. Opportunities for growth and investment include additional first class hotels and restaurants and development of vacation resort facilities, possibly directed toward skiing or fishing attractions.

The effects of increasing state government interest in agriculture will begin to be felt as lands are opened for farming (e.g., the Delta project). Native corporations may also begin to invest in agricultural developments on their lands in order to balance the need for income with a desire to preserve traditional cultures and life-styles. Over the short term, agriculture will be developed primarily to serve the local market, and this experience will help to determine the feasibility of export-based agricultural projects by providing information on methods and productivity of Alaskan farming.

Expansion of coal mining operations will probably occur in the Beluga fields west of Anchorage. Initial production will be for the local market, replacing natural gas as the fuel for electricity generation for Anchorage. Because production of Beluga coal for export would require a deepwater port facility in Cook Inlet, short-term coal production will be limited to supplying in-state requirements.

The one new industry likely to be developed over the short term is a cement plant. Both the state and native corporations have expressed interest in cement manufacturing, and the limiting factor has been the size of the local market. It is estimated that the minimum economic size of a cement plant would be about 200,000 tons per year, and Alaskan baseline demand is now some 150,000 tons per year. A major concrete-consuming construction project (e.g., the capital move) would provide the necessary impetus for plant construction, with permanent employment of about 300 people.

C. LONG-TERM DEVELOPMENT

Over the longer term the outlook for Alaska's economy is more difficult to estimate because of the many factors which will influence its direction:

- The amount of land available for development in the state and types of development allowed,
- Environmental and other regulatory constraints on extractive and manufacturing operations,
- U.S. policy on imports of raw materials and strategic or economic stockpiles,
- The need for new and/or politically stable sources of raw materials,
- World market prices for raw materials and primary products,
- The impacts of new technologies on production cost and resource requirements (i.e., materials substitution), and
- The cost and availability of existing and new (e.g., solar) energy sources.

All of these factors are outside the state's control, limiting its power to control its economic future. Political actions and market dynamics will have to be evaluated frequently to determine changes in demand for products and principal markets. However, Alaska's economy, which will continue to be based on resource extraction and processing for growth, will not be able to respond to short-term market events. New developments will have to be based on long-term, stable growth trends. (That is, a new mine or processing facility cannot be established to meet a spot shortage. Development will depend on projected long-term demand growth.)

With these caveats in mind, it appears that long-term (after 1985) growth of Alaskan economy will be based on expansion of short-term economic activity. However, there is likely to be more hardrock mining activity as demand for specific minerals increases and the more easily accessible (and less costly) reserves are exhausted. Mining development will probably be facilitated by introduction of new mining and mineral handling technologies and gradual expansion of the state's transportation infrastructure.

There is also likely to be some development of large-scale hydroelectric power plants in the mid- to late 1980s. Development costs for these facilities, and the resulting prices for electric power, will help to determine the attractiveness of Alaska to primary metals industries, particularly aluminum. Nonetheless, without dramatic changes in the expected outlook for the metals industry, there will be no primary metals manufacture in Alaska before the mid-1990s, with the possible exception of an iron ore reduction plant.

Longer-term industry developments are likely to include:

- Continued growth of the fishing and fish processing industry as better fishery management increases the allowable catch and world food demand increases.
- Expansion of pulp mills (or construction of new ones) integrated through paper or paperbound production as investors (especially the Japanese) attempt to take advantage of economies of scale and reduce pollution control costs (which are lower at integrated facilities).
- Continued production of and exploration for oil and gas, with greater focus on offshore fields. The chemicals industry will expand into production of a wider variety of basic products. (No final product manufacture is expected.)
- Continued moderate growth of tourism as development of accommodations and facilities and increased personal income and leisure time make Alaska a more attractive destination.

- Expansion of agriculture into production of some crops for export and additional in-state processing as rising world food demand provides incentives for agricultural development.
- Increased coal and hardrock mineral mining to supply world markets as rising prices make Alaskan products competitive in world markets.

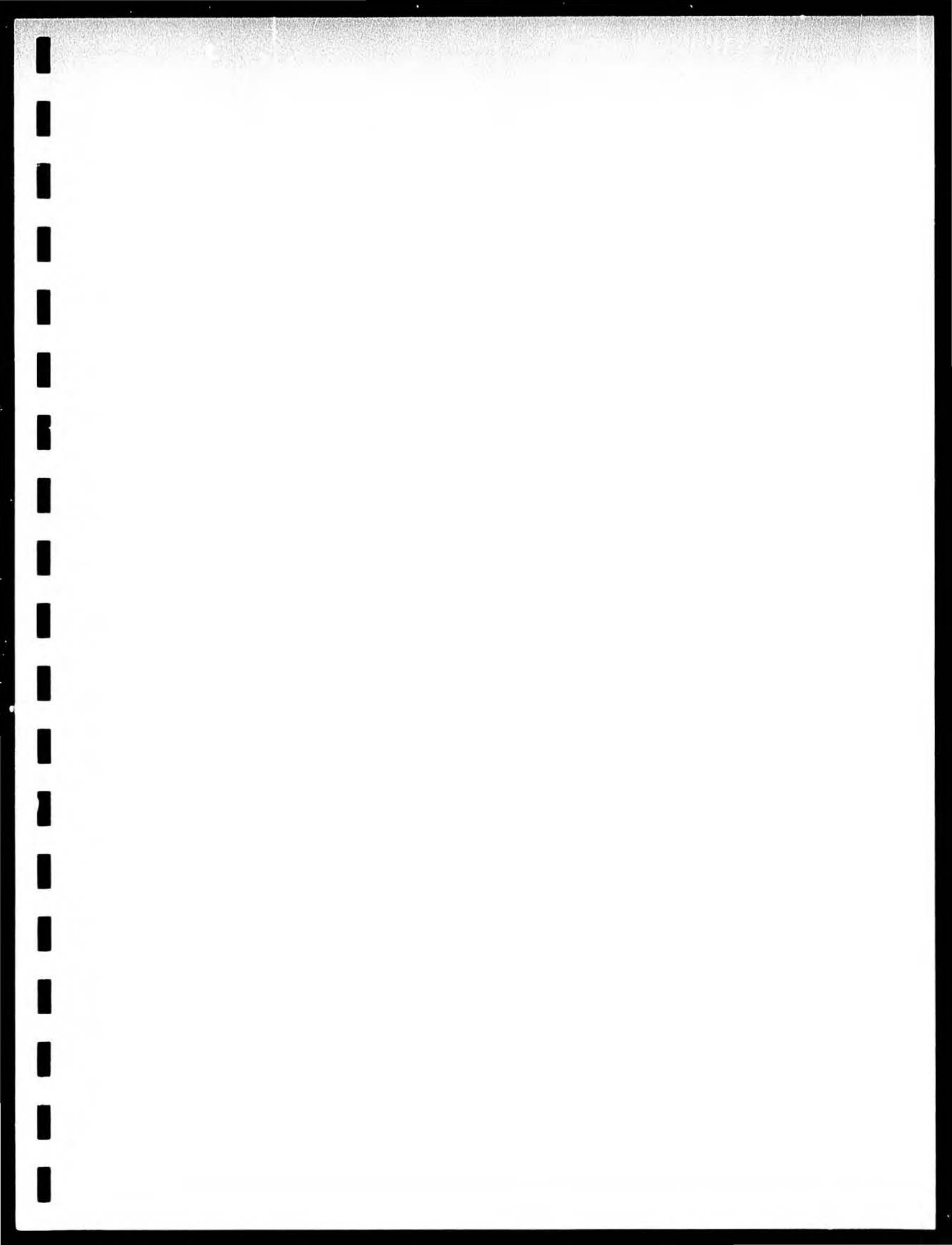
1975-85

1. Tourism - d75 in 3/5 yrs. trans. costs ↓
some public invest. - infra
2. Fishing - 1st in need + potential
3. Agric. - Della Harley a lot of potential - may really be here for export mkt. - grain. veg. oil
4. coal - dev. ops. - sket. for rail belt w/ industry export
5. cement - need a lot of int. gas.
6. asphalt - small scale, no infra. needed, } s.t. major projects

1985-200

1. Aluminium reduction - Bus. Week 3/6 - start on aluminum Power big prob. - Bonavilla shutting off - Susling! Import bauxite, need deep water port ENORMOUS PROJECT - joint hydro/aluminum
2. Iron Ore Reduction - fits AR. - reduce ore to sponge, then to crude steel - export Japan.
3. Chemical intermediates - upgrade petrochem. (mostly oil) facility. ship out semi-finished product.
4. Paper + paperboard - beyond pulp.
5. industrial port - st. monopoly - dev. deep water port, then charge up the wazoo.

State: 1) No Feas. planning. 2) joint invest. ops. w/ natives
3) infrastructure - not subsidized but long term winners - dams or deep water ports



Alaska State Legislature

file #19

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REP. RICK URION

House of Representatives

May 3, 1978

Mr. Cyril C. Herrmann
Arthur D. Little, Inc.
One Maritime Plaza
San Francisco, California 94111

Dear Mr. Herrmann:

I enjoyed the opportunity on March 21 to discuss with you and Mr. Hurley your report, "Economic Development in Alaska, A Sectoral Analysis (March 1978)". We also have been reviewing the addendum to that report of March 31, 1978 in regard to your "best estimates of the capital costs associated with establishing candidate industries in Alaska." We also notice that your estimate of these costs (\$3.7 to \$7.4 billion) does not include "necessary infrastructure".

Four fundamental questions come to mind in regard to business or industry loans:

- 1) If the business ventures within the candidate industries are viable, profitable ventures, what proof do you have that these ventures will be overlooked or misjudged by the private capital markets? Any claim that institutional barriers stand in the way of billions of dollars in business and infrastructure loans should be documented.
- 2) What portion, if not all, of the estimated capital costs can be met by private capital markets?
- 3) If some or all of these ventures cannot be financed by private capital markets, what subsidies will be required in the form of low interest rates, preferred terms, and/or special government agencies? Are the

Mr. Cyril C. Herrmann

-2-

May 3, 1978

subsidies and costs offset by net gains in employment, income, and tax receipts? These questions underlie the provisions in both the Administration and House bills on the Permanent Fund that every loan must be on "...market terms..." or with subsidies that are openly voted by the Legislature. If these investments are being proposed for various social reasons, then the economic sacrifices involved should be put on the table.

4) In so far as these ventures are viable through tax-exempt borrowing, can they avoid Treasury restrictions on the use of industrial revenue bonds and if so, how?

In order that your original report and addendum be useful as a tool for determining investment strategy, we believe these questions must be answered.

The House Permanent Fund Committee is pursuing the unanswered questions your report raises. We would like to have your written reply as soon as possible. Schedule any conferences you think necessary. Please advise by return letter your expenses or costs, if any, and I can immediately authorize the required amount from Committee funds.

Thank you for your help in this matter.

Cordially,

Representative Clark Gruening

CG:jl

SCOMM

#9:20

MORGAN GUARANTY TRUST COMPANY
OF NEW YORK

A PROSPECTUS OF
THE STATE OF ALASKA'S
FINANCES AND ITS
DEVELOPMENT OF ECONOMIC DIVERSITY

Prepared by:

MORGAN GUARANTY TRUST COMPANY OF NEW YORK
JANUARY 12, 1976

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Introduction:

Morgan Guaranty Trust Company of New York sincerely believes the State of Alaska has the opportunity for the first time in the past 100 years to diversify its economy through a well thought out economic development program which should ^{balance} ~~diversify~~ the economy. This development program must involve the State Government's administration and the Legislature, Native Corporations, and private commerce, industry and finance.

But this opportunity, as we all know, can be fraught with problems, selfishness of vested interests, and the results of bad management. It is important to minimize these potential threats to a successful development program. We believe that this can only be done by ensuring that the financial, economic, and legislative elements, necessary to commence the development program through the State of Alaska Permanent Development Fund, be firmly set in place and with reasonable consensus. Only in such a way can the foundation, on which the Permanent Development Fund must sit and rely, be strong enough to allow for the success of this rare economic diversity development opportunity.

Consequently, in the past six months we have started educating ourselves on the laws of the State, the opportunities and guidelines established by the Native Claims Act, and the economy. This educational process will continue certainly through 1976. However, at this time we offer our ideas, suggestions, and some analysis. This analysis is brief, but essential. It primarily involves a credit commentary of