SCOMM

#9:19

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Alaska State Legislature

Chairman
SPECIAL COMMITTEE ON
THE ALASKA PERMANENT FUND
Chairman
WAYS and MEANS SUBCOMMITTEE
Member
FINANCE COMMITTEE
LEGISLATIVE COUNCIL

House of Representatives

POUCH V JUNEAU 99811

M E M O R A N D U M

RE: ADL Study

TO: Reps. Malone & Gardiner

FROM: Rep. Gruening

DATE: May 5, 1978

Attached is a copy of a March 22, 1978 letter from Mr. Hurley of ADL stating that the addendum to the main ADL study "Economic Development in Alaska" was done in lieu of task 5 of the original proposal. Task 5 was not done - "...we will not be completing the development of investment criteria for the fund since our earlier work and our report suggest this step will not be neccessary." To the contrary, the report and addendum ($7.4 billion in capital needs for candidate industries) show that investment criteria are absolutely necessary. I did not approve redefinition of task 5 nor approve the addendum study as required by free conference intent.

At Hugh's urging, I wrote ADL asking for a response to the unanswered questions (letter attached). According to Peter Bushre of Revenue, who has taken Edenso's former position, the bottomfish industry feasibility study is part of the redefined task 5 which will not exceed $14,500.

Attached is a draft copy of the proposal which will have some of the same deficiencies the original ADL study has. Edenso is now in San Francisco talking to ADL and the final ADL proposal for bottom fishing is being developed. I suggest we contact ADL and Edenso (Hyatt House 415 398-1234) and get a meaningful study done.

PF Consult:
A D Little

Arthur D. Little, Inc.
SAN FRANCISCO

ARTHUR D. LITTLE, INC.

QUALIFICATIONS AND RELATED EXPERIENCE

Arthur D. Little, Inc.

STRATEGIES FOR

ECONOMIC/INDUSTRIAL DEVELOPMENT:

REGIONAL AND LOCAL

Massachusetts 'Quality of Life' Analysis

ADL made a detailed statistical analysis of the "quality of life" in Massachusetts for the Massachusetts Department of Commerce and Development. The study focused on the relative standing of 22 major states regarding governmental affairs, business conditions, living conditions, transportation, health, environment, culture, recreation, and education.

Illinois: Growth Opportunities

For the Central Illinois Public Service Company, we examined the regional economy in an effort to identify its assets and liabilities for the purpose of determining opportunities for future industrial growth. The locational advantages of the region were analyzed in light of current market and technological trends within industry groups, to identify those industries most likely to locate and expand in the region.

Mississippi: Local Investment

In an effort to stimulate the interest of local investors in opportunities within the state, the Mississippi State Legislature passed the Internal Industrial Development Act in 1960. ADL was asked to assist the Mississippi Agricultural and Industrial Board in identifying suitable operations for local investment and by preparing feasibility studies of the most promising opportunities.

The preliminary survey of the Mississippi economy and its resources uncovered a number of possible investment opportunities, several of which were recommended for detailed evaulation. Among them were operations involving refrigerated storage, canning, tool and die manufacture, plastics fabrication, furniture assembly, and plywood production.

For each business, feasibility studies identified the potential markets for specific products manufactured or handled, special marketing techniques that would be involved, suitable manufacturing operations, the size of the operation dictated by the potential market, manpower requirements, raw-material availability, transportation facilities needed, investment requirements and operating costs were detailed so that investors could calculate the effect of greater or lesser investment or of joint investment programs on each projected operating business.

Service Sectors of New England Economy

For the New England Regional Commission, Arthur D. Little, Inc., has just completed a study of the service sector as a factor in the economic growth and prosperity of New England. The purpose of the study was to develop actionable guidelines for future policies and programs aimed at stimulating growth in the service sector in the region.

ADL's Ongoing Multiclient Input/Output (I/O) Forecasting Program

ADL has been active in various phases of input/output (I/O) analysis for more than fifteen years. In addition to almost continuous activity in economic forecasting for industry and government clients at home and abroad, we have undertaken a number of I/O studies for a broad spectrum of private and government clients. These studies have been carried out by ADL staff teams made up of individuals experienced in long-range planning, product development, market research, economic and industrial forecasting, technological forecasting, computer programming, mathematical modeling, and data analysis.

The model used in these annual studies, one of the largest of its kinds, is an expanded version of one previously developed for North American Aviation in a diversification planning study. Over the years, the size and detail of the forecasts have substantially increased, and the model is being further modified and expanded to serve as the basix framework for this year's forecasting study.

ADL plans to continue and expand the industrial forecasting program in future years. Later developments will include further industry disaggregation, preparation of additional short-term forecasts and of other forecast information that the clients feel will be of value, and possibly the use of a computer time-sharing system.

California State Development Plan

The California State Planning Office retained ADL to prepare an economic and demographic forecasting model for use by the California State Development Plan. This was developed to prepare forecasts of statewide economic growth as part of an extensive research program designed to provide reliable, consistent, and comprehensive information on statewide and regional development trends, potentials, and the problems facing the California legislature and state administration.

The ADL study steam developed a labor force input/out growth model which made it possible to analyze statewide and regional manpower problems and opportunities. On the supply side, labor force projections and detailed demographic studies provided forecasts of the labor force by year, by age and sex. On the demand side, labor force projections were made through a detailed structural interindustry relationship analysis of the California economy. One unique feature of the projection model was that it estimated the demand levels for the goods and services produced by different industries through the use of wage data and the use of a combination of input/output and multiple-regression analysis techniques.

The model, which was programmed for solution on a computer, was designed so that it could be readily updated when new information was obtained as part of the routine data collection program of the state. The model enabled ADL to test out the repercussions of different state and federal spending policies and programs, such as the reduction in national defense spending.

North Dakota

In an attempt to broaden the base of North Dakota's economy and to stop the population decline in the state, 16 large business concerns having business interests in the region banded together as the "Resources Research Committee" and employed Arthur D. Little, Inc., to appraise the possibilities for industrial development based on the extensive lignite deposits. A comprehensive program of study was undertaken and included as a first step in a study of the technology of lignite (which brought together all available data on lignite), an appraisal of United States energy needs and where lignite fits in; and an economic survey of the region. Information obtained in these studies provided the basis for feasibility studies of specific opportunities, such as an aluminum smelter in the North Dakota area, utilizing lignite in the iron ore industry, producing ammonia and methanol from North Dakota lignite, locating a chlor-alkali plant in North Dakota, production of organic chemicals from lignite, and similar studies.

Missouri

Arthur D. Little, Inc., was retained to assist in identifying potential new opportunities in all manufacturing sectors outside agriculture. We evaluated considerable statistical material on industrial growth, Missouri resources, and industrial trends as well as environmental factors bearing upon the rate of development. We helped to identify those industrial sectors which, based upon their relationship to regional resources and markets and their growth potential, would be logical additions to Missouri's industrial economy. Recommendations were made of those sectors in which further detailed feasibility studies should be undertaken. We also recommended action which the Missouri Division of Commerce and Industrial Development should take to accelerate the rate of industrial development. This approach permitted the Division and other development groups to devote their efforts to attracting those industries which could benefit directly from a location within Missouri, preventing diffusion of attention over the entire industrial spectrum.

West Virginia

For the State of West Virginia, Arthur D. Little, Inc., undertook a four-year industrial development program that contributed substantially to the growth of capital investment in the state. After an initial base study of the state's economy, specific industrial feasibility studies were carried out in the fields of chemicals, apparel, metal fabricating, plastics, electronics, woodworking, aluminum, and nuclear energy.

Maine

In 1958, Arthur D. Little, Inc., made a comprehensive survey of the economy of Maine and of Washington County in Maine for the U.S. Army Corps of Engineers. The object of this study was to determine the economic impact of a proposed tidal power project in the Passamaquoddy Bay area. The report included analyses of population, employment, income and business fluctuations; Maine's fishing, manufacturing, and forest products industries; transportation; tourism and recreation; banking and finance; and mineral and other natural resources. It also assessed the interest of selected U.S. industries in the Passamaquoddy Power Project.

Industrial Development Study for the New York City Planning Commission

Concerned about the continuing decline in the city's manufacturing base and the consequent loss of job opportunities, the New York City Planning Commission asked ADL to study and recommend the types of financial assistance and administrative organizations and procedures needed to facilitate the development and maintenance of a healthy industrial environment. Upon analyzing New York's unique industrial problems, ADL made several recommendations. One of these was the creation of a new agency, with the suggested name of "Public Development Corporation," which would help provide low-cost space for industry. It could be established under existing state legislation and would not require any constitutional amendments in order to be used under the city's urban renewal powers.

The Public Development Corporation would be wholly owned by the city and would provide funds to carry out viable projects. A line of credit for the corporation would be established by using the city-owned vacant, condemned, and underdeveloped land as collateral. This presently unused land would make it financially possible for the corporation to borrow outside the city's debt limit. By drawing on the line of credit made possible by the fluid land reserve (estimated at more than $100 million), the corporation could borrow additional funds and undertake the construction of major development and subsequent leasing of space to appropriate industries.

Development Program for the Harrisburg Economy

ADL completed a project for the city to develop a practical and effective program for the development of the Harrisburg economy. A five-part program of work was designed to carry out the proposed project. It provided both a sound basis for an industrial and economic development program, and an implementation strategy that will be effective in yielding both immediate and long-term results. The results of the project were summarized in a short-range (immediate) action program which took advantage of immediate opportunities, and assisted firms which had not fully recovered from the effects of Hurricane Agnes. A longer-term implementation program to be carried out over the next three years suggested improvements that require more time to be accomplished, such as providing industrial and commercial sites through redevelopment, developing plans for areas that can developed only after flood control projects or new highways have been completed, and a marketing program designed to complement the implementation phase of the Harrisburg, Inc., project. A detailed administrative program and budget for the industrial and economic development program to be carried out during the next three years was also prepared.

Assessment of the New England Economy

ADL conducted a study for the New England Regional Commission, performing a general assessment of the New England economy. For this study, we conducted systematic comparative analyses of the significant relationships between the nation, New England, the states of New England, and the states' subregions utilizing relevant and currently available economic and demographic data. ADL also made an analysis of recent economic projections and presented a set of projections for 1975 and 1980, fully documented with respect to underlying assumptions. On the basis of our analyses, the contractor undertook to plan public investment programs for the region on a five-year plan to 1980.

Economic Study for Puget Sound Regional Transportation Agency

ADL conducted an economic study for the Puget Sound Regional Transportation Agency, Seattle, Washington, to forecast the economic growth potentials of a four-county area for a 15-year period. ADL developed forecasts for this region by using a modified economic base input/output forecasting model. The model traced the existing flows of goods and services among the various sectors of the region's economy and the relationship between the region's economy and the economy of the western United States.

Special questionnaire surveys were conducted among manufacturing industries of the four-county region to augment published data. In addition, special studies of selected industry sectors significant to the area were carried out by ADL industry specialists and incorporated into the model to forecast future growth patterns. The information generated from this study has been used in long-range transportation planning for the Puget Sound area.

Land Use Program for Colorado

ADL assisted the State Land Use Commission in building a program that would provide a framework and process whereby the state and its political subdivisions can guide future development. The study focused on the issues, regions, goals, policies, programs, delivery system, and implemenation action.

The recommended land use program emphasized the local and regional levels of government as the primary decision makers on local questions of land use, and imposed an equitable and consistent discipline on development decisions, rather than a piecemeal and haphazard development. It established a new framework with closer working relationships among agencies and provided a process for guiding growth focused on enhancing the quality of life.

The final report was divided into three parts. Part One contained projections of population and economic trends for Colorado and its five regions, and an explanation of the planning process and the selection of goals, targets, and policies. Part Two presented the recommended programs by region in the areas of environment, economic growth and population, natural resources, and social concerns. Part Three described regulatory tools, organizational structures, and short- and long-term strategies for carrying out the Colorado Land Use Program.

Mendocino County General Plan

ADL was selected to prepare the General Plan for this Northern California county. Our report to the Board of Supervisors and the County Planning Commission involved the traditional projections and allocations of transportation, land use, and public facilities, but was distinguished by its extensive analysis of the economic underpinnings which determine and shape the county's future development. A separate document was prepared which dealt with the land and resources in their economic context as well as with the future potential of the basic industries. A program was recommended to maximize their growth so as to insure a stable and prosperous base for the future physical development.

Lassen County Development

This study was to determine how public lands and facilities should be developed in Lassen County in order to encourage maximum development of private industry. Lassen County was attempting to relate its public expenditures directly to economic development and desired that its Master Plan include an explicit set of public actions to be implemented between 1967 and 1990. The study also included considerations of public controls over the environmental quality of Lassen County's scenic attractions.

Illinois Regional Growth Potential

For the Central Illinois Public Service Company, ADL examined the regional economy in an effort to identify its assets and liabilities for the purpose of determining opportunities for future industrial growth. The locational advantages of the region were analyzed in light of current market and technological trends within industry groups, to identify those industries most likely to locate and expand in the region.

Iowa Development Policy

The Iowa Development Commission commissioned ADL to divide the state into regions in terms of development policy, and to identify industrial and related growth opportunities for the state and its regions. We called for a reorientation of Iowa's program, stressing the vital interdependence of urban and rural areas and the regional approach on a multicounty basis. We used the principle of focal points to divide the state into regions, thus providing the basis for regional opportunity and organizational studies. Numerous specific opportunities were identified and discussed as the first step in proving industrial feasibility and developing prospects. In order to carry out the required feasibility studies, recommendations for staffing the state organizations were included.

New England Economic Diversification and Growth

For the Federal Reserve Bank of Boston, ADL surveyed New England's industrial opportunities by analyzing its human and material resources and the problems of its declining textile industry. The objective was to discover new markets and opportunities for New England manufacturers and to establish new industries suitable to the region. Emphasis was placed on the feasibility of developing the region as a center for several major new industries which, by their nature and locational requirements, would be appropriate to the area.

Washington State Economic Model

ADL developed an econometric model of the Washington State economy for the Washington State Legislature that is now being utilized by the Legislature in order to forecast tax revenue. The model was programmed after a period of research and analysis aimed at identifying the structure and relationships of the Washington economy. The model was tested by the ADL team working with the staff of the Legislative Budget Committee. The model was programmed for and is now being run on a computer owned by the State of Washington.

New York Public Development Corporation

Concerned about a continuing decline in the City's manufacturing base and the consequent loss of job opportunities, the New York City Planning Commission asked ADL to recommend the types of financial assistance and administrative organizations and procedures needed to facilitate the development and maintenance of a healthy industrial environment.

While New York has followed national trends, it has a number of unique industrial problems. The city's unemployment levels it not high percentage-wise, but the number of unemployed is large -- exceeding the entire labor force of Delaware. Two-thirds of its firms employ fewer than 20 people. Many of these firms have limited rent-paying abilities and lack the resources to upgrade their facilities.

As one of its recommendations, ADL suggested the creation of a new agency, with the suggested name of "Public Development Corporation," which would help provide low-cost space for industry. It could be established under existing state legislation and would not require any constitutional amendments in order to be used under the city's urban renewal powers.

The Public Development Corporation would be wholly owned by the city and would provide funds to carry out viable projects. A line of credit for the corporation would be established by using the city-owned vacant, condemned, and underdeveloped land as collateral. This presently unused land would make it financially possible for the corporation to borrow outside the city's debt limit. By drawing on the line of credit made possible by the fluid land reserve (estimated at more than $100 million), the Corporation could borrow additional funds and undertake the construction of major developments and subsequent leasing of space to appropriate industries.

Miami Valley Regional Planning Commission

ADL conducted an extensive analysis of the retailing systems contained within this five-county Ohio region. A research program of surveys and inventories was used to develop the coefficients required for a model of this retailing environment. The model was constructed jointly by the planning agency staff and ADL. Its successful completion permits the planning agency to monitor the factors that determine retail agglomeration locations and sales. The model is currently being used to predict the impact of shifts and demographic characteristics of shopping center and store locations. The same model may also be used to forecast the sales potential of specific sites when zoning policy changes are being requested by developers. Several cities within the region, including Dayton, have already utilized the MVRPC's model to aid them in developing plans for their own jurisdiction.

Development Program for the Port of Astoria, Oregon

ADL completed a comprehensive port development program for the Port of Astoria Master Plan based on a multi-purpose planning and technical approach. Recognizing the port's unique geographic location in a natural deepwater area where the Columbia River meets the Pacific Ocean, the study began with an assessment of the existing setting, i.e., an analysis of port operations and capacity within both a regional and national framework, and a social, economic, fiscal, and ecological profile of the port and Clatsop County. ADL then developed a regional framework and established a development program for the Port of Astoria, taking into consideration its future competitive position, public actions required, evaluation of alternative sites, and a comparative impact analysis of sites. Finally, the study developed a preliminary site plan for high priority sites. In examining the onshore characteristics of suitable shoreline properties, the study concentrated on hydrologic and environmental characteristics which would affect future development options.

Long-Term Development Strategy of the Southern Waterfront, Port of San Francisco

As a part of an overall strategic study, the ADL San Francisco office carried out an analysis of the financial implications of developing containership/LASH facilities at India Basin. The analysis related the specific economics of the proposed new facility to the overall capital investment and ongoing budget and financial resources of the Port of San Francisco. The study showed that significant additional non-maritime development on the northern waterfront of the Port of San Francisco would be required to carry out the development of new facilities and amortize the bonds against these obsolete facilities that the Port held.

Commercial Development of the Northern Waterfront, Port of San Francisco

For the Port of San Francisco and in cooperation with the San Francisco Planning Department, ADL completed an in-depth financial analysis of the potential for additional commercial development on the northern waterfront of the Port that would be supportive of the new maritime facilities contemplated for the southern waterfront. The study investigated the economic feasibility of all possible facilities or uses for the area, the demand for alternative uses, and their physical possibilities. It also investigated the impact of the port on the economy of the city, the economic future of the port, and the development potential of the port property on the Northern Waterfront. The investigation was analyzed to recommend a time-phased development program. This program was designed to facilitate the development of revenue for the port so that they could finance the expansion of maritime activities as indicated by our investigation of their economic future. Concomitantly, this development program considered the overall interests of the City of San Francisco as it would be affected by changing land uses along the Northern Waterfront.

Hawaii's Potential for Ocean-based Industries

The Hawaiian business community engaged ADL to appraise Hawaii's potential in the field of oceanics, or ocean-based industries. The broad purpose of the assignment was to establish whether this field held promise for future economic growth in the Islands. ADL estimated the size and timing of oceanics activity in Hawaii over the next five years, and measured its impact throughout the economy by means of an economic input/output model which had already been developed as part of an earlier transportation study on Oahu.

We assessed Hawaii's attractiveness as a site for oceanics activity as compared with other locations, and sought to identify particular attributes which might help the state to become an important oceanics center. We also noted specific detriments to development of such a center and their possible cures. Our recommendations included steps to be taken by the business community, the University of Hawaii, the state government, and all sectors concerned with oceanics in Hawaii, in order to realize the state's potential in oceanics. Finally, after reviewing the status and potential of the various private and public national programs and funding, we identified those most suited to Hawaii's resources and capabilities.

Southeast Asia Seaport Development Requirements

ADL conducted a major analysis of the seaport development requirements of seven Southeast Asian nations as part of our multi-modal, long-range Regional Transport Survey for the Asian Development Bank. The study was based on the interrelation of economic needs and transportation development in creating a healthy investment climate. We characterized the economic and transport systems of Indonesia, Singapore, Malaysia, Thailand, Laos, Vietnam, and the Philippines and prepared forecasts to 1990 of the needed regional economic and transport structures; recommended measures for greater inter-country cooperation; determined how transport could develop the region's resources and raise its standard of living; established a framework and model by which transport-related investment plans could be assessed and coordinated; developed specific programs for the Bank or outside investors, and recommended institutions for transport development and for collecting and maintaining basic data.

Arthur D. Little, Inc.

ECONOMIC ANALYSIS OF VARIOUS IMPACTS

AND

ECONOMIC FORECASTING

SPECIFIC INDUSTRY AND DEVELOPMENT IMPACTS

Impact of Naval Installation on Kitsap County

ADL recently completed a study of the economic, environmental, and community impact of a planned Trident nuclear submarine base in Kitsap County, Washington, for the Central Puget Sound Economic Development District. Study elements included a detailed analysis of the housing needs for future population, development of new communities, and the development of a population trend model. ADL determined infrastructure costs under several alternative development scenarios, analyzed sources of funds (federal, state, and local), and determined those developments which would have occurred in the absence of this specific naval installation. The study provided an evaluation of alternative development programs and their environmental, social, and economic impacts on current and future residents of the county. For each of the four alternative scenarios, ADL evaluated various techniques for the implementation of development programs, including recommended changes in relevant county ordinances and requirements for new legislation.

Reuse Analysis of NIKE Site in Southern California

With the planned U.S. Department of Defense deactivation of a NIKE missile base lying within its boundaries, the newly incorporated City of Rancho Palos Verdes asked ADL to determine through a study the best nonmilitary use for the site. Because the Palos Verdes Peninsula is a desirable residential area, the study considered housing and population trends and their relation to the city's General Plan. The demand for retail and/or commercial uses was also analyzed, as were such potential public uses of the site as governmental or educational administrative offices, auditorium and multi-purpose activity center, post office, fire station, and recreation and open space. ADL's assignment also included developing a specific site plan relating to the most promising uses, and preparing an environmental assessment.

Butler Valley Dam Economic Impact, Humboldt County, California

For the U.S. Army Corps of Engineers, ADL completed an economic impact statement that determined the short-run and long-run effects of the proposed dam/reservoir project on the flood plain of the Mad River, the lands surrounding the reservoir, and on the county. The economic variables considered included population, market value of land, employment, and income, under the assumptions of the dam being built and not being built. Projections extended to the year 2050.

Economic Analysis of Pacific Northwest Aluminum Industry

ADL undertook an economic analysis of the role of the aluminum industry in the Pacific Northwest states of Washington, Oregon, and Montana. The focus of the analysis was the ten primary aluminum reduction plants, seven of which are located in Washington. The study examined the regional setting in terms of a variety of standard economic indicators. It then analyzed the economic impact of the aluminum industry. In addition to factors like employment, purchases, and taxes, the analysis reviewed uses of aluminum. Of special note was a separate analysis on power consumption. This section traced historical power consumption of the industry and set forth a detailed discussion of actual electricity use compared with overall regional electric power deliveries.

Tourism Impact Study - City of San Diego

ADL completed a study for the City of San Diego which assessed the economic, fiscal, and other impacts of the tourism industry in San Diego. The issue had been the focus of growing public controversy over the use of city funds for tourist promotion. Elements analyzed included economic sector impact, land use consumption by the tourism industry, the cost and benefit of providing public services to tourists, impacts on public facilities such as beaches, and related environmental impacts such as air pollution.

Economic Impact of City of Long Beach's Pacific Terrace Convention Hotel

For the Long Beach Economic Development Corporation, ADL in 1975 assessed the probable economic impact of a proposed destination convention resort hotel in the greater Long Beach area. ADL determined the employment likely to be created and the direct and indirect effects of expenditures during construction and operation of the hotel. The purpose of the analysis was to provide the development corporation and the Economic Development Administration, the financial sponsor, a basis for quantitatively evaluating the major impacts associated with the project.

Tourism Impact Analysis for the State of Maryland

ADL conducted a tourism impact analysis for the Department of Economic and Community Development in the State of Maryland. In that study, ADL developed tourist profiles for the most economically significant types of tourists in each of seven regions of the state. The profiles indicated the economic impact (in terms of jobs, income, and tax revenue) each of these tourists has on the region and the state in total. The study also investigated the relationships between the state, local governments, and the private sector with the intent of identifying options and opportunities the state has in influencing other groups in Maryland to be involved in tourism development. Finally, the study looked at the resources and facilities the state has and assessed their potential for tourism development.

Economic Impact of Redwood National Park in Northern California

ADL was asked by the U.S. Department of the Interior to examine the economic impact of its proposal to establish a Redwood National Park in Northern California and to prepare both short- and long-term projections of employment and income levels in local areas. Two sets of projections were made; the first was based on the assumption that there would be no park, and the second was based on the assumption that the park would be set up. The local government's fiscal position was examined in light of both possibilities. Since the site to be occupied by the park contained much of the commercial timber stands of the local area, ADL analyzed the impact of the park on the lumber and wood products industry and concluded that establishing a park would reduce jobs in this industry by 28%. However, we forecast an overall increase in available jobs in the area due to the positive impact of tourism.

TAX IMPACTS

Major California Headquartered Bank

For a major California headquartered bank, ADL is currently developing demographic and economic baseline data for the bank's internal use. These data comprise a review of past trends (10 years) in state and local governmental costs and revenue sources. Our work has also included a projection of the impact of alternative proposed legislation for dealing with local taxation and, in addition, has considered the impact of SB 90, Serrano Priest court decision, and other major pieces of litigation and legislation.

San Francisco Tax Alternatives

In 1967 the California Legislature passed a law stipulating a uniform assessment ratio for all California real property. The law stated that all property should be assessed at 25% of its market value. In San Francisco the previously existing range of assessment ratios had gone from an average of about 10% on single-family to 50% on commercial properties. Therefore, it was important for the city to find out what the impact of new assessment ratios would be on the city's residents, by subgroups, and on various kinds of housing types.

ADL was able to gauge this impact by using the census data on housing cross-tabulated with household types that had been prepared initially for the San Francisco simulation model. Extensive computer-using analytical manipulation of the data permitted us to break out population subgroups on the basis of the kinds of dwelling units they occupy. Census data on housing rent or value was methodically treated with the inclusion of capitalization assessments to present a distribution of actual housing costs (implicit and explicit) for each category of household.

Estimates of existing assessment practices were utilized to indicate the existing tax for all dwelling units. We then simulated the impact of the tax charge under the assumption of a uniform assessment ratio of 25%. Estimates were made of the change in housing costs that would apply to the various household and dwelling unit types following the tax impost. These estimates were then found to be substantially in accord with the results of a detailed tax study conducted by the assessor with the use of assessment records. Thus, these data and simulation techniques permitted us to gauge the impact on different kinds of income groups and housing types. It also facilitated an estimate of the new tax generation.

Property Taxes and Urban Blight

The Department of Housing and Urban Development asked ADL to determine whether property taxes affect the rate of deterioration of inner city housing. ADL interviewed owners of over 400 properties in 10 cities across the country to determine how their investment decisions and rehabilitation plans are affected by the property tax. The study reports on the type of landlords who invest in city housing and when they are most directly affected by the property tax. The study also suggests alternative methods for inner city housing taxation.

Hawaii's General Excise Tax

Arthur D. Little, Inc., was engaged by the State of Hawaii to analyze and evaluate the general excise tax within the context of Hawaii's tax structure. We measured its performance against a variety of criteria such as equity, ease of administration, responsiveness of yield to economic growth and impact on industrial development. We developed an input-output model of the Hawaiian economy to measure quantitatively the economic multiplier effect of imposing the general excise tax on certain products. We performed a simplified sensitivity analysis to illustrate how critical the excise tax may be in investment decisions, particularly as it affects cash flow. Our major conclusion was that the general excise tax should be retained provided that the business community could be substantially relieved of the burden of paying the "retail" rate on inter-industry purchases. We also made other recommendations designed to alleviate the most discriminatory aspects of the general excise tax.

Washington State Economic Model

We have developed an econometric model of the Washington State economy for the Washington State Legislature that is now being utilized by the Legislature to forecast tax revenue. The model was programmed after a period of research and analysis aimed at identifying the structure and relationships of Washington economy. The model was tested by ADL working with the staff of the Legislative Budget Committee. The tests included specific forecasts for 1968-69 and 1970-71. The model was programmed for and is now being run on a computer owned by the State of Washington.

New Hampshire Cigarette Tax Study

For the State of New Hampshire, ADL estimated the amount of sales of cigarettes in the state to out-of-state buyers in order to determine what effect raising the New Hampshire tobacco tax rate might have on purchasing patterns. We conducted a consumer survey of a representative sample of over 1000 households in Massachusetts. We estimated the extent to which Massachusetts residents buy cigarettes in New Hampshire, the quantities purchased, and the seasonality of purchasing patterns. Knowledge of consumer preferences, coupled with a statistical analysis of relevant economic and social variables, enabled ADL to predict the effects of changes in the tax rate on cigarette sales. The forecast for Fiscal Year 1967 was accurate within a margin of error of two-tenths of one percent.

Arthur D Little, Inc.

PUBLIC POLICY PLANNING AND IMPACTS

Nuclear Power Plants -- Guidelines for Impact Statements

A 1971 decision handed down by a U.S. Circuit Court of Appeals (Calvert Cliffs Coordinating Committee, Inc., et. al. vs. United States Atomic Energy Commission et.al.) stated that the AEC had failed to live up to the mandate embodied by NEPA. As a result of this decision, the construction of the nuclear power plants was slowed and in some cases halted.

In reconsidering its licensing procedures, the AEC requested ADL to develop guidelines for both the preparation and analysis of impact statements. ADL's area of concentration was the impact of the manufacturing operations in the nuclear fuels cycle, including ore mining and fuel fabrication and reprocessing. The final report analyzed the legal framework within which the interests of environmental integrity must be balanced with those of industrial activity and the problems inherent in measuring environmental costs. Format and approach were recommended for applicants preparing impact statements, and guidelines were given for the AEC in discharging its regulatory responsibilities under NEPA.

Environmental Impacts -- Department of Transportation Projects

ADL assisted the U.S. Department of Transportation in responding fully and effectively to the mandates of NEPA without interfering unreasonably with the achievement of long-range transportation goals. A major part of the study was a state-of-the-art analysis of the problems inherent in measuring environmental impacts, particularly those for which qualitative rather than quantitative evaluations were required. The study defined ten categories of impact, encompassing the significant issues for transportation projects, ranging from impacts on air and water quality to impacts on the aesthetic environment.

Decision-making procedures were recommended that would interject environmental considerations into the planning of transportation projects at all levels of government. The Office of Environmental and Urban Systems, which has the responsibility for DOT compliance with the NEPA, was evaluated in terms of its role in and the options available for full compliance with environmental legislation.

Environmental Decision-Making by States

As a follow-up to the previous study for the U.S. Department of Transportation, ADL has been engaged to examine the degree to which state governments are prepared to take over various responsibilities on capital grant projects (such as highways and airports) affecting the environment. This study is in anticipation of possible revenue-sharing problems, unified transportation trust funds unrestricted by modal designation, and decentralization of accountability for projects of regional or local rather than national significance.

ADL staff members have traveled to three states to observe how environmental impact statements are prepared and by whom, what criteria are used in reviewing and approving them, and how broad a spectrum of skills and disciplines is brought to bear on environmental analyses. Currently, one state is being studied in detail to gauge the extent to which organization, staffing, budgeting, and orientation affect the quality of decision making.

Environmental Planning System -- City of Denver, Colorado

In response to increasing local concern for environmental quality, the City of Denver became one of the first cities in the United States to initiate the designing of a comprehensive environmental planning system. In the first part of a two-phase program, ADL was engaged to develop a conceptual framework and assist in developing strategies for system implementation.

Through case studies of selected projects, the environmental decision-making process was evaluated. In making its recommendations, ADL considered the prerequisites for development of the consensus, policies, plans, and government structures that would ensure decision making uniformly consistent with environmental policy. Among the considerations were the critical procedure steps in this decision-making process, the principal actors, the requirement for an environmental data base, the environmental impact statement as a vehicle for decision-making, and the problems in evaluating dimensions and significance of impacts.

National Commission on Water Quality - Regional Assessment Study

Recognizing that the new Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) would have varying impacts on different geographic regions, the National Commission on Water Quality commissioned ADL to conduct a regional assessment study on the San Francisco Bay-Central Valley of California. The purpose of the study was to ascertain, describe, and explain the region-specific impacts of achieving or not achieving the goals and requirements of PL 92-500. Further, it was to clarify and describe the relationship between the existing social, environmental, and economic conditions and the types of impacts engendered by the Act.

The study was structured into two phases. Phase I focused on developing a baseline profile of the region including the identification of the principal issues, problems, and representative subareas. Phase II addressed and analyzed the important social, economic, environmental, and institutional changes from the baseline profile which would occur if specific actions were implemented to control or abate water pollution.

The study found that there was a period of adjustment of state policies and programs to PL 92-500 which resulted in implementation delays. It identified two major problems of water quality control: agricultural wastewater and urban runoff pollutants -- both of which would require new programs and funding sources for effective control. It also pointed out that, in California, water quality improvements are highly interrelated with resource uses and achievement of greater cooperation in this relationship has been stimulated by planning and institutional arrangements responsive to PL 92-500.

Regional Solid Waste Management -- Buffalo, New York

ADL participated with the engineering design firm Camp, Desser, and McKee in a study of regional solid waste management for the State of New York and the Erie-Niagara Counties Planning Board. The planning area encompasses heavily industrialized communities around Buffalo, New York with a population projected to exceed two million over the time span of the solid waste plan.

ADL provided technical analysis of industrial wastes and recommendations for financing and management of the solid waste program. From the many financial, regulatory, legislative, administrative, and institutional alternatives for system implementation, ADL found that a redistribution of management responsibilities would be conducive to effective operation and intergovernmental coordination of the program. According to this plan, responsibility for recycling and for use and procurement of recycled materials would lie at the bi-county level, with villages, cities, and towns responsible for waste storage and collection, and counties overseeing disposal operations and transfer, processing, and hauling of solid waste.

Effluent Guidelines -- Plastics and Synthetics Industry

ADL has recently begun a study for the Environmental Protection Agency to develop effluent limitation guidelines for the plastics and synthetics industry. In addition to characterizing the waste streams from plants in all segments of the industry, ADL is evaluating the control technologies available to treat the waste streams and the solid waste pollution created by them. Treatment capabilities are being assessed at exemplary plants with respect to waste treatment for each industry category. The use of substitute raw materials is being explored, as well as the use of recirculated solvent systems in place of water systems.

Condominiums/Cooperatives Study - Department of Housing and Urban Development

For the U.S. Department of Housing and Urban Development, ADL conducted a study leading to new legislation and regulatory procedures with respect to condominiums and cooperatives in the United States. The study was mandated by Congress in response to proposed legislation to federally regulate the construction and sale of these two forms of multi-family dwellings. In a comprehensive 30-week effort, ADL reviewed the regulations, legislation, and litigation in 50 states, conducting interviews with 1200 owners of condominiums and representatives of the various industries serving the condominium market in order to determine the efficacy of existing regulation, state and local, and the need for new policy. The study concentrated on the housing demand in six SMSAs and resulted in projections for overall housing demand in specific states and the national trend with respect to condominiums and cooperatives.

California Energy Shortage Contingency Plan

For the California Energy Resources Conservation and Development Commission, ADL has recently prepared an Energy Shortage Contingency Plan for the State. The Plan addresses itself to short- to medium-term energy shortages (weeks, months, a year or so; but not hours, days, or several years). It is a procedure for dealing with a significant shortage of a particular source of energy or a simultaneous shortage in several sources of energy. The Plan attemps to bring demand for energy into balance with supply in a manner which imposes the least burden on society. The sacrifices required by the Plan are temporary and necessary to provide a smooth bridge between periods of normal supply. The Plan does not attempt to resolve the long-term energy shortage problem; it is not a long-term energy resource allocation scheme; and is not intended to substitute for or interfere with the capability of energy suppliers to deal with operational day-to-day emergency shortages.

The emphasis of the Plan is on providing for the operation of production activities to the fullest extent possible, given the constraint of energy shortages. The Plan seeks to protect the operation of essential activities, such as public health, safety, and welfare in general during an energy shortage. In general, it relies heavily on public cooperation and voluntary compliance, and on an open decision-making framework in the expectation that an informed public will cooperate more fully than will an uninformed public. There are, however, provisions for mandatory compliance. An appeals procedure is included to grant exemptions to those aggrieved by the mandatory provisions of the Plan.

The Plan requires a mechanism for evaluating the extent of an energy shortage. It also requires the maintenance of reasonably up-to-date energy-use information. Lastly, it requires enforcement measures to assure compliance with mandatory provisions.

Northwest Energy Policy Project

The Governors of Idaho, Oregon, and Washington decided in Spring 1975 that important energy issues for their states could best be addressed by a comprehensive regional energy study to be undertaken under the direction of the Pacific Northwest Regional Commission. Within the commission, the administration of this study was carried out by the Northwest Energy Policy Project. For the project, ADL was one of the contractors. Our responsibilities were for the Energy Shortage Contingency Planning study module.

ADL prepared recommendations applicable to the three northwest states on the elements of energy shortage contingency plans, data requirements, sets of measures designed to alleviate energy emergencies, lists of essential activities, legislative and organizational requirements, and recommendations on how to identify and measure contingencies and implement and enforce plan measures.

FORECASTING AND PROJECTIONS

ADL is particularly well qualified in the area of forecasting and projections of economic and demographic factors that shape a region. It has been a pioneer in the development of input/output technique, one of the newest forecasting tools. A few ADL projects are described below.

- For the State of California, our assignment was to prepare an economic and demographic forecasting model for use by the California State Development Plan. The ADL team developed a labor force model which will permit the state to analyze its manpower needs or surpluses on a statewide and a regional level. The labor force totals were developed by a detailed demographic forecast of future population for each year to 1975 by age and sex. These detailed population totals were converted into future labor force, school-age population, old-age population, etc. Labor force demand was estimated by a fine structural analysis of the California economy which broke out exports, local markets, and inter-industry demand from wage data by multiple correlation techniques. The model makes use of modern computer techniques which offer the opportunity of keeping up-to-date material which is gathered as part of the routine administrative requirement of state programs. In this way, it offers an opportunity for a continuously sensitive system for testing the repercussions of state policies and programs.

- As part of the Community Renewal Program for the City of Stockton, Calif., financed partly through a Housing and Home Finance Agency grant, we prepared economic forecasts of income and employment for the Stockton economic area. We also identified the major sources of wage and non-wage incomes and their relative growth potential. The prime source of information for this study was a questionnaire survey. Because certain business enterprises represented a large fraction of employment in their particular sector, personal interviews were also used to acquire the necessary information. The study suggested that the input/output model provides an accurate statement of the linkages existing between business establishments operating in the local market and those serving primarily the export market. The study also projected future residential, commercial, and industrial land requirements.

- The San Francisco City Planning Commission asked ADL to assist in the preparation of a Community Renewal Program, a long-range plan encompassing all the residential, commercial, and industrial areas of the city. The fundamental objective of the program was the establishment of a schedule for both private investment and public actions to stimulate the renewal of the city. The program had to be one that could be modified as time passed and conditions changed. The systems concept, in which a mathematical model is adapted to electronic computers, was judged to offer the most promise for dealing with the complexities of an urban environment. By the use of this technique, city officials will be in a position to test in

advance the effects of various programs and to select those which achieve the desired results. They will also be able to identify key symptomatic indicators, or warning signals, which will alert them to changes in population, land use, etc., that call for public action and the revision of plans.

- For the Planning Commission of the City of New Bedford, Mass., we undertook a study of the economic base of the metropolitan area to determine the factors affecting industrial growth, to prepare a forecast of an attainable level of future employment, and to forecast future land requirements for income-producing activities within the city. The results of this study served as an input to the preparation of a comprehensive land-use plan. Personal interviews and a questionnaire survey provided important data inputs on the relationship between New Bedford industry and that in other areas.

- For the Puget Sound Regional Transportation study of Seattle, Wash., ADL carried out a program to analyze the sources and levels of economic activity in the region, to forecast future levels of economic activity and population, and to estimate the amount of land required for development. In developing the forecast of future economic activity, we developed a modified "economic base-input/output" economic forecasting model. The model describes the flow of goods and services among the various major industrial groups within the region and, in turn, the relationships between the industries within the region and the "rest of the world." Of particular importance in this study was the need to forecast the probable level of employment of the Boeing Company since the prospects for this company play such an important part in this local economy. The input/output approach made it possible to better understand the relationships which exist and the changes which would occur as the employment at Boeing varied.

- In the spring of 1962, the Ohio River Division of the U.S. Army Corps of Engineers engaged ADL to prepare a 50-year forecast of economic activity in the Ohio River Basin as part of the major study of future water requirements. The study called for estimates of employment and physical output for individual manufacturing industries and for the major nonmanufacturing sectors of the regional economy. In addition to providing a forecast for the Ohio River Basin as a whole, the contract called for dividing the basin into subareas, delineated roughly along tributary basic boundaries. Forecasts of economic activity to the year 2010 were required for each of the subareas.

- A similar study was completed of the New England region, states, and substate areas for the New England Division of the U.S. Army Corps of Engineers. This study used regression analysis as a basic methodological framework. The study was completed in 1965 and published under the U.S. Army Corps of Engineers Division, New England, under the title "Projective Economic Studies of New England."

- In 1964 we carried out a preliminary feasibility study on forecasting construction costs for the Bureau of Yards and Docks, Department of the Navy. Our feasibility study indicated that by applying statistical forecasting techniques to labor wage rates and a few basic construction materials, excellent forecast of the escalation of major cost components could be obtained. We estimated that statistical procedures could be developed to forecast construction costs, for different kinds of facilities and for different geographic areas, three years into the future with a forecast error of less than 2.5%.

- For the Florida Development Corporation, ADL conducted a study of the state's economic stability and growth and made a lo-year projection of its population and labor force development. The ADL case team stressed Florida's major economic features -- manufacturing, agriculture, and tourism -- but also investigated the area's business climate and described its economic condition in terms of per capita income, employment rates, sources of income, tax revenues, and public services.

- The Atchison, Topeka & Santa Fe Railway Company retained ADL to study future economic growth and prospects for rail freight in the West. Specific objectives of the study, the results of which were presented before the Interstate Commerce Commission, were to analyze the regional economy and forecast economic growth and to analyze the relationship between economic activity and the demand for transportation, study carrier competition for freight and forecast rail traffic in the West.

More recently, Arthur D. Litte completed research and prepared testimony for the Chicago and Northwestern-Santa Fe petition for control of the Rock Island Railroad. In support of the Santa Fe position, we performed an analysis of all long-haul truck movements across the region served by the railroads.

Also, we evaluated a development plan for tidewater property in the San Francisco Bay area for the Santa Fe Railroad.

Arthur D. Little, Inc.

INDUSTRIAL PARKS PLANNING

AND

BUSINESS LOCATION STUDIES

Evaluation of Commercial/Industrial Activity in San Francisco

ADL undertook a research and analysis study for the San Francisco Department of City Planning to (1) analyze the economic structure of San Francisco and project future employment and land use, (2) estimate the major impacts of the projected trends on the city and its residents, (3) evaluate the desirability and feasibility of public intervention to alter trends, and (4) suggest alternative strategies for the city's commercial and industrial areas.

The study had included two interrelated elements: economic analysis and land use analysis. Based on these analyses, this study addressed the identifiable locational preferences of industries, possible public action which might affect locational decisions, and strategies for the major commercial and industrial districts of the city. It included an analysis of the city versus the suburb vis-a-vis external and internal economies of location and site for industries and dealt extensively with the implications of city policy for future land-use trends.

ADL's work was the basis of a Commerce and Industry element for the Planning Department's Comprehensive Plan, which was being revised and updated.

Industrial Park Feasibility Study - City of Salem

For the City of Salem, Oregon, ADL in 1975 investigated the feasibility of developing the city-owned property located at McNary Field for industrial park use. To accomplish this objective, a land use and marketability analysis for the 103.8 acre site was performed by ADL under the guidance of the city's Community Development Department. Included in this work was an assessment of economic activity trends, labor force characteristics, development potential, physical site conditions, and riverfront relocation opportunities. As a result of this analysis, a management plan for implementing the recommendations was formulated. The plan considers planning and environmental factors and control measures, facility improvements required, and associated cost estimates and management strategies.

Utilization Study for Dallas-Love Field, Texas

The City of Dallas, responding to growing demands on its airport facility, had decided to transfer its major airport operations from Love Field to the new Dallas-Fort Worth airport by 1973. ADL was responsible for designing the transfer system which would take into account the immediate changeover system as well as the long term land use potential of the Love Field facility. Using a multidisciplinary team of airport planners, market analysts, real estate planners, urban transportation planners, and economic forecasters, ADL designed an effective management system to structure the initial planning process, taking into account the inventory of socioeconomic and land use data, aviation trends, financial constraints, and the identification of special development opportunities. In addition, the ADL design initiated the necessary interim management strategies and prepared the final development program for the future use of the Love Field site. Throughout the planning process, the ADL design took into account the importance of formulating policies and programs which were technically sound as well as politically sensitive and socially responsive.

Industrial Parks Development

For Lincoln, Nebraska; Columbia, South Carolina; Tampa, Florida; Albuquerque, New Mexico, we established the feasibility of and prepared overall plans for the development of industrial parks. Included in these projects were the preparation of cost estimates and restricted covenants, the development of a recommended method of operation, the identification of the type of tenants most likely and suitable to occupy the parks, and a flexible land use plan consistent with the types of potential tenants identified.

Case-Western Reserve

Case-Western Reserve, in partnership with several other institutions in Cleveland's University Circle, asked ADL to determine the feasibility of establishing a "research park" on land abutting the school in order to establish a closer relationship between industry and the faculty and laboratory resources of the institutions of higher learning. In carrying out this related study, it was necessary to pinpoint the links between fundamental and applied research and to determine the desire of industry for physical proximity to centers of higher education.

A Publicly Owned Industrial Park at JFK Airport

ADL was asked by the newly formed Public Development Corporation (PDC) in New York to investigate the potential of a 100-acre tract adjacent to Kennedy Airport for airport-related industries--particularly air freight. The key questions asked of the ADL team were:

- Who are the potential users of the site?
- What are the requirements of these users?
- What are the physical development problems?
- What is the best layout?
- What are the costs and benefits?
- What role should PDC play in the development?

Nogales Industrial Park

The Parque Industrial de Nogales, S.A. (PINSA) is located south of Tucson, Arizona in Nogales, Mexico. In 1968, ADL was employed by the U.S. developer on a five-year contract to assist in creating the park, starting with the raw land and carrying through in all aspects. Currently, PINSA is in successful operation with many prime U.S. companies producing there under the "Twin Plant" concept of the Mexican Border Program It matches the highest standards of design and operational performance, comparable to the best parks in the United States.

Conference on Industrial Parks

Arthur D. Little, Inc., and the New Hampshire State Planning and Development Commision's Industrial Division sponosred a conference on industrial parks held at Dartmouth College. The objectives of this two-day conference were to define the term, "Industrial Park," identify the advantages and disadvantages of industrial park locations, and to examine major economic and governmental issues ariisng from industry's movement to suburban locations from urban industrial centers. Conferees were drawn from the fields of consulting, government, industry, real estate, and transportation. A major contribution of this conference was its delineation of issues--particularly those urgently in need of research, study and action.

St. Louis

For the St. Louis Metropolitan Chamber of Commerce, Industrial Park Corporation, Arthur D. Little, Inc., assessed the feasibility of an industrial development project in Columbia Bottoms. This project involved the development of 2700 salable acres of industrial land in Columbia Bottoms.

Nebraska Chamber Industrial Development Corporation

For the Lincoln, Nebraska, Chamber Industrial Development Corporation, and for the Columbia, South Carolina, Chamber of Commerce, Arthur D. Little, Inc., assisted in the overall plans for the development of industrial parks. Through interviews with business leaders, industrial managers, bankers, government officials, railroad representatives, and industrial realtors, and examination of pertinent economic data, we were able to develop a comprehensive master physical plan consistent with the types of potential tenants identified. Included in these projects was the preparation of cost estimates and restricted covenants and the development of recommended methods of operation. Our industrial park projects have also extended into the areas of management organization, promotion, installation of facilities and utilities, landscape and architectural planning.

Houston Farms

For the Houston Farms Development Company, Arthur D. Little, Inc., was asked to prepare a flexible land-use plan under which Houston Farms could dispose of or use a tract of land of approximately 40,000 acres it owns in Galveston and Brazoria Counties, Texas. This land was determined to be suitable primarily for industrial use, but agricultural, industrial-residential, commercial, and institutional use potentials were also recognized. The land-use plan prepared by Arthur D. Little, Inc., and its guiding criteria were based on the recognition that full development of the land may require up to 30 years. We took into account the demonstrated growth in Texas, which has often been more rapid than forecast.

Tampa Chamber of Commerce

For the Greater Tampa Chamber of Commerce, Arthur D. Little, Inc., devised a plan of development for 1000 acres of industrial property. We conducted an economic/industrial survey of the Tampa area and the whole of Florida to determine labor supply and wage levels, the tax structure, the transportation system, and the characteristics of the local markets for industrial and consumer products. Our recommendation of target industries was based upon this survey and also upon our evaluation of the kinds of industries which are best suited to such a park development. In addition, we recommended restrictive covenants on land use to ensure a park-like atmosphere and the control of such nuisances as smoke, gas, noise and vibrations. We developed a scheme of management for the park during its period of construction and thereafter. And cost outlines were outlined for such necessities as park roadways and entrances, sewarage pipes, drainage systems, systems, lighting and other utilities, and common landscape areas.

Albuquerque's Industrial Park

ADL recently completed a study for the Albuquerque Industrial Development Service, Inc., and the Industrial Foundation of Albuquerque, Inc., to (a) assist the Friden Division of the Singer Company in selecting a site in the proposed industrial park, and (b) plan for the total development of the industrial park. The latter objective included determining industries and companies likely to locate in the park, recommending management and controls for the park, and planning for physical development.

Indonesian Industrial Park

With Westinghouse Electric Corporation ADL conducted a marketing feasibility study for the proposed Pula Gadung Industrial Estate outside Djakarta. This study was a part of a larger one which was aimed at obtaining (1) the participation of the Government of Indonesia as a partner in the Industrial Estate and (2) a substantial loan from the World Bank.

Reuse Analysis of NIKE Site in Southern California

With the planned U.S. Department of Defense deactivation of a NIKE missile base lying within its boundaries, the newly incorporated City of Rancho Palos Verdes asked ADL to determine through a study the best nonmilitary use for the site. Because the Palos Verdes Peninsula is a desirable residential area, the study considered housing and population trends and their relation to the city's General Plan. The demand for retail and/or commercial uses was also analyzed, as were such potential public uses of the site as governmental or educational administrative offices, auditorium and multi-purpose activity center, post office, fire station, and recreation and open space. ADL's assignment also included developing a specific site plan relating to the most promising uses, and preparing an environmental assessment.

Oil Company

A large oil company interested in establishing data-processing facilities asked Arthur D. Little, Inc., to assist in determining the number of centers it should have, how large they should be, where they should be located, and what their estimated costs would be. An ADL team composed of specialists in management information systems, equipment design and layout, site location, and regional economics analyzed the company's data-processing requirements. Their analysis indicated that all credit-card and general accounting activities should be consolidated into two centers, one in the East, and one in the Midwest. The team evaluated potential locations in these regions, considering specialized labor requirements, operating costs, and building requirements, and then recommended equipment and layouts for each installation.

Wholesale Supply House

A large Boston wholesale supply house handling electrical and refrigeration equipment requested Arthur D. Little, Inc.'s assistance in relocating the firm's facilities within the greater Boston area. Considered as necessary by the client in the relocating process were such factors as nearness to customer work areas, ease of transportation both to and from facilities, room for expansion, and proximity to pertinent growth areas in greater Boston. ADL was successful in relocating the firm in an area that maximized the requirements desired by the client.

Commercial Aircraft Manufacturer

For one of the nation's three largest manufacturers of commercial aircraft, Arthur D. Little, Inc., was asked to assume responsibility for a crash program of site selection to locate three plants needed to manufacture airframe sub-assemblies for a major new aircraft type. In addition to specifying fully developed sites to minimize delays in plant construction, the manufacturer required special rail clearances between the site and the home plant to permit shipment of outsized assemblies. ADL was successful in locating three sites which met these specifications and three plants are now under construction.

Pharmaceutical Company

A nationwide manufacturer of pharmaceuticals approached Arthur D. Little, Inc., for assistance in locating a centralized facility to be used for coast-to-coast mail distribution of its products. In addition to requiring a first-class site, a readily available labor force, and an attractive community environment, the client sought a location which would minimize delay in the receiving of mail orders and in the return shipment of small parcels to its customers. Location in a major transportation hub was indicated, yet it was necessary to avoid the congestion of a very large city. Through an analysis of postal dispatching procedures, it was possible to locate a midwest city offering an ideal combination of airmail and parcel post routes.

Retail Store Location

We have completed five studies for an expanding retail chain in San Francisco. We assessed the advisability of specific sites that were considered for new location and also suggested optimum patterns of location for major urban areas which the retailer intends to penetrate. We utilized survey techniques to identify the kinds of consumer most likely to shop at the client's stores. We also investigated geographical patterns of preference or attitude of those potential consumers.

We then estimated the sales that would be obtainable at alternative sites and evaluated factors crucial to the selection of retail locations. In addition to suggested locational patterns that will be most beneficial to sales, we were concerned with the long-run effect of the firm's association with alternative groups of other stores on the company's long-range competitive strength and consumer image.

Major Financial Institution - Site Selection and Development Alternatives

We were requested to develop and comprehensively evaluate several site selection and development alternatives. A branch office was to be located in Southern California, and the executives of the organization were uncertain as to how best to plan for its facilities. The alternatives included several different sites in the same city, and different possible sizes, types, and arrangements of structures on each site. After the reasonable range of alternatives was established, operations research techniques were used to systematically rate the costs and benefits of each. Criteria considered included convenience, prestige location, building economy, traffic generation, land cost, and financing opportunities.

A New Banking Facility in Texas

For a major bank in Texas, ADL analyzed facilities requirements in preparation for a move to a new headquarters building. This included analysis of growth patterns by various elements of banking activity, innovations within the banking industry that will generate changes in facility requirements, appropriate detailed space standards for banking personnel, interrelationships within the bank, and the space "envelope" that would house the bank efficiently and productively. The growth analysis required a consideration of regional as well as local banking trends. The department relationship analysis was designed to increase productivity through appropriate groupings. An important part of the work, oriented toward insuring future flexibility, was the inventorying of space under short-term leases at appropriate places in the banking facility. We also performed the necessary financial analysis to insure that the bank's facility requirement and capital investment would be integrated with, and supported by, a major program of tenant office space.

Arthur D. Little, Inc.

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STAFF BIOGRAPHIES

Arthur D Little, Inc.

KENNETH A. JENSEN

Mr. Jensen is a senior staff member with extensive experience in governmental systems analysis, forecasting and economic model building for problem solving in the public sector.

In the past 10 years with ADL, Mr. Jensen has participated, frequently as project director, in studies that have included analyses of potential for economic development, housing economics, budget analyses, assessments of public service delivery systems, socioeconomic forecasting, and development of macro-economic models.

He recently had responsibility for an assessment of the probable economic impacts of Public Law 92-500 (the Clean Air Act) on industrial, municipal, and utility activities in the San Francisco Bay-Central Valley region of California for the National Commission on Water Quality. Important aspects were the likely impacts on power generation facilities in the area and possible power plant siting problems. An inter-industry model of the California economy was used to determine the direct and indirect impacts.

For the City of Rancho Palos Verdes, California, he analyzed the potential future uses of a federal NIKE site and the economic and environmental impacts of alternative uses.

He was the project director of a study which assessed the impact on Kitsap County, Washington, of the proposed Trident submarine installation at Bangor Annex. By examining four alternative patterns of urban growth that might occur over the next 20 years, public costs and revenues were developed for each alternative to provide public decision makers with a range of public costs likely to be encountered in accommodating growth. Included in this analysis was the development of a housing demand model by income class.

He was also project director of a study for San Diego, California, determining the economic, environmental, and public costs associated with tourism activity. Based on estimates of volume and types of tourists, as well as their expenditure patterns, direct and indirect impacts on the regional, state, and U.S. economy were determined based on an input-output model.

He has analyzed the impacts of a proposed redevelopment project in downtown San Francisco and a proposed residential/commercial complex near San Francisco. He was also in day-to-day charge of a project determining the environmental impact of the proposed Palmdale International Airport near Los Angeles.

KENNETH A. JENSEN (Continued)

Earlier Mr. Jensen was employed as a systems engineer with the Aerojet-General Corporation in Sacramento. His work involved him in long-range planning and systems analysis for the company.

In 1965 and 1966, he was a research assistant at the Center for Real Estate and Urban Economics of the University of California while completing his M.B.A. degree in operations research and econometrics. This work involved him in a study for the Housing and Home Finance Agency in which long-range forecasts of land use, employment, and population were made for the nine-county San Francisco Bay Area. An important part of this study was the development of an industrial location model which evaluated alternative sities for various industrial activities.

Mr. Jensen has written several articles on forecasting, including "An Approach to Forecasting Tax Revenue," which appeared in the fall 1969 Journal of the Western Regional Science Association. Most recently, along with Paul Isaki, Associate Director of the Central Puget Sound Economic Development District, and John Horsley, Trident Coordinator for Kitsap County, he delivered a paper on Trident secondary community impacts to the Tenth Annual Pacific Northwest Regional Economic Conference.

Mr. Jensen received his B.S. degree in mechanical engineering (nuclear option) from Arizona State University and an M.B.A. degree from the University of California at Berkeley, with specialization in operations research and regional economics. He has done additional postgraduate work in econometrics at Massachusetts Institute of Technology. He is a member of the Regional Science Association, the Operations Research Society of America, the Institute of Management Sciences, and the American Economics Association.

Arthur D Little Inc

VINCE P. FICCAGLIA

Mr. Ficcaglia is a senior staff economist concentrating in the areas of regional economic development, industrial economics, and economic forecasting. For five years, he was manager of ADL's economic analysis and forecasting center which monitored and prepared assessments of the performance of the U.S. economy and over 200 individual industries. As a result, he has gained a broad understanding of the market and locational factors important to various industries.

His experience directly related to the proposed study includes:

- For the Commonwealth of Massachusetts, Mr. Ficcaglia was responsible for the preparation of business development strategy aimed at attracting three selected industries to the state. As part of this effort, he analyzed the growth potential, location requirements, and other characteristics of the computer peripherals, biomedical instrumentation, and pollution control equipment industries. Based upon a review of the Commonwealth's infrastructure, resources, and existing business development programs, Mr. Ficcaglia propared a series of action steps to be implemented by the Commonwealth in its attempt to attract such industries to the state.

- In a related case effort for the Commonwealth of Massachusetts Mr. Ficcaglia was part of an ADL team charged with assessing the quality of life in the Commonwealth in comparison to other states. He was responsible for the development of the methodological approach used in the study, the selection of comparative states, and the development of the criteria upon which the quality-of-life assessment and measurement was conducted.

- For a group of East Coast banking and financial executives concerned with industrial development and location, Mr. Ficcaglia provided a comparative evaluation of several urban areas. As part of this assignment, he was responsible for identifying attitudes and impressions held by business decision makers of various urban centers. Mr. Ficcaglia was then charged with assessing these impressions and utilizing objective information to determine their validity. As a result, the study did substantiate some of the attitudes which business decision makers had regarding these urban areas; at the same time, it clearly illustrated that others were false.

- For many clients over the years, Mr. Ficcaglia has prepared baseline economic profiles and long-term outlook projections of many areas of the United States. These areas have included most of the 50 states, major SMSA's, and a limited number of counties. As part of these reviews, much research was directed to gaining a clear understanding of the major determinants of growth within an

VINCE P. FICCAGLIA (Cont.)

area and changes occurring that would alter historical trends. At present, he is directing such an effort concerned with several municipalities and counties in the States of Ohio and Pennsylvania.

Mr. Ficcaglia, a graduate of Brandeis University, received his B.A. degree in economics in 1968. He obtained an M.A. degree in economics in 1970 from Boston College, where he is currently a candidate for the Ph. D. While at Boston College, Mr. Ficcaglia held a teaching fellowship for three years. At present, he is also Professor of Economics in the Arthur D. Little Management Education Institute which offers a program of study leading to a master of science degree in management.

Arthur D Little Inc

BRIAN J. LAYNG

Mr. Layng is a senior consultant in ADL's San Francisco office. During his eight years with ADL, he has concentrated on problems in consumer marketing, retailing, and corporate planning. His experience includes utilizing traditional market research techniques to develop essential information upon which corporate strategies and product strategies can be based. Mr. Layng has been particularly interested in creating techniques whereby critical market information can be developed and integrated in the planning process on an ongoing basis. He has participated in several seminars and presentations to major U.S. companies and overseas affiliates instructing the participants on methods and approaches to the corporate planning process.

In the consumer products area, Mr. Layng has led and participated in several assignments for major corporations in which both corporate and business strategies have been identified, developed, and successfully implemented. He has worked closely with chief executive officers, vice presidents, and planning staffs in the installation of planning systems, and in the development of plans. He has focused on the development of business strategies for diversified corporations operating in a wide variety of markets under different conditions. Specific strategies have included product diversification, acquisitions, efficiency improvements, and divestiture.

In the area of market research and marketing strategy, Mr. Layng has considerable experience in designing and structuring market research projects which include the defining of research objectives, selection of survey instruments and sampling techniques, and the translation of the results onto specific marketing programs and strategies. He has been responsible for several assignments in which clients were entering new markets (both domestic and international) with existing products and services which required detailed evaluations of buyer behavior, competitive conditions in the market, and key factors for success.

His specific industry and marketing expertise includes general merchandise retailing, petroleum marketing, food and beverage distribution, forest products markets, the travel industry (airlines and shipping), the automobile industry, and financial services.

Mr. Layng has been a member of ADL's San Francisco office for four years after spending four years in Cambridge headquarters. His experience in corporate planning assignments and his familiarity with the staff resources in ADL's Management Counselling Group enables him to be an effective case team member for assignments that are for West Coast clients that require professional input from several ADL groups and offices.

Before joining the staff of ADL, Mr. Layng spent several years with an international oil company where he was involved in various marketing and planning assignments.

Mr. Layng received a B.A. degree in government and economics from Lafayette College and an M.B.A. degree from Columbia Business School in marketing and international business.

Arthur D Little Inc

DONALD TATZIN

Mr. Tatzin specializes in urban economics and public policy planning and evaluation. He has been associated with ADL as a consultant since 1972 and is currently a member of the San Francisco office.

He is currently involved in a study for the Department of Ecology in the State of Washington where he is measuring the different economic impacts of alternative scenarios for handling Alaskan crude oil in Washington. His responsibilities include developing an assessment procedure and measuring the impact of several development scenarios on local economies. The Department is particularly concerned with the growth-inducing implications of further direct sector development, and ADL will estimate the population growth which will occur in these areas because of oil-related activities.

Participating in a study for the State of Maine which provided new directions for the development and promotion of the tourism industry, he developed a technique that estimates the cost to both state and local governments of providing services to tourists. For the City of San Diego he helped to provide information the city could use to determine the proper level of tourism it should attract, given its concerns about the future growth of the community. His work included the assessment of the growth-inducing aspects of the tourism industry.

For Kitsap County, Washington, Mr. Tatzin prepared the initial design of a model which forecast the amount of housing to be demanded by migrants to a new defense base. The model considered several types of alternative supply responses and evaluated the differences in costs of several different development plans. The county was particularly interested in the growth implications of the new base and ADL's work included an assessment of the growth-inducing effects of the base.

Prior to joining ADL, Mr. Tatzin worked for the Massachusetts Office of Planning and Program Coordination where he helped to design and conduct a study that looked at the economic feasibility of regionalizing water and sewerage services. His work included defining and applying measures of quality for several urban services. He has helped a Florida county design new industrial promotion programs, completed a community facilities study, and evaluated the potential and impact of tourism.

Mr. Tatzin is a graduate of the Massachusetts Institute of Technology where he received a master's degree in city planning with specialization in urban economics and public policy planning. He also received B.S. degrees in both urban studies and planning and economics from MIT. He was awarded a Rotary Foundation Graduate Fellowship which he used to obtain a master's degree in economics from the Australia National University.

CAMBRIDGE,
MASSACHUSETTS

SAN FRANCISCO
WASHINGTON
ATHENS
BRUSSELS
CARACAS
LONDON
PARIS
RIO DE JANEIRO
TORONTO
WIESBADEN

11:15

George Hahman phoned. He's at 279-7661 (Sheffield). will try to be here at 1:30. He said if the contract is OK with Clark, it's OK with him. Questioned whether you could sign or if it did have to be Clark.

Lou Ann

PROFESSIONAL SERVICES CONTRACT

This contract, effective as of the _____ day of _____, 1977, between the STATE OF ALASKA, DEPARTMENT OF REVENUE, TREASURY DIVISION (hereinafter called the STATE), and ARTHUR D. LITTLE & CO., (hereinafter called the CONTRACTOR),

WITNESSETH THAT:

WHEREAS, the STATE requires professional contractual services in connection with the Alaska Permanent Fund; and

WHEREAS, the CONTRACTOR is willing to undertake the performance of this contract under the terms of this contract; and

WHEREAS, the Commissioner of Revenue may, pursuant to AS 37.10.070(g) enter into contracts for professional services;

NOW THEREFORE, the parties hereto agree as follows:

ARTICLE I.

SERVICES TO BE PERFORMED

The CONTRACTOR shall provide for the Department of Revenue such papers and information deemed necessary:

A. SECTORAL ANALYSIS

At least in concept, the creation of the Permanent Fund, with its ability to supplement and complement the existing commercial banking activity in Alaska with the capacity to provide long-term loans and/or equity participation on development basis, could well be an important mechanism for diversifying the economy and providing for greater utilization of Alaska's resources within Alaska.

One way of establishing a mechanism for budgeting and allocating scarce investment resources among alternative opportunities is to prepare a sectoral analysis of the Alaska economy to identify those sectors, industries, or portions of economic activity that appear to have the greatest payoff in the long run for Alaska in terms of diversification, income distribution, and the various other economic goals the state might develop. This sectoral analysis would provide an overview of the economy, linking both the existing sectors and those that might exist in the future to the overall markets within the

U.S. and the international economies, particularly the economies of the Pacific Rim. By focusing investments in those sectors of the Alaska economy that are likely to have long-term markets and meet state economic goals, it is most likely that those investments will provide long-term gain for the Alaskan economy.

Referring again to the proposed legislation to establish the Permanent Fund, "sectoral analysis" has been identified as one important means for the Fund to identify sound investment projects. Included in the section "Duties of the Policy Board" is an element relating to the annual review and approval of long-range operating plans based on sectoral analysis of the Alaskan economy.

Further, in the section entitled "Operational Principles," various guidelines are provided for in the operation of the proposed public corporation. In addition to establishing the "prudent person rule of investment," this section requires that the particular project or investment being considered be able to stand on its own in terms of financial productivity. Should the Permanent Fund have before it a case requiring a subsidy, this must be explicitly identified and the Legislature must provide for the subsidy component of such an investment out of General Fund revenues.

The same section states further that the corporation will make investment decisions with regard to "economic and other considerations including consideration of employment, income distribution, environment, health, social, and other factors. The corporation shall be sensitive to the views of the affected local community and shall include an analysis of those views and proposals for large investments."

Thus, throughout the draft legislation, the need for the application of economic analysis to proposed investments of the Permanent Fund is clearly identified.

This proposal addresses itself to the establishment of a structure or framework against which projects requesting assistance from the Permanent Fund can be evaluated so that a ranking and prioritizing of projects can be achieved. The net result becomes one of maximizing the productivity of the investments made by the Permanent Fund for economic development purposes.

STATE OF THE ALASKAN ECONOMY

Alaska and its surrounding ocean areas are currently viewed as the United States' greatest reservoir of energy resources required for energy

development in the critical period ahead. The question becomes this: Will Alaska continue to provide the resources but not necessarily the translation of this resource base into increased levels of economic activity through vertical integration. The Alaskan economy is at a watershed. In general, the potential exists for increased economic activity at some sustainable level. What direction will future investments in the Alaskan economy take? Will they be a continuation of current and historical resource extraction investments resulting in cycles of high economic activity followed by a state recession when the resource is exhausted, or will Alaska participate in the further utilization of these resources?

To place in perspective the role of economic development and, in particular, the purpose of a sectoral analysis providing a structured framework for investment decisions by the Permanent Fund, it is useful to briefly examine the overall Alaskan economy and its components.

The relative thinness of the Alaskan economy reflects the fact that so much of the consumer goods as well as a good portion of the industrial requirements are imported, indicating tremendous leakage of Alaskan income to the lower 48 and elsewhere. Recently in Alaska, the distribution of wage and salary employment, a measure of economic activity, has been roughly in the following proportions (this excludes self-employed workers, which exclusion would tend to understate, among other things, the fishing component of the Alaskan economy):

Mining (including oil and gas extraction)	3%
Contract construction	17%
Manufacturing	5%
Transportation, communication, public utilities	10%
Trade	16%
Finance, insurance, and real estate	5%
Services	16%
Government	29%

The above figures indicate the dependence of the economy on government - federal, state, and local. Contract construction representing 17% of recent total wage and salary employment is obviously distorted because of pipeline construction and related activities. Mining, even including oil and gas activity, provides only a modest proportion of the wage and salary employment

in the Alaskan economy. Thus, even with recent pipeline activity, sectors important to increasing the amount of income retained within the Alaskan economy remain small. In fact, in the period from 1970-1975 manufacturing employment actually grew very modestly and stands at no more than 9000-10,000, primarily in fish processing and forest product activities.

Excluding government employment, the Alaskan economy relies in greater or lesser amount on the following activities:

Mineral exploration, development, and production, including fuels and metallic and nonmetallic materials. Here the possibility exists for expansion in a number of areas. It appears that the coal potential along with petroleum natural gas can provide an ongoing thrust to economic activity.

Fisheries. With the passage of Public Law 94-264 extending the U.S. Conservation and Management zone to 200 nautical miles, fishing is still in a period of flux. It can be anticipated that at least some portion of the yield of groundfish currently going to Russian and Japanese ships, will go to Alaska either through actual participation in the fishing or some payment mechanism. In addition, the traditional catches of the Alaskan fishing industry - salmon, king crab, snow crab, shrimp, and halibut - will continue to provide a basis for possible expansion of this sector.

Forest products. This sector, in which the current demand is primarily for pulp for both the lower 48 as well as Japan, reflects the sensitivity of the industrialized economies to materials competition. With the recent rise in oil prices, pulp has been substituted to some extent for petroleum-based fiber. The balance to be struck in the forest products industry in the future is unknown.

Tourism. Certainly in large measure a renewable resource, tourism has emerged recently as an important component of the Alaskan economy. Because its impact covers numerous sectors in a typical economy, it is difficult to measure. Whatever the combination of cruise ship, highway, ferry, liner, plane, and motor coach modes of travel, tourism will continue to grow over the next 10 years. Ways of insuring maximum returns to Alaska of tourism activity are still to be determined.

Agriculture. Agriculture - mainly eggs, potatoes, and milk - provide a modest contribution to Alaska's domestic needs. Similarly, truck farming surrounding the urban areas meets a modest part of the increasing demand in the

urban population. Importation of food products from the lower 48 continues to be an important "leakage" out of the economy, and it can be anticipated that opportunities in this sector will emerge over time.

PURPOSE, SCOPE, AND APPROACH

As a beginning point for the ongoing economic analysis that will be required for proper project assessment by the Permanent Fund, this proposal is directed toward developing a structure and/or framework for evaluating proposed projects for investment. We have termed this a sectoral analysis - an examination of the Alaskan economy from a macro viewpoint, linking its current and potential outputs with those of the rest of the U.S. economy as well as Pacific Rim areas, to identify those long-term markets in which Alaska can most probably compete. Our work would also include an assessment of the internal Alaskan demand for various outputs, to identify areas where there is a possibility for "import substitution." In other words, given certain investment potential among various sectors of the Alaskan economy, what areas will have the greatest payoff to the Fund, balancing risk and return.

Our proposed work would identify the assets that would foster growth and the liabilities that constrain or inhibit development of particular activities in Alaska, and the mechanisms that might be used to remove or at least mitigate impediments in various sectors. To the extent that long-term capital will assist in removing impediments to development, clearly the Permanent Fund can well become an important mitigating measure.

The crux of our approach is to build upon existing studies, data compilations, and investigations of current activity in a manner which will maximize the involvement of the private sector as well as the public sector. This will assist in the identification of appropriate sectors in the evolution of economic diversity and stability within the Alaskan economy.

Specifically, our analysis would include:

1. An assessment of the long-term outlook for the U.S. economy as well as Japan.
2. An assessment of growth prospects for individual industries.
3. An assessment of the outlook for the Alaskan economy and industry:
    a. Identification of influence of national, international, and state trends.

b. Identification of factors contributing to our inhibiting growth in Alaska-based industry.

4. Evaluation of major sectors of the Alaskan economy:

   a. Resource extraction, such as petroleum and natural gas, other minerals, forestry, fisheries, and agriculture.

   b. Manufacturing and processing, such as fish processing, other food processing, petroleum- and natural gas-related processing, and wood products.

   c. Tourism.

   d. International and domestic trade linkages.

   e. Energy.

5. Identification of candidate industries for possible establishment in Alaska.

6. Preparation of sectoral analyses:

   a. Characterization of industry at national level.

      Size

      Location

      Concentration

   b. Historical development.

      Major growth influences

   c. Long-term growth prospects.

      Macro economy

      New products

      New markets

      Other considerations

   d. Industry in Alaska.

      Contributing factors

      Inhibiting factors

   e. Industry development and the Permanent Fund.

      Consistency of goals

      Recommendations for further action

7. Suggested project financial productivity measures:

   a. Fund investment criteria.

   b. Sector financial measures.

   c. Initial sector priorities.

The underlying goal of the above analysis is to utilize the revenues derived from non-renewable resources to achieve maximum use of renewable resources within the state.

METHODOLOGY

The development of a sectoral analysis emphasizing identification of possibilities for vertical integration within the Alaskan economy to capitalize on existing renewable and non-renewable resources as well as expanding the availability of goods and services for the internal Alaskan economy requires a broad approach and a wide array of methodologies. The product of this proposed study is not just the output of a macroeconomic model; rather, it is the results of several flows of analyses coming together, leading to the identification of sectors appropriate for consideration by the Permanent Fund for project investment - sectors that are either represented currently in the Alaskan economy or are likely candidates for inclusion in the economy over the next few years. This would include vertical integration in terms of the processing of both renewable and non-renewable natural resources, as well as consideration of ways to reduce the leakage out of the domestic economy. For instance, over the next few years certain threshholds may be reached within the economy, permitting the establishment of business activity that heretofore could not viably compete because of such factors as lack of economies of scale, sufficient domestic market, etc.

WORK PROGRAM

To achieve the purposes of the project, we propose to undertake the following tasks:

1. Characterization of existing conditions;
2. Assessment of the present Alaskan economy:
3. Determination of the domestic/international markets related to outputs of key sectors of the Alaskan economy;
4. Preliminary analysis of the comparative locational advantage for Alaska by major sector;
5. Intersectoral cost/benefit comparison and development of investment criteria; and, upon approval of the Department, the House and Senate Permanent Fund Committee,
6. Suggested sectoral priorities for the Permanent Fund.

TASK 1 - CHARACTERIZATION OF EXISTING CONDITIONS IN ALASKA

To establish a consistent set of baseline information for determining suitable sectoral investment focuses and developing economic development strategies, we will first initiate a reconnaissance program to bring together relevant information on the existing situation within Alaska. This will cover existing studies and ongoing research including relevant data and analysis from the numerous affected public agencies in Alaska as well as private sector sources.

To compliment the review of existing published data and analyses, we will conduct a structured interview program with appropriate persons primarily in the private sector in the major areas of activity in the state. This program will provide additional background on issues we consider it necessary to address and on the current nature of economic activity, and will also provide a preliminary assessment of the ability of existing Alaskan industry to compete in expanded markets.

There are a number of studies in progress that provide information on the current state of the Alaskan economy; this includes both statistical information and "models of the economy." Among these basic sources of information are the following:

Alaska Department of Commerce and Economic Development.

Alaska Department of Revenue.

Alaska Department of Labor.

Governor's Office, Policy Development and Planning.

University of Alaska, particularly the Institute for Social, Economic and Government Research related to their "Main in the Arctic Program."

Bureau of Land Management, quantitative models developed for assessing impact on the Alaskan economy of oil and natural gas development.

Trade flow models developed both in the State of Washington and in Alaska linking the Alaskan economy to the Northwest portion of the lower 48.

Other public agency information.

The set of Regional Profiles prepared by the University of Alaska for the state and the Joint Federal-State Land Use Planning Commission for Alaska.

Our analysis of the availability of infrastructure and level of community development will be based upon information provided by the Alaska Department of Transportation, the U.S. Bureau of Land Management, and the U.S. Bureau of Indian Affairs, supplemented by local area information from the Alaska Department of Community and Regional Affairs.

For specific sectoral information - i.e., historical measures of economic activity - we would utilize information from such entities as the Alaska Department of Natural Resources, Alaska Department of Fish and Game, the Division of Economic Enterprise of the Department of Commerce and Economic Development, the National Marine Fisheries Service, the Bureau of Indian Affairs, the U.S. Forest Service, and the Bureau of Mines.

TASK 2 - ASSESSMENT OF THE PRESENT ALASKAN ECONOMY

To place Alaska in perspective, we will utilize the baseline information developed in Task 1 to prepare an assessment of the present Alaskan economy. This will include:

Trends in economic indicators;

Identification of structural relationships within the Alaskan economy;

Delineation of regional economic activity in Alaska;

Nature of economic development factors;

Characteristics of the major sectors of the current economy;

Level of infrastructure development; and

Preliminary identification of constraints and impediments to future economic growth.

This assessment will be utilized later in work program to compare Alaska's potential as well as development constraints with likely emerging markets within Alaska, elsewhere in the United State, and abroad. Labor supply and wage structure, transportation and communications, capital availability, utilities, tax structure, and existing markets will be included in our examination of development-related factors.

The major basic sectors of the economy, including resource extraction (e.g., petroleum and natural gas, other minerals), forestry, fisheries, and agriculture, plus the currently limited manufacturing and processing areas, will be characterized in terms of their long-term potential. Tourism - an activity that cuts across a number of sectors of the regional economy - will be quantified to the extent possible, and the sensitive factors in it will be

identified. Energy development including utilization of coal and hydro, the potential of geothermal, and the utilization of oil and natural gas, will be defined.

TASK 3 - DETERMINATION OF DOMESTIC/INTERNATIONAL MARKETS RELATED TO OUTPUTS OF KEY SECTORS OF THE ALASKAN ECONOMY

We will utilize the Arthur D. Little economic analysis model which provides information (among other things) on the output from 220 industry sectors. This will be used as a take-off point for estimating 10-year demand for outputs of various industrial sectors and, in combination with the results of Task 2, will enable us to screen down to those sectors that represent possible expansion potential.

We note that, in addition to the utilization of information on the U.S. economy, along with information on trends in the Japanese economy, we will examine (again based on the information from Task 2) possibilities in non-basic sectors of the Alaskan economy such as the service, trade, and other areas that might represent important growth prospects. It is our feeling that there is a need for a blend of quantitative analysis with qualitative judgments regarding possibilities for expansion of some of the smaller sectors in the Alaskan economy for which local manpower and local resources can be utilized. To the extent possible, utilization of renewable resources will be stressed to enable the economy to reach a sustainable level of activity.

TASK 4 - PRELIMINARY ANALYSIS OF COMPARATIVE LOCATIONAL ADVANTAGE FOR ALASKA BY MAJOR SECTORS

The results of Task 3 will identify on a preliminary basis those sectors both existing and potential that may offer the opportunity for expanded economic activity in Alaska. In this task we will utilize industry (or sector) specialists to determine on a pre-feasibility study basis the ability of Alaska to compete with other areas providing similar outputs or products. Having previously identified growth sectors, we will evaluate which of Alaska's characteristics operate to its advantage as an industrial location and which operate to its disadvantage. This will require knowledge of the sectors' resource input requirements, labor and capital requirements, and market distribution.

The key factors in the determination of the locational requirements of the potential sectors addressed will include proximity to suppliers and markets, availability of labor force, sensitivity to other input costs, taxes,

infrastructure requirements, and related industrial factors. Ranking of the relevant importance of each of the above will be made for sector and industry types.

The candidate industries would be those whose locational requirements would be most closely met by Alaska as compared to other potential areas.

TASK 5 - INTERSECTORAL COMPARISON AND DEVELOPMENT OF INVESTMENT CRITERIA

The results of Task 4 will provide an estimate of the likely ability of Alaska to compete in the identified sectors on a statewide basis. While the economics of a particular establishment might indicate potential for Alaska, for example, lack of development of infrastructure and related factors may hinder economic development in a given sector or industry. As part of this task we will examine on a subregional basis the likely distribution of future economic activity related to major sectors with the goal of identifying problems associated with, for example, infrastructure that would provide access or supply water or energy to the particular economic activity. This will enable us to make a preliminary ranking of appropriate sectors in terms of viability of a particular enterprise or establishment, and of the types of investment in infrastructure that probably would be required to facilitate development.

The results of this intersectoral comparison will be a preliminary set of investment criteria for establishing on a project-by-project basis the necessary types of information that will be required when a proposed investment comes before the Permanent Fund.

In the evaluation process of choosing among projects one key assumption is that investment decisions will most likely be made under a capital rationing situation. This means that the Fund itself will be limited in size and that if presented with several "attractive" investment opportunities, the selection process must decide upon only a few projects out of the total array of possibilities.

The Fund will thus be faced with developing a strategy for allocating its resources among competing projects. Basically, this becomes a problem of screening and ranking the various proposed projects to ensure that those projects eventually chosen meet the Fund's criteria. This investment analysis requires the design of a methodology for measuring various projects by using such measurement tools as sensitivity analysis and the development of risk/return profiles on each project under consideration. In this task the

following steps will be taken to arrive at a process for project selection and ranking:

1. First, an overall fund strategy will be developed. This will include identifying the mix of projects desired in the Fund, and their risk, return, and capital requirements. Once the NPV is computed, a sensitivity analysis should be undertaken. A sensitivity analysis determines how a certain level of change in a particular project assumption effects the overall risk/return profile of the project and thus measures how "volatile" the financial productivity of the project would be under different assumptions. If a company has a performance history against which variables can be verified and adjusted, this task is much simpler. If, on the other hand, the Fund is presented a proposal for a new project with untested characteristics, this exercise becomes more difficult. The sensitivity analysis provides another tool of measurement and helps define more clearly the risk level of the project.

The risk analysis of a project investment decision does not simply entail measuring the risk of a project relative to its potential return. A particular project's risk must also be judged against that of other projects and as well against the risk of criterion of the Fund itself. This type of analysis permits balancing the various projects for which the Fund will be providing capital. For example, a low risk project can be balanced against a high risk criterion established by the Fund. For example, an objective of the fund strategy might be to select the combination of investment proposals that provides the highest net present value subject to any constraints for the period. For a project within a particular sector, its financial productivity should bear a relationship to the long-run characteristics of the industry in which the project is located. The goal of the fund strategy will be to develop a rational process to ensure proper management of the Fund's assets.

2. Once the strategy for the Fund and the associated criteria are developed, it becomes necessary to establish the project evaluation process. For evaluation purposes, each project must be analyzed according to criteria such as the net present values (NPV) of earnings it proposes to achieve within a specific timetable. The Fund will value this proposed stream of earnings according to the amount, timing, and any opportunity costs it is likely to incur.

Other measurements of projects exist, such as the payback method which analyzes the number of years required to return the original investment -

the far simplest method. Payback criteria, however, do not consider income beyond the payback period. Therefore, if the Fund portfolio is to be viewed as an ongoing sources of cash, attention must be given to events beyond the one project's payback period.

> [Task 5 is to be deferred until such time that the Department, the Committees and the Company agree to commencing Task 5, except if Task 5 is undertaken, it must be completed prior to the expiration date of the contract. If Task 5 is not undertaken within the term of this contract then the amount of the contract is correspondingly reduced by the amount proposed for Task 5. This reduction amount shall not exceed $14,500 in total.]

TASK 6 - SUGGESTED SECTORAL PRIORITIES FOR THE PERMANENT FUND

To provide the decision-makers within the Permanent Fund with useful sectoral information against which to evaluate proposed projects, this task will focus on assigning priorities to sectors and/or industries that appear to justify possible public investment. We will suggest short-term as well as long-term priorities, based on not only market and resource use criteria but the state of development of the associated infrastructure necessary for the establishment of certain industries. For example, it might be that in the immediate future, certain projects that might be proposed within particular sectors may be in existing, developed areas where access to available labor and infrastructure is relatively easy. These projects may have more immediate public returns.

For long-term projects, it may be that investment might be required not only in the enterprise itself but in the infrastructure such as roads, utilities, etc., necessary to make it feasible. Thus investment in these projects, even though within promising sectors, may require greater investments over longer periods of time.

B. REPORTS:

All reports, correspondence, graphs, computer programs, and other documents prepared under this contract are the property of the STATE and it shall have the full right to use these documents for its purposes, or other wise, when and where the STATE may designate without any claim on the part of the CONTRACTOR for additional compensation.

The work shall be done in accordance with generally recognized standards of professional consulting services. In the event that any work does not meet these standards, the Commissioner of Revenue may serve written notice and satisfactory correction shall be made within ten (10) days. Completion dates

for any portion(s) of the work shall be set by mutual agreement and corresponding written progress reports submitted to the State. Failure to complete the work on time shall result in liquidated damages of One Hundred Dollars ($100) per day, except for delays due to causes beyond the control and without fault or negligence of the CONTRACTOR. Liquidated damages shall not exceed the total payments allowed under the contract and may be deducted from payments that are owing.

The Commissioner of Revenue may terminate this contract upon written notice of the necessity for doing so and payment shall be made for satisfactory work. Any dispute concerning a question of fact that relates to the CONTRACTOR's performance, if not disposed of by agreement between the parties, shall be decided by the Commissioner of Revenue, who shall notify the CONTRACTOR. This decision, unless appealed to a court of competent jurisdiction within ninety (90) days of the completion or termination of the contract, shall be final and conclusive.

ARTICLE II.

PERIOD OF PERFORMANCE

The period of performance under this contract shall commence on June 15, 1977 and expire on June 14, 1978. Performance may be extended for additional periods by the mutual agreement of the parties.

ARTICLE III.

CONSIDERATION

In full consideration of the CONTRACTOR's performance hereunder, the STATE shall pay the CONTRACTOR the customary hourly fees not to exceed $98,000. Payments shall be made to the firm on a monthly basis commencing August 30, 1977 except that no payment shall be made for any task not undertaken and completed. Progress reports will accompany said monthly billings.

~~ARTICLE IV.~~

~~ADDITIONAL CONTRACT PROVISIONS~~

~~Appendix A attached hereto and made a part hereof sets forth additional general contract provisions of this contract.~~

Struck ederso says

IN WITNESS WHEREOF, the parties have executed this contract this _____ day of _____, 1977.

CONTRACTOR:

By: _____

_____
(Official Title)

STATE OF ALASKA, DEPARTMENT OF REVENUE
TREASURY DIVISION

By: _____

_____
(Official Title)

APPROVED:

_____
Department of Administration

_____
(Date)

Arthur D. Little, Inc. ONE MARITIME PLAZA · SAN FRANCISCO CALIFORNIA 94111 · (415) 981-2500

July 7, 1977

Mr. Jim Edenso, Deputy Commissioner
State of Alaska, Department of Revenue
Pouch SBL
Juneau, Alaska 99801

Dear Mr. Edenso: 1-8883 (Revised)

Arthur D. Little, Inc., is pleased to submit this proposal to provide economic development advice to the Department of Revenue and the State Investment Advisory Committee. We view this as an exciting opportunity to be "present at the creation" of what could emerge as one of the more momentous economic development mechanisms so far conceived. We appreciate having had the opportunity to participate in a number of State Investment Advisory Committee meetings and to meet with interested parties within the Administration and the Legislature regarding the possible scope of our services and the need for assistance in defining economic development analyses appropriate to the Permanent Fund.

We have prepared this proposal on the basis of: meetings and discussions with various people in Alaska; an examination of previous as well as current studies focused on the compilation of data and the analysis of economic activity and industrial development in Alaska; and our knowledge in the broad area of economic development, both domestic and international. We believe we have the necessary combination of experience and professional skills to assist you in developing the necessary economic information and analysis required for initiation of the Permanent Fund.

Our proposal is divided into the following sections, reflecting our understanding of your requirements:

- Background
- Sectoral Analysis
- The State of the Alaskan Economy
- Purpose and Scope of the Study
- Methodology
- Work Program
- Management Organization and Staffing
- Cost, Duration, and Billing Procedures

Mr. Jim Edenso, Deputy Commissioner
State of Alaska, Department of Revenue 1-8883

We have made a diligent effort to respond to your needs on the basis of our professional judgment as to the appropriate manner in which to conduct this project. Should you wish modifications of our work program, we hope that we will have the opportunity to jointly review your needs in order to make the necessary changes in our response.

We believe that Arthur D. Little is unusually well qualified to meet the needs of Alaska in the area of economic development, including analysis and development of recommendations. We base this belief on the following factors:

- Members of the Arthur D. Little staff who will be assigned to this project have recently conducted or are completing assignments of a similarnature. Such studies provide us with a good background for evaluating the suitability and appropriateness of potential economic sectors.

- Staff assigned to this project have operational as well as consulting experience with public agencies and public entities which have as their primary concern appropriate economic development and facilitation of this development through various financial mechanisms. We are experienced both in the area of public policy and of industrial and economic analysis.

- Our Western Regional office in San Francisco specializes in regional planning and industrial development projects. We have assigned to this project senior personnel with excellent credentials in the area of industrial development.

BACKGROUND

Based on existing best estimates, between now and 1985 Alaska's share of North Slope, Prudhoe Bay, and other Outer Continental Shelf (OCS) oil and gas production can be expected to exceed $7 billion. In addition, the possibility exists for additional state income from the extraction of coal, iron ore, and other minerals. With this large potential revenue from non-renewable resources flowing in at an increasing rate over the coming period, it becomes necessary to determine from a public standpoint the optimal ways to best utilize this income.

Mr. Jim Edenso, Deputy Commissioner
State of Alaska, Department of Revenue 1-8883

Until now, the majority of the oil-related revenues have gone into the state's General Fund. While these revenues have provided for much-needed improvement in services and facilities provided by the state, a saturation point has probably been reached in terms of the ability of state government to absorb much additional revenue on a current operating basis. This will be underscored by the significant increase in state revenues following the start of the flow of oil through the pipeline.

Last November the Alaskan voters overwhelmingly approved the concept and the creation of the "Alaska Permanent Fund." Simply put, the concept was to provide a means of collecting at least a portion of the ongoing non-renewable resource revenues and placing these revenues in a permanent fund where the revenue capital would be maintained (the concept of permanence) while the income from the fund could be utilized for various purposes. This action was taken in anticipation of the fund's providing a sound basis for ongoing economic development beyond the period of non-renewable resource extraction.

Along with the passage of the referendum on the Alaska Permanent Fund, the ongoing State Investment Advisory Committee was expanded with additional citizen members reflecting a wide range of viewpoints to consider the questions of the structure and organization of the proposed Permanent Fund. Over the past few months, the investment committee, in association with its consultants, has developed draft legislation detailing the proposed management and organization for the Alaska Permanent Fund.

Quoting from Section 37.13.020, "Purpose of the Permanent Fund," House Bill 298, one version of the proposed legislation, provides an indication of the thrust of the goals of the Permanent Fund:

> "(a) The purpose of the Permanent Fund is to provide a means of conserving a portion of the state's revenues from mineral resources to the ultimate benefit of present and future generations of Alaskans. The revenues so conserved shall be invested in income-producing investment which will provide further benefits to present and future generations of Alaskans.
>
> "(b) Further benefits may be derived from the use of the Permanent Fund to:

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"(1) Assist the diversification of the economy of Alaska by making sound investments in Alaska's renewable and non-renewable resources.

"(2) Seek to smooth the cyclical pattern of growth of the Alaska economy.

"(3) Encourage and assist the participation of private capital from both within and outside Alaska in private enterprises of benefit to Alaskans . . . ."

The Permanent Fund, at least as envisioned in the legislation under consideration, will be both a savings bank as well as a development bank. The draft bill provides that:

- Half the revenues derived by Alaska from its mineral resources will be put into the Permanent Fund. At a minimum 40% of the fund's balances must be put into "investment grade securities."

- As much as 30% of the remainder of the Permanent Fund will go to providing long-term investment capital for expansion of private sector economic activity in Alaska when sufficient capital is not available from other sources.

- No more than 30% can go to public works for community development projects for municipalities and public entities within Alaska.

Thus, a significant amount of revenue will be available to the Permanent Fund for purposes of providing investment capital for existing and potential economic activity within the state.

Having agreed upon the concept of the Permanent Fund, it becomes important to determine on what basis and through what set of criteria will financial assistance by the Permanent Fund in economic development projects be determined. As in any capital budgeting decision, typically, the fund will be faced with a set of proposed projects whose cumulative financial requirements exceed the Permanent Fund's financing capability at that point in time. Given this budget constraint, the question is then how to allocate scarce investment resources among a set of proposed projects.

In addition, the State of Alaska has historically been utilized as a resource base for the rest of the United States and to some extent Japan. Today it remains an economy primarily devoted to the extraction of both renewable and non-renewable resources with little value added from the processing of such resources. Pipeline activity has been a significant short-term boost to the state economy over the last several years, but it may well leave behind little residual long-term economic activity because of the relative "thinness" of the Alaskan economy. This would once again confirm the "boom and bust" characterization of the Alaskan economy.

SECTORAL ANALYSIS

At least in concept, the creation of the Permanent Fund, with its ability to supplement and complement the existing commercial banking activity in Alaska with the capacity to provide long-term loans and/or equity participation on a development basis, could well be an important mechanism for diversifying the economy and providing for greater utilization of Alaska's resources within Alaska.

One way of establishing a mechanism for budgeting and allocating scarce investment resources among alternative opportunities is to prepare a sectoral analysis of the Alaska economy to identify those sectors, industries, or portions of economic activity that appear to have the greatest payoff in the long run for Alaska in terms of diversification, income distribution, and the various other economic goals the state might develop. This sectoral analysis would provide an overview of the economy, linking both the existing sectors and those that might exist in the future to the overall markets within the U.S. economy as well as the international one, particularly the Pacific Rim economies. By focusing investments in those sectors of the economy that are likely to have long-term markets and meet state economic goals, it is most likely that the investments will provide long-term gain for the Alaskan economy.

Referring again to the proposed legislation to establish the Permanent Fund, "sectoral analysis" has been identified as one important means for the fund to determine what projects it will finance and in what manner. Included in the section "Duties of the Policy Board" is an element relating to the annual review and approval of long-range operating plans based on sectoral analysis of the Alaskan economy.

Further, in the section entitled "Operational Principles," various guidelines are provided for the operation of the public corporation. In addition to establishing the "prudent person rule of investment," this section requires that the particular project or investment being considered be able to stand on its own in terms of financial productivity. Should the Permanent

Fund have before it a case requiring a subsidy, this must be explicitly identified and the Legislature must provide for the subsidy component of such an investment out of general fund revenues.

The same section states further that the corporation will make investment decisions with regard to "economic and other considerations including consideration of employment, income distribution, environment, health, social, and other factors. The corporation shall be sensitive to the views of the affected local community and shall include an analysis of those views and proposals for large investments."

Thus, throughout the draft legislation, the need for the application of economic analysis to proposed investments of the Permanent Fund is clearly identified.

This proposal addresses itself to the establishment of a structure or framework against which projects requesting assistance from the Permanent Fund can be evaluated so that a ranking and prioritizing of the projects can be achieved. The net result becomes one of maximizing the productivity of the investments made by the Permanent Fund for economic development purposes.

STATE OF THE ALASKAN ECONOMY

Alaska and its surrounding ocean areas are currently viewed as the United States' greatest reservoir of energy resources required for energy development in the critical period ahead. The question becomes this: Will Alaska continue to provide the resources but not necessarily the translation of this resource base into increased levels of economic activity through vertical integration. The Alaskan economy is at a watershed. In general, the potential exists for increased economic activity at some sustainable level. What direction will future investments in the Alaskan economy take? Will they be a continuation of current and historical resource extraction investments resulting in cycles of high economic activity followed by a state recession when the resource is exhausted, or will Alaska participate in the further utilization of these resources?

To place in perspective the role of economic development and, in particular, the purpose of a sectoral analysis providing a structured framework for investment decisions by the Permanent Fund, it is useful to briefly examine the overall Alaskan economy and its components.

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The relative thinness of the Alaskan economy reflects the fact that so much of the consumer goods as well as a good portion of the industrial requirements are imported, indicating tremendous leakage of Alaskan income to the lower 48 and elsewhere. Recently in Alaska, the distribution of wage and salary employment, a measure of economic activity, has been roughly in the following proportions (this excludes self-employed workers, which exclusion would tend to understate, among other things, the fishing component of the Alaskan economy):

- Mining (including oil and gas extraction) 3%
- Contract construction 17%
- Manufacturing 5%
- Transportation, communication, public utilities 10%
- Trade 16%
- Finance, insurance, and real estate 5%
- Services 16%
- Government 29%

The above figures indicate the dependence of the economy on government – federal, state, and local. Contract construction representing 17% of recent total wage and salary employment is obviously distorted because of pipeline construction and related activities. Mining, even including oil and gas activity, provides only a modest proportion of the wage and salary employment in the Alaskan economy. Thus, even with recent pipeline activity, sectors important to increasing the amount of income retained within the Alaskan economy remain small. In fact, in the period from 1970-1975 manufacturing employment actually grew very modestly and stands at no more than 9000-10,000, primarily in fish processing and forest product activities.

Excluding government employment, the Alaskan economy relies in greater or lesser amount on the following activities:

Mineral exploration, development, and production, including fuels and metallic and nonmetallic materials. Here the possibility exists for expansion in a number of areas. It appears that the coal potential along with petroleum natural gas can provide an ongoing thrust to economic activity.

Fisheries. With the passage of Public Law 94-264 extending the U.S. Conservation and Management zone to 200 nautical miles, fishing is still in a period of flux. It can be anticipated that at least some portion of the yield of groundfish currently going to Russian and Japanese

ships, will go to Alaska either through actual participation in the fishing or some payment mechanism. In addition, the traditional catches of the Alaskan fishing industry – salmon, king crab, snow crab, shrimp, and halibut – will continue to provide a basis for possible expansion of this sector.

Forest products. This sector, in which the current demand is primarily for pulp for both the lower 48 as well as Japan, reflects the sensitivity of the industrialized economies to materials competition. With the recent rise in oil prices, pulp has been substituted to some extent for petroleum-based fiber. The balance to be struck in the forest products industry in the future is unknown.

Tourism. Certainly in large measure a renewable resource, tourism has emerged recently as an important component of the Alaskan economy. Because its impact covers numerous sectors in a typical economy, it is difficult to measure. Whatever the combination of cruise ship, highway, ferry, liner, plane, and motor coach modes of travel, tourism will continue to grow over the next 10 years. Ways of insuring maximum returns to Alaska of tourism activity are still to be determined.

Agriculture. Agriculture – mainly eggs, potatoes, and milk – provides a modest contribution to Alaska's domestic needs. Similarly, truck farming surrounding the urban areas meets a modest part of the increasing demand in the urban population. Importation of food products from the lower 48 continues to be an important "leakage" out of the economy, and it can be anticipated that opportunities in this sector will emerge over time.

Where does the economy go in the future? Are there take-off possibilities based on capitalizing on resources, especially the renewable resources, of Alaska? Can this tremendous storehouse of resources and energy potential be developed with sensitivity to the compatibility of maximum utilization of renewable resources with the unavoidable use of non-renewable resources? These are the types of questions which a sectoral analysis of the Alaskan economy will begin to examine.

PURPOSE, SCOPE, AND APPROACH

As a beginning point for the ongoing economic analysis that will be required for proper project assessment by the Permanent Fund, this proposal is directed toward developing a structure and/or framework for evaluating proposed projects for investment. We have termed this a sectoral analysis – an examination of the Alaskan economy from a macro viewpoint, linking its current and potential outputs with those of the rest of the U.S. economy as well as

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Pacific Rim areas, to identify those long-term markets in which Alaska can most probably compete. Our work would also include an assessment of the internal Alaskan demand for various outputs, to identify areas where there is a possibility for "import substitution." In other words, given certain investment potential among various sectors of the Alaskan economy, what areas will have the greatest payoff to the Fund, balancing risk and return.

Our proposed work would identify the assets that would foster growth and the liabilities that constrain or inhibit development of particular activities in Alaska, and the mechanisms that might be used to remove or at least mitigate impediments in various sectors. To the extent that long-term capital will assist in removing impediments to development, clearly the Permanent Fund can well become an important mitigating measure.

The crux of our approach is to build upon existing studies, data compilations, and investigations of current activity in a manner which will maximize the involvement of the private sector as well as the public sector. This will assist in the identification of appropriate sectors in the evolution of economic diversity and stability within the Alaskan economy.

Specifically, our analysis would include:

1. An assessment of the long-term outlook for the U.S. economy as well as Japan.
2. An assessment of growth prospects for individual industries.
3. An assessment of the outlook for the Alaskan economy and industry:
   a. Identification of influence of national, international, and state trends.
   b. Identification of factors contributing to or inhibiting growth in Alaska-based industry.
4. Evaluation of major sectors of the Alaskan economy:
   a. Resource extraction, such as petroleum and natural gas, other minerals, forestry, fisheries, and agriculture.
   b. Manufacturing and processing, such as fish processing, other food processing, petroleum- and natural gas-related processing, and wood products.
   c. Tourism

d. International and domestic trade linkages

e. Energy

5. Identification of candidate industries for possible establishment in Alaska.

6. Preparation of sectoral analyses

a. Characterization of industry at national level.

- Size
- Location
- Concentration

b. Historical development.

- Major growth influences

c. Long-term growth prospects.

- Macro economy
- New products
- New markets
- Other considerations

d. Industry in Alaska.

- Contributing factors
- Inhibiting factors

e. Industry development and the Permanent Fund.

- Consistency of goals
- Recommendations for further action

7. Suggested project financial productivity measures.

a. Fund investment criteria.
b. Sector financial measures.
c. Initial sector priorities

The underlying goal of the above analysis is to utilize the revenues derived from non-renewable resources to achieve maximum use of renewable resources within the state.

METHODOLOGY

The development of a sectoral analysis emphasizing identification of possibilities for vertical integration within the Alaskan economy to capitalize on existing renewable and non-renewable resources as well as expanding the availability of goods and services for the internal Alaskan economy requires a broad approach and a wide array of methodologies. The product of this proposed study is not just the output of a macroeconomic model; rather, it is the results of several flows of analyses coming together, leading to the identification of sectors appropriate for consideration by the Permanent Fund for project investment – sectors that are either represented currently in the Alaskan economy or are likely candidates for inclusion in the economy over the next few years. This would include vertical integration in terms of the processing of both renewable and non-renewable natural resources, as well as consideration of ways to reduce the leakage out of the domestic economy. For instance, over the next few years certain thresholds may well be reached within the economy, permitting the establishment of business activity that heretofore could not viably compete because of such factors as lack of economies of scale, sufficient domestic market, etc.

An important aspect of our approach and methodology is the utilization of our ongoing economic advisory service. Over the past several years Arthur D. Little has offered a variety of programs to both public and private clients focusing on the growth prospects for the U.S. economy and, most importantly, individual industries within the sectors. Currently a team of analysts is charged with assessing the performance of the U.S. and international economies and the implications for industry growth. Prominent in this ongoing effort is Arthur D. Little's large-scale input-output model of the U.S. economy, which characterizes the interface between the macroeconomy and individual industries, incorporating technological changes, new products, material substitutions, etc. As part of this effort we closely monitor the economy and developments in areas such as:

- Consumer spending.
- Business capital spending.
- New building activity.
- Fiscal and monetary policies.
- International trade activities.
- Worldwide economic conditions.

Through these activities, Arthur D. Little maintains close awareness of developments in more than 220 individual industries (see Appendix A). This provides us with a large, comprehensive, consistent, and detailed (four digit industrial classification) industry information system for

problem solving – in particular, identification of likely sectors of growth in the Alaskan economy. This information system, embodying the analyses and insights of a large body of Arthur D. Little expertise, is carefully managed and continually updated.

WORK PROGRAM

To achieve the purposes of the project, we propose to undertake the following tasks:

1. Characterization of existing conditions,
2. Assessment of the present Alaskan economy,
3. Determination of the domestic/international markets related to outputs of key sectors of the Alaskan economy,
4. Preliminary analysis of the comparative locational advantage for Alaska by major sector,
5. Intersectoral cost/benefit comparison and development of investment criteria, and
6. Suggested sectoral priorities for the Permanent Fund.

Task 1 – Characterization of Existing Conditions in Alaska

To establish a consistent set of baseline information for determining suitable sectoral investment focuses and developing economic development strategies, we will first initiate a reconnaissance program to bring together relevant information on the existing situation within Alaska. This will cover existing studies and ongoing research including relevant data and analysis from the numerous affected public agencies in Alaska as well as private sector sources.

To complement the review of existing published data and analyses, we will conduct a structured interview program with appropriate persons primarily in the private sector in the major areas of activity in the state. This program will provide additional background on issues we consider it necessary to address and on the current nature of economic activity, and will also provide a preliminary assessment of the ability of existing Alaskan industry to compete in expanded markets.

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There are a number of studies in progress that provide information on the current state of the Alaskan economy; this includes both statistical information and "models of the economy." Among these basic sources of information are the following:

- Alaska Department of Commerce and Economic Development.
- Alaska Department of Revenue.
- Alaska Department of Labor.
- Governor's office, Policy Development and Planning.
- University of Alaska, particularly the Institute for Social, Economic and Government Research related to their "Main in the Arctic Program."
- Bureau of Land Management, quantitative models developed for assessing impact on the Alaskan economy of oil and natural gas development.
- Trade flow models developed both in the State of Washington and in Alaska linking the Alaskan economy to the Northwest portion of the lower 48.
- Other public agency information.
- The set of Regional Profiles prepared by the University of Alaska for the state and the Joint Federal-State Land Use Planning Commission for Alaska.

Our analysis of the availability of infrastructure and level of community development will be based upon information provided by the Alaska Department of Highways, the Alaska Department of Public Works, the U.S. Bureau of Land Management, and the U.S. Bureau of Indian Affairs, supplemented by local area information from the Alaskan Department of Community and Regional Affairs.

For specific sectoral information – i.e., historical measures of economic activity – we would utilize information from such entities as the Alaska Department of Natural Resources, Alaska Department of Fish and Game, the Division of Economic Enterprise of the Department of Commerce and Economic Development, the National Marine Fisheries Service, the Bureau of Indian Affairs, the U.S. Forest Service, and the Bureau of Mines.

Task 2 – Assessment of the Present Alaskan Economy

To place Alaska in perspective, we will utilize the baseline information developed in Task 1 to prepare an assessment of the present Alaskan economy. This will include:

- Trends in economic indicators,
- Identification of structural relationships within the Alaskan economy,
- Delineation of regional economic activity in Alaska,
- Nature of economic development factors,
- Characteristics of the major sectors of the current economy,
- Level of infrastructure development, and
- Preliminary identification of constraints and impediments to future economic growth.

This assessment will be utilized later in th vork program to compare Alaska's potential as well as development constraints with likely emerging markets within Alaska, elsewhere in the United States, and abroad. Labor supply and wage structure, transportation and communications, capital availability, utilities, tax structure, and existing markets will be included in our examination of development-related factors.

The major basic sectors of the economy, including resource extraction (e.g., petroleum and natural gas, other minerals), forestry, fisheries, and agriculture, plus the currently limited manufacturing and processing areas, will be characterized in terms of their long-term potential. Tourism – an activity that cuts across a number of sectors of the regional economy – will be quantified to the extent possible, and the sensitive factors in it will be identified. Energy development, including utilization of coal and hydro, the potential of geothermal, and the utilization of oil and natural gas, will be defined.

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Task 3 – Determination of Domestic/International Markets Related to Outputs of Key Sectors of the Alaskan Economy

We will utilize the Arthur D. Little economic analysis model which provides information (among other things) on the output from 220 industry sectors. (See Appendix A for discussion of the industry indicators and industry sectors included in this assessment.) This will be used as a take-off point for estimating 10-year demand for outputs of various industrial sectors and, in combination with the results of Task 2, will enable us to screen down to those sectors that represent possible expansion potential.

We note that, in addition to the utilization of information on the U.S. economy, along with information on trends in the Japanese economy, we will examine (again based on the information from Task 2) possibilities in non-basic sectors of the Alaskan economy such as the service, trade, and other areas that might represent important growth prospects. It is our feeling that there is a need for a blend of quantitative analysis with qualitative judgments regarding possibilities for expansion of some of the smaller sectors in the Alaskan economy for which local manpower and local resources can be utilized. To the extent possible, utilization of renewable resources will be stressed to enable the economy to reach a sustainable level of activity.

Task 4 – Preliminary Analysis of Comparative Locational Advantage for Alaska by Major Sectors

The results of Task 3 will identify on a preliminary basis those sectors both existing and potential that may offer the opportunity for expanded economic activity in Alaska. In this task we will utilize industry (or sector) specialists to determine on a pre-feasibility study basis the ability of Alaska to compete with other areas providing similar outputs or products. Having previously identified growth sectors, we will evaluate which of Alaska's characteristics operate to its advantage as an industrial location and which operate to its disadvantage. This will require knowledge of the sectors' resource input requirements, labor and capital requirements, and market distribution.

The key factors in the determination of the locational requirements of the potential sectors addressed will include proximity to suppliers and markets, availability of labor force, sensitivity to other input costs, taxes, infrastructure requirements, and related industrial factors. Ranking of the relevant importance of each of the above will be made for sector and industry types.

The candidate industries would be those whose locational requirements would be most closely met by Alaska as compared to other potential areas.

Task 5 – Intersectoral Comparison and Development of Investment Criteria

The results of Task 4 will provide an estimate of the likely ability of Alaska to compete in the identified sectors on a statewide basis. While the economics of a particular establishment might indicate potential for Alaska, for example, lack of development of infrastructure and related factors may hinder economic development in a given sector or industry. In this task we will examine on a subregional basis the likely distribution of future economic activity related to major sectors with the goal of identifying problems associated with, for example, infrastructure that would provide access or supply water or energy to the particular economic activity. This will enable us to make a preliminary ranking of appropriate sectors in terms of viability of a particular enterprise or establishment, and of the types of investment in infrastructure that probably would be required to facilitate development.

The results of this intersectoral comparison will be a preliminary set of investment criteria for establishing on a project-by-project basis the necessary types of information that will be required when a proposed investment comes before the Permanent Fund.

The project analysis based on certain investment criteria will differ from financing decisions in degree of complexity and in the breadth of its scope. The financing of projects requires an examination of the several methods of financing, such as debt, equity or combinations thereof and the terms and conditions of the financing instruments, and the project's ability, operating as well as financial, to provide a return on an investment made in it. Typically this procedure will include an analysis of operating performance, return on capital ratios, and other financial ratios. On the other hand, to select investment opportunities, the Permanent Fund will view the particular financing decision as only one part of an overall strategy. An investment analysis requires the design of a methodology for measuring various projects, the use of sensitivity analyses, and the development of risk/return profiles on each project under consideration.

In this task, we will consider the following aspects of developing investment criteria for projects within various sectors:

- The fund strategy is initially determined. This includes identifying the mix of projects desired in the fund, and their risk, return, and capital requirements. The choice of various projects will determine the financial structure of the fund and will define the overall level of risk the fund will be able to support. A "hurdle rate" refers to this risk level whenever a project is considered as a potential investment.

  In the evaluation process of choosing among projects one key assumption is that investment decisions will most likely be made under a capital rationing situation. This means that the fund itself will be limited in size and that if presented with several "attractive" investment opportunities, the selected process must decide upon only a subgroup of the total array of possibilities.

- For evaluation purposes, each project must be analyzed according to such criteria as the net present values (NPV) of earnings it proposes to achieve within a specific timetable. The fund will value this proposed stream of earnings according to the amount, timing, and opportunity costs it is likely to incur. These costs represent the opportunity foregone on the next most profitable investment.

  Other measurements of projects exist, such as the payback method which analyzes the number of years required to return the original investment – the far simplest method. Payback criteria, however, do not consider income beyond the payback period. Therefore, if the fund portfolio is to be viewed as an ongoing source of cash, attention must be given to events beyond the one project's payback period. This necessitates a long-term fund strategy.

  Thus, an objective of the fund strategy will be to select the combination of investment proposals that provides the highest net present value subject to any constraints for the period. To determine the NPV of a project, the appropriate discount rate will have to be selected. The discount rate must be in line with the hurdle rate, must consider an opportunity rate, should include an inflation factor, and most importantly must reflect a risk factor. For a project within a particular sector, its financial productivity should bear a relationship to the long-run characteristics of the industry in which the project is located.

- Once the rate is set, and the NPV computed, a sensitivity analysis should be undertaken to examine how volatile the variables are that determined the projected stream of earnings. If a company has a performance history against which variables can be verified and adjusted, this task is much simpler. If, on the other hand, the fund is presented a proposal for a new project with untested characteristics, the exercise of assigning probabilities to the variables becomes more difficult. The sensitivity analysis provides another tool of measurement and helps define more clearly the risk level of the project.

- The risk analysis of an investment decision does not simply entail measuring the risk of a project relative to its potential return. A particular project's risk must also be judged against that of other investment opportunities and most importantly against the overall risk of the fund itself. This means that the project should at best complement the fund's risk level. This can be accomplished, for example, by fitting the project's risk level against other fund projects such as having the risk of a high risk/return balanced against a low risk/return project.

Task 6 – Suggested Sectoral Priorities for the Permanent Fund

To provide the decision-makers within the Permanent Fund with useful sectoral information against which to evaluate proposed projects, this task will focus on assigning priorities to sectors and/or industries that appear to justify possible public investment. We will suggest short-term as well as long-term priorities, based on not only market and resource use criteria but the state of development of the associated infrastructure necessary for the establishment of certain industries. For example, it might be that in the immediate future, certain projects that might be proposed within particular sectors may be in existing, developed areas where access to available labor and infrastructure is relatively easy. These projects may have more immediate public returns.

For long-term projects, it may be that investment might be required not only in the enterprise itself but in the infrastructure such as roads, utilities, etc., necessary to make it feasible. Thus investment in these projects, even though within promising sectors, may require greater investments over longer periods of time.

In establishing these priorities we would anticipate the involvement of the committee to insure an understanding of the procedures that we would have gone through in arriving at these priorities.

MANAGEMENT ORGANIZATION AND STAFFING

I will be project administrator and maintain day-to-day administration of this case. My professional experience includes 10 years as a regional economist and industrial development specialist with Arthur D. Little, Inc., in a wide range of public and private projects. I will have major responsibilities in the assessment of the current Alaskan economy, in linking the long-term demands in the overall U.S. economy, and that of Japan, with the appropriate sectors of the Alaskan economy, and in developing investment criteria and ranking sectors for possible investment.

I have extensive experience in the development of criteria for location of industrial activity in metropolitan and rural areas both in the United States and in developing countries; much of my work has also involved identification of specific economic activities appropriate for particular areas. Domestically, my work in industrial development has included identification of target industries for regions in Kansas, Nevada, Pennsylvania, Oregon, Washington, and California.

Internationally, I have examined the prospects for expansion of particular economic sectors in the countries of Senegal, West Africa; Republic of South Korea; and in the developing economies of the South Pacific, specifically the Kingdom of Tonga and the island of Truk, in Micronesia. These studies have also assessed the benefits and costs associated with the development of the specific sectors.

Closely associated with me in this project will be senior Arthur D. Little staff members with extensive experience in the broad areas of regional economics and industrial development:

Cyril C. Herrmann – Dr. Herrmann will assume primary project management and implement overall contract and study policy. Dr. Herrmann has been a consultant with Arthur D. Little for 22 years, and has worked on many economic development projects. His domestic work has included studies in New England, Florida, and California. For several years he was manager of the Arthur D. Little "Operation Bootstrap" program in Puerto Rico,

one of the most successful industrial development action programs ever established. He had similar responsibilities for industrial development programs in Egypt, Iraq, Honduras, the Phillipines, and several provinces in Canada. He is Vice President of the Urban Land Institute and Chairman of the Research Committee.

Harry Foden – Mr. Foden will join with Dr. Herrmann in providing policy guidance and project review. Mr. Foden's experience in economic development work for Arthur D. Little extends over a 20-year period. Within the United States he has directed studies for states, municipalities, and public utilities, including New York, Pennsylvania, Mississippi, Massachusetts, Illinois, Indiana, and South Carolina. Overseas he has been involved in economic development work for Iraq and currently is engaged in such studies in Saudi Arabia. He is an Executive Group Member of the Industrial Council of the Urban Land Institute and a member of the American Industrial Development Council.

Vincent Ficcaglia – Mr. Ficcaglia is a senior staff economist whose work is concentrated in the areas of industrial and regional development and applied quantitative economics. Over the past several years he has directed numerous studies employing econometric and other quantitative techniques. In particular, he has utilized Arthur D. Little's input/output model of the U.S. economy to address questions related to the impact of various public policy measures and new industrial developments upon national, regional, and local economies.

Donald Tatzin – Mr. Tatzin is a regional planner and economist specializing in the identification of economic sectors for regional and local economies. He is presently evaluating the type and magnitude of new industrial and related activities associated with the effects of Alaskan Outer Continental Shelf development on Puget Sound and the State of Washington.

Richard Goodale – Mr. Goodale is a financial specialist with Arthur D. Little, concentrating on investment opportunities and financial analyses.

Christopher Krebs – Mr. Krebs is an economist and social analyst with special interest in community and regional economic development and public policy formulation. Of particular relevance to this project is his recent work for a major U.S. air carrier regarding the trade linkages and communities of interest between the United States and Japan, focusing particularly on the impacts on the Pacific Northwest economy.

In addition, as appropriate, technical specialists knowledgeable in particular sectors will be called on to provide in-depth assessments of markets and competitive positions within these sectors. Their resumes and those of the project team members are attached.

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COST AND DURATION

It is our understanding that this work is to be completed within six months. Assuming an early August start, work could be completed by the first of February during the next legislative session. By early October we would be able to provide an interim report to you and the committee relative to the preliminary sectoral analysis. We will also submit monthly informal progress reports indicating work done to that time.

The final report could be presented in January, with the final report in 20 copies and a reproducible master copy provided at the beginning of February.

For the work outlined we propose that you authorize a fixed price of $98,000 to cover professional services and expenses. We have estimated that the following levels of effort by task will be required:

Task	Professional Service and Expense
1	$ 6,500
2	8,000
3	18,000
4	41,000
5	14,500
6	10,000

Invoices will be submitted monthly according to the following schedule and will be payable upon receipt:

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Invoice Date	Amount
End of Month 1	$15,000
End of Month 2	15,000
End of Month 3	15,000
End of Month 4	15,000
End of Month 5	15,000
End of Month 6	15,000
Submittal of Final Report	8,000

GENERAL PROVISIONS

Our work for clients is conducted on a confidential basis, and we will treat information developed hereunder in accordance with our established professional standards.

Since announcement to the public of our working relationship, either while it is in progress or afterward, might be mutually beneficial, we will discuss with you any opportunities we see in this area. Of course, the details of any such announcement would be confirmed in writing by both parties.

Our work will be on a best efforts basis. We trust the results will meet the objectives sought, and we have assigned to the work professional personnel having the required skills, experience and competence. In any event, our liability for damages direct or consequential resulting from this work will be limited to the amount paid us hereunder.

Any change in this agreement shall be confirmed in writing. This agreement shall be interpreted according to the laws of the State of California.

Our agreement may be terminated on 30 days' written notice by either party, or within such lesser time as we may find necessary to conclude the work currently under way and summarize our findings for you. In that event, you will be responsible only for the professional services and expenses which have been committed to that time.

Arthur D Little, Inc.

July 7, 1977

-23-

Mr. Jim Edenso, Deputy Commissioner
State of Alaska, Department of Revenue

1-8883

ACCEPTANCE

We look forward with great interest to working with you on this project. If this proposal meets with your approval and you would like us to proceed, please sign and return the enclosed copy within thirty days. Should you have any questions or wish more time to consider our proposal, please let me know.

Sincerely yours,

Kenneth A. Jensen

KAJ:gac

Approved for Arthur D. Little, Inc.

By _____

Authorized Contracting Officer

Accepted for State of Alaska, Department of Revenue

By _____

Title _____

Date _____

The candidate industries would be those whose locational requirements would be most closely met by Alaska as compared to other potential areas.

Task 5 - Intersectoral Comparison and Development of Investment Criteria

The results of Task 4 will provide an estimate of the likely ability of Alaska to compete in the identified sectors on a statewide basis. While the economics of a particular establishment might indicate potential for Alaska, for example, lack of development of infrastructure and related factors may hinder economic development in a given sector or industry. As part of this task we will examine on a subregional basis the likely distribution of future economic activity related to major sectors with the goal of identifying problems associated with, for example, infrastructure that would provide access or supply water or energy to the particular economic activity. This will enable us to make a preliminary ranking of appropriate sectors in terms of viability of a particular enterprise or establishment, and of the types of investment in infrastructure that probably would be required to facilitate development.

The results of this intersectoral comparison will be a preliminary set of investment criteria for establishing on a project-by-project basis the necessary types of information that will be required when a proposed investment comes before the Permanent Fund.

In the evaluation process of choosing among projects one key assumption is that investment decisions will most likely be made under a capital rationing situation. This means that the fund itself will be limited in size and that if presented with several "attractive" investment opportunities, the selection process must decide upon only a few projects out of the total array of possibilities.

The Fund will thus be faced with developing a strategy for allocating its resources among competing projects. Basically, this becomes a problem of screening and ranking the various proposed projects to ensure that those projects eventually chosen meet the Fund's criteria. This investment analysis requires the design of a methodology for measuring various projects by using such measurement tools as sensitivity analysis and the development of risk/return profiles on each project under consideration. In this task the following steps will be taken to arrive at a process for project selection and ranking:

1. First, an overall fund strategy will be developed. This will include identifying the mix of projects desired in the fund, and their risk, return, and capital requirements. Once the NPV is computed, a sensitivity analysis should be undertaken. A sensitivity analysis determines how a certain level of change in a particular project assumption affects the overall risk/return profile of the project and thus measures how "volatile" the financial productivity of the project would be under different assumptions. If a company has a performance history against which variables can be verified and adjusted, this task is much simpler. If, on the other hand, the fund is presented a proposal for a new project with untested characteristics, this exercise becomes more difficult. The sensitivity analysis provides another tool of measurement and helps define more clearly the risk level of the project.

The risk analysis of a project investment decision does not simply entail measuring the risk of a project relative to its potential return. A particular project's risk must also be judged against that of other projects and as well against the risk of criterion of the fund itself. This type of analysis permits balancing the various projects for which fund will be providing capital. For example, a low risk project can be balanced against a high risk project so that their combined average risk would be compatible with the risk criterion established by the fund. For example, an objective of the fund strategy might be to select the combination of investment proposals that provides the highest net present value subject to any constraints for the period. For a project within a particular sector, its financial productivity should bear a relationship to the long-run characteristics of the industry in which the project is located. The goal of the fund strategy will be to develop a rational process to ensure proper management of the fund's assets.

2. Once the strategy for the fund and the associated criteria are developed, it becomes necessary to establish the project evaluation process. For evaluation purposes, each project must be analyzed according to criteria such as the net present values (NPV) of earnings it proposes to achieve within a specific timetable. The fund will value this proposed stream of earnings according to the amount, timing, and any opportunity costs it is likely to incur.

Other measurements of projects exist, such as the payback method which analyzes the number of years required to return the original investment - the far simplest method. Payback criteria, however, do not consider income beyond the payback period. Therefore, if the fund portfolio is to be viewed as an ongoing sources of cash, attention must be given to events beyond the one project's payback period.

Task 6 - Suggested Sectoral Priorities for the Permanent Fund

To provide the decision-makers within the Permanent Fund with useful sectoral information against which to evaluate proposed projects, this task will focus on assigning priorities to sectors and/or industries that appear to justify possible public investment. We will suggest short-term as well as long-term priorities, based on not only market and resource use criteria but the state of development of the associated infrastructure necessary for the establishment of certain industries. For example, it might be that in the immediate future, certain projects that might be proposed within particular sectors may be in existing, developed areas where access to available labor and infrastructure is relatively easy. These projects may have more immediate public returns.

For long-term projects, it may be that investment might be required not only in the enterprise itself but in the infrastructure such as roads, utilities, etc., necessary to make it feasible. Thus investment in these projects, even though within promising sectors, may require greater investments over longer periods of time.

Alaska State Legislature

SPECIAL COMMITTEE ON
THE ALASKA PERMANENT FUND
(907) 276-3433
528 W. 5TH, SUITE 270
ANCHORAGE, AK. 99501
[POUCH V, JUNEAU, AK. 99811]
(907) 465-3873

MEMBERS
REP. CLARK GRUENING, CHMN.
REP. TERRY GARDINER, V. CHMN.
REP. E. J. HAUGEN
REP. RUSS MEEKINS
REP. BILL MILES
REP. LEO SCHAEFFER
REP. RICK URION

House of Representatives

RECEIVED
AUG 0 1977

Jim Edenso
Deputy Commissioner
Department of Revenue
Pouch S
Juneau, AK 99811

Dear Mr. Edenso:

In accord with the legislative intent governing the appropriation for a sectoral analysis of the Alaska economy, we have reviewed the revised proposal of Arthur D. Little, Inc. and find it satisfactory with the exception of Task 5 (an investment screening model). In the contract we have signed, the decision on this work and the release of the $14,500 involved are deferred to a later date.

Sincerely,

CLARK GRUENING, Chairman
House Permanent Fund
Committee

GEORGE HOHMAN, Chairman
Senate Permanent Fund
Committee

PROFESSIONAL SERVICES CONTRACT

This contract, effective as of the 15th day of JUNE, 1977, between the STATE OF ALASKA, DEPARTMENT OF REVENUE, TREASURY DIVISION (hereinafter called the STATE), and ARTHUR D. LITTLE & CO., (hereinafter called the CONTRACTOR),

WITNESSETH THAT:

WHEREAS, the STATE requires professional contractual services in connection with the Alaska Permanent Fund; and

WHEREAS, the CONTRACTOR is willing to undertake the performance of this contract under the terms of this contract; and

WHEREAS, the Commissioner of Revenue may, pursuant to AS 37.10.070(g) enter into contracts for professional services;

NOW THEREFORE, the parties hereto agree as follows:

ARTICLE I.

SERVICES TO BE PERFORMED

The CONTRACTOR shall provide for the Department of Revenue such papers and information deemed necessary:

A. SECTORAL ANALYSIS

At least in concept, the creation of the Permanent Fund, with its ability to supplement and complement the existing commercial banking activity in Alaska with the capacity to provide long-term loans and/or equity participation on development basis, could well be an important mechanism for diversifying the economy and providing for greater utilization of Alaska's resources within Alaska.

One way of establishing a mechanism for budgeting and allocating scarce investment resources among alternative opportunities is to prepare a sectoral analysis of the Alaska economy to identify those sectors, industries, or portions of economic activity that appear to have the greatest payoff in the long run for Alaska in terms of diversification, income distribution, and the various other economic goals the state might develop. This sectoral analysis would provide an overview of the economy, linking both the existing sectors and those that might exist in the future to the overall markets within the

U.S. and the international economies, particularly the economies of the Pacific Rim. By focusing investments in those sectors of the Alaska economy that are likely to have long-term markets and meet state economic goals, it is most likely that those investments will provide long-term gain for the Alaskan economy.

Referring again to the proposed legislation to establish the Permanent Fund, "sectoral analysis" has been identified as one important means for the Fund to identify sound investment projects. Included in the section "Duties of the Policy Board" is an element relating to the annual review and approval of long-range operating plans based on sectoral analysis of the Alaskan economy.

Further, in the section entitled "Operational Principles," various guidelines are provided for in the operation of the proposed public corporation. In addition to establishing the "prudent person rule of investment," this section requires that the particular project or investment being considered be able to stand on its own in terms of financial productivity. Should the Permanent Fund have before it a case requiring a subsidy, this must be explicitly identified and the Legislature must provide for the subsidy component of such an investment out of General Fund revenues.

The same section states further that the corporation will make investment decisions with regard to "economic and other considerations including consideration of employment, income distribution, environment, health, social, and other factors. The corporation shall be sensitive to the views of the affected local community and shall include an analysis of those views and proposals for large investments."

Thus, throughout the draft legislation, the need for the application of economic analysis to proposed investments of the Permanent Fund is clearly identified.

This proposal addresses itself to the establishment of a structure or framework against which projects requesting assistance from the Permanent Fund can be evaluated so that a ranking and prioritizing of projects can be achieved. The net result becomes one of maximizing the productivity of the investments made by the Permanent Fund for economic development purposes.

STATE OF THE ALASKAN ECONOMY

Alaska and its surrounding ocean areas are currently viewed as the United States' greatest reservoir of energy resources required for energy

development in the critical period ahead. The question becomes this: Will Alaska continue to provide the resources but not necessarily the translation of this resource base into increased levels of economic activity through vertical integration. The Alaskan economy is at a watershed. In general, the potential exists for increased economic activity at some sustainable level. What direction will future investments in the Alaskan economy take? Will they be a continuation of current and historical resource extraction investments resulting in cycles of high economic activity followed by a state recession when the resource is exhausted, or will Alaska participate in the further utilization of these resources?

To place in perspective the role of economic development and, in particular, the purpose of a sectoral analysis providing a structured framework for investment decisions by the Permanent Fund, it is useful to briefly examine the overall Alaskan economy and its components.

The relative thinness of the Alaskan economy reflects the fact that so much of the consumer goods as well as a good portion of the industrial requirements are imported, indicating tremendous leakage of Alaskan income to the lower 48 and elsewhere. Recently in Alaska, the distribution of wage and salary employment, a measure of economic activity, has been roughly in the following proportions (this excludes self-employed workers, which exclusion would tend to understate, among other things, the fishing component of the Alaskan economy):

Mining (including oil and gas extraction)	3%
Contract construction	17%
Manufacturing	5%
Transportation, communication, public utilities	10%
Trade	16%
Finance, insurance, and real estate	5%
Services	16%
Government	29%

The above figures indicate the dependence of the economy on government - federal, state, and local. Contract construction representing 17% of recent total wage and salary employment is obviously distorted because of pipeline construction and related activities. Mining, even including oil and gas activity, provides only a modest proportion of the wage and salary employment

in the Alaskan economy. Thus, even with recent pipeline activity, sectors important to increasing the amount of income retained within the Alaskan economy remain small. In fact, in the period from 1970-1975 manufacturing employment actually grew very modestly and stands at no more than 9000-10,000, primarily in fish processing and forest product activities.

Excluding government employment, the Alaskan economy relies in greater or lesser amount on the following activities:

Mineral exploration, development, and production, including fuels and metallic and nonmetallic materials. Here the possibility exists for expansion in a number of areas. It appears that the coal potential along with petroleum natural gas can provide an ongoing thrust to economic activity.

Fisheries. With the passage of Public Law 94-264 extending the U.S. Conservation and Management zone to 200 nautical miles, fishing is still in a period of flux. It can be anticipated that at least some portion of the yield of groundfish currently going to Russian and Japanese ships, will go to Alaska either through actual participation in the fishing or some payment mechanism. In addition, the traditional catches of the Alaskan fishing industry - salmon, king crab, snow crab, shrimp, and halibut - will continue to provide a basis for possible expansion of this sector.

Forest products. This sector, in which the current demand is primarily for pulp for both the lower 48 as well as Japan, reflects the sensitivity of the industrialized economies to materials competition. With the recent rise in oil prices, pulp has been substituted to some extent for petroleum-based fiber. The balance to be struck in the forest products industry in the future is unknown.

Tourism. Certainly in large measure a renewable resource, tourism has emerged recently as an important component of the Alaskan economy. Because its impact covers numerous sectors in a typical economy, it is difficult to measure. Whatever the combination of cruise ship, highway, ferry, liner, plane, and motor coach modes of travel, tourism will continue to grow over the next 10 years. Ways of insuring maximum returns to Alaska of tourism activity are still to be determined.

Agriculture. Agriculture - mainly eggs, potatoes, and milk - provide a modest contribution to Alaska's domestic needs. Similarly, truck farming surrounding the urban areas meets a modest part of the increasing demand in the

urban population. Importation of food products from the lower 48 continues to be an important "leakage" out of the economy, and it can be anticipated that opportunities in this sector will emerge over time.

PURPOSE, SCOPE, AND APPROACH

As a beginning point for the ongoing economic analysis that will be required for proper project assessment by the Permanent Fund, this proposal is directed toward developing a structure and/or framework for evaluating proposed projects for investment. We have termed this a sectoral analysis - an examination of the Alaskan economy from a macro viewpoint, linking its current and potential outputs with those of the rest of the U.S. economy as well as Pacific Rim areas, to identify those long-term markets in which Alaska can most probably compete. Our work would also include an assessment of the internal Alaskan demand for various outputs, to identify areas where there is a possibility for "import substitution." In other words, given certain investment potential among various sectors of the Alaskan economy, what areas will have the greatest payoff to the Fund, balancing risk and return.

Our proposed work would identify the assets that would foster growth and the liabilities that constrain or inhibit development of particular activities in Alaska, and the mechanisms that might be used to remove or at least mitigate impediments in various sectors. To the extent that long-term capital will assist in removing impediments to development, clearly the Permanent Fund can well become an important mitigating measure.

The crux of our approach is to build upon existing studies, data compilations, and investigations of current activity in a manner which will maximize the involvement of the private sector as well as the public sector. This will assist in the identification of appropriate sectors in the evolution of economic diversity and stability within the Alaskan economy.

Specifically, our analysis would include:

1. An assessment of the long-term outlook for the U.S. economy as well as Japan.
2. An assessment of growth prospects for individual industries.
3. An assessment of the outlook for the Alaskan economy and industry:
    a. Identification of influence of national, international, and state trends.

b. Identification of factors contributing to our inhibiting growth in Alaska-based industry.

4. Evaluation of major sectors of the Alaskan economy:

   a. Resource extraction, such as petroleum and natural gas, other minerals, forestry, fisheries, and agriculture.

   b. Manufacturing and processing, such as fish processing, other food processing, petroleum- and natural gas-related processing, and wood products.

   c. Tourism.

   d. International and domestic trade linkages.

   e. Energy.

5. Identification of candidate industries for possible establishment in Alaska.

6. Preparation of sectoral analyses:

   a. Characterization of industry at national level.

      Size

      Location

      Concentration

   b. Historical development.

      Major growth influences

   c. Long-term growth prospects.

      Macro economy

      New products

      New markets

      Other considerations

   d. Industry in Alaska.

      Contributing factors

      Inhibiting factors

   e. Industry development and the Permanent Fund.

      Consistency of goals

      Recommendations for further action

7. Suggested project financial productivity measures:

   a. Fund investment criteria.

   b. Sector financial measures.

   c. Initial sector priorities.

The underlying goal of the above analysis is to utilize the revenues derived from non-renewable resources to achieve maximum use of renewable resources within the state.

METHODOLOGY

The development of a sectoral analysis emphasizing identification of possibilities for vertical integration within the Alaskan economy to capitalize on existing renewable and non-renewable resources as well as expanding the availability of goods and services for the internal Alaskan economy requires a broad approach and a wide array of methodologies. The product of this proposed study is not just the output of a macroeconomic model; rather, it is the results of several flows of analyses coming together, leading to the identification of sectors appropriate for consideration by the Permanent Fund for project investment - sectors that are either represented currently in the Alaskan economy or are likely candidates for inclusion in the economy over the next few years. This would include vertical integration in terms of the processing of both renewable and non-renewable natural resources, as well as consideration of ways to reduce the leakage out of the domestic economy. For instance, over the next few years certain threshholds may be reached within the economy, permitting the establishment of business activity that heretofore could not viably compete because of such factors as lack of economies of scale, sufficient domestic market, etc.

WORK PROGRAM

To achieve the purposes of the project, we propose to undertake the following tasks:

1. Characterization of existing conditions;
2. Assessment of the present Alaskan economy:
3. Determination of the domestic/international markets related to outputs of key sectors of the Alaskan economy;
4. Preliminary analysis of the comparative locational advantage for Alaska by major sector;
5. Intersectoral cost/benefit comparison and development of investment criteria; and, upon approval of the Department, the House and Senate Permanent Fund Committee,
6. Suggested sectoral priorities for the Permanent Fund.

TASK 1 - CHARACTERIZATION OF EXISTING CONDITIONS IN ALASKA

To establish a consistent set of baseline information for determining suitable sectoral investment focuses and developing economic development strategies, we will first initiate a reconnaissance program to bring together relevant information on the existing situation within Alaska. This will cover existing studies and ongoing research including relevant data and analysis from the numerous affected public agencies in Alaska as well as private sector sources.

To compliment the review of existing published data and analyses, we will conduct a structured interview program with appropriate persons primarily in the private sector in the major areas of activity in the state. This program will provide additional background on issues we consider it necessary to address and on the current nature of economic activity, and will also provide a preliminary assessment of the ability of existing Alaskan industry to compete in expanded markets.

There are a number of studies in progress that provide information on the current state of the Alaskan economy; this includes both statistical information and "models of the economy." Among these basic sources of information are the following:

Alaska Department of Commerce and Economic Development.

Alaska Department of Revenue.

Alaska Department of Labor.

Governor's Office, Policy Development and Planning.

University of Alaska, particularly the Institute for Social, Economic and Government Research related to their "Main in the Arctic Program."

Bureau of Land Management, quantitative models developed for assessing impact on the Alaskan economy of oil and natural gas development.

Trade flow models developed both in the State of Washington and in Alaska linking the Alaskan economy to the Northwest portion of the lower 48.

Other public agency information.

The set of Regional Profiles prepared by the University of Alaska for the state and the Joint Federal-State Land Use Planning Commission for Alaska.

Our analysis of the availability of infrastructure and level of community development will be based upon information provided by the Alaska Department of Transportation, the U.S. Bureau of Land Management, and the U.S. Bureau of Indian Affairs, supplemented by local area information from the Alaska Department of Community and Regional Affairs.

For specific sectoral information - i.e., historical measures of economic activity - we would utilize information from such entities as the Alaska Department of Natural Resources, Alaska Department of Fish and Game, the Division of Economic Enterprise of the Department of Commerce and Economic Development, the National Marine Fisheries Service, the Bureau of Indian Affairs, the U.S. Forest Service, and the Bureau of Mines.

TASK 2 - ASSESSMENT OF THE PRESENT ALASKAN ECONOMY

To place Alaska in perspective, we will utilize the baseline information developed in Task 1 to prepare an assessment of the present Alaskan economy. This will include:

Trends in economic indicators;

Identification of structural relationships within the Alaskan economy;

Delineation of regional economic activity in Alaska;

Nature of economic development factors;

Characteristics of the major sectors of the current economy;

Level of infrastructure development; and

Preliminary identification of constraints and impediments to future economic growth.

This assessment will be utilized later in work program to compare Alaska's potential as well as development constraints with likely emerging markets within Alaska, elsewhere in the United State, and abroad. Labor supply and wage structure, transportation and communications, capital availability, utilities, tax structure, and existing markets will be included in our examination of development-related factors.

The major basic sectors of the economy, including resource extraction (e.g., petroleum and natural gas, other minerals) forestry, fisheries, and agriculture, plus the currently limited manufacturing and processing areas, will be characterized in terms of their long-term potential. Tourism - an activity that cuts across a number of sectors of the regional economy - will be quantified to the extent possible, and the sensitive factors in it will be

identified. Energy development including utilization of coal and hydro, the potential of geothermal, and the utilization of oil and natural gas, will be defined.

TASK 3 - DETERMINATION OF DOMESTIC/INTERNATIONAL MARKETS RELATED TO OUTPUTS OF KEY SECTORS OF THE ALASKAN ECONOMY

We will utilize the Arthur D. Little economic analysis model which provides information (among other things) on the output from 220 industry sectors. This will be used as a take-off point for estimating 10-year demand for outputs of various industrial sectors and, in combination with the results of Task 2, will enable us to screen down to those sectors that represent possible expansion potential.

We note that, in addition to the utilization of information on the U.S. economy, along with information on trends in the Japanese economy, we will examine (again based on the information from Task 2) possibilities in non-basic sectors of the Alaskan economy such as the service, trade, and other areas that might represent important growth prospects. It is our feeling that there is a need for a blend of quantitative analysis with qualitative judgments regarding possibilities for expansion of some of the smaller sectors in the Alaskan economy for which local manpower and local resources can be utilized. To the extent possible, utilization of renewable resources will be stressed to enable the economy to reach a sustainable level of activity.

TASK 4 - PRELIMINARY ANALYSIS OF COMPARATIVE LOCATIONAL ADVANTAGE FOR ALASKA BY MAJOR SECTORS

The results of Task 3 will identify on a preliminary basis those sectors both existing and potential that may offer the opportunity for expanded economic activity in Alaska. In this task we will utilize industry (or sector) specialists to determine on a pre-feasibility study basis the ability of Alaska to compete with other areas providing similar outputs or products. Having previously identified growth sectors, we will evaluate which of Alaska's characteristics operate to its advantage as an industrial location and which operate to its disadvantage. This will require knowledge of the sectors' resource input requirements, labor and capital requirements, and market distribution.

The key factors in the determination of the locational requirements of the potential sectors addressed will include proximity to suppliers and markets, availability of labor force, sensitivity to other input costs, taxes,

infrastructure requirements, and related industrial factors. Ranking of the relevant importance of each of the above will be made for sector and industry types.

The candidate industries would be those whose locational requirements would be most closely met by Alaska as compared to other potential areas.

TASK 5 - INTERSECTORAL COMPARISON AND DEVELOPMENT OF INVESTMENT CRITERIA

The results of Task 4 will provide an estimate of the likely ability of Alaska to compete in the identified sectors on a statewide basis. While the economics of a particular establishment might indicate potential for Alaska, for example, lack of development of infrastructure and related factors may hinder economic development in a given sector or industry. As part of this task we will examine on a subregional basis the likely distribution of future economic activity related to major sectors with the goal of identifying problems associated with, for example, infrastructure that would provide access or supply water or energy to the particular economic activity. This will enable us to make a preliminary ranking of appropriate sectors in terms of viability of a particular enterprise or establishment, and of the types of investment in infrastructure that probably would be required to facilitate development.

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following steps will be taken to arrive at a process for project selection and ranking:

1. First, an overall fund strategy will be developed. This will include identifying the mix of projects desired in the Fund, and their risk, return, and capital requirements. Once the NPV is computed, a sensitivity analysis should be undertaken. A sensitivity analysis determines how a certain level of change in a particular project assumption effects the overall risk/return profile of the project and thus measures how "volatile" the financial productivity of the project would be under different assumptions. If a company has a performance history against which variables can be verified and adjusted, this task is much simpler. If, on the other hand, the Fund is presented a proposal for a new project with untested characteristics, this exercise becomes more difficult. The sensitivity analysis provides another tool of measurement and helps define more clearly the risk level of the project.

The risk analysis of a project investment decision does not simply entail measuring the risk of a project relative to its potential return. A particular project's risk must also be judged against that of other projects and as well against the risk of criterion of the Fund itself. This type of analysis permits balancing the various projects for which the Fund will be providing capital. For example, a low risk project can be balanced against a high risk criterion established by the Fund. For example, an objective of the fund strategy might be to select the combination of investment proposals that provides the highest net present value subject to any constraints for the period. For a project within a particular sector, its financial productivity should bear a relationship to the long-run characteristics of the industry in which the project is located. The goal of the fund strategy will be to develop a rational process to ensure proper management of the Fund's assets.

2. Once the strategy for the Fund and the associated criteria are developed, it becomes necessary to establish the project evaluation process. For evaluation purposes, each project must be analyzed according to criteria such as the net present values (NPV) of earnings it proposes to achieve within a specific timetable. The Fund will value this proposed stream of earnings according to the amount, timing, and any opportunity costs it is likely to incur.

Other measurements of projects exist, such as the payback method which analyzes the number of years required to return the original investment -

the far simplest method. Payback criteria, however, do not consider income beyond the payback period. Therefore, if the Fund portfolio is to be viewed as an ongoing sources of cash, attention must be given to events beyond the one project's payback period.

> [Task 5 is to be deferred until such time that the Department, the Committees and the Company agree to commencing Task 5, except if Task 5 is undertaken, it must be completed prior to the expiration date of the contract. If Task 5 is not undertaken within the term of this contract then the amount of the contract is correspondingly reduced by the amount proposed for Task 5. This reduction amount shall not exceed $14,500 in total.]

TASK 6 - SUGGESTED SECTORAL PRIORITIES FOR THE PERMANENT FUND

To provide the decision-makers within the Permanent Fund with useful sectoral information against which to evaluate proposed projects, this task will focus on assigning priorities to sectors and/or industries that appear to justify possible public investment. We will suggest short-term as well as long-term priorities, based on not only market and resource use criteria but the state of development of the associated infrastructure necessary for the establishment of certain industries. For example, it might be that in the immediate future, certain projects that might be proposed within particular sectors may be in existing, developed areas where access to available labor and infrastructure is relatively easy. These projects may have more immediate public returns.

For long-term projects, it may be that investment might be required not only in the enterprise itself but in the infrastructure such as roads, utilities, etc., necessary to make it feasible. Thus investment in these projects, even though within promising sectors, may require greater investments over longer periods of time.

B. REPORTS:

All reports, correspondence, graphs, computer programs, and other documents prepared under this contract are the property of the STATE and it shall have the full right to use these documents for its purposes, or other wise, when and where the STATE may designate without any claim on the part of the CONTRACTOR for additional compensation.

The work shall be done in accordance with generally recognized standards of professional consulting services. In the event that any work does not meet these standards, the Commissioner of Revenue may serve written notice and satisfactory correction shall be made within ten (10) days. Completion dates

for any portion(s) of the work shall be set by mutual agreement and corresponding written progress reports submitted to the State.

The Commissioner of Revenue may terminate this contract upon written notice of the necessity for doing so and payment shall be made for satisfactory work. Any dispute concerning a question of fact that relates to the CONTRACTOR's performance, if not disposed of by agreement between the parties, shall be decided by the Commissioner of Revenue, who shall notify the CONTRACTOR. This decision, unless appealed to a court of competent jurisdiction within ninety (90) days of the completion or termination of the contract, shall be final and conclusive.

ARTICLE II.

PERIOD OF PERFORMANCE

The period of performance under this contract shall commence on June 15, 1977 and expire on June 14, 1978. Performance may be extended for additional periods by the mutual agreement of the parties.

ARTICLE III.

CONSIDERATION

In full consideration of the CONTRACTOR's performance hereunder, the STATE shall pay the CONTRACTOR its customary fees for labor and expenses not to exceed $98,000. Payments shall be made to the firm on a monthly basis commencing August 30, 1977 except that the STATE shall retain 5% of billings to be paid upon completion and acceptance of the work in Article I.

ARTICLE IV.

ADDITIONAL CONTRACT PROVISIONS

Appendix A attached hereto and made a part hereof sets forth additional general contract provisions of this contract.

IN WITNESS WHEREOF, the parties have executed this contract this 28th day of September, 1977.

CONTRACTOR:

By: Todd C. DeBinder
Todd C. DeBinder

Director, Government Contracting
(Official Title)

STATE OF ALASKA, DEPARTMENT OF REVENUE
TREASURY DIVISION

By: Jim Edenso

Deputy Commissioner
(Official Title)

APPROVED:

Frank Bair
Department of Administration

10-4-77
(Date)

STATE OF ALASKA

DEPARTMENT OF REVENUE

TREASURY DIVISION

JAY S. HAMMOND, GOVERNOR

ELEVENTH FLOOR
STATE OFFICE BUILDING
POUCH SB
JUNEAU, ALASKA 99811

April 5, 1978

The Honorable Clark Gruening
Chairman, Special Committee on
the Permanent Fund
Capitol Building, Room 121
Juneau, Alaska 99811

Dear Representative Gruening:

In accordance with the legislative intent governing the appropriation for a sectoral analysis of the Alaska economy and your previous restriction in regards to the contract with Arthur D. Little, Inc., I have attached for your review and approval a redefinition of Task 5 not to exceed a total cost of $14,500.

Your prompt attention to this matter will be appreciated.

Sincerely,

Jim Edenso
Deputy Commissioner

JE:ge
Enclosure

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The candidate industries would be those whose locational requirements would be most closely met by Alaska as compared to other potential areas.

Task 5 - Intersectoral Comparison and Development of Investment Criteria

The results of Task 4 will provide an estimate of the likely ability of Alaska to compete in the identified sectors on a statewide basis. While the economics of a particular establishment might indicate potential for Alaska, for example, lack of development of infrastructure and related factors may hinder economic development in a given sector or industry. As part of this task we will examine on a subregional basis the likely distribution of future economic activity related to major sectors with the goal of identifying problems associated with, for example, infrastructure that would provide access or supply water or energy to the particular economic activity. This will enable us to make a preliminary ranking of appropriate sectors in terms of viability of a particular enterprise or establishment, and of the types of investment in infrastructure that probably would be required to facilitate development.

The results of this intersectoral comparison will be a preliminary set of investment criteria for establishing on a project-by-project basis the necessary types of information that will be required when a proposed investment comes before the Permanent Fund.

In the evaluation process of choosing among projects one key assumption is that investment decisions will most likely be made under a capital rationing situation. This means that the fund itself will be limited in size and that if presented with several "attractive" investment opportunities, the selection process must decide upon only a few projects out of the total array of possibilities.

The Fund will thus be faced with developing a strategy for allocating its resources among competing projects. Basically, this becomes a problem of screening and ranking the various proposed projects to ensure that those projects eventually chosen meet the Fund's criteria. This investment analysis requires the design of a methodology for measuring various projects by using such measurement tools as sensitivity analysis and the development of risk/return profiles on each project under consideration. In this task the following steps will be taken to arrive at a process for project selection and ranking:

1. First, an overall fund strategy will be developed. This will include identifying the mix of projects desired in the fund, and their risk, return, and capital requirements. Once the NPV is computed, a sensitivity analysis should be undertaken. A sensitivity analysis determines how a certain level of change in a particular project assumption affects the overall risk/return profile of the project and thus measures how "volatile" the financial productivity of the project would be under different assumptions. If a company has a performance history against which variables can be verified and adjusted, this task is much simpler. If, on the other hand, the fund is presented a proposal for a new project with untested characteristics, this exercise becomes more difficult. The sensitivity analysis provides another tool of measurement and helps define more clearly the risk level of the project.

The risk analysis of a project investment decision does not simply entail measuring the risk of a project relative to its potential return. A particular project's risk must also be judged against that of other projects and as well against the risk of criterion of the fund itself. This type of analysis permits balancing the various projects for which fund will be providing capital. For example, a low risk project can be balanced against a high risk project so that their combined average risk would be compatible with the risk criterion established by the fund. For example, an objective of the fund strategy might be to select the combination of investment proposals that provides the highest net present value subject to any constraints for the period. For a project within a particular sector, its financial productivity should bear a relationship to the long-run characteristics of the industry in which the project is located. The goal of the fund strategy will be to develop a rational process to ensure proper management of the fund's assets.

2. Once the strategy for the fund and the associated criteria are developed, it becomes necessary to establish the project evaluation process. For evaluation purposes, each project must be analyzed according to criteria such as the net present values (NPV) of earnings it proposes to achieve within a specific timetable. The fund will value this proposed stream of earnings according to the amount, timing, and any opportunity costs it is likely to incur.

Other measurements of projects exist, such as the payback method which analyzes the number of years required to return the original investment - the far simplest method. Payback criteria, however, do not consider income beyond the payback period. Therefore, if the fund portfolio is to be viewed as an ongoing sources of cash, attention must be given to events beyond the one project's payback period.

Task 6 - Suggested Sectoral Priorities for the Permanent Fund

To provide the decision-makers within the Permanent Fund with useful sectoral information against which to evaluate proposed projects, this task will focus on assigning priorities to sectors and/or industries that appear to justify possible public investment. We will suggest short-term as well as long-term priorities, based on not only market and resource use criteria but the state of development of the associated infrastructure necessary for the establishment of certain industries. For example, it might be that in the immediate future, certain projects that might be proposed within particular sectors may be in existing, developed areas where access to available labor and infrastructure is relatively easy. These projects may have more immediate public returns.

For long-term projects, it may be that investment might be required not only in the enterprise itself but in the infrastructure such as roads, utilities, etc., necessary to make it feasible. Thus investment in these projects, even though within promising sectors, may require greater investments over longer periods of time.

Alaska State Legislature

SPECIAL COMMITTEE ON
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REP. E. J. HAUGEN
REP. RUSS MEEKINS
REP. BILL MILES
REP. LEO SCHAEFFER
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

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

ADL outline of new proposal - to arrive Tuesday, 5/9

It is the policy of the State of Alaska to encourage the rapid expansion of its existing fishing industry (primarily a "near-shore" industry), to promote major entry into the "off-shore" fishing industry, and to develop permanent on-shore processing facilities for fish harvested in the U. S. North Pacific.

It is the purpose of this project to determine the strategic actions which should be taken by the State of Alaska to assure the accomplishment of these goals. It is believed that Alaska is in competition with foreign and other U. S. West Coast regions for the location of on-shore processing facilities and basing of the fishing fleets. The strategies developed must specifically deal with the current and expected competition.

Study Outline (rely on existing data to greatest extent possible).

1. Resources:

   Species (size, current harvest, sustainable yields)

   Location

   Current harvesting and processing operations

      identify (include foreign as well as domestic)

      number

      locations

      markets

2. Current industry participants (Alaska and other)

   Inventory - Operations, facilities, employment, markets, and marketing methods

   Locations used and why

   Major problems

      capital

      seasonal

      EPA

      regulatory

3. Identify and assess support programs of competitors

   Seattle/Washington

   Oregon

   Foreign nations

4. Profiling of future industry structure by sector:

   Harvesting

      near-shore

      off-shore

   Equipment and facilities needs, processing capital, labor, etc.

   Management, markets, marketing, transportation, etc.

5. Profiling of on and off-shore infra-structure requirements

   facilities

   labor

   regulatory

6. Assess likely on-shore impacts (villages, etc.)

7. Identification of strategies to follow

   High payoff areas for immediate action

   Critical steps needed to foreclose competitors

8. Development of tactical plans

   Expand existing participants

   Relations with foreign markets

   Joint-ventures with foreign and other (non-Alaska fishery operations), etc.

   Lure other West Coast operators to base/relocate in Alaska

Regulatory Strategies & practices

Old proposal

Arthur D. Little, Inc. ONE MARITIME PLAZA · SAN FRANCISCO CALIFORNIA 94111 · (415) 981-2500

April 6, 1978

Mr. Jim Edenso
Deputy Commissioner
Alaska Department of Revenue
State Office Building
Pouch SB
Juneau, Alaska 99811

Dear Jim: 1-8059

Arthur D. Little, Inc., is pleased to submit this proposal for a study of appropriate roles that the Alaska Permanent Fund can play to encourage the development of a local bottomfishing industry.

BACKGROUND

That says it all.

The Alaska Department of Revenue, an administrator of the state's Permanent Fund, is seeking ways to diversify the Alaskan economy. Arthur D. Little recently concluded a sectoral analysis of the Alaskan economy identifying those sectors and industries that hold potential for economic development and diversification. One of the areas identified was bottomfishing.

The extension of U.S. territorial waters to 200 miles by the enactment of the Fishery Conservation and Management Act of 1976 gives Alaskan fishermen access to a large supply of fish previously taken by Japanese, Russian, and other foreign fishing interests. In the past, foreign fishing fleets have taken more than 4 billion pounds of fish annually from waters off Alaska, compared to only 800 million pounds caught by U.S. fishermen in the same waters.

Fishery products currently are second only to oil and gas as a contributor to Alaska's economy. Bottomfishing appears to offer a good opportunity for future expansion of the state's fishing industry. The development of an Alaskan bottomfishing industry would increase opportunities for fish processing in the state, an activity currently accounting for more than one-third of Alaska's manufacturing employment. Bottomfishing would also reduce the seasonality of both fishing and processing employment because these fish can be taken year round.

PURPOSES OF STUDY

The purposes of this study are to:

- Determine the feasibility of a domestic bottomfishing industry in the U.S. North Pacific,
- Determine the infrastructure requirements of the industry in Alaska,
- Identify the potential benefits to and impacts on the Alaskan economy resulting from the development of this industry, and
- Recommend appropriate roles for the Permanent Fund with regard to encouraging the establishment of a bottomfishing industry.

WORK PROGRAM

Task 1 - Determination of the Feasibility of a Domestic Bottomfishing Industry in the North Pacific

Recent interest in establishing a domestic bottomfishing industry stems from a change in the regulatory environment. The Fishery Conservation and Management Act of 1976 established specific rights and restrictions regarding the fish within the newly created 200 mile territorial waters. In this task, we will analyze the implications and probable effects of this Act and other applicable Federal, state, and international regulations on the development of an Alaskan bottomfishing industry.

Our analysis will seek to identify by species the bottomfish resouce base within the Alaskan territorial waters. We will examine the available data concerning historical and current catch and value levels of bottomfish taken in these waters. We will also consider the future sustainable yield levels of individual species established by the North Pacific Fishery Management Council.

In quantifying the resource base of bottomfish in Alaskan waters, we will utilize both secondary (published) material and personal interviews conducted by our staff. We will use such data sources as:

- United Nations field data
- U.S. marine fisheries reports
- Preliminary fishery management plans of the North Pacific Fishery Management Council
- Pacific Packers Report
- Pacific Rim Development Commission
- National Oceanic and Atmospheric Administration reports
- Foreign fish catch reports to the U.S. Department of Commerce

We will interview representatives of Federal, state, and local agencies, trade associations, corporations, and fishing commissions; individuals engaged in bottomfishing, and university experts.

We will analyze and describe historical and current bottomfishing operations in Alaskan waters. We will identify:

- The countries involved in bottomfishing,
- The type and level of financial support provided by foreign governments to their bottomfishing fleets,
- The size, type, and number of boats engaged in bottomfishing,
- Methods of harvest,
- Type and level of processing of land-based and floating processing facilities, and
- The estimated value and method of marketing the catch.

Through published data and personal interviews, we will also examine the number and types of Alaskan ships and processing facilities currently engaged in bottomfishing, compare their harvest levels to projected optimum harvest levels, and estimate the magnitude of the opportunity open to a developing Alaskan bottomfishing industry. Based upon these calculations,

Mr. Jim Edenso, Deputy Commissioner
Alaska Department of Revenue 1-8059

we will develop estimates for the total fleet and fish processing needs of an Alaskan bottomfish industry.

The development of a bottomfishing industry is predicated on a sustainable market demand. We will attempt to identify existing and potential markets for canned, fresh, frozen, and processed Alaskan bottomfish products. Our investigation will include:

- The identification of countries currently consuming bottomfish,
- An estimate of tonnage and dollar volume of the markets in selected export areas,
- An analysis of historical price trends by market,
- A projection of future selling prices, price stability, and elasticity,
- An analysis of the type of products consumed,
- A projection of future demand, and
- An investigation of market share potential and competition in export markets.

Based upon this analysis, we will indicate the most likely markets for Alaskan bottomfish products.

Ultimately, the development of an Alaskan-based bottomfishing industry will be determined by the financial opportunities and risks associated with the industry. The Alaskan Department of Commerce and Economic Development recently contracted with two firms to explore bottomfish processing in an effort to collect data and encourage the development of a shore-based Alaskan trawl industry. We will utilize the information developed in these studies, the results of personal interviews, and published information to develop a "model enterprise" representative of a likely Alaskan bottomfishing and processing company. We will estimate the total capital requirements, probable revenues, operating costs, and income of this representative enterprise. For comparison purposes and to assess the overall attractiveness of an Alaskan bottomfishing industry, we will compare the risks and financial rewards associated with bottomfishing to those of the remainder of the Alaskan fishing industry.

Mr. Jim Edenso, Deputy Commissioner
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At the conclusion of Task 1, we will present to the Department of Revenue an interim report on the feasibility of establishing a bottomfishing industry in Alaska. This report will cover:

- The size of the bottomfish resource,
- The levels of current domestic and foreign activities,
- Markets for bottomfish products, and
- Estimated financial feasibility for firms engaged in bottomfishing.

Task 2 - Determination of Infrastructure and Support Needs of Alaskan Bottomfishing Industry

The level of industry development and the timing associated with establishing an Alaskan-based bottomfishing industry will depend on the availability of certain infrastructure support such as docks, transportation, and distribution facilities; of a trained or trainable labor force; and of various supply and service support industries. We will seek to identify the types of infrastructure needed at both the local and state level and compare these requirements with the existing infrastructure.

For the support activities or facilities which we find need to be developed, we will indicate which types tend to be developed by the private sector and which by the public sector. We will prepare preliminary cost estimates for the publicly financed and supported infrastructure needed by a bottomfishing industry.

For this information we will look to the experience in other geographic areas with a bottomfishing and fish processing industry. We will also rely on Arthur D. Little work related to establishing processing industries in developing economies, and on interviews with people currently engaged in the bottomfishing industry.

Task 3 - Identification of Potential Benefits of a Bottomfishing Industry on the Alaskan Economy, and of Economic Impacts

We will identify the direct and indirect benefits associated with the establishment of an Alaskan bottomfishing industry. Examples of direct benefits to the Alaskan economy might include:

- Increased tax revenues,
- Employment increases,
- Smoothing of employment seasonality,
- Economic diversification and utilizat on of renewable resources, and
- Increased gross state product.

Indirect benefits might include:

- Development of ancillary support businesses and services,
- Stimulation of other sectors of the economy due to the multiplier effect associated with increased income and spending, and
- Development of a more complete state infrastructure network.

Our analysis will also identify potential negative impacts of the development of a bottomfishing industry, such as:

- Environmental degradation,
- Industry ownership by non-Alaskan interests and subsequent "leakage" out of the Alaskan economy, and
- Changes in native villages or lifestyle.

The magnitude of these impacts, both favorable and unfavorable, will be a function of the size and level of development of the industry. We will construct a set of high, medium, and low development forecasts for the bottomfishing industry and analyze the probable long-term impacts on the Alaskan economy. The output of these "scenarios" will be a characterization of type and level of benefits and impacts associated with different levels of development.

Task 4 - Appropriate Roles for the Permanent Fund

In exploring appropriate roles of the Permanent Fund, we will identify current Federal and state fishery programs and funds, and determine how these can be utillized in the development of an Alaskan bottomfishing industry. Having examined existing programs, guidelines for the utilization of the Permanent Fund can be developed that will avoid duplication of current funding programs.

The Permanent Fund can encourage industrial development through direct or indirect incentives. Direct incentives might include the attraction of capital investment by providing:

- Long-term capital in the form of loans,
- Loan guarantees, and/or
- Equity capital.

Indirect incentives would include such supports as:

- Infrastructure development,
- Loans provided to local governments impacted by increased service demands generated by the bottomfishing industry,
- Financial support for ancillary services, and
- Manpower training programs.

We will develop a list of appropriate roles consistent with the Permanent Fund's purpose. We will provide the Department of Revenue with a written report outlining the options including a specific recommendation of the most appropriate role for the Permanent Fund. For the role we will develop estimates of:

- The level of funding necessary to spur development,
- The type of development funding,
- The financial risks and paybacks associated with the role, and
- The impact of recommended programs on the development of a bottomfishing industry.

Mr. Jim Edenso, Deputy Commissioner
Alaska Department of Revenue 1-8059

SCHEDULING AND REPORTS

We expect the entire project will take approximately three months to complete with the individual tasks requiring the following amounts of time:

Task 1	4-6 weeks
Task 2	3
Task 3	3
Task 4	2
	12-14 weeks

We will prepare an oral interim report at the conclusion of Task 1. At the conclusion of the project we will provide the Department of Revenue with a written report outlining our findings in each of the tasks, including our conclusions and recommendations.

COST AND DURATION

For the work outlined above, we propose that you authorize a budget for professional services and expenses not to exceed $130,000 without prior approval. Expenses will include such items as travel, communications, report production and directly related costs. Our invoices, which are payble upon receipt, will be submitted in accordance with the following schedule and in the amounts indicated:

On the first of the second calendar month in which this agreement is effective	$40,000
One month thereafter	$40,000
Two months thereafter	$50,000

After completion of the work when all our charges are known, we will submit a final invoice based on our records of the total charges for both professional services and expenses.

GENERAL PROVISIONS

We propose that this work assignment be included in our current project (case #81102) with the Department of Revenue. All other terms and conditions of that contract apply.

Mr. Jim Edenso, Deputy Commissioner
Alaska Department of Revenue

1-8059

We look forward with great interest to working with you on this project. If this proposal meets with your approval and you would like us to proceed, please sign and return the enclosed copy within thirty days. Should you have any questions or wish more time to consider our proposal, please let me know.

Very truly yours,

Lauren Ward

Lauren S. Ward

LSW/ctl
Letter in duplicate

Approved for
ARTHUR D. LITTLE, INC.

By Ford C. DeBuidy

Accepted for
ALASKA DEPARTMENT OF REVENUE

By_____

Title_____

Date_____

ARTHUR D. LITTLE, INC.

BIOGRAPHIES

Arthur D Little, Inc.

LAUREN S. WARD

Mr. Ward is a senior member of the ADL/San Francisco Management Counseling staff.

He received his Master's of Business Administration degree with honors from the Stanford University Graduate School of Business with emphasis in Marketing. He also holds the Bachelor of Science degree in Finance awarded with honors from Kansas University.

His functional experience with ADL has been in long-range planning, corporate strategy, and industrial marketing. He has worked closely with the top management of companies in defining short- and long-range objectives, alternative business strategies, and in assessing management performance.

Examples of the type of work he has done recently include:

- An examination of the alternatives available to a group of domestic agricultural producers competing with significantly lower cost imports. The study included: an examination of the dynamics of the world and domestic markets; identification and evaluation of marketing alternatives; an appraisal of the competitive cost and performance of their co-operatively owned processing and marketing company; and recommendation of the steps needed to improve the strategic position of these producers.

- Determination of marketing and sales strategies for a supplier of modular, relocatable buildings. The study included an appraisal of the selling and marketing practices of competing organizations, revamping of the compensation system, reallocation of marketing efforts geographically and by product line, reorganization of the sales and marketing department, identification of new business development methods, and preparation of a detailed marketing plan to implement the recommended changes. A second study undertaken for the same client involved the development of a management information and control system for their 2,000 unit fleet of leased vehicles; the design of a construction bidding system (including determination of the staff and organization necessary to implement it); and examination of the appropriate financial structure of the firm.

- An examination of the food service industry and the markets for prepared frozen entrees. The study included a strategic assessment of a leading supplier and assistance in preparation of a strategic plan to improve financial and market performance.

- Preparation of corporate and business unit strategic plans for one of the largest U.S. food service operators.

LAUREN S. WARD (Continued)

Mr. Ward has extensive experience in construction, building materials, and forest products. He has worked with some of the nation's largest forest products companies studying business opportunities in wood based building materials. He has also helped the U.S. Environmental Protection Agency assess the economic impact of new water pollution control standards on the plywood and lumber industries.

Mr. Ward has served as Controller of a wholesaler paper merchant in San Francisco and Vice President and General Manager of a California common carrier trucking concern. He has also conducted research in the fields of business policy and marketing while he was a member of the staff of the Stanford University Graduate School of Business. He is a member of the Corporate Planner's Association of San Francisco.

Arthur D. Little, Inc.

RICHARD F. GOODALE

Mr. Goodale joined Arthur D. Little's Western Regional Office in San Francisco in early 1976 after several years in the Resource Consulting Group in the Cambridge headquarters offices. Mr. Goodale's professional interest and expertise is directed towards venture analysis, with particular emphasis on market and financial evaluations.

Since joining the company Mr. Goodale has worked for over 50 private and public clients, in a variety of industries. The projects which he has directed, or participated in, have included:

- Several national analyses of the market potential for solar energy systems, for private clients and for the Federal government.
- A study of the worldwide market potential for systems built housing for a major oil company.
- An analysis of the market potential for a fire retardant resin for a prospective licensor.
- A market feasibility and strategic planning assignment for a company holding rights to product and process patents on a novel road building system.
- A strategic planning study for a lessor of capital equipment.
- Market analyses and financial evaluations in merger acquisitions and diverstitures studies for foreign and domestic clients in the steel, cement, home furnishings, forest products, smoke detector and heavy construction industries.

Prior to joining Arthur D. Little, Mr. Goodale served as chief financial officer for the real estate development operations of a publicly traded company. He has been employed on a consulting basis by Citibank, Bache and Company, and at the French subsidiary of American Can Company.

Mr. Goodale is a graduate of Stanford University and the Harvard Business School, where his concentration was in the area of international business and strategic planning. He is fluent in French.

GARRETT E. LION

Mr. Lion is a management consultant in Arthur D. Little's San Francisco Office. He has been consulting since 1969 and is experienced in financial analysis, strategic and implementation planning, information systems and procedures, and management audits. He earned a B.S. degree in engineering from Stanford University and an MBA in management science from Harvard Business School.

In the planning area, he recently participated in the development of a corporate strategic plan for a multi-industry corporation. In another project, he analyzed the feasibility of a client's entering a new type of business. He has prepared numerous implementation plans requiring definition of implementation tasks, estimation of implementation resources, timephasing of activities based on precedents and availability of resources, and gaining client concurrence and commitment. Besides actually preparing plans, he has designed planning processes to meet company's unique needs.

He also has considerable experience in financial analysis and financial systems. He has conducted the financial analysis of past performance of businesses and future capital requirements for alternative strategic plans. He has designed financial systems for budgeting, cost accounting, contract monitoring and government grant accounting. He has conducted many analyses of the costs and benefits of capital investment alternatives and the feasibilities of new ventures.

Mr. Lion is also experienced in planning, designing, and implementing manual and computerized information systems. For instance, he has designed management information systems to measure organizational performance in the areas of project control, operations analysis, marketing and cost control. He also designed/implemented information systems for general accounting, government regulatory reporting, telecommunications, computer auditing and market research.

Mr. Lion has conducted numerous management audits for public sector and private clients. These audits have included analysis of procedures, personnel policies, organizational issues, planning, management controls, financial controls, operations, acquisition policies, performance measurement systems, etc. These audits have generally resulted in development of recommendations for improvements and identification of improvement implementation steps.

Mr. Lion's experience has been with both public sector and commercial clients. He has consulted to state and local governments and to a number of private companies in the following industries: transportation, oil and gas, health care, insurance, financial services, manufacturing, public accounting, retailing and agriculture.

Prior to joining Arthur D. Little, Inc., Mr. Lion worked for a major certified public accounting firm and another consulting firm. He has led seminars for professional groups, university classes, and client personnel on effective business writing techniques and other subjects. He has been active in professional activities and community affairs, and recently served two years as president of a local community association.

Arthur D Little, Inc

JOYCE NEWMARK

Ms. Newmark is a member of the Arthur D. Little, Inc., San Francisco office professional staff specializing in economic and socioeconomic impact assessment and statistical analysis.

She is currently responsible for the assessment of existing demographic and economic conditions in Alaska, in a study of future industrial development potential being conducted for the State Department of Revenue.

For U.S. Steel's proposed Conneaut, Ohio, steel mill, Ms. Newmark had responsibility for evaluating all quantitative inputs to the SIMPACT IV computer model which were developed by more than 50 ADL professionals. In addition to responsibility for five major subject areas, she held major assignments in the areas of construction and operations manpower analysis, regional economics, population, and housing.

Ms. Newmark was responsible for the design of demographic and socio-economic profiles and data collection for a major San Francisco Bay Area social service agency.

She helped make the demographic analysis undertaken in a study of the feasibility of converting a surplus U.S. Army hospital in Southern California to use as an Indian health care facility.

For a major air carrier she assisted in the analysis of trends in trans-pacific travel and the outlook for future travel between the United States and Asia. This study also covered the attitudes and perceptions of trans-pacific travelers, and projections over a 10-year period. For a Southern California airport, she assisted in the determination of the future demand for air travel through that airport, and of the impacts of airport noise on the surrounding community.

For a growing construction company, Ms. Newmark helped to analyze past sales and bidding performance and to develop new bidding procedures.

Ms. Newmark attended the Massachusetts Institute of Technology, where her areas of concentration were mathematics and chemistry.

Arthur D Little, Inc

STEPHEN M. RACE

Mr. Race is a specialist in marketing management and planning with experience in areas of consumer and industrial goods and services and marketing research.

Since joining Arthur D. Little, Inc., he has been engaged in a study for a major food products company of the market for institutional frozen foods, and in a study for a major trucking company of dealer and user attitudes toward heavy duty trucks. He has participated in a number of strategic planning assignments including an integrated food service company and a major leasing corporation.

In a project undertaken for the State of Alaska, he is currently participating in exploring options for the Alaska Permanent Fund. The project is exploring the potential for economic diversification for the State. Mr. Race has prepared a series of background papers on the activities and development of various industries in the State.

He was previously employed by a major wood and consumer paper products manufacturer, with responsibilities that included new product identification and product management.

Mr. Race was associated with the Wharton School at the University of Pennsylvania where he was instrumental in establishing a postgraduate Executive Educational Program for the Marketing Department. Earlier work included financial analysis and cost control with a major book publisher.

Mr. Race holds B.S. and M.B.A. degrees from the Wharton School, and an M.S. degree in Energy & Power Management from the Graduate School of Arts and Sciences, University of Pennsylvania. His graduate thesis was published as a report by the National Science Foundation.

He is a member of the American Marketing Association.

Arthur D Little, Inc

KATHLEEN CRISPELL BLACKMER

Ms. Blackmer is a member of the Management Counseling staff in the Western Region office specializing in marketing and corporate strategic planning.

She received a B.A. degree in journalism with honors from the University of Michigan in 1967 and an M.B.A. degree from Stanford University in 1976.

At Arthur D. Little, Ms. Blackmer's experience has included:

- A marketing strategy study for a West Coast based national food processor examining the current and future markets for one of its subsidiaries. The result was a written strategic plan for the business unit based on examination of its capabilities and competitive position.

- A marketing strategy study for a major U.S. sugar producer emphasizing alternatives for operating in a world market. The study included an examination of the dynamics of the world and domestic markets, a performance appraisal of the client's cooperatively-owned processing and marketing company, and recommendation of steps needed to improve the strategic position of the producer.

- An assignment for a multi-faceted institutional food service company, using the Arthur D. Little strategy center concept to assist in devising a corporate strategic plan.

- A plant location study for a West Coast manufacturer interested in establishing a distribution facility on the East Coast, with the capability of eventually expanding the facility to include manufacturing.

- A market study for a West Coast can manufacturer, examining the potential for expanding production facilities in a new geographic area.

- An assessment of the value of a subsidiary company being considered for sale by a shipping concern. The analysis emphasized the separability of the subsidiary's business and the risks and problems associated with offering alternative business configurations for sale.

Formerly advertising director for a national apparel firm, Ms. Blackmer was an integral part of the company's marketing group. She coordinated all advertising, sales promotion, and public relations activities. Her work involved significant interface with the firm's parent company, a multinational conglomerate with both industrial and leisure product interests.

More recently, Ms. Blackmer attended Stanford Graduate School of Business where her experience in marketing led to developing a comprehensive strategic plan for a San Francisco-based career development firm.

While at Stanford, she consulted for the Association of American Medical Colleges, editing publications of the Association's Management Advancement Program for teaching management techniques to deans of academic medical centers.

Arthur D Little, Inc

FRANCIS B. ADAMSON

Mr. Adamson joined the Food and Agribusiness staff of Arthur D. Little, Inc., after fifteen years of broad-based experience in food processing operations located in Europe, North and South America. He received his undergraduate degree in Food Technology from Weybridge, England, and is a professional member of the Institute of Food Technologists. He holds a Master of Science degree in management of agro-industrial and industrial development from the Arthur D. Little Management Education Institute, Cambridge, Massachusetts.

Since joining Arthur D. Little, Inc., Mr. Adamson has been involved in food and agribusiness studies in Europe, the Middle East, North and South America, and in business development activities in Central America. Examples of assignments in which he has participated include the following:

- Evaluation of marine resources and design of processing facilities for the Peruvian Ministry of Fisheries.
- Audit and implementation of a quality assurance program for a multi-plant meat processor in Europe, and for a major food processor in the United States.
- Plant audit for a Canadian food ingredients producer, with special emphasis on the examination of processing and quality deficiencies.
- On-site scale-up trials of a unique balanced nutrition baked product.
- Methods improvement and major layout changes for a large warehousing facility.
- Acquisition studies and the promotion of joint ventures.

He commenced his career with the Corporate Research and Development Department, Bird's Eye Food Division of Unilever, Ltd. After gaining experience in nearly all of the operating divisions including agricultural services and the processing of meats, fish, fruits, and vegetables, he was appointed Production Manager of their frozen foods plant in Grimsby, England.

He then joined W.R. Grace and Company, Inc., as Technical Supervisor of their food processing operations in Colombia, South America, at the time of a major plant and product line expansion. This involved close coordination with agronomists and growers in the commercial development of plantations of subtropical and other fruits and vegetables, new product formulation, the supervision of equipment installation and startup, and the training of Spanish-speaking staff in processing techniques. He was then named Plant Manager and stayed nearly four years in this location.

FRANCIS B. ADAMSON (continued)

In 1967 Mr. Adamson moved to Chicago and joined Consolidated Foods, Inc., initially as New Products Manager, involved in the development of a line of cryogenically-frozen gourmet foods, and later as Sales Coordinator of the International Sales Division. Prior to joining Arthur D. Little, Inc., in 1971, he spent some time in the field of professional consulting to the food industry with Roth Young, Inc., of Boston, as Director of the Food Processing Division.

In June 1972, Mr. Adamson was a speaker in a Food Processing and Packaging Technical Seminar organized by the United States Department of Commerce, and presented in Guatemala and Costa Rica. He has addressed a Food and Drug Industries Seminar on the subject of a systems approach to control point quality assurance and was guest speaker on agro-industrial development at the Federal University of Minas Gerais.

Mr. Adamson returned to the United States in 1975, after a two-year residential assignment in Brazil with the Instituto de Desenvolvimento Industrial de Minas Gerais. This involvement concerned the development of the state's food and agribusiness sector, and included overseas and domestic investor assistance, project analysis, preparation of prefeasibility studies, industrial promotion and professional training of Brazilian staff.

Mr. Adamson speaks English, Portuguese and Spanish, and has a working knowledge of French.

GREGORY F. DOYLE

Mr. Doyle is a member of the Energy Economics Group at Arthur D. Little Inc., with a varied background in maritime analysis. He specializes in technical and economic studies in the areas of ship design, acquisition and fleet operating costs; shipyard design and ship production; port and harbor design, and fishery management and economics. His consulting assignments around the world have been with private firms, educational institutions, state and provincial governments, national governments, and international bodies.

Mr. Doyle's recent assignments in the area of fishery management and economics have included:

- For the Massachusetts Marine Fishery Council, he examined the economic impact and value of blue fin tuna on commercial and sport fishing. A major element of the study dealt with the identification of foreign consumer markets for the tuna.

- For the Federal Land Bank, Mr. Doyle investigated the feasibility of converting the Boston Navy Yard into a fishing boat construction and repair facility.

- For the Massachusetts Department of Community Affairs, he analyzed the impact of developing a commercial fishing port in Newburryport, Massachusetts.

His port and harbor consulting has involved development planning for both developed and developing countries around the world. They have included the preliminary design of an entirely new major port in a developing country and the direction of a study resulting in a technical and economic model of a complete inland waterway system for a developing country.

His vessel design activities have covered the preliminary design of a full range of ship sizes and types; producibility and production costs analyses; the development and implementation of a software package to derive fleet cashflow analyses based on route and commodity flow characteristics; and the development of a program to analyze various segregated ballast policies for tankers.

Mr. Doyle's experience in the shipbuilding area has included design and analysis of shipyards of all sizes; engineering and financial feasibility studies and new yards; remedial analysis of existing yards; national sectorial studies in North America, Europe, the Middle East, and Asia; regional economic impact assessments of new yards; and world shipbuilding cost and capacity analyses.

Mr. Doyle holds an M.S. degree in Civil Engineering from the Massachusetts Institute of Technology, where he also received a B.S. degree in Materials Science.

Arthur D Little, Inc.

WILLIAM C. HALE

Mr. Hale joined the staff of Arthur D. Little in 1969. He is a graduate of the University of Massachusetts from which he received a B.S. degree in Food Technology and of Boston College from which he was granted a Master of Business Administration degree.

Since joining Arthur D. Little, Mr. Hale has been concerned with issues related to the marketing of agricultural, processed food, fish and beverage products as well as allied products. His involvement with these issues has been from several different vantage points. For example, he has been concerned with market strategy formulation; technological assessment as it impinges on the marketplace; identification and quantification of marketing opportunities, and long-range planning. In addition, he has developed and assisted in executing market entry.

Mr. Hale's involvements have covered a wide range of subsectors in the food, fish, and agribusiness industry in the United States, South America, and Europe. These include: fresh fruits and vegetables; meats; fish; frozen food products; potatoes; beverages; protein products; baked goods; and sugar. Although a major part of the work in which he has been involved is sponsored by firms in the private sector, he has also worked for a number of governments to include Algeria, Brazil, Peru, Portugal, the Dominican Republic, Venezuela, Mexico, and the United States.

The wide range of project work has caused him to be concerned with marketing issues that are international in scope as well as those which are primarily oriented toward domestic marketing questions. In several projects Mr. Hale has been responsible for identifying market opportunities that are appropriate for specific countries given their agribusiness capability. The identification, quantification, and description of the market's characteristics were only part of the concern. The second step in several of these projects was assisting the governments establish institutions that would foster orderly development of the market opportunities. Projects of this nature were conducted on behalf of Algeria, Peru, Brazil, and Portugal, in the recent past.

Mr. Hale is a member of the Institute of Food Technologists and is the author of a paper dealing with the utilization of management development programs in the technical community and coauthor of studies entitled Fast Food Franchising 1970-75, Trends in Supplying the Food Service Industry, Economic Impact of Food Additives, Prospectus: Convenience Produce, Outlook for Food and Agribusiness, and Impact of Technology on the Food Supply: Alternative Food Ingredients.

Arthur D Little, Inc

DAVID H. REST

Mr. David H. Rest is a senior staff member of the Food and Agribusiness Section of Arthur D. Little. He has been particularly involved with technical and economic development of a wide range of food processes, including such novel methods as freeze drying, radiation, aseptic packaging, and microwave processing. In addition, he has carried out studies on low-temperature and controlled-atmosphere processing and transportation of foodstuffs.

Mr. Rest recently supervised a very large study to identify the edible fish resources of Peru and to match these resources with the world demand. Upon matching market with recources, detailed recommendations were made as to production and processing operations, and locations. These recommendations are now being implemented.

Mr. Rest has been involved in the sub-Arctic king crab industry. He is currently concerned with the development of a tuna process to minimize labor and increase yields.

He has also been involved with mariculture of fresh water, marine, and anadromous species.

Sea plant resources have also been areas of his efforts, particularly Chondrus crispus in Prince Edward Island, algae off the west coast of Canada and currently in the Transvaal.

Mr. Rest has also been involved in the meat processing industry advising major processors in regard to technical and economic optimization of processing and procurement.

Before coming to Arthur D. Little, Mr. Rest was director of manufacturing facilities for the United Fruit Company's processed food subsidiary where he was responsible for the operation of food processing factories, for maintaining quality and cost objectives, for supervising construction projects, and for coordinating research programs on products and processes. Here his work included responsibility for shrimping operations off Central American coasts.

Earlier, Mr. Rest was employed by the U.S. Army Quartermaster Corps. His work included supervising the research, development, and operational aspects of a broad food preservation program, and serving as an advisor to many government agencies on setting up food processing plants in foreign countries. Mr. Rest did pioneering work in the areas of freeze drying of foods and radiation preservation of foods.

Mr. Rest has also served as superintendent of production of synthetic organic chemicals for G. D. Searle and Company, Chicago.

Mr. Rest holds a B.S. in Chemical Engineering from the Armour Institute of Technology and has completed graduate work in sanitary engineering (University of Cincinnati) and nuclear physics (University of California).

DAVID H. REST (Continued)

He is a member of the Institute of Food Technologists, American Institute of Chemical Engineers, Health Physics Society, American Chemical Society, American Institute of Biological Sciences, and a registered professional engineer in Illinois and Massachusetts.

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

STATE OF ALASKA

DEPARTMENT OF REVENUE

TREASURY DIVISION

JAY S. HAMMOND, GOVERNOR

ELEVENTH FLOOR
STATE OFFICE BUILDING
POUCH SB
JUNEAU, ALASKA 99811

April 6, 1978

The Honorable Clark Gruening
Chairman, House Permanent Fund Committee
Capitol Building
Juneau, Alaska 99811

Dear Representative Gruening:

The Arthur D. Little, Inc. sector analysis of Alaska's economy has been completed and submitted to the State. You should have received a copy of that study. Arthur D. Little presented a verbal report of the study to the Governor and to the Senate and House Permanent Fund Committees. At that meeting questions were asked concerning the capital requirements for costs associated with establishing the identified candidate industries in Alaska.

Arthur D. Little subsequently went back and prepared estimates for the capital costs of the candidate industries identified in their study. Those capital costs ranked from a low of $3.7 billion to $7.4 billion. The attached letter of transmittal and capital investment costs were submitted by Arthur D. Little to me along with an explanation for each candidate industry to include a description, estimated capital costs, assumptions, infrastructure requirements, employment, and additional comments. This addendum to the report enhances the value of the sector analysis and provides valuable information for deliberations of the Legislature concerning the Alaska Permanent Fund. It is my hope that you will include this report in your deliberations for establishing the investment parameters of the Alaska Permanent Fund.

Should you have any questions concerning the attached addendum please do not hesitate to contact me directly.

Sincerely,

Jim Edenso

Jim Edenso
Deputy Commissioner

JE:ge
Enclosures
cc: Senator John Sackett, Chairman, Senate Finance Committee
All Members of the Senate Finance Committee
Representative Steve Cowper, Chairman, House Finance Committee
All Members of the House Finance Committee

04-012LH

SB 181

Arthur D. Little, Inc. ONE MARITIME PLAZA · SAN FRANCISCO, CALIFORNIA 94111 · (415) 981-2500

March 31, 1978

Jim Edenso
Deputy Commissioner
Alaska Department of Revenue
State Office Building
Pouch SB
Juneau, Alaska 99811

Dear Jim:

Attached are our best estimates of the capital costs associated with establishing candidate industries in Alaska. These estimates have been put together by our industry experts based on their experience and under the following assumptions:

- Capital costs presented represent 1978 dollars.
- Capital costs do not include the cost of land.
- Construction costs for Alaska were estimated to be 50% higher than construction costs in the lower 48. The costs presented represent Alaskan construction estimates.
- These construction costs could be significantly higher if the production or processing facilities are located in the interior with little transportation access.
- We have assumed that the necessary infrastructure is in place. No estimates have been made for the construction of infrastructure.

We estimate that the total cost of establishing the candidate industries will be $3.7 to $7.4 billion. This variation is in part attributable to the uncertainty of hydro facilities ($100 million to $3 billion) and in part due to the various levels and types of processing or production

Jim Edenso
Deputy Commissioner
Alaska Department of Revenue

facilities. The addition of a number of these industries will place significant demands on the Alaskan infrastructure, and the costs for such facilities or services as a transportation network, port facilities, communications, training programs, and electrical power will be substantial.

The attached estimates include all the sectors you requested us to investigate with the exception of bottomfishing. Under separate cover, we are sending a proposal to investigate the feasibility of establishing a bottomfishing industry and the appropriate roles the Permanent Fund can play in encouraging the development of this sector.

I hope this information is responsive to your needs. If you require any clarification or additional input, please call me.

Sincerely,

Cyril C. Herrmann

Cyril C. Herrmann
Vice President

CCH/cd

CAPITAL INVESTMENT COSTS

Sector or Project	Range in Millions of Dollars Low	High
Refining State Royalty Oil	$ 260	$ 760
Tourism	500	500
Coal Mining	120	150
Cement Production	50	50
Asphalt Production	0.6	1.3
Hydroelectric Facilities	100	3,000
Aluminum Reduction	540	800
Chemical Intermediates	775	825
Industrial Port	100	100
Barley Production	12	14
Potato Processing	30	35
Pulp Mill	450	500
Newsprint Facility	225	275
Timber Logging	1.5	2
Sawmill	26	33
Sponge Iron Direct Reduction	90	120
Steel Mill	120	240
Totals	$3,400.1	$7,405.3

Arthur D Little, Inc

Candidate Industry: ALUMINUM REDUCTION

Description: Production of primary aluminum from the primary metal bauxite.

Estimated Capital Costs: $540 - $800 million. An aluminum reduction facility of economic size falls in the range of 80,000 - 265,000 tons annual production. Construction costs are estimated at $2000/ton in the lower 48 states, or $3000 in Alaska. Therefore, an average size facility with an annual production capacity of 180,000 tons would cost approximately $540 million to build in Alaska. This figure does not include land costs. An average size facility would require approximately 1500 - 2000 acres of land.

Assumptions:

- Primary aluminum production is one of the most energy-intensive of all manufacturing industries, and a cheap and uninterrupted power source, preferably hydroelectric power, is required. Consumption is normally 6.5 - 8 kilowatt hours per pound of aluminum; a new, still experimental technique may reduce the requirement to 5.5 - 6.5 kilowatt hours per pound.

- An export operation requires access to an industrial port, since aluminum produced would be transported by ship to its markets.

- The primary aluminum market is expected to grow at a rate exceeding GNP growth and faster than other resource-based primary metals industries. Japan is expected to be a major consumer of primary aluminum.

Infrastructure Requirements:

- Industrial port
- Power
- Roads
- Rail spur

Employment:

Approximately 900 employees 80% skilled, 20% unskilled. This estimate is for an average size facility.

Additional Comments:

- The most recently announced aluminum reduction plant is the Alumax facility to be built in Berkeley County, South Carolina.

  Size: 197,000 ton annual capacity
  Approximate Cost: $400 million
  Construction Time: 32 months
  Construction Work Force: 1600
  Permanent Work Force: 800

- Average annual wage in 1976 for aluminum reduction plant in the lower 48 states was $19,008.

Candidate Industry: ASPHALT

Description: Asphalt batch production facility.

Estimated Capital Costs: $600,000 - $1.3 million. The cost of a 300-tons-per-hour facility in the lower 48 states is currently $500,000 - $700,000. A 150-ton-per-hour facility currently ranges between $400,000 and $600,000. Cost of construction in Alaska would be higher and in the range of $750,000 - $1.3 million for a 300-tons-per-hour facility and $600,000 - $900,000 for a 150-tons-per-hour facility.

Assumptions:

- Sufficient local demand
- The availability of rocks for the production process.
- An existing petroleum industry for key elements in the production process.

Infrastructure Requirements:

- Roads
- Power

Employment:

Typically low; 3-5 workers per facility, half of whom are skilled.

Candidate Industry: BARLEY PRODUCTION AND ELEVATOR

Description: Produce and store 1 million bushels of barley per year

Estimated Capital Costs: $12-14 million. A grain elevator of economic size is 1 million bushels. Construction costs are estimated to be $6 to $7 a bushel in Alaska. This includes rail siding, road access, and storage facilities.

To produce 1 million bushels of barley, 16,000 acres will be required. To develop this land, an expenditure of $6 million to $7 million will be required. This does not include the cost of the land or the trucking equipment necessary for assembling grain.

Assumptions:

- A market for barley
- 16,000 acres can be obtained.
- Irrigation and labor would be available.

Infrastructure Requirements:

- Transportation network
- Water and power availability
- Labor force for clearing land, transporting, and operating the facility.

Employment:

The production of barley would require approximately 32 farmers with a part-time field crew of 250. The operation of a 1 million bushel grain elevator would require 45-50 full-time employees and a 250 part-time crew.

Candidate Industry: CEMENT

Description: Production facility for cement.

Estimated Capital Costs: $50 million. An economically sized cement production facility (approximately 750,000 tons per year) is estimated at $100 million or $130-140 per ton of capacity in the lower 48 states. Present demand in Alaska is approximately 180,000 tons per year and long-term baseline demand has been estimated in the range of 200,000 tons per year. Due to the costs of construction in Alaska and the diseconomics of small plant size, a 200,000 ton facility might cost $50 million.

Assumptions:

- Available energy source
- Facility located in the Anchorage-Fairbanks corridor
- Proximity to a limestone deposit

Infrastructure Requirements:

- Power
- Transportation facilities

Employment:

Moderate sized U.S. cement plants employ 40 people per 100,000 tons of capacity. Consequently, a 200,000 ton Alaskan facility might employ 80-100 workers, the majority of whom would be skilled.

Candidate Industry: COAL MINING

Description: Operation of an open pit mine in the Beluga coal fields

Estimated Capital Costs: $120-150 million. These costs are based on the development of a 6 million short-ton per year mine which would begin operation in 1978 and reach full capacity in 1984.

The initial investment to reach full production is estimated at $120 million cumulative in current dollars over the development of the mine. Operating costs in 1984 are estimated to be $8.66 per ton in the lower 48.

Assumptions:

- The Beluga coal field is the logical location because of its proximity to tidewater, quality of coal, and overburden ratio.
- Operation at an average overburden ratio of 5.6:1 on a 14-foot thick seam.

Infrastructure Requirements:

- Transportation network (roads, rail)
- Housing
- Schools
- Labor force

Employment:

Approximately 300 employees. Work force estimated at 312 employees, approximately seven of whom would be management and clerical, 36 foremen, and the rest hourly workers. Ideally, the hourly workers would be 50% skilled, 25% semiskilled, and, at most, 25% unskilled.

Candidate Industry: CONTAINERBOARD

Description: Manufacturing of linerboard for the conversion to corrugated containers.

Estimated Capital Costs: $300 - 375 million. Linerboard is made from unbleached kraft pulp. A new mill with production capacity of about 1,000 tons per day average would represent an economically sized mill. New construction is on the order of $180,000 to $250,000 per daily ton of capacity in the lower 48.

Assumptions:

- An adequate supply of softwood exists to support the mill needs of 400,000 to 450,000 cunits per year.
- Access to deep water port facilities is available to provide for export of all of the production.
- Capital cost estimates do not include the acquisition costs of wood lands.

Infrastructure Requirements:

- Port, deep water
- Rail service, roads
- Forestry support services
- Energy

Employment:

Labor requirement would be on the order of 350 to 450 persons, 70% to 80% of which would be skilled.

Candidate Industry: HYDROELECTRIC POWER

Description: Operation of an hydroelectric power plant to provide electricity for Alaska's population centers.

Estimated Capital Costs: $100 million - $3 billion or more, depending on size and location of the project.

The Corps of Engineers is the chief source for information on the five proposed hydroelectric projects for the state. They have done preliminary reviews of all five projects, but have released cost estimates on only two of them. Latest information available from the Corps is:

Project	Location	Capacity	Construction Time	Alaska Cost	Status
Thomas Bay	Petersburg	N.A.	3-5 years	N.A.	Not likely to be recommended by the Corps.
Bradley Lake	Homer	132 million kilowatt hours	5 years	$100-200 million	Like to be recommended; requires only small dam.
Watana	Susitna River	6.1 billion kilowatt hours	9 years	$1.5-3 billion	Corps has outlined 4-year environmental assessment plan of study.
Devil's Canyon	Susitna River	6.1 billion kilowatt hours	7 years	$1.5-3 billion	Corps has outlined 4-year environmental assessment plan of study.
Rampart	Yukon River	24 billion kilowatt hours	12-22 years	N.A.	Not likely to be recommended because of its huge size and large environmental impact.

Infrastructure Requirements:

- Access roads
- Transmission lines
- Construction village

} included in cost estimates

Employment:

Employment estimates are not available. Very large projects have significant employment impacts during their construction. An existing project in Eklutna, built in 1955 with a capacity of 137 million kilowatt hours, employs 13 people. This capacity is similar to that proposed for Bradley Lake.

Candidate Industry: INDUSTRIAL PORT

Description: A bulk loading facility with a minimal container shipping operation.

Estimated Capital Costs: $100 million. This estimate is for a "modest" port facility that could handle bulk products such as coal and aluminum as well as containerized products.

Assumptions:

- Basic port configuration would include: a high-speed, belt-type bulk loader, a stacker reclaimer, a rotary car dump system, a rail loop and connnecting conveyor system, and a suitable wharf area.

- A specialized aluminum loading system, estimated at $2-3 million is assumed to be part of this port. It would include a seven-yard clam shell backet, an A-type portatle, a multi-purpose crane, and a continuous belt-type bulk loader. Alternatively, a pneumatic siphon system could be built at a cost of approximately $1 million.

- The "minimal" container operation would consist of a 1-2 berth facility with one or two A-style container cranes, 50 acres of paved back-up space per berth, a container freight station, and necessary stacking equipment. Estimated cost is $40 million, included in the $100 million total.

- The minimal land requirement for the port would be 2000-3000 acres initially, with approximately 2000-4000 feet of water frontage or enough for 2-4 berths.

- Berths assumed to have 40-45 foot draft capacity.

Infrastructure Requirements:

- Roads
- Electricity
- Sewer

Costs, not included in estimate, expected to be $10-15,000 per acre for site development.

Candidate Industry: IRON DIRECT REDUCTION

Description: Production of sponge iron by direct reduction of beneficiated and pelletized iron ore to provide feed stock for electric furnace steelmaking.

Estimated Capital Costs: $90-120 million. Current designs of a sponge iron direct reduction facility have modular capacity of 400,000 to 600,000 long tons per year. Capital costs in Alaska are estimated to be $225 to $300 per ton of capacity.

Assumptions:

- The availability of suitable ore in sufficient quantity (approximately 2-4 million tons of pellets per year).
- Natural gas requirements for process fuel and reductant at nominal consumption of 16 million cf/day and electrical energy at 150 kwh/ton which would require approximately 8000 to 10,000 kw at transmission line voltage for stepping down to lower voltages for in-plant distribution.
- Plant site near a docking facility.
- The only market for the sponge iron product of a direct reduction plant is electric furnace steel making. Prospective market areas are essentially limited to the states along the Pacific Coast with three steel plants in Washington, two in Oregon, and about as many more in California, as well as in Hawaii, which operate electric furnaces having combined annual steelmaking capacity on the order of 2 million tons. Foreign markets have been slow to develop and generally would look to nearby sources such as Indonesia or Australia which could produce sponge iron at lower cost than an Alaskan plant. If a steel plant was built in Alaska, it could provide a local outlet whose consumption would be governed by market demand.

Infrastructure Requirements:

- Natural gas line
- Industrial port
- Power
- Water supply
- Local labor force

Employment:

Work force of 125-150 personnel with about 35-40% as management, foremen, and maintenance staffs, and the balance as operators, workers, and helpers.

IRON DIRECT REDUCTION (continued)

Additional Comments: Direct reduction of iron ore pellets is now an established technology with three plants in operation in the United States, one in Canada, about 10 plants in operation or various stages of construction in Latin America and many more throughout the world. However, each of these plants, except in isolated and unique circumstances, is operated in conjunction with an electric furnace steel plant which consumes essentially all the sponge iron production from the direct reduction plant. One could presume that the economic viability of an Alaskan direct reduction plant would be dependent upon its association with an adjoining steel plant.

Candidate Industry: LOGGING OPERATIONS

Description: Harvesting of timber from Alaskan forests.

Capital Costs: $1.5 - 2 million. The cost cited above would be sufficient to set up a logging operation capable of producing 10,000 MBF (Scribner) per year in Alaska. Included in this estimate are felling, trimming, bucking, yarding, loading, and hauling equipment used at the logging site. Several such operations would be needed to support a mill. The high lead yarding systems similar to those used in the Northwest would be required in Alaska. Working capital requirements are estimated to be 20% of the equipment costs. Logging costs in similar terrain in the Northwest run $120-150 per MBF but could be significantly higher in Alaska due to wage rates.

Assumptions:

- All roads (primary, secondary, and logging roads) are in place. Construction of logging roads can be very costly in steep terrain.
- Existing mills operate log yards or concentration areas capable of handling additional volume.
- The cost cited above is for the equipment to operate at one location only. Normally operators have work progressing at several sites.
- Logging activity is seasonal in the Northwest where slow-downs occur as a result of fire danger in the summer and weather in the winter. Seasonal factors in Alaska may be more severe.

Infrastructure Requirements:

- Roads from the logging site to the mill yard.
- Converting and/or export facilities.
- Road maintenance equipment and machinery maintenance shops.

Employment:

Estimated work force of 24-27 at each location -- 80% skilled, 20% unskilled.

Additional Comments:

As the terrain gets steeper, capital costs, operating costs, and the need for skilled workers all go up while productivity goes down.

Terrain that can be logged using skidders rather than high lead equipment require less capital and have a significant operating cost advantage.

Arthur D Little, Inc

Candidate Industry: OIL REFINERY

Description: Refining of Alaska Royalty Oil

Estimated Capital Costs: $260 - $760 million depending upon type of refining process. Current world scale grass roots refineries are in the 100,000 to 250,000 B/D capacity range. In order to achieve reasonable economies of scale and to match the Alaska Royalty oil availability, a refinery size of 150,000 B/D is appropriate. The wide variation in capital costs is a result of different refining processes. Costs for three different processes are outlined below.

Millions of Dollars	Topping	Hydroskimming	Conversion
Process	50	115	260
Offsites	210	325	500
Total Investment	260	440	760

The processes represent different levels of refining and produce somewhat different end products.

Assumptions:

- Site location with port access
- Production primarily for export market
- Manpower requirements based on U. S. Gulf experience

Infrastructure Requirements:

- Industrial port
- Electrical power
- Work force

Employment:

Typical employment requirements for a 150,000 B/D facility are:

Permanent Employees	Topping	Hydroskimming	Conversion
Operations	65	110	150
Administrative/Supervisory	60	90	100
Maintenance	65	100	125
Total	190	300	375

Candidate Industry: OIL REFINERY (Continued)

Skilled Labor: 75%

Unskilled Labor: 25%

Additional Comments:

Refinery construction would require about three to four years field construction and would employ about 1200 to 4000 men during the construction period, depending on refinery type.

Current Alaskan refining capacity consists of about 62,000 B/D topping capacity and 40,000 B/D hydroskimming capacity. The most recent addition was the 25,000 B/D North Pole Refining Co. refinery at North Pole, Alaska. Planned increases in capacity include a 5000 B/D crude distillation increase at the Tesoro refinery at Kenai, and a 6000 B/D vacuum distillation unit at the North Pole refinery - both scheduled for completion early in 1978.

Arthur D. Little, Inc.

Candidate Industry: PETROCHEMICAL INTERMEDIATES

Description: An ethylene complex with associated derivatives (polyethylene, ethylene glycol, styrene monomer, ammonia and urea.

Estimated Capital Costs: $775 - $825 million. A world scale petrochemical complex requires an estimated capacity of one billion pounds per year. A similar facility in the U. S. Gulf Coast would cost $520 - $550 million.

Assumptions:

- Plant Location: Kenai, or off pipeline with port access.
- Associated derivatives: polyethylene (low and high-density), ethylene glycol, styrene monomer, ammonia and urea.
- Investment includes 50,000 barrel/day natural gas liquids separation plant.
- Investment includes normal "offsites" at 40% of battery limits investment.
- Investment does not include additional infrastructure requirements.
- Complex requires about 3000 barrels/day benzene for styrene production.

Infrastructure Requirements:

- Rail and/or water links to important markets.
- Skilled and semi-skilled labor with associated infrastructure.
- Specialized fabrication, maintenance and repair industries.
- Interconnection of product and material flows with associated industries.
- Power and water.

Employment:

Employment requirements vary in terms of numbers and skill levels with degree of downstream processing. The industry is not labor intensive. According to recent estimates, a hypothetical one billion pound ethylene plant has some 300 associated employees. At the intermediate petrochemical level, associated employment increases dramatically to about 5500 per billion pounds of ethylene capacity.

Candidate Industry: POTATO PROCESSING

Description: Farm production, storage, and processing of potatoes into frozen french fries.

Estimated Capital Costs: $30-35 million. A potato processing plant with an annual output of 100 million pounds of french fries has been assumed. Approximately 9000 acres of land will be required to produce sufficient potatoes to support the facility. Capital costs are estimated to be:

Facility	$ Millions
Plant Processing Facility	9 - 11
Field Storage Facility	17 - 19
Farm Land Development	4 - 5
	30 35

Assumptions:

- The land yields are based on lower 48 statistics.
- 270 million pounds of potatoes will be required to support a 100 million pound production facility.
- Capital costs do not include land.

Infrastructure Requirements:

- Roads
- Power and water
- Labor

Employment:

Typical employment requirements include:

Processing plant	250
Field Storage	30
Farm Production	27
TOTAL	307

90% unskilled, 10% skilled

Candidate Industry: PULP AND PAPER INDUSTRY

Description: Production of newsprint from pulp wood and chips.

Estimated Capital Costs: $225-275 million. To build an economically sized newsprint mill which uses thermo mechanical pulping process for converting solid wood into fiber for paper making requires a productive facility with a capacity of approximately 500 tons per day or 175,000 tons per year.

Assumptions:

- An adequate wood supply of softwood pulp wood and sawmill residues existing to meet the annual demand of about 200,000 cunits of wood.
- Access to deep water is available to allow shipments to the West Coast and Japanese markets.
- Does not include costs of acquisition of timber and/or timberlands.

Infrastructure Requirements:

- Port, deep water
- Energy/Power
- Rail service and roads
- Forestry support services

Employment:

Total employment is 200 to 250 people; 20% to 25% unskilled; 75% to 80%, skilled. This does not include seasonal labor needed in the forests to supply pulp wood.

Candidate Industry: PULP AND PAPER INDUSTRY

Description: Manufacture of bleached paper grade kraft market pulp for sale to the paper industry.

Estimated Capital Costs: $450-500 million. New bleached kraft market pulp mills are being built with an annual capacity of approximately 350,000 tons or 1000 tons per day average. Typical construction takes 30 to 40 months.

Assumptions:

- An adequate softwood supply is available within an economic hauling distance to a deep water port.
- A good supply of process water is available, and water and air environmental regulations for waste disposal can be met.
- Capital estimates do not include costs of buying timberlands.

Infrastructure Requirements:

- Deep water port
- Forestry support services
- Roads and rail service

Employment:

Work force of permanent nature would be about 350 to 400, of these, 70% to 80% would be skilled. This does not include seasonal forest workers needed to ensure wood supply.

Candidate Industry: SAWMILLING

Description: Cutting of dimension lumber and boards.

Estimated Capital Costs: $26-33 million. The cost associated with the construction of a dimension mill having an annual capacity of 90,000 MBF is $26-33 million in Alaska. The appropriate economic size of a sawmill is very flexible and dependent on location, timber, and market factors.

Assumptions:

- Timber is available in sufficient quantity and quality to support the mill.
- The mill has access to in-place shipping facilities.
- Dimension lumber and boards are appropriate products (rather than studs) given the timber and markets available.

Infrastructure Requirements:

- Roads
- Rail and/or water shipping facilities at the site.
- Power

Employment:

Work force of 200 - 225, approximately 70% skilled, 30% unskilled. This estimate is for a mill of average efficiency and automation levels.

Additional Comments:

- Current sawmill construction projects in the United States range from a $6 million stud mill in the Southeast to a $48 million state-of-the-art dimension mill in Longview, Washington. Several high volume small log sawmills are also under construction. The point is an "economic size" unit for a sawmill is site specific and would be for different locations within a given region of Alaska too.
- Working capital requirements are estimated to be 20% of fixed capital expenses.
- Operating expenses are estimated to be $75.00 per MBF in the Northwest and would most likely be considerably higher in Alaska.

Alaskan Study - II

Candidate Industry: STEELMAKING

Description: Production of steel light section rods, merchant bars and structural shapes for local market consumption by electric furnace steelmaking from local and imported scrap or sponge iron raw materials.

Estimated Capital Costs: $120 - $240 million. Current designs of small steel plants, so-called minimills, are based on electric furnace steelmaking from scrap or sponge iron raw materials, continuous casting of the molten steel to extended billet lengths, and hot rolling the billets with a merchant bar mill to product shapes of rods, bars and light structural sections. The capacities of minimills range from 100,000 tons per year to approximately 600,000 tons per year. At the lower range, plants have a limited product mix but at the higher range, the product mix is broadened to include more sophisticated and higher valued products. The unit capital cost of a minimill could range from $300 - $600 per ton, for the plant facilities. The capital costs indicated above represent a 400,000 ton per year facility.

Assumptions:

- A minimill consumes about 1000 kwh/ton with intensive short time peak power demands.
- The economic viability of the minimills has depended on their having access to low-cost melting stock for raw materials, coupled with a local market for their limited product mix located away from major steel producing plants. These same elements will govern the viability of a minimill in Alaska.

Infrastructure Requirements:

- Power
- Fuel
- Scrap or Sponge Iron Raw Material
- Local Labor Force
- Highway System Throughout Market Area
- Railroad

Employment:

Work force would range from about 200 - 300 for the smaller minimill up to 800 - 1200 for the larger minimill, with managerial and skilled personnel about 30 - 35% and the balance operators, workers and helpers.

Candidate Industry: STEELMAKING (Continued)

Additional Comments:

One of the most recent minimills in the U. S. has a capacity of 600,000 tons per year with a raw material mix of scrap and sponge iron, a cost of $150 - $200 million and full employment of 1200 personnel.

Arthur D Little, Inc

Candidate Industry: TOURISM

Description: The attraction of 600,000 to 1,000,000 non-Alaskans to the state for business or vacation.

Estimated Capital Costs: Could be in excess of $500 million. The development of tourism in Alaska is dependent upon hotels and accommodations in gateway cities, infrastructure outside major cities, and lower cost Alaskan vacations.

- Anchorage will need approximately 5,000 more hotel rooms to handle the increased flow. Current construction costs are $60,000-$65,000 per room.
- The development of a major self-contained tourist facility at Tokichitna Glacier could cost in excess of $50 million.
- 100-site campground parks cost in excess of $4,000
- A convention center depending upon size and multiplicity of use, $25-50 million.

Assumptions:

- The primary tourist attractions currently exist in Alaska in the form of national parks, pristine environment, and hunting or fishing.
- The land cost portion of an Alaskan trip or vacation will remain high relative to other vacation opportunities.
- Awareness and demand levels are sufficiently high or will be raised to attract 600,000 to 1 million visitors.

Infrastructure Requirements:

The requirements are extensive in the form of:

- Transportation networks to outlying attraction centers
- Visitor and information centers
- Food and accommodations
- Visitor and information centers

Employment:

A current work force of 8,000 people are employed in tourist-related industries for an estimated 300,000 visitors. An anticipated work force of 15,000 semiskilled workers might be needed to support a 1 million visitor population.

Additional Comments

Tourism, unlike the other candidate industries, does not produce a product and will not be established with the construction of a single facility.

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

Representative
CLARK GRUENING
940 Tyonek Drive
Anchorage, Alaska
99501

907-274-2446

Alaska State Legislature

Chairman
SPECIAL COMMITTEE ON
THE ALASKA PERMANENT FUND
Chairman
WAYS and MEANS SUBCOMMITTEE
Member
FINANCE COMMITTEE
LEGISLATIVE COUNCIL

House of Representatives

POUCH V JUNEAU 99811

M E M O R A N D U M

RE: ADL Study

TO: Reps. Malone & Gardiner

FROM: Rep. Gruening

DATE: May 5, 1978

Attached is a copy of a March 22, 1978 letter from Mr. Hurley of ADL stating that the addendum to the main ADL study "Economic Development in Alaska" was done in lieu of task 5 of the original proposal. Task 5 was not done - "...we will not be completing the development of investment criteria for the fund since our earlier work and our report suggest this step will not be neccessary." To the contrary, the report and addendum ($7.4 billion in capital needs for candidate industries) show that investment criteria are absolutely necessary. I did not approve redefinition of task 5 nor approve the addendum study as required by free conference intent.

At Hugh's urging, I wrote ADL asking for a response to the unanswered questions (letter attached). According to Peter Bushre of Revenue, who has taken Edenso's former position, the bottomfish industry feasibility study is part of the redefined task 5 which will not exceed $14,500.

Attached is a draft copy of the proposal which will have some of the same deficiencies the original ADL study has. Edenso is now in San Francisco talking to ADL and the final ADL proposal for bottom fishing is being developed. I suggest we contact ADL and Edenso (Hyatt House 415 398-1234) and get a meaningful study done.

Arthur D. Little, Inc. ONE MARITIME PLAZA · SAN FRANCISCO, CALIFORNIA 94111 · (415) 981-2500

REVISION I

March 22, 1978

Mr. Jim Edenso
Deputy Commissioner, Treasury
State of Alaska
Department of Revenue, Treasury Division
State Office Building
Eleventh Floor
Pouch SB
Juneau, Alaska 99811

Dear Jim: 81102

We appreciate the time which you spent with us on Monday and Tuesday and believe the presentations went well. We are looking forward to completing the bottomfishing feasibility study and the capital cost estimates. It is the purpose of this letter to confirm our conversations of yesterday which in effect alter our existing contract.

The changes in the contract involve substituting the task of estimating the capital requirements for the several industries which we recommended that the State of Alaska evaluate in lieu of Task 5 of our existing contract. In other words, we will not be completing the development of investment criteria for the fund since our earlier work and our reports suggest this step will not be necessary. On page 13 of the existing contract it is indicated that Task 5 would be deferred and would not be commenced without your prior written approval and that the amount paid for Task 5 would not exceed $14,500. We have agreed now to substitute the capital requirements estimate report and that our charges for both professional services and expenses will not exceed the $14,500.

All other terms and conditions of our existing contract will remain in force and we will continue to operate under Arthur D. Little, Inc., case number 81102.

Per your direction we have already started on the capital cost estimating requirements and the work will be conducted under the direction of Cy Herrmann; working with Cy will be Mr. Stephen Race and Ms.

Arthur D. Little, Inc.

March 22, 1978

Mr. Jim Edenso
Deputy Commissioner, Treasury

81102

Kathleen Blackmer plus those industry experts who participated in the base study. We expect to be able to phone you by no later than Monday, April 3 with the cost data and we will then submit written materials which will document our assumptions and cost estimates relative to the industry groups. This letter should arrive in your office no later than April 7.

Please sign and return this copy so that our records will indicate our mutual understanding of this contract task substitution.

In addition, we are submitting a full proposal for the bottomfishing industry feasibility study. This proposal will be sent to you no later than March 27.

Sincerely,

David G. Hurley

DGH/ck

cc: Contracting

Approved for
ARTHUR D. LITTLE, INC.

By Todd C. DeBinder
Authorized Contracting Officer

Accepted for
THE DEPARTMENT OF REVENUE
STATE OF ALASKA

By Jim Edenso
Title Deputy Commissioner
Date March 28, 1978

APPROVED:

Department of Administration

Date

ECONOMIC DEVELOPMENT IN ALASKA

A Sectoral Analysis

report to

STATE OF ALASKA
DEPARTMENT OF REVENUE

ECONOMIC DEVELOPMENT IN ALASKA

A Sectoral Analysis

report to

STATE OF ALASKA
DEPARTMENT OF REVENUE

March 1978

81102

Arthur D Little Inc.

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I. INTRODUCTION AND SUMMARY

A. PURPOSE AND SCOPE

On November 7, 1976, the voters of Alaska approved a constitutional amendment providing for the establishment of a "Permanent Fund" the purpose of which is to "preserve a legacy for future generations of Alaskans and still provide immediate benefits to present Alaskans ..... the Permanent Fund will give the State the opportunity to invest revenue received from non-renewable resources into renewable resources."* It is expected that the Permanent Fund will provide a sound basis for ongoing economic development beyond the period of non-renewable resource extraction.

Among the goals expressed for the Fund in proposed legislation are:

- To facilitate the diversification of the economy of Alaska by making sound investments in Alaska's renewable and non-renewable resources,
- To seek to smooth the cyclical pattern of growth in the Alaskan economy, and
- To encourage and assist the participation of private capital from both within and outside Alaska in private enterprises of benefit to Alaskans.

The concept of the Permanent Fund is well established, and the principal debate in the legislature and by various citizen groups has been over the allocation of the funds and the determination of their ultimate use -- whether they should be used for economic development purposes such as the stimulation of specific industries, or the development of infrastructure to support private capital investment; whether they should be placed in "investment grade securities" and the income used to defray debt within the state; or whether the funds should be used for public works and community development projects.

Given the many opportunities for use of the funds for the benefit of Alaskans, and given the various legislative and administrative prospects for investments, the Director of the Department of Revenue intends to establish criteria for investment based on analysis of economic sectors, industries, or portions of economic activities that appear to have the greatest payoff in the long run for Alaska in terms of diversification, income distribution, and various other economic goals the state might develop.

---

*Governor Jay S. Hammond as quoted in "The Alaskan Economy," published by the State Department of Commerce and Economic Development, June 1977.

In October 1977, the Director of the Department of Revenue entered into a contract with Arthur D. Little, Inc., to provide a sectoral analysis which would provide an overview of the Alaskan economy linking both the existing and potential economic sectors to the overall markets within the United States and foreign economies, particularly those of Pacific Rim nations. The economic analyses conducted under this contract were intended to provide a background and framework against which projects seeking assistance from the Permanent Fund could be evaluated.

In preparing this report we utilized information gathered at meetings and discussions with various state government agency representatives and citizen groups; examined previous and current studies, focusing on the compilation of data; and drew on our own knowledge of economic development, both domestic and international, to analyze economic activity and industrial development in Alaska and to consider the major projects which may enhance or detract from the state's economy. The latter include outer continental shelf (OCS) development, the possible move of the state capital, and development of the ALCAN gas pipeline.

We surveyed and analyzed statistical data on Japan and the lower 48 to identify those industries or industry expansions which could enhance the state's economy or otherwise provide opportunities for Alaskans or investment opportunities for the Permanent Fund. We examined selected industry markets in order to determine the priorities for possible participation by the Fund.

The sectoral analyses consisted of a screening process in which we identified the resources of Alaska, both labor and material; industries which could be supported by these resources; and markets for the industries: domestic Alaskan markets, lower 48 markets, and international markets. We identified candidate industries with potential for Alaska, and analyzed them in terms of the short- and long-term potential and in terms of their ability to meet the state economic development goals.

More specifically, the study, which encompassed a period of six months, included:

- A sectoral analysis of the economy of Alaska,
- A sectoral analysis of the economy of the United States as a whole,
- An analysis of the Japanese economy, particularly as related to demand for Alaskan resources/products,
- An analysis of the interrelationships among the three economies,
- The determination of the industrial development opportunities in Japanese and U.S. economies which could be exploited through investment by the Permanent Fund,

- Rationalization of economic development opportunities in Alaska vis-a-vis the stated and perceived economic development goals of the state,

- A review of the conclusions developed from the above analyses with the representatives of the Department of Revenue and the various state agencies concerned with the direction and use of the Permanent Fund, and

- The preparation of this report.

B. CONCLUSIONS

Opportunities for industrial development in the State of Alaska exist within industries characterized as agriculture, fishing, tourism, oil and gas exploration and refining, coal development, development of hardrock minerals, forest products, hydroelectric power, pulp and paper, cyclic intermediates and chemicals, aluminum, and iron ore mining and direct reduction.

The role of the Permanent Fund in the development of these industries will depend largely on the resources of the licensees or developers, the strategic plans of the native corporations which are evaluating entry into some of these specific industries, and the timing and growth of these industries in the lower 48 and Japan. We have concluded in general, however, that the Permanent Fund may best be used for development of infrastructure leading to the investment by operators in the private sector both in Alaska and Japan and from the lower 48, and/or the development of feasibility studies which will clarify the economic role of operators and investors and the timing of investment. Our overall conclusions, which are more thoroughly developed in Chapter VI of this report, are as follows:

1. Over the short term, it is unlikely that there will be significant development of new industries -- i.e., industries not currently present in Alaska. Because of the long lead time necessary for the development of industrial projects, particularly in Alaska, there is a role for the Permanent Fund in developing the preliminary feasibility plans for participation in new industries and the determination of the role of other state agencies and native corporations.

2. Short-term industrial growth will be concentrated in fish processing, lumber and pulp, and petroleum-related industries.

3. Growth in the forest products and the petroleum based industries could be seriously constrained by environmental or other institutional factors.

4. Growth in industries dependent on the construction sector (asphalt and cement) will depend on the execution and timing of major projects planned in the state (OCS development, capital move, ALCAN pipeline, etc.).

5. The major long-term industrial development opportunities will depend on factors outside the state's control -- world demand and prices for minerals and other resources. That is, Alaska, despite the wealth represented by the Permanent Fund and the resources of the Alaskan native corporations, will not be in a position to dictate its future development.

6. The federal d-2 land proposal is the most important economic development issue currently facing Alaska. After specific land designations have been made, it may not be economical to develop resources on the residual lands if the most efficient transportation corridors cannot be used because of the wilderness classifications.

7. While vertical integration of resource-based industries could proceed to the intermediate product stage, final processing of consumer goods depends on proximity to large markets and therefore is not a likely development possibility in Alaska.

8. Alaska's tourism industry will continue to grow as a result of promotion and development efforts currently underway. Tourism is in an early stage of development and has considerable potential to mesh with the goals of the Permanent Fund.

9. Most of the industry candidates which were the subject of the sectoral analyses and which fit Alaska's resources and meet the state's economic development goals, conflict with state and/or federal regulatory and environmental goals.

10. There is a need to review, coordinate, and organize state policies on economic development, environmental protection, land use, energy, employment, and taxes in order to improve the business climate and to provide a rational framework for industrial development.

11. The long-term payback potential of investment in infrastructure may be the major in-state investment opportunity for the Permanent Fund. Some infrastructure -- e.g., an industrial port -- may be eventually paid for by the user fees. Other infrastructure development -- e.g., railroads -- may generate large amounts of employment and tax revenue which can indirectly reimburse the Fund.

C. RECOMMENDATIONS

Based on our findings and conclusions, we recommend that:

1. Those managers of the Permanent Fund concerned with economic development should conduct feasibility studies on specific industries which the sectoral analysis suggests are growth opportunities for the state. These feasibility studies should be focused on the role of the Fund in infrastructure development plus possible participation in financing feasible new industries and expansion of existing industries.

2. The staff of the Permanent Fund should not ignore the investment potential of the combined assets of the native corporations and the Fund: that is, working together on industrial development the two, having complementary goals for natives and the state in general, will obviously have a greater impact than each working alone or competing for investment opportunities.

3. In addition to infrastructure development, the Fund staff should investigate the costs and benefits of public works projects such as hydroelectric plants, or fisheries improvements such as hatcheries, which can have secondary and tertiary benefits in terms of creating employment and renewing resources. These investments and operating entities as such should be able to return interest or dividends on the equity invested by the Permanent Fund and thus not necessarily comprise a sunk cost.

D. THE ROLE OF THE PERMANENT FUND

The Permanent Fund clearly has the potential to play a major role in Alaska's economic development. Although there are many outside forces which will shape the direction of Alaska's economy, the state will be able to foster industrial development by decision on such matters as provision of transportation infrastructure, and taxes, and will be able to mitigate the adverse impacts of growth by providing public services, housing, and the like: the Fund can stimulate development by providing equity capital, long-term loans, or debt guarantees for new business.

However, based on the economic research reported here, we believe that the majority of the funds available for economic development should be held while long-term opportunities are studied in detail. More immediate capital needs can be identified and met, such as mortgage financing of additions to the fishing fleet. Equity investments and loans for larger projects will more prudently follow detailed study of specific proposals or possible developments, including financial plans, markets available, and non-financial impacts.

The Permanent Fund's goals can effectively be used as the basis for investment decisions. That is, given two or more equally attractive projects (in terms of standard financial criteria such as rate of return and cash flow) the goals of employment, income, and reliance on renewable resources can be used to choose among these projects.

The Fund's mandate is to make investments which will diversify the economy, helping to reduce cyclicality and provide new opportunities for the state's residents. As discussed above, market forces and overall economic development trends beyond the state's control will to some extent perpetuate cyclicality and other negative economic fluctuations in Alaska. Further, the availability of capital will not, of itself, be a significant attractor of new industry, particularly large national or international firms. It is more likely that Permanent Fund financing for new business will go to smaller, local firms or entrepreneurs who are unable to raise money from out-of-state institutions and whose requirements exceed the lending ability of local banks (in amount or term).

Nonetheless, there are opportunities for the Permanent Fund in almost all industries likely to exist in Alaska, as the sectoral analysis that follows will indicate. Some of these investments will help to stimulate new business or help residents participate in existing or new industries. Others could be equity investments in larger projects, made to return a part of a major venture's profits to the state and its people. Areas for Permanent Fund consideration, and other state actions which could stimulate development, are outlined below.

Specific Areas for Consideration

State and federal agencies are already involved in the fishing industry in resource management and research, identification of new markets, salmon hatchery programs, and investigation of bottomfishing. As the markets and requirements for bottomfishing are identified, the Permanent Fund could make or guarantee loans to finance fishing boats or processing facilities, the latter possibly in cooperation with native corporations. Other local businesses which might be loan candidates are fishing industry support facilities (e.g., boat repair yards).

The state's role in the lumber and pulp industry will probably be in leasing timberland. Existing demand in Japan will be the stimulus for growth, and Japanese companies should continue to be principal investors. Over the long-term, there may be an opportunity for equity investment in an integrated pulp and paper mill. Local market-oriented wood products firms may be candidates for loans.

The state is already involved in the oil and gas industry and related refining and chemicals production. Because of its ability to determine the state lands available for leasing and the timing of such leases, the state will have some control over oil and gas exploration and production. However, the state will not be able to control oil and gas development on native corporation and federal lands.

The state's decision to accept North Slope royalty oil in kind for sale to an in-state processor is another example of the state's role in creating jobs and income. The success of this initial petrochemical venture will influence future decisions on use of royalties and the economies of Alaskan production. (That is, a successful petrochemical plant could lead to additional sales of royalty oil, gas, and possibly hardrock minerals to in-state processors.)

Possible opportunities for local business (and thus Permanent Fund investments or loans) in oil and gas and related industries include oil industry support. (Native corporations have already invested in companies to perform construction, pipeline camp support, and similar functions.) While Alaska is not a likely location for the manufacture of oilfield machinery and equipment, possible services would include camp construction, food services for oilfield workers, etc. Similar businesses would be required to support OCS drilling activity (home building, construction of warehouses, etc.). The Permanent Fund could also provide short-term loans to local governments impacted by oil (or other) developments to cover the gap between increased service demands and realization of additional property tax revenues.

The state has become involved in promoting tourism in the lower 48 and Japan and financing local tourism promotion programs. The opportunities for increasing tourism will involve development of destination attractions (ski lodges, fishing camps, etc.) outside the principal cities and providing transportation facilities to reach these destinations. Since the tourism industry is not likely to be able to finance its own transportation development, tourism may follow other industrial development. The state should be alert to investment opportunities in tourism facilities located to take advantage of existing or new transportation routes.

The Delta project currently being carried out by the Department of Commerce and Economic Development will help determine agricultural investment opportunities by providing information on the economics of larger-scale farming in Alaska. Over the short-term, opportunities will exist in expanding agricultural production for the local market (development of a middleman system linking small farmers with suppliers and consumers). As agriculture expands, there will be opportunities (and needs) for processing facilities for meat, vegetables, and grains, including such applications as producing alcohol from potatoes. Agricultural infrastructure (land clearing and drainage, irrigation, transportation, and distribution) is a possible area for cooperative state-native corporation investment or loan programs.

Longer term, large-scale agricultural development, if feasible, would provide opportunities for investment in processing, storage, and transportation facilities. The dedication of some two million acres of land to export grain farming would require substantial capital to acquire the land and prepare it for planting. Other necessary facilities would include rail or road transportation from farms to ports, grain elevators, and special grain handling facilities to load ships.

Other agricultural-related investments could be in the use of chemicals made in Alaskan plants for Alaskan agriculture. For example, urea, currently produced in Alaska, is a major input to fertilizer production. Agricultural limestone could also be processed in-state.

The initial requirements for coal and other mining operations will be transportation infrastructure -- access roads to mines and rail or port facilities for product shipment. If a study of mining lease holders indicated sufficient demand, an industrial port would be a good investment opportunity because of the long-term payback and income derived from port revenues. Alternatively, the Permanent Fund could guarantee the revenue bonds of a local port authority.

The possibility of Permanent Fund investment in roads will be limited because such infrastructure will not produce income. However, the indirect payback potential -- in jobs, access to tourist destinations, and improved transportation facilities for state residents -- might justify general fund investment. Similar arguments could be made for investment in the trans-Canada rail extention.

In summary, Permanent Fund investments could take the form of loan capital to finance local business, equity in large development projects, or financing or guaranteeing infrastructure development. The local businesses are likely to occur over the short term, while equity investments are a longer-term development. Investments in infrastructure will depend on policy decisions and the perceived benefits in terms of social as well as economic criteria.

II. CHARACTERISTICS OF THE ECONOMY

This chapter presents an overview of the current status of the Alaskan economy in terms of population trends, labor force and employment, relationships among the principal economic sectors, and interactions with the U.S. and foreign economies. It also includes a discussion of the principal institutional, legal, and regulatory issues which have affected economic development in the state and which will continue to determine the future level and direction of growth. The purpose of this baseline summary is to identify the specific problems of the economy which the state is seeking to solve through the development of new industry and to describe the conditions which will have to be considered in assessing the likelihood of Alaskan location for specific industries.

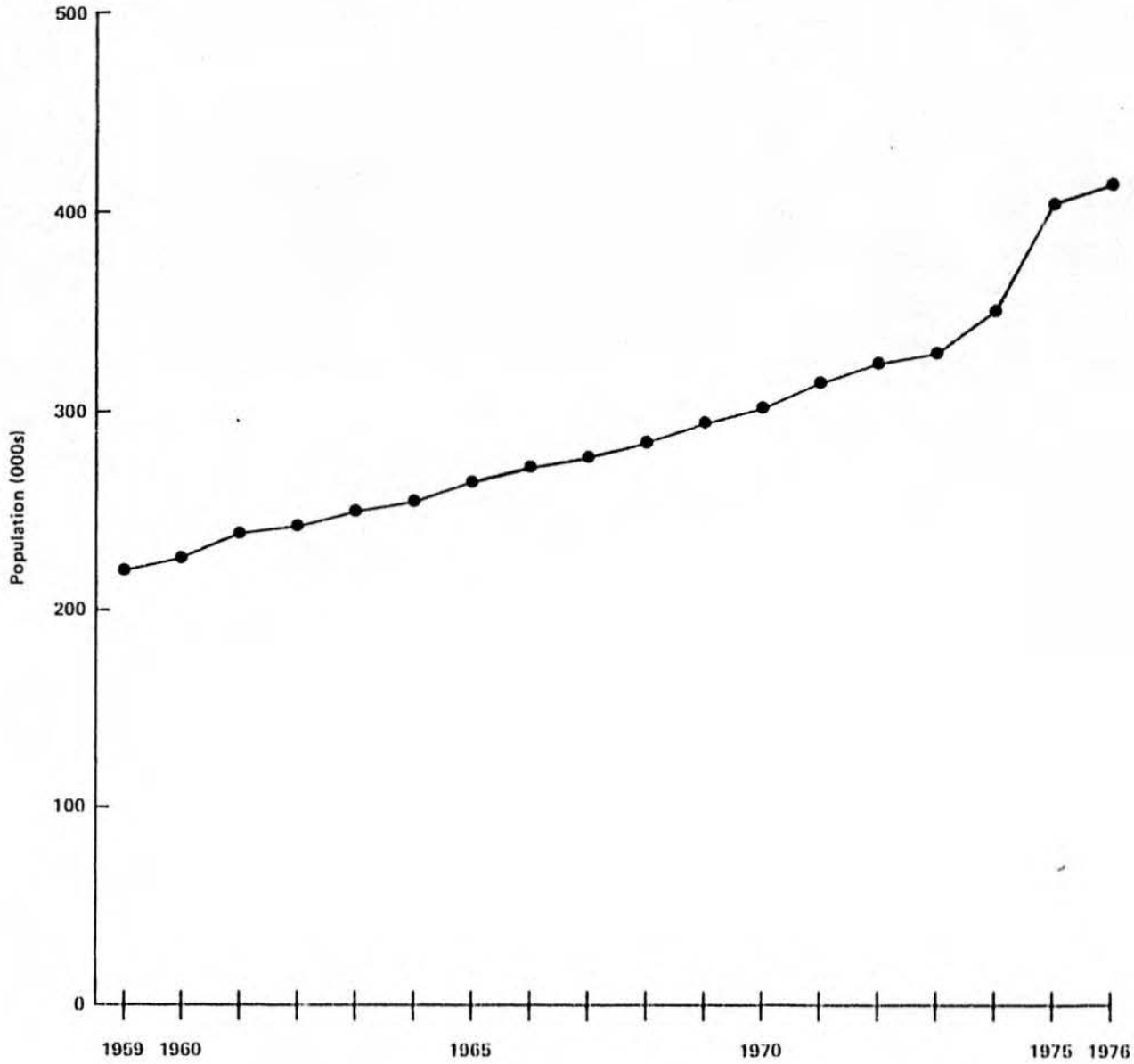
A. POPULATION TRENDS

Population in the State of Alaska has almost doubled since statehood, from about 220,000 in 1959 to a current level of more than 400,000 (see Figure II-1). From 1959-73, total population grew at a rate of approximately 3% per year, with the majority of growth due to natural increase (births minus deaths). However, since 1973 the rate of population growth has increased substantially as a result of in-migration. During 1974 and 1975, Alaska experienced net in-migration of about 30,000 people per year, attracted primarily by trans-Alaskan pipeline-related employment opportunities.

From World War II through the late 1950s, members of the military made up a large share of the state's population. In 1943, about 65% of Alaska residents were members of the armed forces; during the Korean War military personnel accounted for about one-quarter of the state's population. Since statehood, the number of military personnel in Alaska has been declining gradually. The military share of population was about 14% in 1960, 10% in 1970, and is currently approximately 6%.

Alaska's native population has grown at a rate of 2% per year since 1960, and is currently about 60,000. The native share of total population has been declining slowly and is now about 15%. While average birth rates among the natives have been higher than those for the state's total population, natural increase has been offset to some extent by out-migration of natives for education and other purposes. (Approximately 20,000 persons enrolled under the Alaskan Native Claims Settlement Act live outside the state.) Furthermore, in-migration to the state in recent years has accelerated overall population growth far beyond the contribution of natural increase.

As the state's population has grown, it has become more concentrated in urban centers. In 1976, the Anchorage Census Division contained some 45% of the state's total population, compared to 37% in 1960. The state's



Source: Alaska Department of Commerce and Economic Development.

FIGURE II-1 ALASKA POPULATION – 1959-76

three largest cities -- Anchorage, Fairbanks, and Juneau -- contain nearly two-thirds of the total population. Moreover, because of the low level of population outside these cities, isolated events have significant effects on population levels and growth rates. For example, population in the Barrow-North Slope and Valdez Census Division has tripled since the startup of pipeline construction in 1974.

The age distribution of Alaska's population is significantly different from the national average. In 1976, more than 83% of the state's population was under 45 years of age -- the comparable national figure was 69%.* Less than 3% of Alaska's population is older than 65. Factors contributing to the relatively low age of Alaska's population include a higher than average birth rate and the in-migration of young adults, particularly in the last few years.

Historical population growth trends in Alaska are likely to continue over the next several years. The state's rate of natural increase should remain above the national average, in large measure because of the age distribution of its population. While in-migration will fall off from recent levels of 30,000 per year, the average rate of the decade prior to pipeline construction (about 3500 people per year) is likely to continue given the state's image as the "last frontier" and continued national publicity about Alaska's resources and physical attractions. Anchorage should remain the state's principal population center.

As was the case with trans-Alaska pipeline development, future large-scale projects will have significant impacts on population growth rates and distribution. Major construction projects are likely to attract in-migrant workers who will become either temporary or permanent residents of the state. Oil and gas and mineral developments are likely to have a fairly small population impact in terms of total in-migrants to the state, but may have significant impacts on outlying communities.

B. LABOR FORCE AND EMPLOYMENT

Alaska's labor force is characterized by high participation rates, seasonal and temporary in-migrant workers, and high unemployment. The seasonal and cyclical nature of the state's economy is the principal contributor to these trends.

1. Labor Force

Alaska's civilian labor force grew at an annual rate of about 4-5% between 1960 and 1973, compared to a population growth rate of some 3% per year during the same period. Construction of the trans-Alaska pipeline and related development attracted nearly 70,000 additional participants to the labor force between 1973 and 1976. Labor force growth over this

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*U.S. Department of Commerce, Bureau of the Census, Current Population Reports, Series P-25, No. 646, February 1977.

three-year period was 15% per year, about twice the rate of population growth. The civilian labor force decreased substantially (by about 20,000 people) in 1977 as the pipeline was completed and unemployed workers began to leave the state.

Alaska has historically experienced high labor force participation rates. At the time of the 1970 census, Alaska's total labor force participation rate (including armed forces) was about 68% of the population 16 years and older, compared to a national average of 61%. Higher than average labor force participation is largely a function of the age distribution of the state's population -- very few of those people 16 years and older are over 65.

Labor force participation increased dramatically during pipeline construction -- to almost 75% of the 16 and older population. Increased employment opportunities in the state caused residents to enter the labor force in larger numbers. In addition, many of the people who came to the state to take pipeline-related jobs were single men and women who expected to be temporary residents. Among this group, labor force participation was effectively 100%.

The size of Alaska's civilian labor force exhibits a seasonal pattern, with the total August labor force about 10% larger than the annual average and the January labor force 10-15% smaller. In 1974-76, this amounted to a difference of about 40,000 between the high and low months. This pattern was much less evident in 1977 since many former pipeline workers had left the state by August. After this post-pipeline adjustment has been completed, labor force seasonality is likely to return to its former pattern.

The factors contributing to labor force seasonality are the same ones that have contributed to labor force growth in recent years. Alaskan residents are drawn into the labor force during the peak summer months by additional employment opportunities in seasonal industries -- fishing, fish processing, construction, etc. In addition, even before pipeline construction began, temporary in-migrants contributed to peak labor force numbers. It has been estimated that as many as one-third of the additional workers needed in the summer months are temporary workers who come from Seattle and other areas in the lower 48.

2. Employment

Total civilian employment in Alaska grew at an annual rate of 4.2% between 1960 and 1973, and at nearly 16% per year from 1973-76. Total employment decreased by about 30,000 jobs between August 1976 and August 1977, reflecting the effect of the trans-Alaska pipeline on job opportunities in the state.

The government sector has historically been, and continues to be, Alaska's largest employer. However, as other sectors of the state's economy have grown, particularly in the last several years, the government share of total employment has decreased. Government accounted for approximately 40% of non-agricultural wage and salary employment in 1960, 38%

in 1970, and had decreased to only 28% by 1976 (see Figure II-2). Data for the first eight months of 1977 indicate that the government share had increased to 30%, primarily the result of decreasing construction employment.

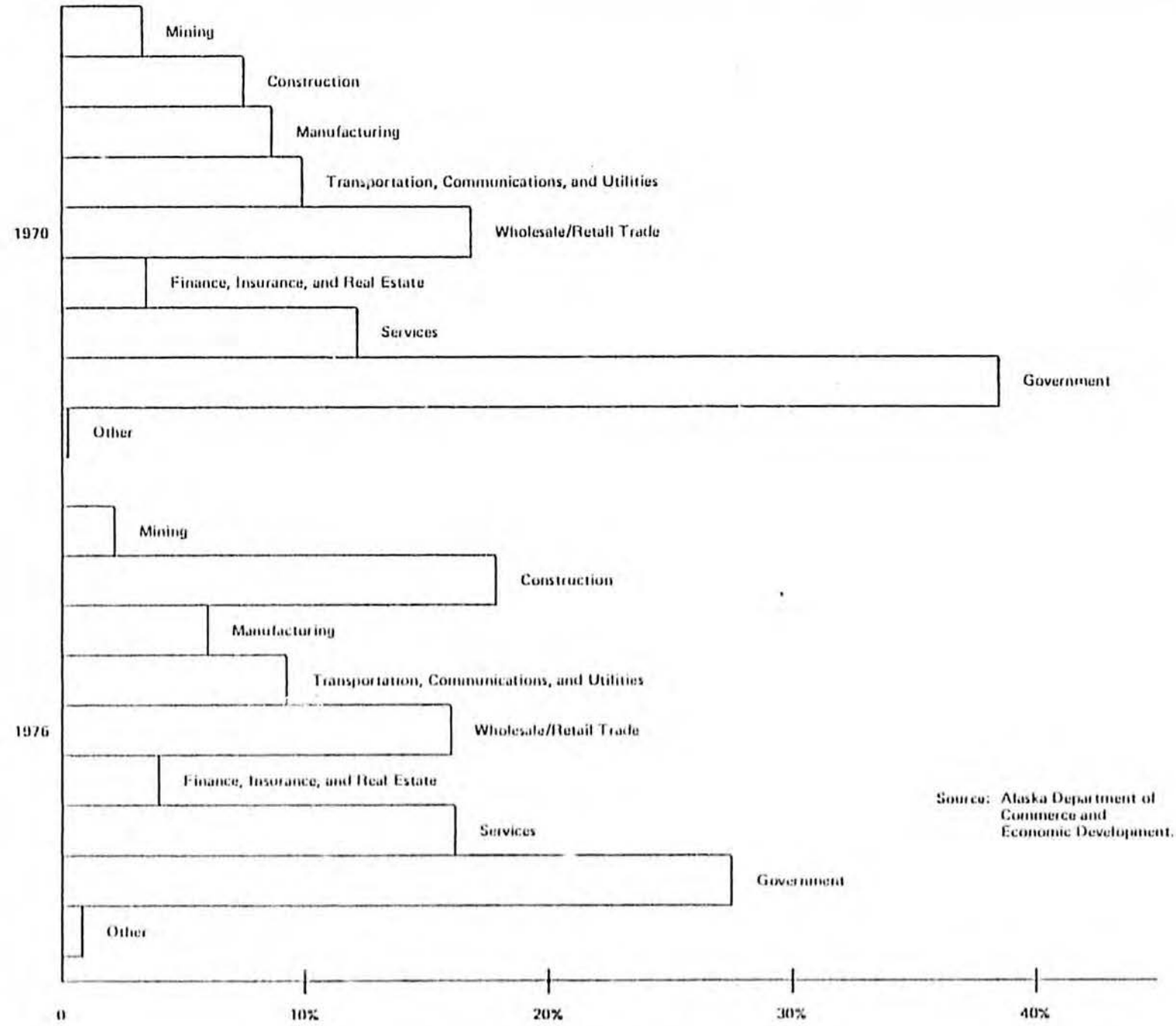
In the early 1970s, trade, services, and transportation, communications and utilities (TCU) were the next largest employers. These three sectors combined provided about as many jobs as the government sectors. Manufacturing accounted for less than 10% of employment. For the total United States, manufacturing contributed almost 30% of all jobs, with only 18% in government. In 1970, 7.5% of Alaska's workers were employed in the contract construction sector.

The trans-Alaska pipeline project began in 1974, increasing the construction share of total employment to 11%. In 1976, construction was the second largest employer in the state, followed by services and trade. In addition, pipeline construction was responsible for some of the employment increases in TCU, trade, and services; this is borne out by employment losses in these sectors in 1977.

As is the case for the state's labor force, employment in Alaska is subject to seasonal variations. Peak month (August) employment is approximately 12% higher than the annual average, while low month (January) employment is typically 15-20% below the average (Figure II-3). The principal contributors in this employment seasonality are the construction and manufacturing sectors (Figure II-4). Construction employment is heavily concentrated in the summer months because of weather constraints. Manufacturing employment is primarily in the food processing (mainly fish) and logging industries, which are highly seasonal activities. The government sector exhibits the least seasonal variation, and as the state's largest employer provides a moderating influence on overall employment seasonality.

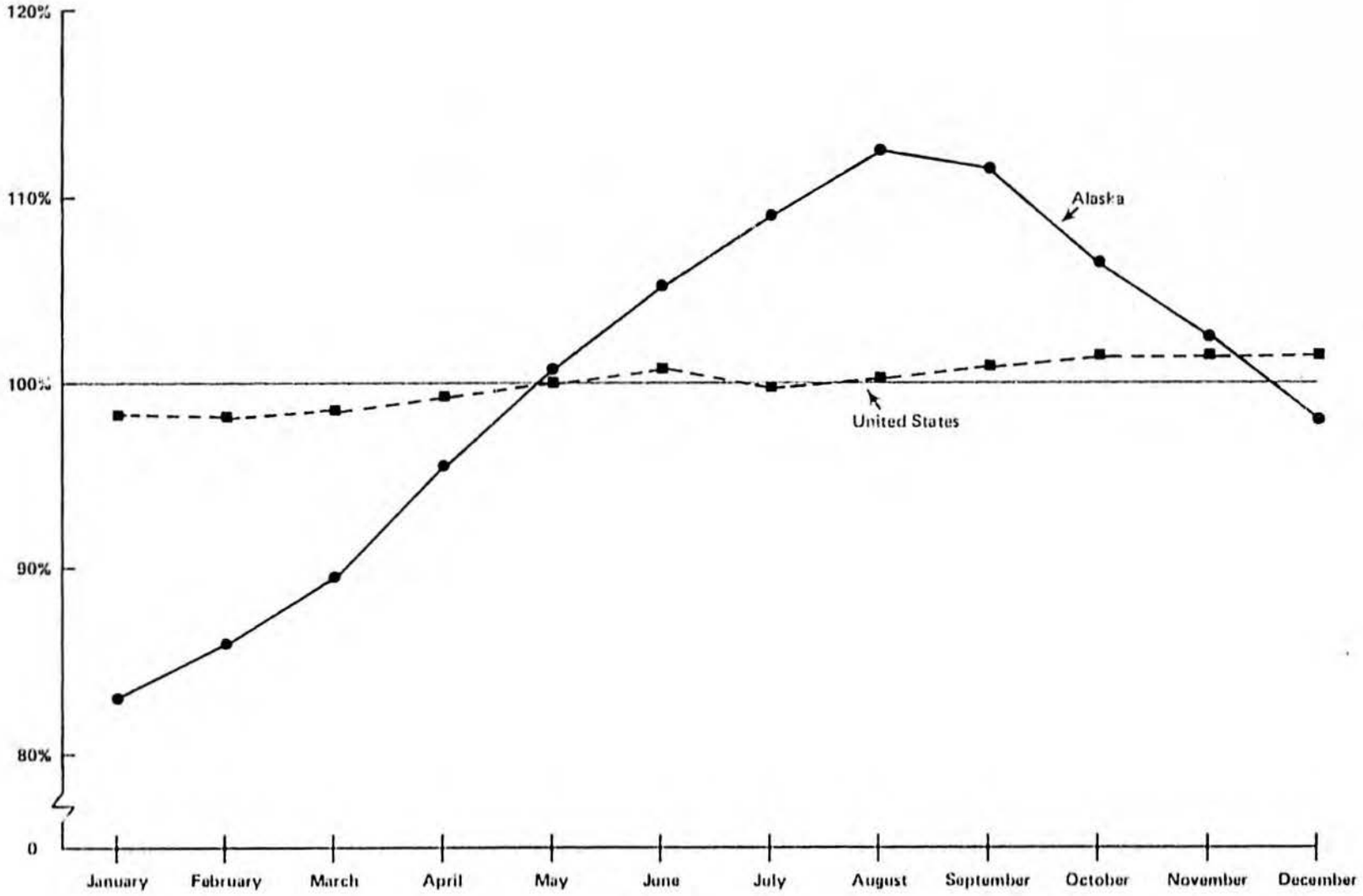
Seasonality of employment varies among areas of the state based on the distribution of industries. In 1976, government accounted for approximately 60% of non-agricultural wage and salary employment in the Juneau Census Division. Total employment varied from 95% of the annual average to 107%. The Kodiak Census Division derived about 40% of its employment from the manufacturing sector and experienced a seasonal variation of 90% to 139%. The greatest seasonal variation occurred in the Southeast Fairbanks Census Division. In this area, about two-thirds of the workers were employed in the construction sector and monthly employment varied from 52% to 146% of the annual average. In general, those areas with the greatest amount of employment in the less seasonal government and support sectors experienced the least dislocation during the winter months.

Employment in Alaska is cyclical as well as seasonal. This is evident in the events of the last several years, during which construction of the oil pipeline increased total employment by about 60,000 over three years. The last year saw a substantial decrease in employment as the project was completed. It is almost inevitable that major development projects planned



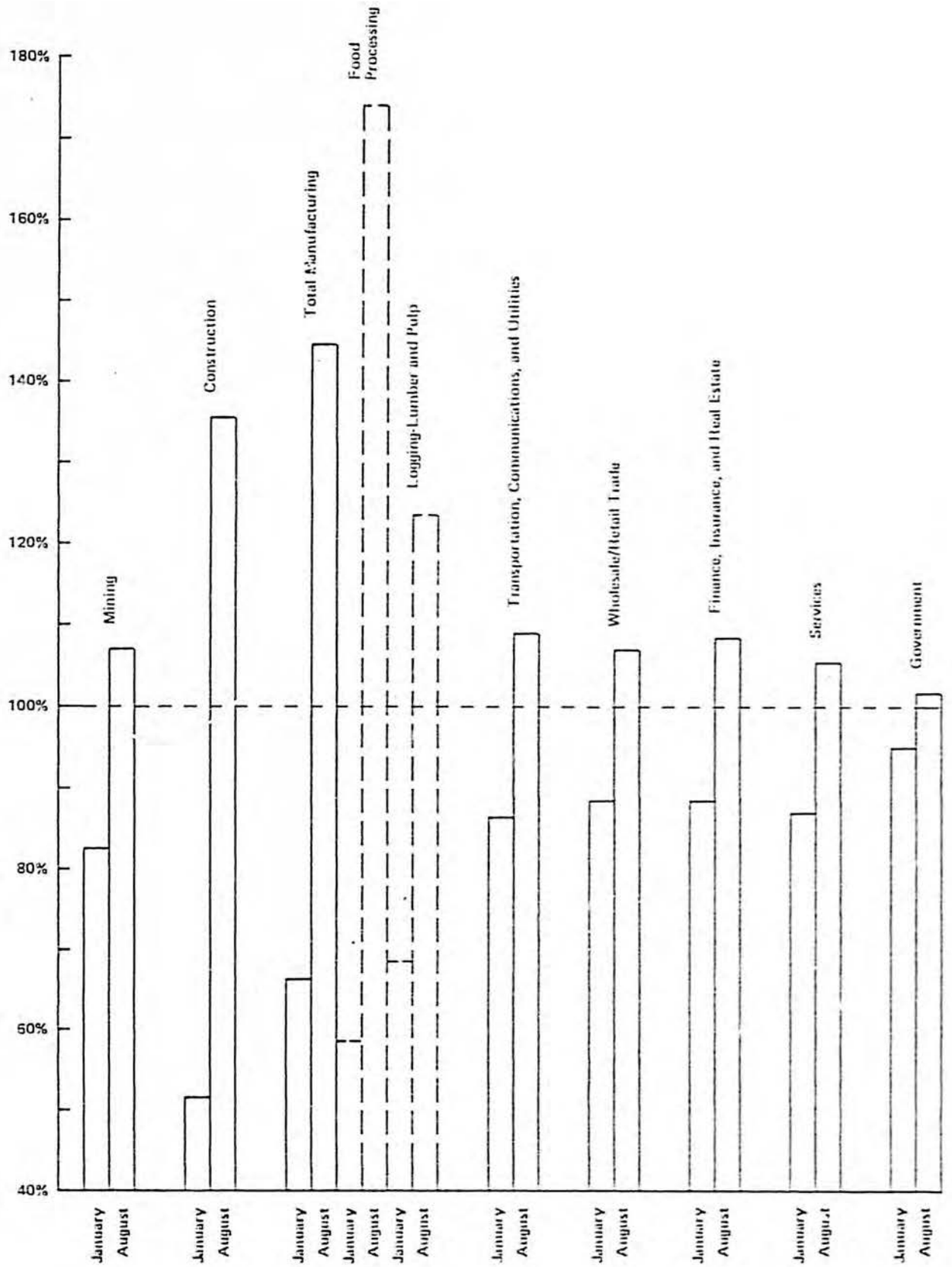
Source: Alaska Department of Commerce and Economic Development.

FIGURE II-2 PERCENT DISTRIBUTION OF NON AGRICULTURE WAGE AND SALARY EMPLOYMENT -- 1970 AND 1976



Sources: Alaska Department of Labor, Alaska Labor Force Estimates by Area and Employment by Industry, 1974, 1975, 1976; U.S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings*, various issues.

FIGURE II-3 MONTHLY PERCENT OF AVERAGE ANNUAL EMPLOYMENT
(Three-year Average for 1974-76)



Source: Alaska Department of Labor, Alaska Labor Force Estimates by Area and Employment by Industry, 1974, 1975, 1976.

FIGURE II-4 JANUARY AND AUGUST PERCENT OF AVERAGE ANNUAL EMPLOYMENT BY SECTOR
(Three-year Average for 1974-76)

Arthur D Little Inc

for the future, particularly those with large construction components (gas pipeline, capital move) will produce similar dramatic swings in employment. However, because of the in-migration of temporary residents to take construction jobs, the employment decline after such projects should not assume the magnitude of a "bust."

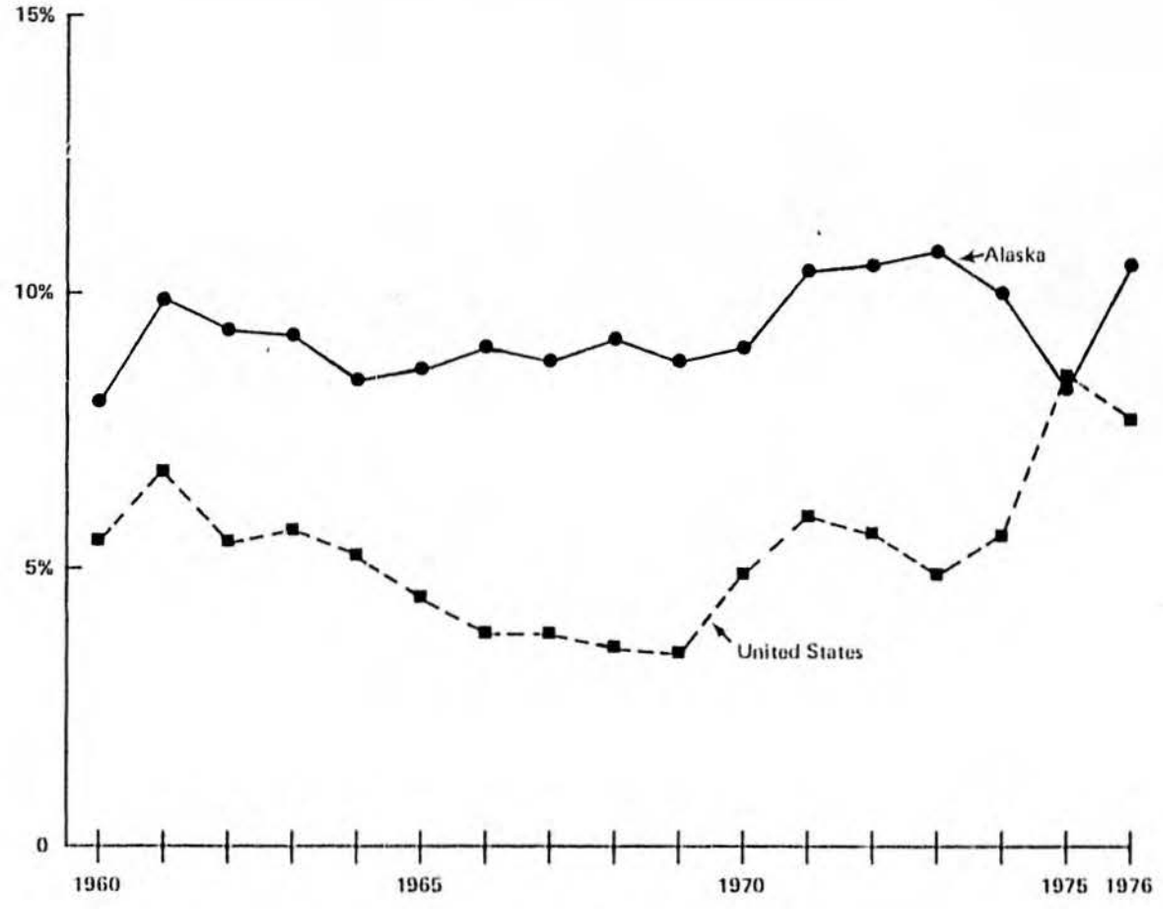
In addition to the wage and salary employment reported in published statistics, many Alaska residents, both native and non-native, rely at least in part on the traditional subsistence economy. A 1974 federal study estimated that some two-thirds of the state's natives rely on hunting and fishing to provide at least part of the food for their families. Many of these people are seasonal workers (e.g., in the fish processing industry) and engage in the traditional subsistence activities during the rest of the year. Even some city dwellers hunt and fish for part of their food.

3. Unemployment

High labor force participation, seasonal employment patterns, and the cyclical nature of the economy have resulted, until recently, in unemployment rates in Alaska about twice the national level (see Figure II-5). In 1975, the pipeline construction activity in the state and the second year of recession in the United States resulted in an unemployment rate slightly less than the national rate for the first time. As pipeline layoffs began in 1976, Alaska's unemployment rate increased by more than two points, while the national rate began to decline. Partial data for 1977 indicate monthly unemployment rates running about four points above 1976 levels, so that the annual average unemployment rate may well return to twice the national rate.

According to state Department of Labor statistics, about half the 1977 insured unemployed were workers in the construction industry, a direct result of pipeline layoffs. However, an annual unemployment rate of about 15% for 1977 represents a short-term problem. Many construction workers came to Alaska as temporary residents and many of the unemployed have left or will leave the state. The level of unemployment peaked in April of 1977 and had declined by about 12,000 (one-half) by August. Furthermore, currently planned projects, such as the gas pipelines, OCS developments, and the capital move, should provide jobs for many of the state's resident construction workers.

As might be expected from employment patterns in Alaska, unemployment rates exhibit high seasonal and regional variations. Unemployment is highest during the winter months and decreases dramatically in the summer, which is the peak season for construction, fishing, and other seasonal employment. Unemployment rates also vary throughout the state based on regional employment and industry distribution. Unemployment rates in Juneau and Anchorage in recent years have averaged two to three percentage points below the statewide average, while some areas in the southeast (Haimes and Angoon) have had unemployment rates of 25-40%, in part because of extremely poor fishing seasons.



Source: Alaska Department of Labor, Alaska Labor Force Estimates by Area and Employment by Industry, 1960-76.

FIGURE II-5 AVERAGE ANNUAL UNEMPLOYMENT RATE – ALASKA AND UNITED STATES, 1960-76

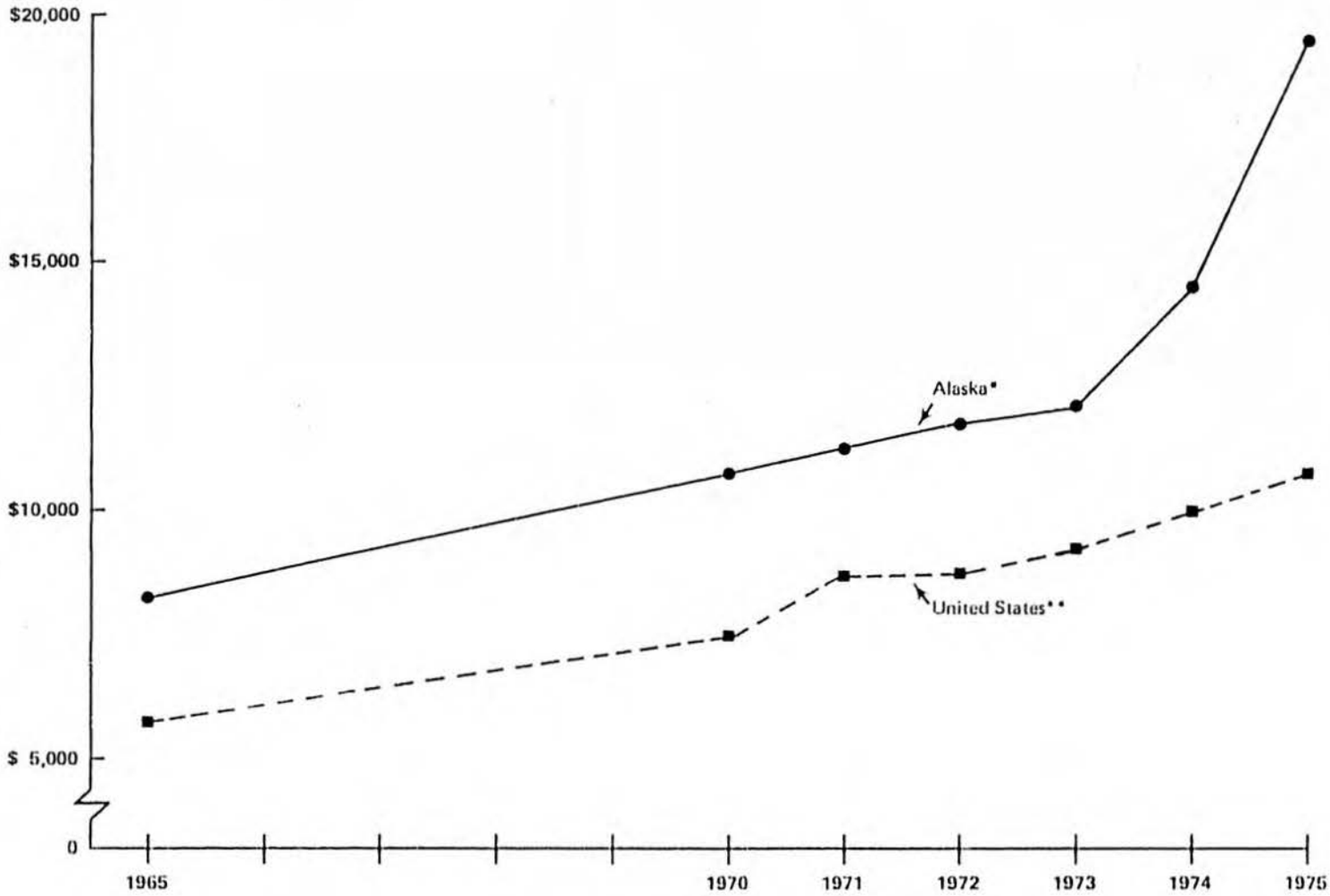
There are other points which should be noted about unemployment in Alaska. While the unemployment rate is typically very high, the level of unemployment is fairly low because of the small size of the state's population and labor force. Even in 1971-74, when the average annual unemployment rate was 10% or more, the number of persons unemployed was less than 15,000. Furthermore, unemployment rate statistics may overstate the severity of the problem to some extent because of prevailing wage rates in Alaska. For example, average weekly earnings for construction workers over the last few years have been about $1,000. Even if these workers, who make up a large share of the unemployed, work only six months of the year and are considered unemployed for the other six, their annual earnings, excluding unemployment insurance benefits, would average more than $25,000.

C. WAGES

Wages and salaries paid to employees in Alaska are considerably higher than average wages for the United States as a whole (Figure II-6). Wage rates in the state are a function of the industrial distribution of employment, a short season for many industries which results in large amounts of overtime earnings, and the state's high cost of living which requires higher wages to attract workers.

From 1965-73, average earnings per employee in Alaska grew at an average annual rate of about 5%. At the beginning of this period, annual earnings were almost 45% above the U.S. average, but by 1973 a faster growth rate for average U.S. earnings had narrowed the gap to about 30%. However, with the beginning of pipeline construction and associated activity in 1974, average earnings per worker in Alaska increased 20% above the previous year, followed by a 35% increase in 1975.

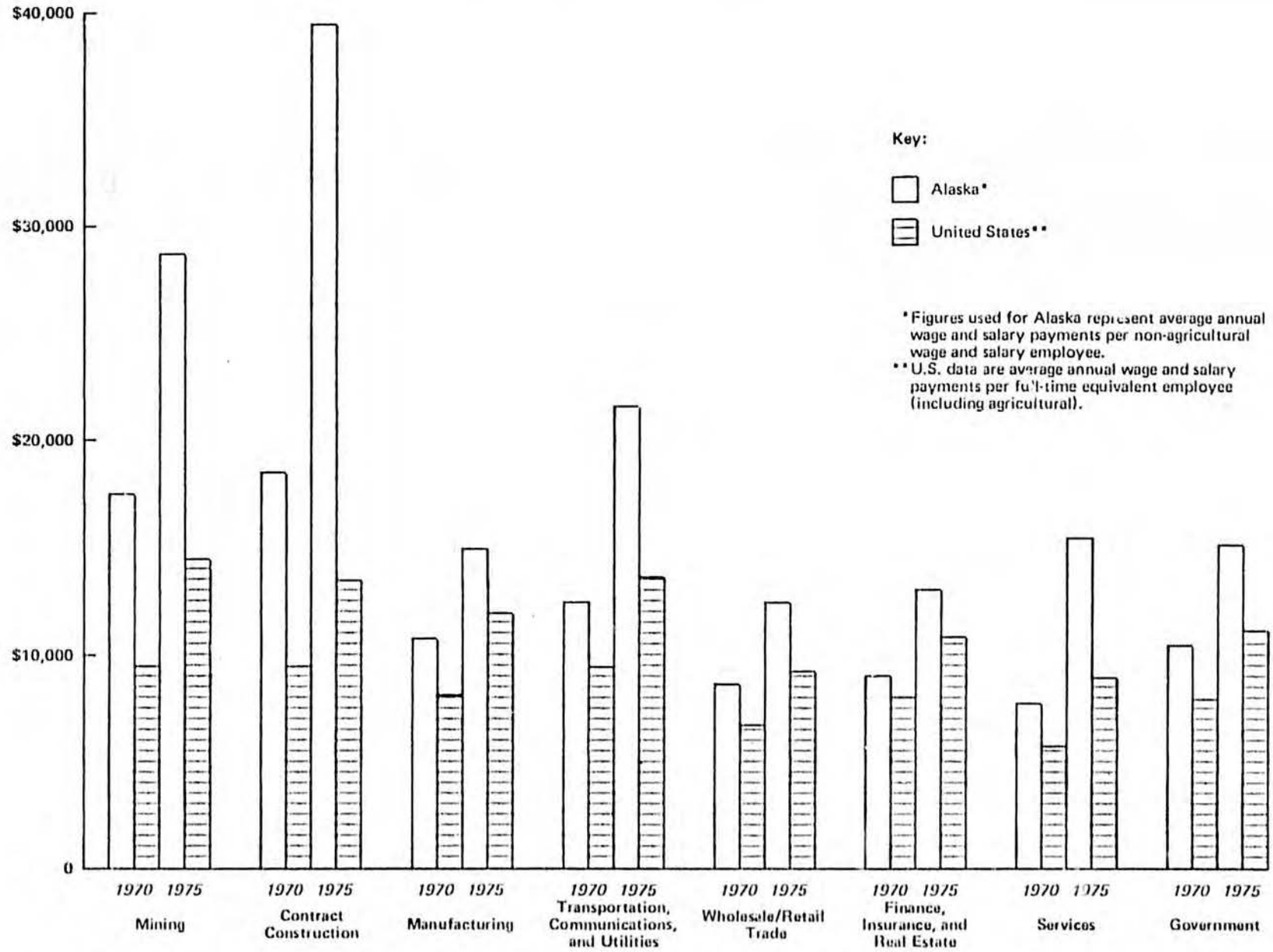
While, as might be expected, the largest increase in wages occurred in the construction sector, where average earnings per employee doubled between 1973 and 1975, earnings in almost all sectors of the state's economy were affected. To a large extent, this was a result of changes in the mix of employment within each sector. The mining sector was affected by an increase in the share of employment accounted for by the oil and gas industry and the especially high wages paid to North Slope workers. Similarly, the largest employment growth in the services sector was in the area of business services due to firms directly or indirectly related to the pipeline. Large numbers of employees in engineering, management, and related professional services contributed to the 60% increase in earnings in this sector over the two-year period. Earnings in transportation, communications, and utilities also rose sharply because of the pipeline-related demands on the state's transportation system. Wages per employee in each of these sectors -- construction, mining, services, and TCU -- were much higher relative to U.S. averages in 1975 than in 1970 (see Figure II-7).



*Figures used for Alaska represent average annual wage and salary payments per non agricultural wage and salary employee.
**U.S. data are average annual wage and salary payments per full-time equivalent employee (including agricultural).

Sources: Alaska Department of Commerce and Economic Development; U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Businesses.*

FIGURE II-6 AVERAGE ANNUAL EARNINGS PER EMPLOYEE – 1965 AND 1970-75



Sources: Alaska Department of Commerce and Economic Development, *The Alaska Economy, Mid-year Performance Reports 1977*; U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*.

FIGURE II-7 AVERAGE ANNUAL EARNINGS PER EMPLOYEE BY SECTOR – 1970 AND 1975

The seasonal nature of the state's economy leads to substantial overtime payments to workers in many industries. During most of the pipeline construction period, workers averaged 60 hours a week compared to less than 40 in the lower 48 because of the need to concentrate construction activity in the summer months. Thus, average weekly earnings for construction workers were approximately $1,000. Similarly, the state's manufacturing sector, which is highly seasonal, had average weekly earnings approximately 50% higher than the national average, while annual earnings were only about 25% above the national level for 1975 (see Figure II-8).

D. COST OF LIVING

The cost of living in Alaska, measured by consumer prices, is considerably higher than in the lower 48. However, until pipeline construction and related activity generated rapid price increases in the state, the rate of inflation was generally lower than the national average.

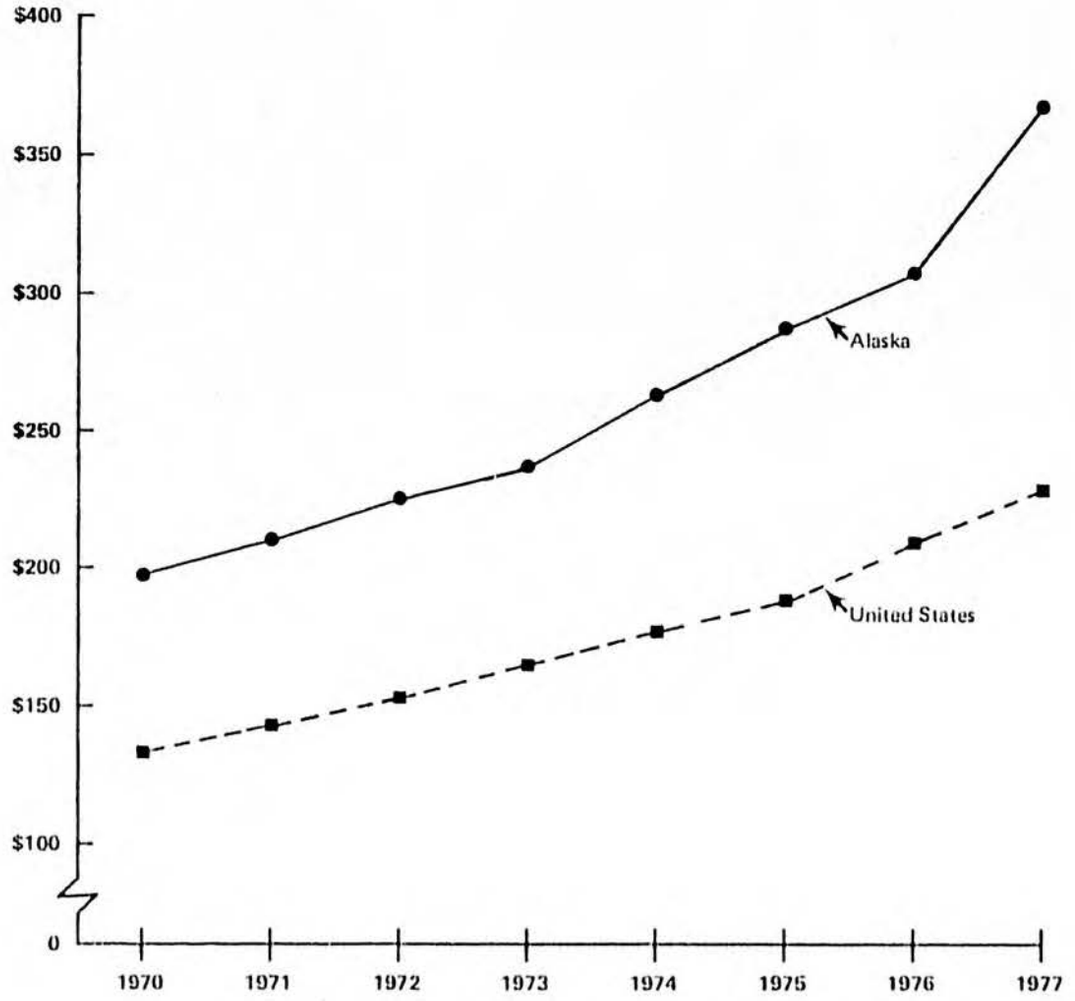
The Anchorage Consumer Price Index (CPI) increased at about 2.3% per year between 1961 and 1973, compared to an annual rate of 3.4% for the United States as a whole. Figure II-9 shows that while the cost of living in Anchorage was approximately 45% higher than the national average in 1961, by 1973 the difference was only 30%. However, between 1973 and 1976, the Anchorage CPI increased at an average annual rate of 10.8%, compared to a national average of 8.6%, so that by 1976 the Anchorage CPI was once again almost 40% above the U.S. average.

To a large extent, the rapid increase in the cost of living since 1973 can be attributed to pipeline construction. The influx of construction and other workers created pressures on the housing supply and thus on housing prices. The housing component of the Anchorage CPI increased at an average annual rate of 11.5% over the three-year period. Food prices increased almost 12% per year, with the greatest increases in the "food away from home" component, reflecting sharply increased business travel and related activity. The other principal components of the CPI experienced annual rates of increase somewhat lower than the overall rate of inflation.

It should be noted that Anchorage is the only area in Alaska for which the Bureau of Labor Statistics prepares a consumer price index. However, available data indicate that prices in other parts of the state are higher than those in Anchorage, largely the result of higher transportation and distribution costs for all consumer goods.

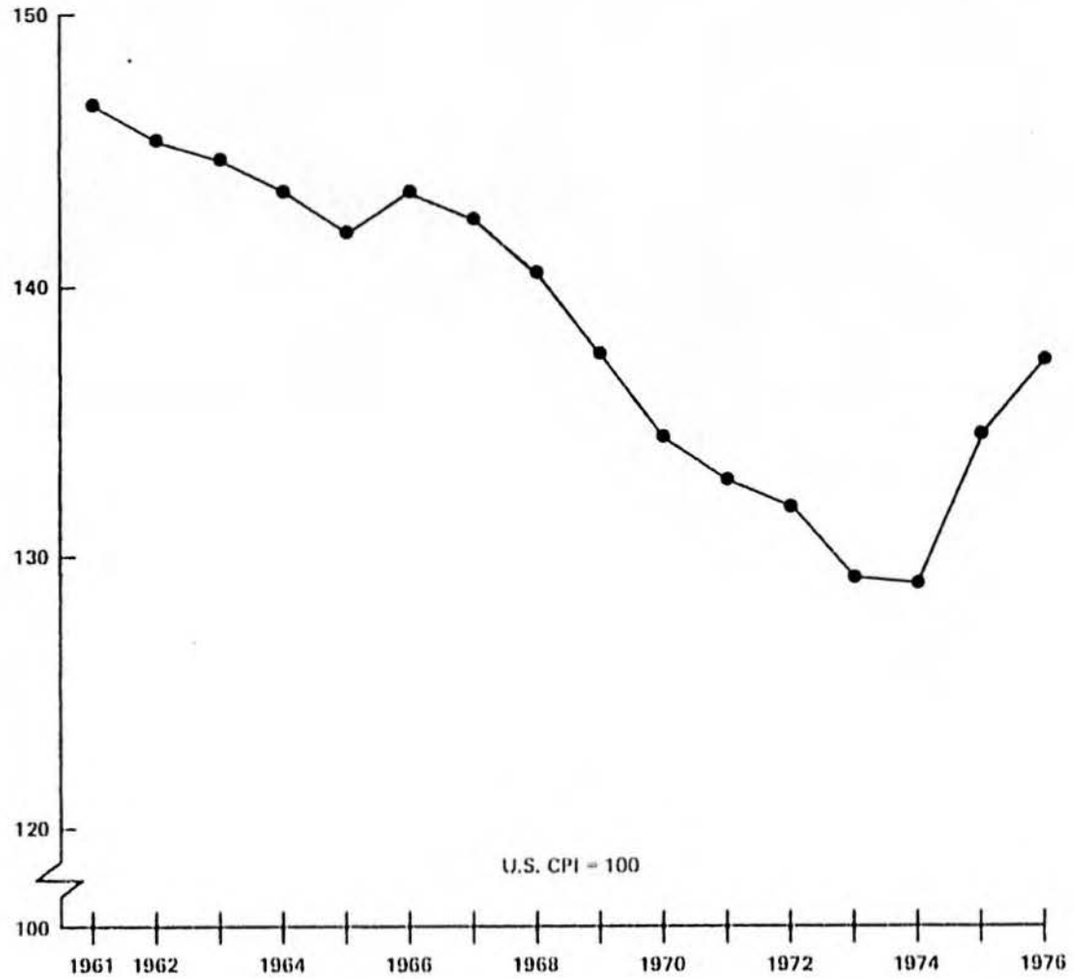
The above discussion of cost of living suggests that the higher wage rates in Alaska do not necessarily provide a higher standard of living for the state's workers.

Figure II-10 presents the data on average annual earnings per employee from the previous section adjusted to reflect the difference in CPI between Alaska and the United States as a whole. As can be seen, through 1973



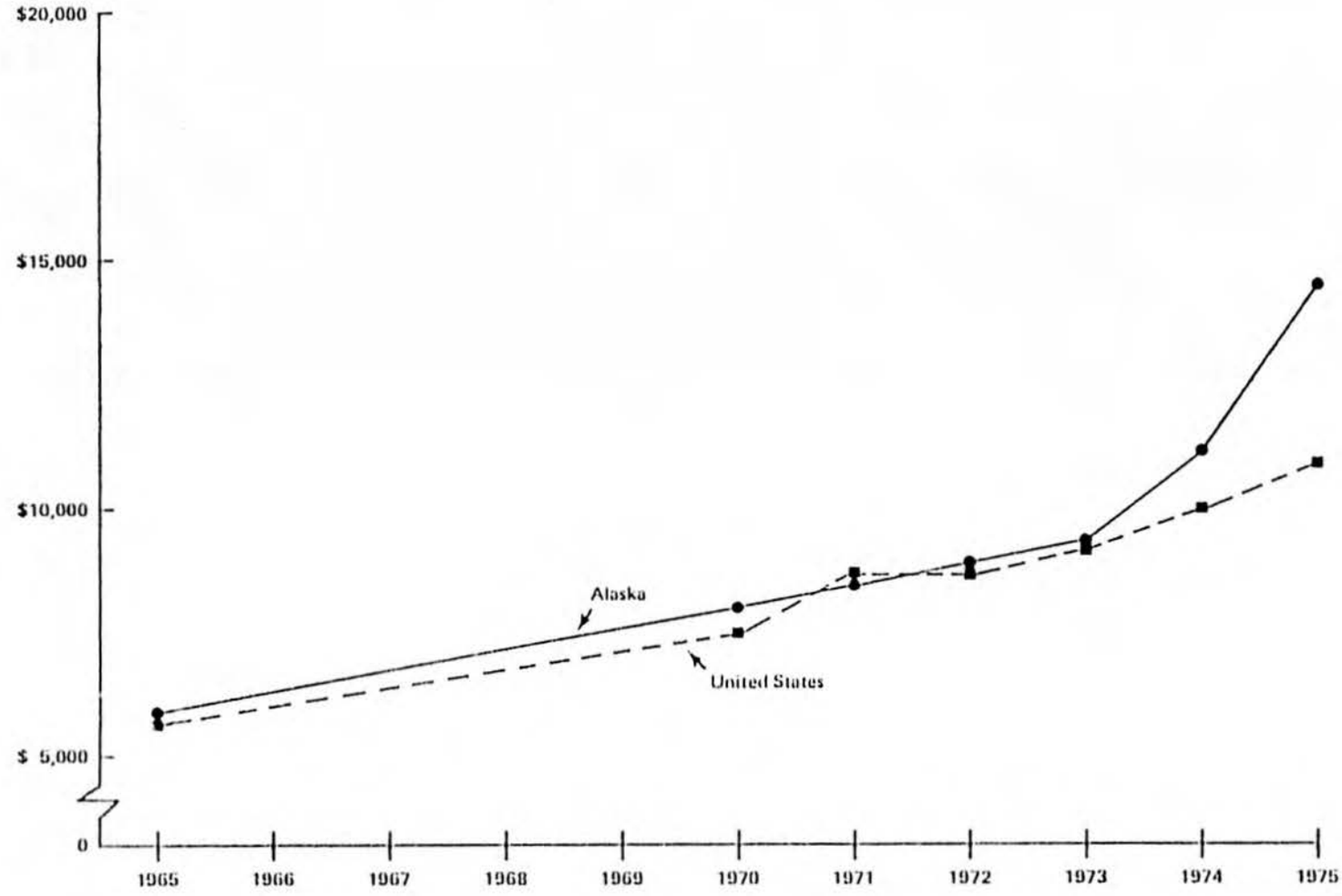
Source: U.S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings*, various issues.

FIGURE II-8 AVERAGE WEEKLY EARNINGS OF PRODUCTION EMPLOYEES ON MANUFACTURING PAYROLLS – JUNE



Sources: U.S. Department of Labor, Bureau of Labor Statistics; Alaska Department of Commerce and Economic Development.

FIGURE II-9 ANCHORAGE CPI RELATIVE TO U.S. CPI – 1961-76



Sources: Figures II-6 and II-9.

FIGURE II-10 AVERAGE ANNUAL EARNINGS PER EMPLOYEE ADJUSTED FOR DIFFERENCE IN CPI

there was no significant difference in average earnings between Alaska and the rest of the country when considered in terms of consumer buying power. However, even adjusted for cost of living, average earnings per worker in Alaska were one-third higher than the national average in 1975.

Partial data for 1977 indicate that the rate of inflation in Alaska has decreased substantially since the peak pipeline construction period. The increase in the Anchorage CPI from January 1976 to January 1977 was only 6.7% compared to an 11.1% increase for the previous year. However, this was still above the national CPI increase of 5.2% for the same period. As temporary pipeline workers leave the state, it is likely that inflationary pressures will continue to decrease, particularly in the area of housing prices. Moreover, average wages adjusted for cost of living are likely to return to a level closer to the national average as high construction earnings, particularly overtime earnings, decrease as a percentage of wage and salary payments.

E. MAJOR ECONOMIC SECTORS

This section presents a brief description of Alaska's principal economic sectors:

- Mining
- Contract construction
- Manufacturing
- Transportation, communications, and utilities (TCU)
- Wholesale/retail trade
- Finance, insurance, and real estate (FIRE)
- Services
- Government

Each sector is described in terms of its contribution to employment and gross state product (GSP), and in terms of its links to other sectors.

Table II-1 shows the rank and percent contribution of each of the sectors to employment, wages and salaries, and gross state product for 1973 before the short-term effects of pipeline construction. (GSP for Alaska is measured from the earnings side in terms of employee compensation and other factor payments -- interest, rents, and profits.) Government contributed more than one-third of all non-agricultural wage and salary employment and a slightly smaller share of GSP. (The value of production originating in the government sector is measured in terms of employee compensation only.) Wholesale/retail trade was the second largest generator of employment and GSP, but its share of GSP was about five percentage points below its share of employment because of the relatively low wages paid in this sector, particularly the retail trade component.

TABLE II-1

PERCENT DISTRIBUTION AND RANKING OF
EMPLOYMENT, SALARIES, AND GSP BY SECTOR - 1973

	Employment		Wages and Salaries		GSP	
	Percent	Rank	Percent	Rank	Percent	Rank
Mining	1.8%	8	2.9%	8	11.5%	3
Contract Construction	7.2	6	11.8	3	10.1	5
Manufacturing	8.6	5	8.3	6	7.2	8
Transportation, Communication, and Utilities	9.6	4	10.9	4	11.1	4
Trade	16.8	2	13.1	2	12.0	2
Finance, Insurance, and Real Estate	3.9	7	3.5	7	8.5	6
Services	14.0	3	10.5	5	8.2	7
Government	38.1	1	39.0	1	31.4	1

Sources: Alaska Department of Commerce and Economic Development, The Alaska Economy, Mid-year Performance Report 1977; University of Alaska, Institute of Social, Economic, and Government Research, Alaska Review of Business and Economic Conditions, "Estimates of Alaska Gross Product by Region, 1965-1973."

Even in 1973, before North Slope oil and gas production began, the mining sector was the third largest contributor to GSP, only slightly behind trade. However, mining was by far the smallest employer, providing less than 2% of all jobs. Mining, particularly the oil and gas industry, is highly capital-intensive and employee compensation is only a very small share of GSP generated in this sector.

Among the remaining sectors, construction, TCU, and FIRE contributed a greater share of GSP than employment. Construction and TCU both have relatively high average wage levels and thus make a significant part of their contribution to GSP through employee compensation. The FIRE sector generates its principal contribution through factor payments other than salaries. Manufacturing and services both generate greater shares of employment than GSP. For the services sector in particular, the relatively low wages paid make this sector the third largest employer but next to last in terms of GSP.

Table II-2 shows the distribution of non-agricultural wage and salary employment for Alaska and the United States and the growth in employment for each sector. During the 1960-73 period (i.e., before pipeline construction began), employment in three of the "support" sectors -- trade, FIRE, and services -- grew more rapidly than total employment. For the United States as a whole, these three sectors also grew more rapidly than total employment, but government was the second fastest growing sector, exceeded only by services. In Alaska, government employment grew somewhat more slowly than total employment.

The most obvious difference in employment distribution patterns between Alaska and the United States is the relative shares of government and manufacturing employment. For the nation, manufacturing contributed 31% of total employment in 1960 and gradually declined to about 24% by 1976. In Alaska, manufacturing employment has been 10% or less of the total. On the other hand, before pipeline construction, government contributed close to 40% of Alaska's total employment, compared to a national average of less than 20%. In addition, the trend appears to be a decreasing government share of employment in Alaska and an increasing government share nationwide. The Alaskan share of employment in the other major industry sectors is not significantly different from the U.S. average, although mining, construction, and TCU contribute a somewhat larger share of the state's jobs.

1. Mining

Mining is Alaska's smallest sector in terms of employment, but the largest in terms of value of production. Furthermore, the mining sector has created, and will continue to create, significant employment and other economic impacts in the state, not only through directly related activities such as construction, but also through the revenues it provides to the state government.

TABLE II-2

DISTRIBUTION AND GROWTH OF EMPLOYMENT BY MAJOR INDUSTRY SECTOR

	1960		1970		1973		1976		Average Annual Growth Rate 1960-73		Average Annual Growth Rate 1960-76	
	Alaska	United States	Alaska	United States	Alaska	United States	Alaska	United States	Alaska	United States	Alaska	United States
Mining	1.9%	1.3%	3.2%	0.9%	1.8%	0.8%	2.3%	1.0%	4.7%	-0.8%	8.4%	0.6%
Contract Construction	10.4	5.3	7.5	5.0	7.2	4.8	17.8	4.5	2.2	2.6	10.7	1.4
Manufacturing	10.2	31.0	8.4	27.2	8.6	26.2	6.1	23.9	3.8	1.4	3.7	0.8
Transportation, Communications, and Utilities	11.9	7.4	9.9	6.4	9.6	6.1	9.3	5.7	3.3	1.1	5.4	0.7
Trade	13.5	21.0	16.7	21.2	16.8	21.6	16.2	22.3	6.9	3.0	8.3	2.8
Finance, Insurance, and Real Estate	2.5	4.9	3.4	5.2	3.9	5.4	4.2	5.4	8.8	3.3	10.7	3.0
Services	9.8	13.7	12.3	16.4	14.0	17.0	16.4	18.4	8.0	4.4	10.5	4.3
Government	39.8	15.4	38.6	17.7	38.1	18.1	27.7	18.8	4.8	3.9	4.7	3.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	5.2	2.7	7.1	2.4

Sources: Alaska Department of Commerce and Economic Development, Alaska Statistical Review, 1972, and The Alaska Economy, Mid-year Performance Report 1977; U.S. Department of Commerce, Statistical Abstract of the United States, and Survey of Current Business.

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Since the late 1960s, the principal products of the mining sector have been oil and gas, which currently account for about 85% of the value of mining production and the same share of mining employment. Sand and gravel and gold are the other principal products mined, although barite, coal, silver, mercury, and other minerals are produced in small quantities. Much of the mining activity in recent years has been directed toward exploration for minerals in an attempt to determine the quantity and quality of Alaska's resources and the feasibility of development.

Many mineral deposits have been identified in Alaska, but there has been little development to date. The economics of mining operations in Alaska -- lack of infrastructure, labor costs, transportation costs -- make resource development feasible only under conditions of high world demand and price or national policy priorities, as was the case for North Slope oil and gas resources. Therefore, it is likely that activity in the mining sector will be concentrated in the oil and gas industry, at least for the next five to ten years, although coal development could occur over the short term with some transportation facility construction.

While the mining sector is highly capital-intensive and provides very few jobs in relation to its value of production, it can have significant spinoff effects throughout the economy. The obvious example is the trans-Alaska pipeline project. While oil and gas production at Prudhoe Bay will require relatively few workers, the pipeline built to transport the oil resulted in significant numbers of new jobs not only in the construction sector, but also in the support sectors of the economy -- TCU, trade, and services. Thus, the infrastructure construction and other support requirements associated with any large-scale mining project will provide jobs in other sectors of the state's economy. It is also possible that mining could generate activity in the manufacturing sector through the development of primary processing facilities in the state.

The mining sector also has a significant impact on the state's economy because of the taxes it pays. It is estimated that one-half to three-quarters of the state's general fund revenues are derived from the petroleum industry in the form of income taxes, production taxes, reserves taxes, etc. To the extent that the state uses these funds for capital improvement projects, additional jobs will be created and additional infrastructure will be available to support other economic and industrial growth. Thus, while the direct contribution of the mining sector to the state's economy is small in terms of jobs and wages, its indirect and related impacts are potentially immense.

2. Contract Construction

The construction sector in Alaska is subject to extreme cyclical fluctuations. During the early 1970s construction employed 7000-8000 workers on an annual basis and was the sixth largest employing sector in the state. However, as a result of the trans-Alaska pipeline project, construction employment reached 30,000 in 1976 and was second only to government in share of total employment. The contribution of the construction sector to GSP varies with its employment requirements.

The construction sector is made up of three major components -- private, public, and special projects construction. The private construction component includes the building of houses, office buildings, hotels, and other commercial or industrial facilities financed by the private sector. Growth in this part of the construction industry depends on population growth, which generates requirements for new housing and commercial facilities, and on the overall growth of the state's economy. The public construction segment of the sector is made up of those capital improvement projects financed by federal, state, and local government agencies -- highways, office buildings, sewage treatment systems, airport improvements, etc. The level of public construction activity is influenced by population growth, the availability of public funds (current revenues, grants-in-aid, or debt financing), and regulatory or policy issues which may dictate priorities or requirements for other than economic reasons.

Special projects construction activity, such as the oil pipeline, may be funded by either the private or public sector, but is set apart from other construction by its magnitude. Because of the cost of these projects, their cyclical nature, and the level of employment generated, special projects construction has the greatest impact in Alaska's economy. As discussed previously, trans-Alaska pipeline construction created increases in employment, population, wages, and prices throughout the state. Future special projects (the gas pipeline, OCS development, the proposed capital move) are likely to have similar consequences.

Overall, as was evident over the last few years, the construction sector has links to almost all other sectors of the state's economy. Construction of facilities and/or infrastructure is a necessary input to all of the other economic sectors. At the same time, the other sectors provide inputs to the construction industry: mining provides sand and gravel, manufacturing provides sawmill products, and TCU, trade, FIRE, and services provide many support functions. Thus, as demand for construction activity is created, the overall economy will grow.

3. Manufacturing

Alaska's manufacturing sector is quite small, providing 8000-10,000 jobs and 6-8% of total employment. In 1973, the share of GSP originating in manufacturing was the smallest of any of the eight major sectors. Manufacturing activity is currently highly seasonal and is concentrated in very few industries, making the entire sector vulnerable to industry-specific problems.

Almost half of the state's manufacturing employment is in the food processing industry, with most of this in fish processing. Employment in this industry is extremely seasonal, with peak summer employment two to three times January levels. The other principal manufacturing industry is lumber and wood products. Included in this industry are logging operations, sawmills, and Alaska's two pulp mills. Employment in the lumber and wood products industry is seasonal, but much less so than the food

processing industry. Other manufacturing employment (approximately 2000 jobs) is spread among a variety of industries. The Kenai Peninsula ammonia and urea plant is the only large-scale export-oriented manufacturer in this group. Other operations are generally small and supply the local market.

Local market-oriented manufacturing activities -- bakeries, printers, furniture makers -- will grow along with overall state population growth. Development of larger-scale export based industries will be tied to resource extraction and development of suitable infrastructure -- transportation, utilities, etc. In addition, the resolution of several regulatory/ institutional problems will be necessary before significant new manufacturing activity will occur, for example, the U.S. Forest Service's 10-year limit on timber leases.

Even over the long term, manufacturing in Alaska is not likely to account for the 20-30% share of employment experienced at the national level. The economics of most manufacturing industries require that final product fabrication operations be located near major consumer markets. Furthermore, Alaska's wage structure, limited industrial base, and lack of significant infrastructure development all work against establishment of new industry. Development of the manufacturing sector in Alaska will likely follow the historical pattern of reliance on primary processing of natural resources (e.g., fish processing, petroleum refining). Over time, it may be possible to attract some intermediate product manufacturing industries (e.g., chemicals or primary metals), but final product manufacturing and high technology industries are not likely.

4. Transportation, Communications, and Utilities (TCU)

The TCU sector has historically ranked fourth in terms of employment and contribution to GSP. While TCU is a support sector which depends on economic and population growth for its expansion, development in this sector may also act as a catalyst for further economic growth.

Transportation is the largest component of this sector, accounting for about two-thirds of its total employment. Within transportation, air transportation is the largest employer, followed by trucking and warehousing. Communications and public utilities together employ 4000-5000 people, roughly the same as air transportation.

The transportation and utilities components of this sector are not only affected by increased demand generated in other sectors, but can also be determinants of future growth. Lack of transportation infrastructure and high transportation costs are among the principal factors inhibiting industrial growth in Alaska. The road and rail systems are limited, and many interior areas can only be reached by air. Similarly, while water transportation is used for freight and passenger transport, there is not yet a large industrial port which would support coal or ore shipments. As a result, the expansion of the state's transportation network in response to population and business growth will in turn provide infrastructure to support additional growth.

Public utilities are in somewhat the same position as transportation. Utility services -- electric, gas, water, sanitary -- are expanded because of demand generated by increased population and business activity. However, utility infrastructure, particularly electric power generation, can also attract new industry.

The communications portion of this sector includes telephone, telegraph, radio, and television services. In recent years, activity in this sector has been directed toward improving communications facilities in the outlying areas of the state. Growth in communications reflects population and business demand. However, unlike the other components of this sector, additional communications development will not attract new industry.

Over the long term, the TCU sector will follow the growth of the state's population and economy. The transportation portion, in particular, is likely to be the greatest beneficiary of industrial development, as well as a catalyst for further growth.

5. Wholesale/Retail Trade

This sector has historically been the second largest employer in the state, except in 1976 when construction and service sector employment rose dramatically because of the pipeline project. Retail trade has typically accounted for 80% of employment in this sector and 70% of wage and salary payments.

Alaska's wholesale trade activity is concentrated in Anchorage and Fairbanks; retail establishments exist in all areas of the state. One of the fastest growing components of retail trade in recent years has been eating and drinking establishments, to a large extent the result of increased business activity and travel in the state. This is also the most seasonal retail trade category. As might be expected, general merchandise, apparel, and food stores have experienced growth related to overall population increases. The "other retail establishments" component, which includes automobile service stations in addition to other retail categories, has also grown rapidly, in large measure reflecting new and expanded operations resulting from pipeline activity.

Three sets of events will affect the growth of the trade sector in Alaska. Obviously, trade can be expected to grow along with population and to generally follow the geographic distribution of population. Second, increased vacation and business travel to and within the state will increase trade activity in eating and drinking places and other travel/tourist-related businesses. Finally, the trade sector will grow to accommodate new industry in the state, either as a supplier of materials and equipment or as a distributor of products.

6. Finance, Insurance, and Real Estate (FIRE)

The FIRE sector is the seventh largest employer in the state, exceeding only mining. However, this has been the fastest growing sector in the state, with total employment more than doubling since 1970. Almost two-thirds of FIRE employment is located in Anchorage, the state's population and commercial center.

The finance industries -- banking, securities, and holding companies -- make up the largest component of this sector, accounting for almost two-thirds of its employment. The largest share of this group is employed in Alaska's 14 commercial banks and four savings and loan associatons. Another 20% of the employment in this sector is in insurance. While there is no major insurance company based in Alaska, there are more than 700 life, fire, casualty, and other carriers which operate there. The real estate component of this sector has grown with the expanding housing market of the last several years.

Growth in the FIRE sector is directly related to increased business activity and personal income.

7. Services

Since 1960, service sector employment has grown faster than employment in any other sector except FIRE, to which it is related. In 1976, services was third behind government and construction in terms of total employment. However, until the last few years this sector's contribution to GSP has been small relative to employment because of low wage rates in most of its component industries. Increases in business and professional services have altered average wage rates in this sector dramatically since 1974.

Within the services sector, business services has been the fastest growing group since 1960. Included in this group are building services, advertising, employment agencies, data processing, consultants, etc. Moreover, business service employment increased more than fourfold between 1973 and 1976, reflecting the impact of trans-Alaska pipeline construction and related activity. Hotel and lodging services has also been a relatively rapidly growing industry because of increasing business and vacation travel in the state. The only part of the services sector which has not experienced substantial growth is personal services, where employment has remained virtually constant throughout the 1970s.

The services sector is affected by both population and business growth in the state. The industries likely to experience the greatest future growth are those tied to Alaska's other growth sectors -- hotels, business services, and other professional services (engineers, architects, accountants). Industries more closely related to population -- personal and medical services -- are likely to grow at a slower rate than other portions of the services sector.

8. Government

Government is overwhelmingly the largest employer in Alaska, typically providing about 40% of the state's jobs. (It should be noted that this is only civilian government employment and does not include more than 20,000 military personnel stationed in Alaska.) However, government's share of total employment has been declining slowly because of more rapid rates of employment growth in other sectors.

Until the late 1960s, the Federal Government accounted for the majority of employment in this sector. However, total federal employment in Alaska has not changed substantially since that time. On the other hand, state and local government employment increased by nearly 75% between 1969 and 1976, with somewhat more rapid growth in local government employment.

The government sector has been a stable foundation for the state's economy, providing a large employment base which is fairly well insulated from seasonal and cyclical fluctuations. Moreover, government is indirectly responsible for activity in other sectors through purchases of goods and services and financing of capital improvement projects.

Growth in government employment is likely to continue, but at a somewhat slower rate. Federal employment will not grow significantly, and may decrease as the Federal Government transfers more Alaskan lands to the state and to native corporations and as a declining military force requires fewer support personnel. State and local government should continue to provide the growth in this sector, supported by increasing state tax revenues from the petroleum industry. However, the government share of total employment will continue to decrease because of more rapid growth in other sectors of the economy.

F. INTERACTIONS WITH THE U.S. AND FOREIGN ECONOMI

Because of its limited population and economic base, Alaska must rely on the rest of the United States and the rest of the world for production of the goods it needs and for markets for its own products. While the U.S. economy is the principal supplier of goods to Alaska, the rest of the world (and Japan in particular) is the major market for Alaskan export.

Tables II-3 and II-4 present data collected for the University of Alaska's Census of Alaska Transportation. The authors selected 1973 as the base year in order to display transport patterns without the effects of the trans-Alaska pipeline project. It was also noted that these data do not indicate transshipment through U.S. ports -- that is, some of the commodities shipped between Alaska and the rest of the U.S. may in fact have originated in or be destined for other countries.

In almost all commodity groups, the majority of imports came from other parts of the United States, principally through Washington and California. Other countries were significant suppliers of farm products, fresh fish, crude petroleum and petroleum products, and stone, clay, and glass products. After 1973, major foreign import commodities were jet fuel, steel pipe, and other construction materials necessary for pipeline construction. Japan and Canada have been the leading foreign suppliers of commodities to Alaska, and imports from other Asia countries have increased significantly in recent years.

TABLE II-3

MAJOR COMMODITY IMPORTS INTO ALASKA - 1973
(tons)

	Domestic Imports	Foreign Imports	Percent Domestic Imports
Farm Products	6,349.9	6,670.0	49%
Fresh Fish and Other Marine Products	481.0	181,781.0	-
Coal	6,058.3	167.0	97
Crude Petroleum	-	82,674.0	-
Nonmetallic Minerals, Except Fuels	32,764.5	15,482.0	68
Food and Kindred Products	246,479.2	43,512.5	85
Basic Textiles	1,055.3	18.0	98
Lumber and Wood Products, Except Fuel	89,871.7	11,143.3	89
Furniture and Fixtures	14,073.6	386.3	97
Pulp, Paper, and Allied Products	14,025.4	1,033.6	93
Chemicals and Allied Products	85,348.7	16,686.9	84
Petroleum and Coal Products	853,917.2	835,378.8	51
Rubber and Miscellaneous Plastic Products	3,748.3	241.8	94
Stone, Clay, and Glass Products	76,619.0	59,347.7	56
Primary Metal Products	51,781.9	8,083.1	86
Fabricated Metal Products, Except Machinery	46,035.6	903.0	98
Machinery, Except Electrical	25,311.7	1,675.0	94
Electrical Machinery, Equipment, and Supplies	5,152.0	14.7	99
Transportation Equipment	43,540.7	2,275.1	95
Miscellaneous Manufactured Products	39,616.0	82.1	99
Miscellaneous Products	347,973.8	126,184.7	73

Source: Lloyd M. Perrela and Staff, Census of Alaska Transportation, prepared for the U.S. Department of Transportation, University of Alaska Institute of Social and Economic Research, September 1976.

TABLE II-4

MAJOR COMMODITY EXPORTS FROM ALASKA - 1973
(tons)

	Domestic Exports	Foreign Exports	Percent Domestic Exports
Fresh Fish and Other Marine Products	26,837.0	4,098.0	87%
Metallic Ores	112.5	887,721.0	-
Coal	1,783.0	-	100
Crude Petroleum	7,571,806.0	7.9	100
Nonmetallic Minerals, Except Fuels	48,930.5	4,225.5	92
Food and Kindred Products	69,325.1	3,630.2	95
Lumber and Wood Products, Except Fuel	6,307.0	1,121,339.4	1
Pulp, Paper, and Allied Products	224,536.9	1,152,830.0	16
Chemicals and Allied Products	580,538.9	224,904.1	72
Petroleum and Coal Products	1,303,508.7	969,609.6	57

Source: Lloyd M. Perrela and Staff, Census of Alaska Transportation, prepared for the U.S. Department of Transportation, University of Alaska Institute of Social and Economic Research, September, 1976.

Of far greater importance to the future of Alaska's economy are the distribution and growth of export markets. Table II-4 shows the domestic and foreign shares of Alaska's principal commodity exports. In 1973 fresh and processed fish, coal, nonmetallic minerals, and crude petroleum were shipped primarily to the lower 48 (although a portion of the seafood was then transshipped to foreign destinations). Other countries were the principal purchasers of metallic ores, lumber, and pulp. Chemicals and petroleum products (ammonia, urea, and LNG) were shipped to both the lower 48 and other countries.

Alaska's principal foreign market is Japan, which regularly accounts for about 80% of all Alaskan foreign exports. (In 1976, the second largest export market was Mexico, with less than 5% of the total.) This export link is strengthened by Japanese direct investment in Alaska, estimated at more than $300 million. It thus becomes evident that trends in the Japanese economy are as important as those in the U.S. economy to future industrial development in Alaska. The outlook for both countries is discussed in detail in Chapter IV.

G. INSTITUTIONAL ISSUES

Economic development in Alaska is subject to a variety of legal, regulatory, and other institutional considerations. While some of these issues are national in scope (such as environmental protection legislation), many are unique to Alaska. Furthermore, even when institutional actions do not specifically prohibit economic growth, the uncertainties about regulatory actions and perceptions of problems in obtaining development permits have contributed to an unfavorable business climate.

To a large extent these institutional considerations are a result of the long-time federal presence and influence in Alaska. In 1959, the Federal Government owned more than 99% of the land in Alaska. The Statehood Act granted 103.3 million acres, or 28% of the land area, to the new state, transferred natural resource management functions to state agencies, and provided for payment to the state of 90% of the revenues from federal oil and mineral lease sales, rentals, and royalties (excluding OCS area). Even so, the Federal Government remains a strong presence in Alaska, with about 24,000 military and 18,000 civilian employees (some 10% of total state population and close to 40% of civilian employment). The Bureau of Indian Affairs remains active in providing services for the native population, the Department of Transportation operates the Alaska Railroad, and the U.S. Forest Service controls the vast majority of timber harvested in the state.

The most significant issue affecting Alaska's economy is the Alaska Native Claims Settlement Act of 1971, which provided about 44 million acres of land and almost $1 billion in cash grants to 12 native regional corporations. The economic development concern is centered on Section 17(d)(2) which provides for the withdrawal of up to 80 million acres of "national interest" land for federal protection as national parks, wildlife refuges, and national forests. Congress is required to act on the final selection and classification of these d-2 lands by the end of 1978.

The eventual status and extent of d-2 lands will have a significant impact on the development of Alaskan resources. One proposal -- HR 39 (the Udall bill) -- would set aside 115 million acres of land under d-2 status and would classify most of this land as wilderness, precluding virtually all industrial use and exploration. Other proposals call for smaller total land allocations (close to the 80 million acres mentioned in the 1971 Act) and a classification system allowing exploration and some development. Opponents of HR 39 fear that areas of potentially huge resources will be cut off not only from development, but also from exploration. Proponents argue that it would be possible to open wilderness lands to exploration and development at some time in the future should conditions warrant it.

While the selection and classification of d-2 lands will be determined by the end of the year, the corollary issue of transportation corridors will remain. If it is not possible to build highways, pipelines, or railroads across federal d-2 lands to reach state or native corporation lands, the most efficient transportation access to resources may be blocked. Particularly in Alaska, where transportation infrastructure is limited and construction costs for such infrastructure are high, the need to route transportation around d-2 lands could make an otherwise economically attractive development infeasible.

The d-2 question is part of the larger issue of environmental protection which has had and will continue to have impacts on almost all development proposed in Alaska. While the environmental laws (NEPA, clean air and water regulations, etc.) are national in scope, Alaska has received considerable attention from environmentalists. Court actions brought by these groups delayed construction of the trans-Alaska pipeline for three years and caused Champion International to abandon plans for a wood processing complex after 10 years of litigation. Water pollution abatement requirements nearly forced the closing of the Ketchikan Pulp plant before agreement was reached with EPA extending the compliance deadline.

Any future industrial development in Alaska will, of course, have to meet applicable environmental standards. However, the state appears to have become a battleground for environmental groups who see Alaska as the last remaining wilderness in America. The numerous lawsuits brought by such groups to halt industrial projects have convinced many potential developers that location or expansion in Alaska is not worth the "hassle."

Other related institutional actions are the U.S. Forest Service's regulations governing timber cut in national forests, about 90% of the Alaskan timber harvest. Forest Service stumpage fees, which are based on finished product prices, have become so high that logs are being imported from Canada for processing in Alaskan pulp mills. Furthermore, Forest Service lease sales have been cut back from 55 to 10 years, discouraging the establishment of large-scale processing plants.

Another federal law which affects Alaska's economy is the Jones Act which required that ocean shipments between U.S. ports be carried on U.S.-built and manned vessels. The higher shipping costs of the U.S. merchant fleet make Alaskan products less competitive in the lower 48 market and make goods shipped into Alaska more expensive. Lower foreign fleet shipping costs have certainly contributed to the extensive trade connections between Japan and Alaska. The Jones Act has also served to limit the cruise ship tourism market in Alaska, since non-U.S. ships (most of the cruise fleet) must spend at least half of the cruise in Canadian ports.

Not all federal laws and regulations are detrimental to Alaska's economy. In 1976 Congress enacted a 200-mile "fishery conservation zone." Foreign fleets have been allocated portions of the resources within these fisheries only when the stocks are determined to be surplus to U.S. needs. It is now reported that the National Oceanographic and Atmospheric Administration plans to give U.S. processors the same proprietary rights to fish caught within the 200-mile limit. The impact of the 1976 law and the proposed additional regulations will be to strengthen Alaska's fishing industry and provide it with a market in Japan and other countries whose fleets had previously fished in Alaskan waters.

Many other legal/regulatory actions proposed or discussed at the federal level could also have significant impacts on economic development in Alaska. The timing of OCS leasing and development will determine the nature of petroleum industry spinoffs in the state. Possible incentives to increase coal use and higher prices for gas and oil could make export of Alaskan coal to the lower 48 more economically attractive. In general, because of the federal presence in the state and the extent of federal land ownership, many of the legal and regulatory actions which will affect Alaska's economic growth will be determined by the Federal Government.

H. REGIONAL CHARACTERISTICS

The preceding sections have described demographic and economic characteristics for the state as a whole. However, Alaska is by no means homogenous. Labor force participation, employment, unemployment, and principal industries vary from region to region, and recent trends have tended to enforce regional differences. Therefore, this section presents a comparison of some of the demographic and economic characteristics of the five principal regions shown in Figure II-11.

While several studies have used the regional division shown in Figure II-11 (sometimes separating Anchorage and Fairbanks from the Southcentral and Interior regions), it should be noted that each region is composed of many different subareas. Even the Census Divisions in each region are not homogenous economic units. The purpose of this regional description is therefore to indicate broad regional differences and the variations from state average economic conditions which exist in each region.

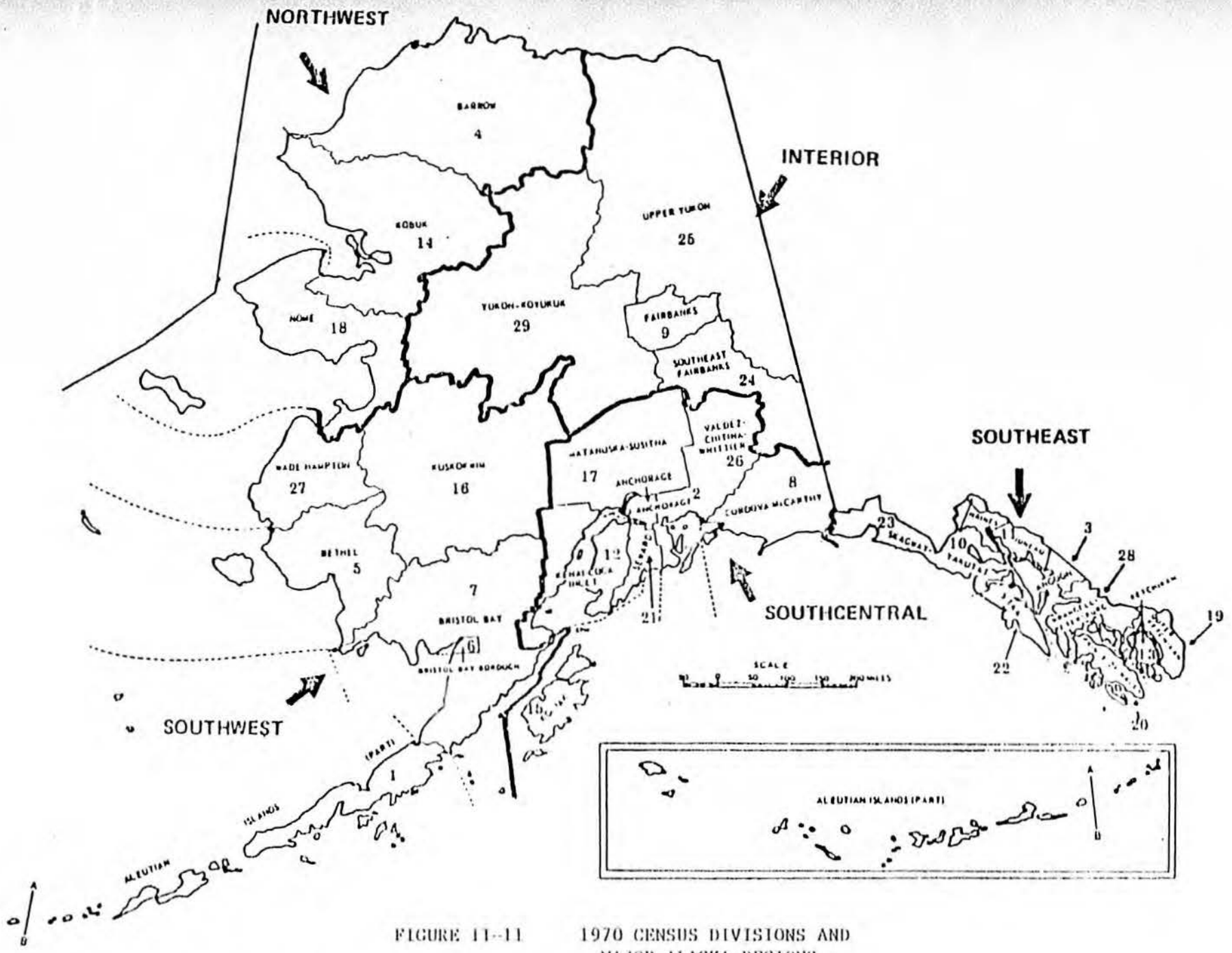


FIGURE II-11 1970 CENSUS DIVISIONS AND MAJOR ALASKA REGIONS

Source: Babb, "Age and Sex Characteristics of Alaska's Population," Alaska Review of Business and Economic Conditions, March 1972.

Table II-5 shows the population distribution among the five regions. The Southcentral region, which includes Anchorage, currently contains almost 60% of the state's population, with another 17% in the Interior (Fairbanks). As noted above, nearly two-thirds of the state's population lives in its three largest cities (Anchorage, Fairbanks, and Juneau). Moreover, the trend has clearly been toward a greater concentration of population in the Southcentral region, particularly Anchorage. The share of population in each of the other regions has declined since 1960, although the Northwest has seen an increase since 1970 because of North Slope activity.

TABLE II-5

REGIONAL POPULATION DISTRIBUTION

Year	Southeast	Southcentral	Southwest	Northwest	Interior
1960	15.7%	48.1%	9.3%	5.2%	21.7%
1970	14.1	54.2	8.8	4.2	18.7
1971	13.9	55.8	8.5	4.3	17.5
1972	13.8	56.4	8.3	4.0	17.5
1973	14.1	57.1	7.9	3.8	17.1
1974	14.3	55.4	8.0	4.3	18.0
1975	12.5	56.7	7.0	4.4	19.4
1976	12.4	59.1	6.9	5.1	16.6

Source: Alaska Department of Commerce and Economic Development, The Alaska Economy, Mid-year Performance Report 1977.

While data on detailed population characteristics for the last few years are not available, a 1975 report* contained figures on the military and native population by region. In 1973, there was a significant military presence (more than 10% of the population) in the Southwest and Interior regions, although the largest number of military personnel was stationed in the Southcentral area. In the early 1970s, the Southwest and Northwest regions both had primarily native residents (more than 80% in the Northwest and two-thirds in the Southwest), although the native share of population in the Northwest has decreased in the last few years because of North Slope workers. The Southeast area has a significant native population (about 20%). The native population share is not significant in the Southcentral region.

*University of Alaska, Institute of Social, Economic, and Government Research, Issues in Alaska Development, July 1975.

Table II-6 presents highlights of regional labor force, employment, and income characteristics. In general, lower labor force participation and income characterize the Southwest and Northwest regions, which is consistent with their large native populations, many of whom continue to participate in the traditional subsistence economy. These two regions also exhibit the greatest reliance on government employment, indicating relatively little development of the private sector economy.

The Southeast region includes Juneau, but also many smaller communities with fishing and timber as the principal industries. There was substantially less employment growth from 1970-76 here than in the other regions because of the geographic isolation of the Southeast. In other words, the pipeline project did little to stimulate economic growth in the Southeast. This is also evident from the government share of employment, which remained essentially constant here while declining significantly in all other regions as private sector employment grew substantially. The Southeast region has also experienced a significant increase in its relative unemployment rate; it had the lowest regional rate in 1970, but had a rate 2.5 points above the state average in 1976. The higher unemployment rate reflects not only the lack of pipeline-related job creation, but also problems affecting the fishing and timber industries in this area (e.g., poor fishing seasons and slack Japanese demand for wood products). Nonetheless, per capita income in the Southeast remains above the state average because of the large number of government employees with relatively high wages and salaries.

The Southcentral region, which includes Anchorage, is not only the state's population center, but also its economic center. This is particularly evident from the fact that government accounts for a smaller share of employment here than in any other region, even though about half of all government employees work here. With about 60% of Alaska's labor force and employment in the Southcentral region, economic conditions here generally determine the statewide average. Historically, the unemployment rate has been somewhat lower and per capita income somewhat above the state averages because of less favorable economic conditions in other areas.

The Southwest region has had a very small share of population in the civilian labor force -- in part because of the relatively high military presence and in part because of the number of persons engaged in the traditional subsistence economy. While the number of jobs has increased much more rapidly than population in recent years, the unemployment rate remains high. This is because military cutbacks have been offset by increasing civilian population and an expanding civilian labor force. Even with the related loss of some civilian Department of Defense jobs, however, the Southwest continues to derive about half of its employment from the government sector, with manufacturing (primarily seasonal fish processing activity) the other major employer. The subsistence economy and high seasonality in this region keep per capita income low even with substantial government employment.

TABLE II-6

REGIONAL LABOR FORCE AND EMPLOYMENT CHARACTERISTICS

	State Average	Southeast	Southcentral	Southwest	Northwest	Interior
Percent of Population in the Civilian Labor Force						
1970	32.5%	41.4%	34.8%	15.5%	21.8%	29.3%
1974	42.4	50.4	45.2	25.8	26.6	38.4
1975	44.4	52.3	45.3	27.0	27.8	46.9
1976	48.3	53.2	49.2	29.9	44.2	50.6
Average Annual Employment Growth Rate - 1970-76	12.3	6.6	13.0	15.8	23.0	12.7
Unemployment Rate						
1970	9.2	8.5	9.0	14.8	13.6	8.5
1974	10.0	16.6	9.7	13.3	13.8	8.6
1975	8.3	11.3	8.1	10.8	11.5	5.7
1976	10.5	13.0	9.9	14.3	10.1	10.1
Government Share of Civilian Employment						
1970	38.6	38.2	33.2	55.3	53.8	38.7
1974	32.7	39.4	28.9	47.7	53.0	34.8
1975	28.6	39.0	25.5	46.8	46.8	24.2
1976	26.4	39.9	21.9	45.1	26.2	26.2
Per Capita Income						
1970	$4,645	$4,780	$4,860	$3,345	$2,570	$4,730
1974	6,890	7,295	7,020	5,375	4,595	7,405

Sources: 1970 - U.S. Department of Commerce, Bureau of the Census, City and County Data Book 1972; 1974-76 - Alaska Department of Labor, Employment Security Division, Alaska Labor Force Estimates by Areas.

The Northwest has the smallest population of the five regions although it has experienced substantial population and employment growth since 1970 because of the North Slope oil field development. In fact, employment has grown about three times as fast as population because almost all of the in-migrants to the area are employed in the petroleum industry and related activities (pipeline construction and maintenance). Before these dramatic changes occurred, the Northwest was very similar to the Southwest in its demographic and economic characteristics, with a primarily native population engaged in traditional subsistence activities and the government sector supplying more than half of all civilian employment. The Northwest had, and still had in 1974, the lowest per capita income in the state. However, the wages paid to petroleum industry workers will continue to increase average incomes. The Northwest was the only one of the five regions which experienced a decreasing unemployment rate in 1976.

About 85% of the population and employment of the Interior region is in the Fairbanks area. The remainder of the region is similar to the neighboring Northwest in terms of a relatively large native population participating in the subsistence economy, and a high government share of available jobs. The pipeline project had a significant impact on the region because Fairbanks was the staging area for construction. The number of jobs (measured on an average annual basis) did not grow as rapidly as in other areas, but this is because of the seasonal nature of the construction industry. Nonetheless, the unemployment rate dropped nearly three percentage points below state and national levels in 1975; by 1976 pipeline layoffs had begun and the unemployment rate increased, although it remained below the state average. In addition, the region's population declined by about 10,000 in 1976 as temporary residents left the area or the state.

III. ALASKA'S RESOURCES - DEVELOPMENT AND PROSPECTS

This chapter describes Alaska's principal natural resources in terms of their present and potential economic development. The state's timber, fishery, and oil and gas resources have been the focus of development to date. There has been relatively little development of coal, hardrock minerals, and tourism, and the state's agricultural potential is virtually untouched. The potential for expansion of Alaska's transportation and utility (primarily electric power) systems is also described, because future infrastructure development is directly tied to economic growth.

The factors and problems likely to inhibit or constrain development of resource-based industries are also described. Some of these problems are common to all economic development activity in Alaska -- the d-2 lands issue, limited transportation infrastructure, environmental concerns, etc. Others, such as U.S. Forest Service policies, will affect only one industry. While some of these inhibiting factors may be removed by appropriate public or private action, others are likely to remain constraints to development for the foreseeable future.

Even though there are factors likely to inhibit economic development in Alaska, there are opportunities to develop all of the state's resources. Whether such development will occur will depend on policy as well as economic considerations, many of which are outside the state's control.

The initial development of any natural resources (i.e., the extraction process) leads to both direct and indirect spinoff potentials. For example, a mineral ore can be mined in Alaska and shipped to the lower 48 or other destinations for processing, creating limited economic activity in the state. However, the first level of downstream development (the primary processing) could also occur in the state, increasing the value added and employment generated by resource development. In general, the value of resource development to the state and its residents will increase as steps are added in the processing chain. However, the economics of Alaskan operation make it extremely unlikely that in-state development will reach the final product state, except for small-scale operations to serve the local market.

Because of the small size and fragmented nature of the state's economy, the more indirect spinoffs of resource development may be as important, or even more important, than the direct downstream activities in terms of employment and income generated. A case in point is the construction of the trans-Alaska pipeline to support North Slope oil and gas development. Other resource development will generate support activities (e.g., boat repairing operations serving the fishing industry) and new infrastructure. New infrastructure will facilitate additional industry (e.g., roads built into the interior of the state to reach mineral resources may also provide access to areas attractive for tourism).

This chapter identifies the outlook and opportunities for the entire resource development process. The prospects for resource-based manufacturing industries are described in greater detail in Chapter V.

A. AGRICULTURE

1. Summary and Overview

Agriculture, other than subsistence farming, is insignificant in Alaska. Of the 20 million acres of land that appear to be suitable for agricultural development, only about 20,000 are being cultivated. In 1974, about 750 people were employed in nonsubsistence agriculture. There were an estimated 300 farms in Alaska in 1970. Milk production comprises the largest share of total agricultural production -- about 33%, followed by hay and potatoes. Although commercial production is confined to local and military markets, Alaskan farmers produce only a small part of the state's food needs.

The most obvious limitation on Alaskan agricultural development is the short growing season that limits the range of crops that can be produced. A more fundamental problem is the high cost of agricultural production in Alaska which limits the competitiveness of Alaskan products in the export and the Alaskan market. High production costs result from the size of Alaskan farms which are too small to realize economies of scale. Additional contributors to high costs of farm operations include the time and resources required to prepare land for agricultural operations (i.e., clearing, drainage, leveling, etc.). The most serious infrastructure problem is the lack of a marketing system, which forces farmers to deal directly with retailers and consumers, and the lack of a transportation system to bring in supplies and ship out products. Future agricultural development will, in part, depend on the resolution of political and regulatory issues that will determine the availability of large tracts of land for development.

The potential for expanded agricultural production in Alaska is theoretically huge because Alaska is one of the few remaining places in the world with large areas of undeveloped agricultural land. If Alaska is to realize its potential for agricultural production, operating costs will have to be reduced. Cost reduction will depend to some extent on establishment of state policies that make large tracts of land available for agricultural development and that improve transportation facilities to permit better access to supplies and markets. The most apparent opportunity for large-scale agriculture lies in the production of feed grain, especially barley, for the export market, especially Japan. Expanded grain production could also be the basis for expansion of beef, poultry, and pork production for the in-state market, and development of processing facilities.

2. Present Status

Agriculture, other than subsistence farming, is insignificant in Alaska. Of the 20 million acres of land that appear to be suitable for agricultural development, only about 20,000 are being cultivated. In 1974, about 750 people were employed (full or part-time) in non-subsistence agriculture. Alaskan agriculture is characterized by small farms reflecting the historical homestead basis of Alaskan agricultural development. There were an estimated 300 farms in Alaska in 1970.

The low level of agricultural development is evident from the data on agricultural production. In 1976 the value of Alaskan agricultural production was an estimated $8.7 million (see Table III-1). Between 1960 and 1970, there was no change in the value of agricultural production in current dollars. Between 1970 and 1976, it rose from $5.5 million to $8.7 million, with most of the increase in crop value. Milk production comprises the largest portion of total agricultural production (almost $2.9 million -- or about 33%) followed by hay and potatoes. Barley has been the principal grain grown in Alaska. Alaskan grains have been grown almost exclusively for livestock feed. Wheat is low yielding in Alaska and is grown only to a limited extent.

Commercial production is confined primarily to local and military markets. However, Alaskan farmers produce only a small portion of the state's food needs. For example, fresh milk sales from Alaskan producers accounted for only one-third of total fluid milk consumed in the state. Similarly, Alaska produces less than 2% of the beef marketed within the state.

Alaskan agriculture is concentrated in about five areas. Vegetables are grown on the Kenai Peninsula, the Tanana Valley, and the Matanuska/Susitna Valley. The latter two areas also produce small grains and dairy products. Beef cattle are raised on Kodiak Island and in the Matanuska/Susitna Valley. The Matanuska Valley accounts for most of the state's agricultural activity (see Figure III-1).

3. Problems

There are several reasons for the slow pace of development of Alaskan agriculture. The most obvious is the limitations posed by the Alaskan climate. Alaska's short growing season limits the range of crops that can be produced.

A more fundamental problem is the economics of agricultural production in Alaska. The high costs of agricultural production in Alaska limit the competitiveness of Alaskan products in the export market and in the Alaskan market. High production costs in Alaska result from small farms and from the lack of an agricultural infrastructure. Farmland in Alaska originated in homesteading or other government programs. Consequently, individual farming operations are generally too small to realize the economies of scale enjoyed by farmers in other states. The average farm in Alaska is less than 160 acres, which is considerably smaller than most estimates of economic farm size. Furthermore, large-scale agricultural development in other states has been accompanied by the local availability of supplies such as herbicides, pesticides, and livestock, hog, and poultry feed. In Alaska such supplies must be imported at high cost. In fact, one reason given for the failure of beef and pork production to increase is the lack of adequate feed supplies.

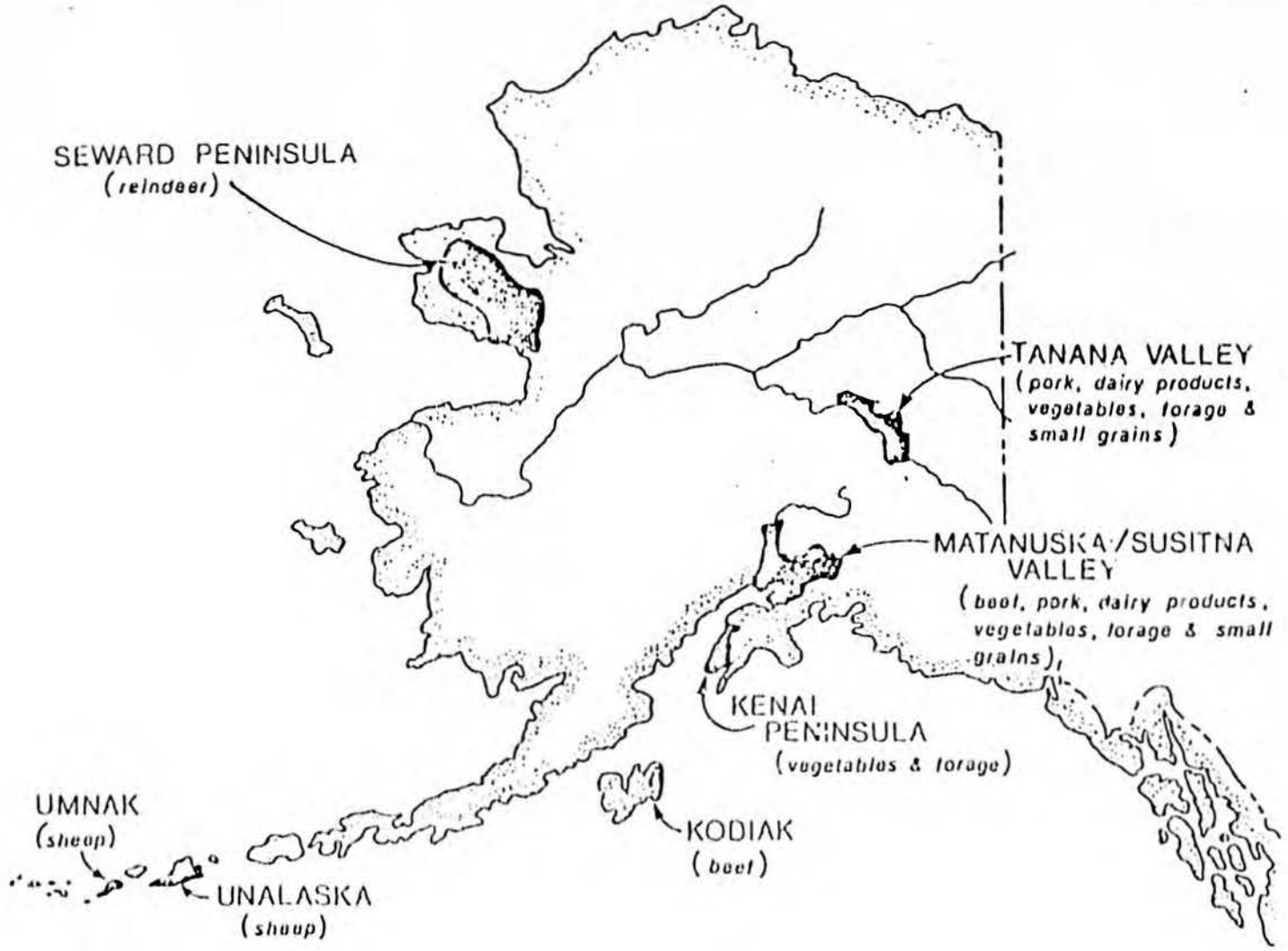
Probably the most serious infrastructure problem is the lack of a marketing system for agricultural products and a corollary system for supplying farm inputs. The small size of Alaskan farms and the Alaskan market resulting in low production levels have precluded the profitable

TABLE III-1

VOLUME AND VALUE OF AGRICULTURAL
PRODUCT IN ALASKA BY MAJOR PRODUCT - 1976

Product	Volume of Production	Value of Production
Field Crops	3,800 cwt	
Oats	3,800 cwt	$ 30,000
Barley	32,200 cwt	261,000
Hay	18,600 tons	2,325,000
Silage	11,200 tons	391,000
Total		$3,007,000
Vegetable Crops		
Potatoes	91,000 cwt	$1,001,000
Lettuce	9,500 cwt	261,000
Cabbage	4,000 cwt	59,000
Carrots	1,900 cwt	36,000
Other	2,200 cwt	63,000
Total		$1,420,000
Total Crop Production		$4,427,000
Livestock Products		
Milk	16,000,000 lbs	$2,888,000
Eggs	500,000 doz	570,000
Beef and Veal	716,000 dr wt	608,000
Pork	105,000 dr wt	84,000
Poultry Meat	140,000 dr wt	43,000
Lamb and Mutton	18,000 dr wt	10,000
Wool	51,000 lbs	45,000
Total Livestock Production		$4,248,000
Total Agricultural Production		$8,675,000

Sources: U.S. Department of Agriculture, Statistical Reporting Service; State of Alaska, Department of Commerce and Economic Development, Division of Economic Enterprise.



Source: University of Alaska, Institute of Social, Economic and Government Research, "Agriculture In Alaska: 1976-2000 AD."

FIGURE III-1 MAIN AGRICULTURAL PRODUCTION AREAS IN ALASKA

development of wholesale marketing and distribution enterprises. Consequently the burden of marketing has fallen on the individual farmers who lack the capacity to develop larger-scale markets. Thus farmers market directly to retailers, and in some cases to consumers. The lack of processing facilities further limits the market potential for farm products. The Alaskan local market is limited and the export market undeveloped so that there is only a small market for processed food products.

Transportation is another factor which has limited Alaska's agricultural development. The lack of transportation facilities in some areas has limited farmland development because of the inability to obtain supplies or to ship products to market. Where transportation facilities are available they are expensive. For example, transportation rates for milk are so high that in the southeastern part of the state, producers have difficulty competing with products brough in from outside the state.

Other problems will have to be resolved if agricultural production in Alaska is to increase substantially. To increase the economic viability of Alaskan agriculture, farms will have to be larger in order to realize economies of scale, and this will require a land policy that makes significant amounts of land available for large-scale agriculture. However, the following potential obstacle make the future availability of large tracts of agricultural land uncertain:

- The d-2 land issue,
- Availability of native corporation lands,
- The lack of privately owned land, and
- Competition with other land uses such as recreation and urban/suburban development.

In the Matanuska Valley agricultural land use has begun to conflict with other development uses. The valley is a prime agricultural area because of its good soil, warm temperature, and moderate rainfall. However, with increases in population in the Anchorage area, valuable agricultural land may be turned over for residential, commercial, and industrial uses.

The U.S. Interior Department's d-2 proposal would incorporate about one-half of the state's tillable land and significantly reduce the state's agricultural potential. Once the federal lands have been identified and selected for withdrawal, it would be impossible for the land to be used for agriculture.

Even if sufficient land becomes available for large-scale farming, the small size of the Alaskan market may limit the viability of large-scale development. Production for the export market could justify large-scale agriculture but this would depend on the prevailing commodity prices in world markets. Lands selected by the native corporations for ownership under the Alaska Native Claims Settlement Act would still have a potential for agricultural production. This could be through individual operation, corporate farming, or some kind of lease arrangement.

4. Outlook and Opportunities

The potential for agricultural development in Alaska is theoretically huge, as indicated in Figure III-2. Alaskan agriculture has the potential to serve a world market and to reduce Alaskan imports of farm products. Alaska is one of the few remaining places in the world with large areas of undeveloped agricultural land (See Figure III-3).

There are four major concentrations of suitable land: the Anchorage/Kenai/Matanuska-Susitna Valley area; the Dillingham/Tikchik Lake area; the Tanana/Kantishna/Salcha Basin area in the interior; and the Yukon flats area of the Upper Yukon. In addition, there are three minor areas: the Yukon Valley from below Holy Cross to Ruby (including the Koyukuk Basin), the Kuskokwim Valley from just below Aniak to Lake Minchumina, and the Copper Valley-Chitina Basin. The Tanana Valley has the greatest potential for agricultural development because of a large land base, available water, a developed transportation (rail and land) system, and land use planning; it has an even greater potential than the Matanuska Valley. The Tanana Valley currently produces about 20% of the crops produced in the state.

If Alaska is to realize its potential for increased agriculture production, operating costs will have to be reduced so that Alaskan products become competitive in the lower 48 and in worldwide markets. Reduction of production costs will depend in part on establishment of governmental policy that makes sufficient land available for large-scale agricultural production and that encourages improved transportation systems that permit better access to supplies and markets. However, development of commercial agriculture in Alaska has not been a major state policy goal. Only recently has there been discussion of the need for a comprehensive assessment of agriculture as a major land resource development alternative.

Recent developments show that statewide interest in agriculture in Alaska is gaining momentum. A Department of Commerce and Economic Development project is investigating the costs associated with producing Alaska's agricultural products and livestock. And the state legislature is beginning to look more closely to agriculture. This increased attention given to agriculture probably reflects concern for developing industries based on renewable resources.

The proposed Delta project may be evidence of new state interest in promoting agricultural development. The project would promote barley production in the Delta-Clearwater area. The Delta plan would utilize 64,000 acres of land south of Delta for barley production with the state financing the clearing and breaking of the land. State costs under the plan would be recouped by leasing the land to farmers for a five-year lease period and then offering a purchase option. The North Pole refinery will be producing diesel fuel in its first stage of operation and probably gasoline in 1979. This new facility will assure lower prices and a steady supply of fuel and will exhaust steam at a rate of 200,000-350,000 pounds an hour at an average temperature of 600 degrees F. The waste heat from the North Pole refinery and from the pump stations on the trans-Alaska pipeline will provide a source of heat to dry grain and serve as an energy source

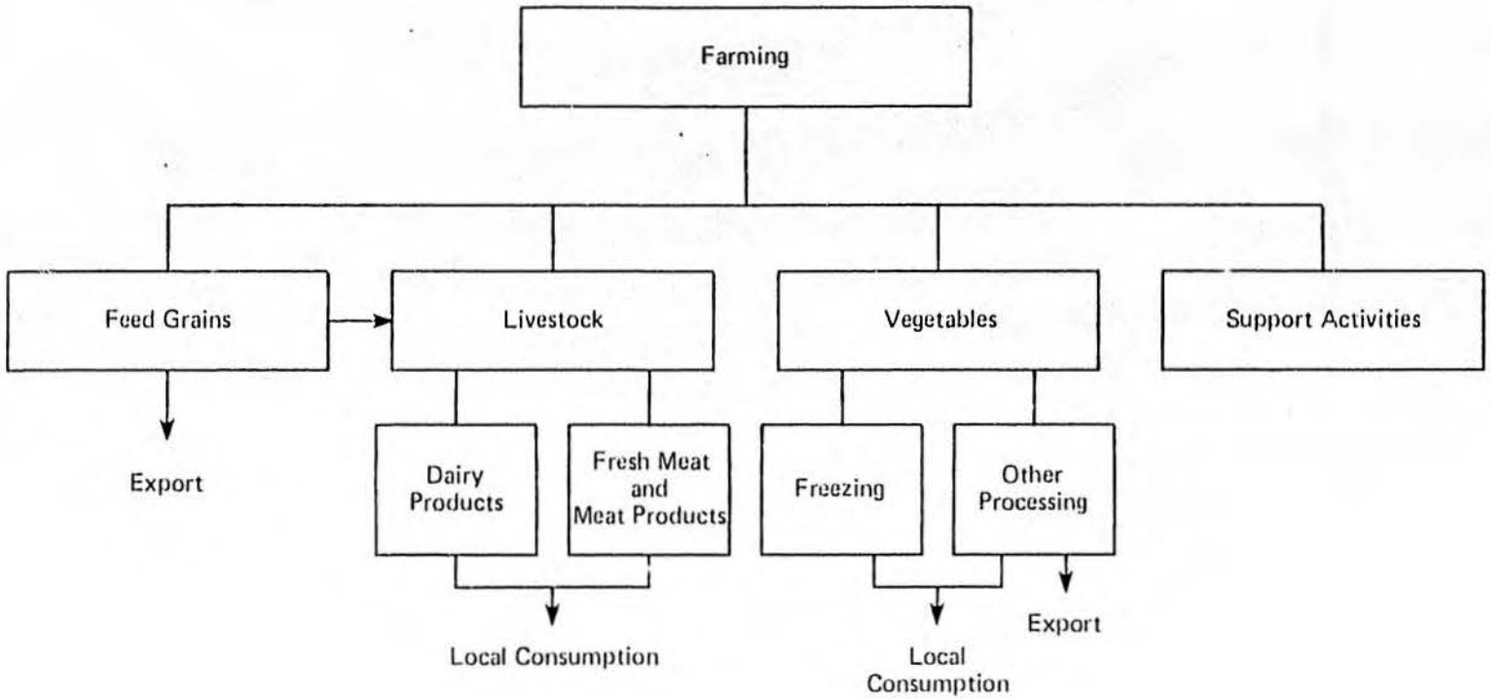
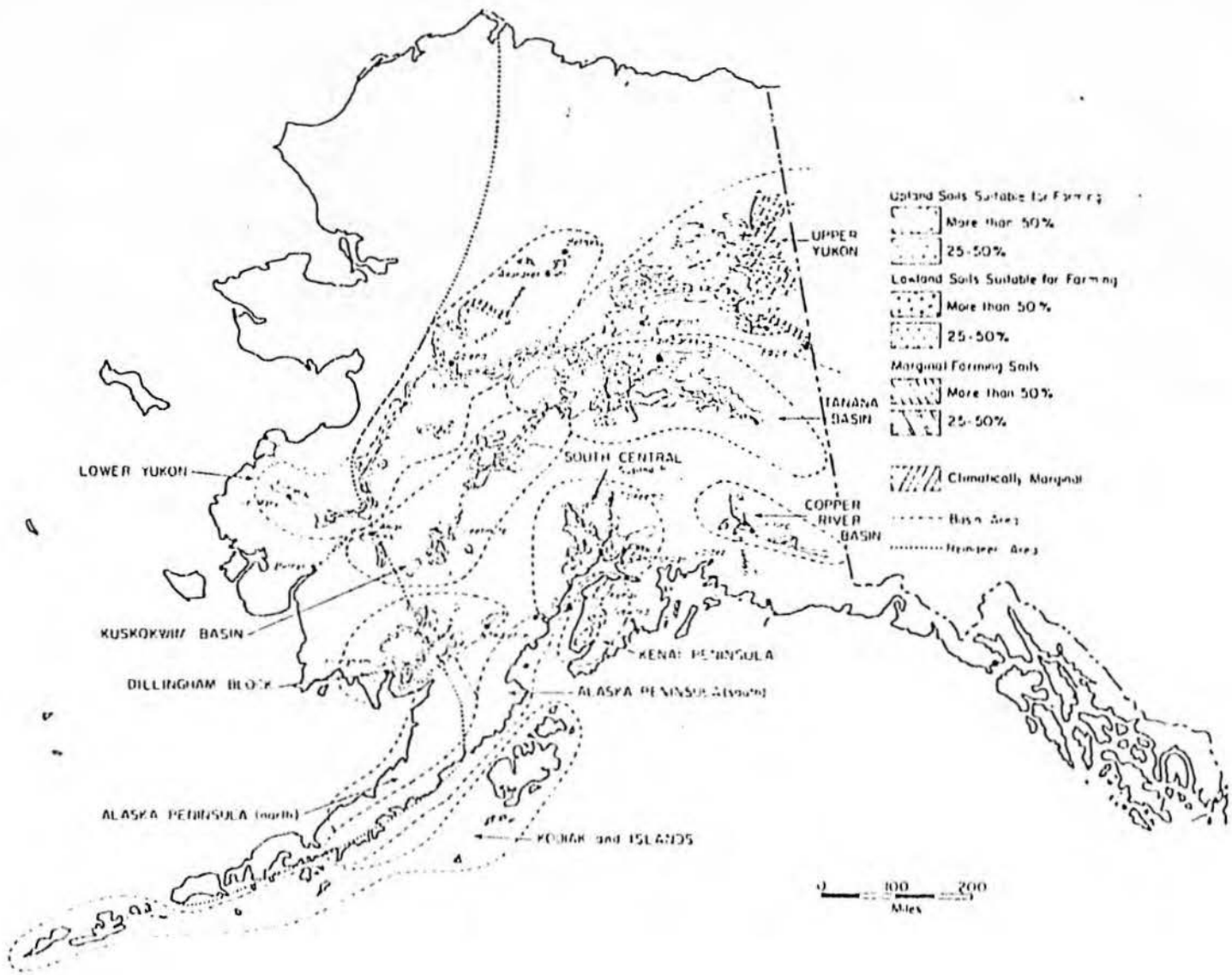


FIGURE III-2 DOWNSTREAM DEVELOPMENT POTENTIAL -- AGRICULTURE



Source: Wayne Burton, Defining Parameters of Agricultural Potential in Alaska, Institute of Agricultural Sciences Bulletin No. 44, (Fairbanks: University of Alaska, 1975).

FIGURE III-3 REGIONS OF ALASKA AND SOILS SUITABLE FOR FARMING

in slaughter plants, feed lots, dairy operations, poultry operations, greenhouses, and soil warming. The project, if completed, would more than quadruple the presently tilled acreage in Alaska.

State policies and programs to encourage agricultural development would probably show results only in the long term. A study conducted in 1976 by the Institute of Social, Economic, and Government Research of the University of Alaska concluded that:

> "Even if development of large-scale agriculture in Alaska were to begin now, it would take 10 years to obtain significant increases in production. Because knowledge of large-scale farming in northern latitudes is incomplete and because the private sector and the government lack adequate knowledge to deal with the problems, an estimate of 25 years seems more appropriate for obtaining significant increases in agricultural production."

The most apparent opportunities for increased agricultural development lie in the production of feed grains for the export market. Barley, which grows well in Alaska, could be produced and exported to Japan. Other potential export destinations for Alaskan feed grains include the Soviet Union and the U.S. West Coast. Furthermore, increased barley and oat production could form the basis for expansion of beef, poultry, and pork production which have been limited in part by the need to import feed. The development of an export-based feed grain industry would require, above all, the commitment of a substantial amount of land. Oceangoing grain vessels typically have a capacity of 2-4 million bushels. To put this into perspective, at typical U.S. yields of 40 bushels per acre of barley, 100,000 acres of production would be needed to load a single vessel. Furthermore, the world grain trade is carried out by an extremely sophisticated group of traders and the likelihood of attracting a major firm into Alaska before crop acreages exceed 2 million acres would be small.

Expansion of grain production would also require the construction of substantial infrastructure facilities. These would include:

- Construction of rail lines to move the product to coastal shipping points,
- Access roads for farmers to move product to the rail lines,
- Storage and grain elevator facilities at railroad collection areas, and
- Storage and grain elevator facilities at water shipment points.

Expanded agricultural production could result in development of spinoff industries. On the supply side, Alaska's farmers could have a competitive advantage in obtaining fertilizers and pesticides if chemical industry development occurs in Alaska. Feed industries could develop to meet the needs of increased beef production. On the demand side, beef and pork slaughterhouse and processing could develop to meet the needs of the intrastate market.

Expansion of potato production and potato processing is another possibility. Processing facilities could be developed to make french fries, chips, and shoestrings, and processed potatoes for the domestic market. Another possibility is the production of industrial alcohol from potatoes (or grain). Of greater potential significance is the export of processed potatoes.

Most of Alaska's potato production is in the Matanuska Valley; somewhat less than a third of the state's crop is harvested in the Tanana Valley and only a token acreage is grown on the Kenai Peninsula. Even in these areas, however, Alaskans produce less than half of the table-stock that they consume. Alaskan potato production does not satisfy or meet the in-state market needs because very few persons have been able to economically finance the mechanization necessary for efficiently producing, storing, and marketing their crop. Without these necessities, especially adequate up-to-date storage facilities, potatoes have glutted the market at harvest and later reached the market in poor competitive position after long periods in storage.

In Alaska, as in other potato growing regions, consumption of processed and frozen potato products, mainly french fries, now exceeds consumption of fresh potatoes. Therefore, processing of potatoes in Alaska is a "must" if Alaskan growers are to supply the market in the state.

Expanded agricultural development in Alaska will require, or occur in conjunction with, expanded infrastructure facilities and marketing channels. Transportation facilities would be needed to bring in supplies to farmers and to ship out farm products. As noted above, to increase grain production, additional rail transportation facilities would be required as well as grain elevators, loading facilities, and storage facilities. Processing facilities and the resulting vertical integration of agricultural production would provide a market distribution channel for primary products. For example, the availability of slaughterhouses could provide a channel for the use of hogs or cattle. The development of farmer cooperatives could help provide the resources needed to develop marketing channels that would be beyond the capacity of individual producers.

The most immediate potential for Alaska agricultural development is to increase the local market. Assuming the availability of feed and availability of lower cost transportation facilities, hog production could constitute a major share of the Alaskan market for pork. Increased milk production for the local market would be another possibility because marketing channels already exist.

If food supplies are tight and agricultural product prices are high, the interest of investors in Alaskan agricultural development could be substantial. On the other hand, if the present surplus situation for most major commodities and the associated low farm prices continue, the investment incentive will be limited.

B. FOREST PRODUCTS

1. Summary and Overview

Timber harvesting and processing ranks third after oil and gas and fisheries in terms of contribution to Alaska's economy. In 1976, employment in logging, lumber, and pulp activities was 3200 -- less than 2% of the state's total employment but close to one-third of the state's total manufacturing employment.

In 1976, about 522 million board feet of timber were harvested in Alaska -- 90% of which were taken from national forest lands managed by the U.S. Forest Service. Forest Service policies have a great impact on Alaska's forest resource utilization. Most of the state's timber operations have been in southeastern Alaska in the Tongass National Forest. On a statewide basis Alaska is utilizing only about one-third of the allowable cut. Nearly 90% of the output of Alaska's forest products industry is shipped to Japan -- primarily cants, chips, and dissolving pulp for the production of rayon.

For economic and regulatory reasons, Alaska has utilized only a small portion of its forest product resources. The economic reasons are the same as those that limit the development of other export industries -- i.e., the high cost of operating in Alaska which limits the competitiveness of Alaskan products in the export markets. Regulatory limitations on the forest products industry include the following:

- Restrictions on the export of unprocessed logs,
- Limitation of future timber contracts to 10 rather than 55 years, and
- State and federal policies affecting timberland availability for commercial use.

The economics of Alaskan forest product production will probably limit the industry to its existing markets. The high costs of Alaskan operations will likely preclude the production of processed products that cannot compete in the lower 48 where the market is controlled largely by major integrated producers in the Pacific Northwest and the South. Future industry expansion will be linked to the Japanese need for lumber for construction and pulp for rayon and paper production. Some expansion of sawmill and processing facilities may occur to meet the needs of the in-state market.

2. Present Status

Timber harvesting and processing ranks third after oil and gas and fisheries in terms of contribution to Alaska's economy (measured in terms of value of production). In 1976, employment in logging, lumber, and pulp activities was 3200 -- less than 2% of the state's total employment but almost one-third of the state's total manufacturing employment. Employment in the industry has increased by about 400 since 1970.

In 1976, approximately 522 million board feet (mbf) of timber were harvested in Alaska (see Table III-2). The volume of timber harvested peaked in 1973 when 679 mbf were harvested, an 86% increase over the 1960 amount. The end product value of timber harvested increased from $47.3 million in 1960 to $208.2 million in 1976. Nearly 90% of the timber harvested was taken from national forest lands controlled by U.S. Forest Service.

TABLE III-2

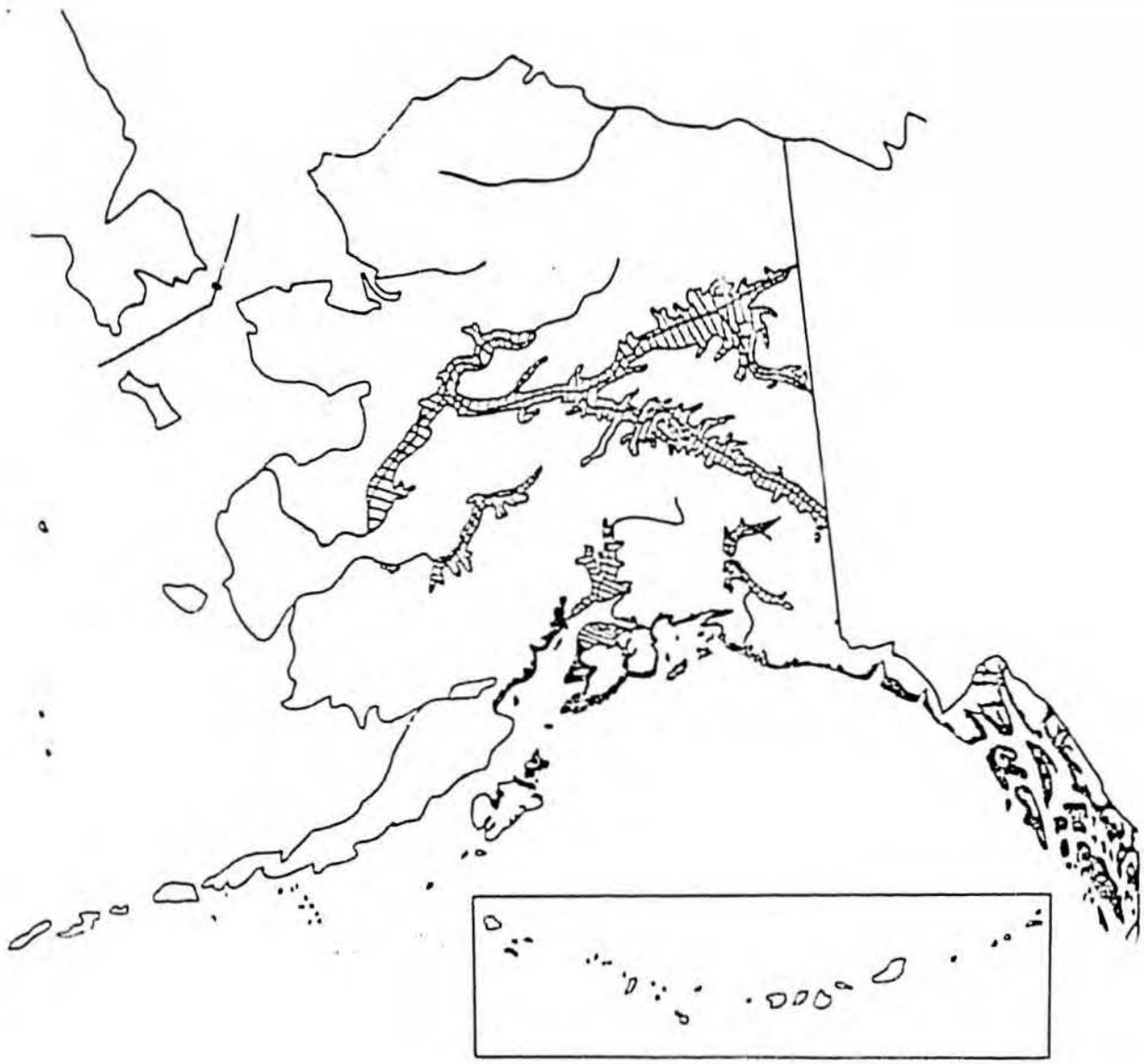
VOLUME OF TIMBER HARVESTED IN ALASKA
BY LAND OWNERSHIP CATEGORY - 1960-76
(in thousands of board feet)

Year	National Forest Lands	State Lands	Other Lands	Total
1960	351,109	210	14,181	365,500
1965	404,498	24,161	3,241	431,900
1970	560,975	53,568	41,648	656,191
1975	413,000	33,500	22,150	468,750
1976	472,800	41,700	7,200	521,700

Sources: U.S. Forest Service; Alaska Department of Natural Resources; U.S. Bureau of Land Managemen.; U.S. Department of the Interior, Bureau of Indian Affairs.

For forest inventory purposes, the state is considered as two regions -- coastal and interior (see Figure III-4). Timber in the two regions differs in species, growth rate, and economic significance. Coastal Alaska contains about 13 million acres of forested land, or about 40% of the regions gross land area. Some 6 million forested acres, or 44% of the total forested area, are considered commercial by the U.S. Forest Service which manages most of the timberland. The major species in the coastal area include Sitka spruce, western hemlock, and some cedar and hardwoods. Interior Alaska contains an estimated 106 million acres of forested land or about one-third of the gross land area. Commercial timber accounts for about 23 million acres -- 22% of the forested area. The dominant commercial species in the interior is white spruce, with paper birch, aspen, and cottonwood as secondary species.

Most of the state's timber operations have been in southeastern Alaska in the Tongass National Forest. Of the 11 million acres of forest land in Southeast Alaska, about half are of commercial value -- and 92% of these commercial trees are in the Tongass. More than one-third of the national



Coastal Forests (Hemlock-Spruce)

Interior Forests (Spruce-Hardwoods)

Source: Compiled in 1971 by the Federal Field Committee for Development Planning in Alaska from authoritative sources.

FIGURE III-4 COMMERCIAL FORESTS OF ALASKA

forest is commercial timber, representing 77% of all the sawtimber in Alaska, 70% of the nation's supply of Sitka spruce, and 40% of its western hemlock sawtimber. Average volumes per acre for sawtimber stands in Southeast Alaska compare favorably with similar stands in forest-rich Oregon and Washington.

Alaska currently utilizes only a small portion of its timber resources. On a statewide basis, and considering all timberlands, the present utilization is estimated at only about one-third of the allowable cut -- i.e., the amount of timber that can be cut during the interim period until "sustained yield" capacity is reached. Allowable cuts are subject to variation, depending upon the factors considered in their computation, especially the rotation cycle, or number of years estimated to produce a new harvestable forest stand.

Several federal agencies manage land in Alaska. The Bureau of Land Management (BLM) controls about 85% of the federally controlled lands in Alaska. The U.S. Forest Service controls about 6%, but that includes more than 5 million acres of commercial timber in national forests in coastal Alaska where most of the state's timber development has occurred. The fact that national forests supply almost 90% of Alaska's timber production illustrates the impact of U.S. Forest Service policies on Alaska's forest resource utilization.

Two large dissolving pulp mills account for most of the state's timber production volume and shipment value. Small sawmills exist throughout the state providing wood to meet local construction needs. However, Alaska imports most of its finished wood products from the lower 48; it does not have a large enough market to support the diversity and quality of wood products that consumers require. In addition, because of high labor costs, Alaskan-made products may cost more than imports. Even some commodity products such as plywood flooring are imported.

Almost 90% of the output from Alaska's forest products industry is shipped to Japan. Exports of forest products in 1976 included 315.8 mbf of logs, lumber, and cants; 182,400 short tons of pulp; and 107,700 2000-pound units of chips. Dissolving pulp, used in the production of rayon, acetate, cellophane, and cellulose chemicals, is Alaska's most important forest product export. Both of Alaska's mills can also make bleached paper pulp for tissue and printing papers. Most of it is shipped to Japan, with lesser amounts going to the lower 48.

The Japanese are heavily involved in the Alaskan timber industry. For example, the Alaskan Lumber and Pulp Company's mill at Sitka (one of the state's two major pulp mills) is Japanese-owned, with much of the initial capital for the company coming from 15 chemical fiber manufacturing companies including all of the major rayon-producing companies of Japan. The mill employs about 500 people -- mostly local. The firm's shipments to Japan travel mostly by carriers specially built for this route.

The Wrangell Lumber Company was originally incorporated as a subsidiary of Alaska Lumber and Pulp, and eventually became its parent company. It operates a mill at Wrangell which cuts Sitka spruce and hemlock into cants for shipment to Japan.

Southcentral Timber Development, Inc., is owned by Japan's largest lumber company, Iwakura-Gumi Lumber Limited, which receives most of the exported cants and lumber products.

3. Problems

Alaska has utilized only a small portion of its forest product resources. The reasons for the limited development of the Alaska forest products industry are economic and regulatory. The economic reasons are the same as those that constrain the development of other export industries in Alaska -- i.e., the high cost of operating in Alaska which limits the competitiveness of Alaskan products in export markets.

The principal disadvantage which Alaska faces in marketing forest products in the lower 48 and Canada is the relative high cost of Alaskan products because of the high cost of harvesting, transporting, processing, and distributing timber and wood products from a remote region. Labor rates in southeastern Alaska logging operations are about 25% higher than those prevailing in similar operations in the Pacific Northwest. Construction costs of forest access roads in Alaska are substantially higher than those of roads built in the Pacific Northwest. For pulp mills of comparable type and capacity, costs of construction in Alaska may be almost double those prevailing in the Northwest and Canada.

The markets which Alaska competes in are dominated by the highly integrated, well-established forest products industry in the Pacific Northwest and the South which has lower-cost operations. The Jones Act adds to Alaska's locational disadvantage by requiring that ocean shipments be made on relatively high-cost U.S. vessels.

One area where Alaska can compete economically is closed to it because of state/federal regulatory policy. Forest management agencies (U.S. Forest Service, BLM, and the State Division of Lands) restrict the export of unprocessed materials. Consequently, Alaska cannot export unprocessed logs. Instead it must process the logs into pulp, cants, or chips. This prevents the industry from minimizing the high costs of Alaskan labor and construction by forcing the location of costly processing facilities within the state (although this also enhances use of Alaskan labor and inhibits overuse of unprocessed resources).

The future of the timber products industry in Alaska will continue to depend on the economics of Alaskan production, but to an increasing extent will depend on the availability of land for timber development. Federal and state regulatory policy and political/institutional considerations make this availability uncertain. For example, a recent U.S. Forest Service regulation could seriously limit expansion of Alaska's forest products industry. The Forest Service imposed a two-year moratorium on timber sales in Alaska, pending completion of a land use plan for the Tongass National Forest. Also, future timber contracts will be limited to a maximum of 10 years rather than 55 years, which previously was the norm in Alaska. Consequently, firms considering the large investment required to establish a major wood processing operation would be unable to obtain an assured supply of logs to justify a major installation. Should this policy remain, expansion of the forest products industry in Alaska will be limited to relatively small mills.

The future utilization of the interior forests is uncertain. Coastal timber has a higher profit margin associated with larger sawlogs and denser forest stands, faster growth, and better accessibility. Many of the interior forests are inaccessible and would require construction of costly access roads and transportation facilities if they are to be developed. The interior forests are only partially inventoried, and prospective large developers lack information about specific areas to be sure of feasibility. In addition, the state, which manages much of the interior forests, has not as yet classified enough land as timber-producing land to assure a sustained supply for economic size forest product ventures.

The availability for development of lands that come under the Alaska Native Claims Settlement Act is also uncertain. BLM timber sales from lands which have been nominated for selection by the native village and regional corporations and from the d-2 lands selected by the Secretary of the Interior, as specified by the Act, have been almost entirely eliminated; timber slaes from these lands must be approved by the appropriate native corporation or the federal agency which is expected to administer the d-2 lands.

The transfer of some Alaskan lands from federal to state jurisdiction may also affect timberland availability. The Alaska Statehood Act empowered the State of Alaska to select and receive title to approximately 104 million acres of land; the state has selected much of the commercial, accessible timberlands formally administered by the BLM, further diminishing the cut from BLM-administered lands.

Environmental restrictions may also limit both the availability of timberland and the operations of the forest products industry. The cancellation of the Champion International pulp mill complex because of delays in obtaining timberland lease clearances and beginning operations illustrates the difficulties companies face in obtaining timberland. The Champion International Company cancelled its plans for constructing a pulp mill complex for Berner's Bay near Juneau. The company sought and received a final cancellation of its 50-year timber sale on Admiralty Island. The sale had been involved for several years in litigation between the company, the Sierra Club, and the U.S. Forest Service. In releasing Champion from its contract, the Forest Service indicated a policy change which would no longer allow the long-term and wide-ranging timber sales experienced in Alaska in previous years.

The Ketchikan Pulp Company controversy illustrates the environmental restrictions on forest product company operations. During 1975 water pollution restrictions were imposed on the Ketchikan Pulp Company by the U.S. Environmental Protection Agency (EPA) similar to regulations it enforced throughout the dissolving pulp industry. The estimated $30 million capital cost to meet the regulations, coupled with rapidly rising timber harvesting costs as the company began to use its interior lease-holdings, caused company officials to threaten to close the Ketchikan pulp mill by mid-1977. The closing would have severely impacted the Ketchikan area and much of Southeast Alaska. As the area's major employer, the mill closing

could have idled nearly 45% of the population in the Ketchikan/Prince of Wales area. The controversy was resolved by financing the company and extending its deadline for meeting EPA standards to 1980.

The most promising development for Alaska's timber industry was the passage, in October 1976, of the National Forest Management Act. This bill lifted a previous ban on clear-cutting which threatened to curtail the entire Alaskan forest products industry. Due to the extreme density of the forests, clear-cutting is the only economically feasible method to harvest timber in southeastern Alaska. With the clear-cutting ban at an end, existing sawmills can develop previously uneconomic areas.

4. Outlook and Opportunities

Alaska's vast timberlands have huge development potential, as portrayed geographically in Figure III-5. The U.S. Forest Service estimates that 28 million of Alaska's 119 million acres of forest land can be developed commercially. The volume of Alaskan sawtimber that can be developed commercially from these lands is an estimated 215 billion board feet, which is equivalent to all the sawtimber in the New England, Middle Atlantic, and Central states combined. Nearly 80% of the marketable timber is located on the islands and coastal forest of the Tongass National Forest in Southeast Alaska.

The future of the Alaskan forest products industry and development of timber resources will depend on the economics of Alaskan production and the availability of timberland for development. The economics of Alaskan forest products development will probably limit expansion of the industry to the existing markets. Given the high operating costs of Alaskan production, it is unlikely that Alaska can produce processed wood products that are competitive with those produced in the lower 48. If the primary processing requirements are continued, expansion of the Japanese market for Alaskan forest products will depend on the Japanese construction industry and Japan's production of rayon and paper. The export of cants to Japan may increase to meet the needs of Japan's expanding housing construction program. Japanese demand for dissolving pulp for rayon production will be affected by the competition from petroleum-based fibers (mainly polyester and nylon). In the past this competition has weakened demand for Alaska's pulp. World dissolving pulp demand is expected to grow at an average rate of 1% per year for the next 5-10 years. The expansion of paper pulp production at Ketchikan Pulp will probably permit the mill to respond more quidkly to changes in the market.

Land availability problems, as outlined earlier, will have to be resolved so that the industry can determine the amount and location of timberland that will be available and can then estimate economic feasibility and market potential.

RESOURCE: TIMBER

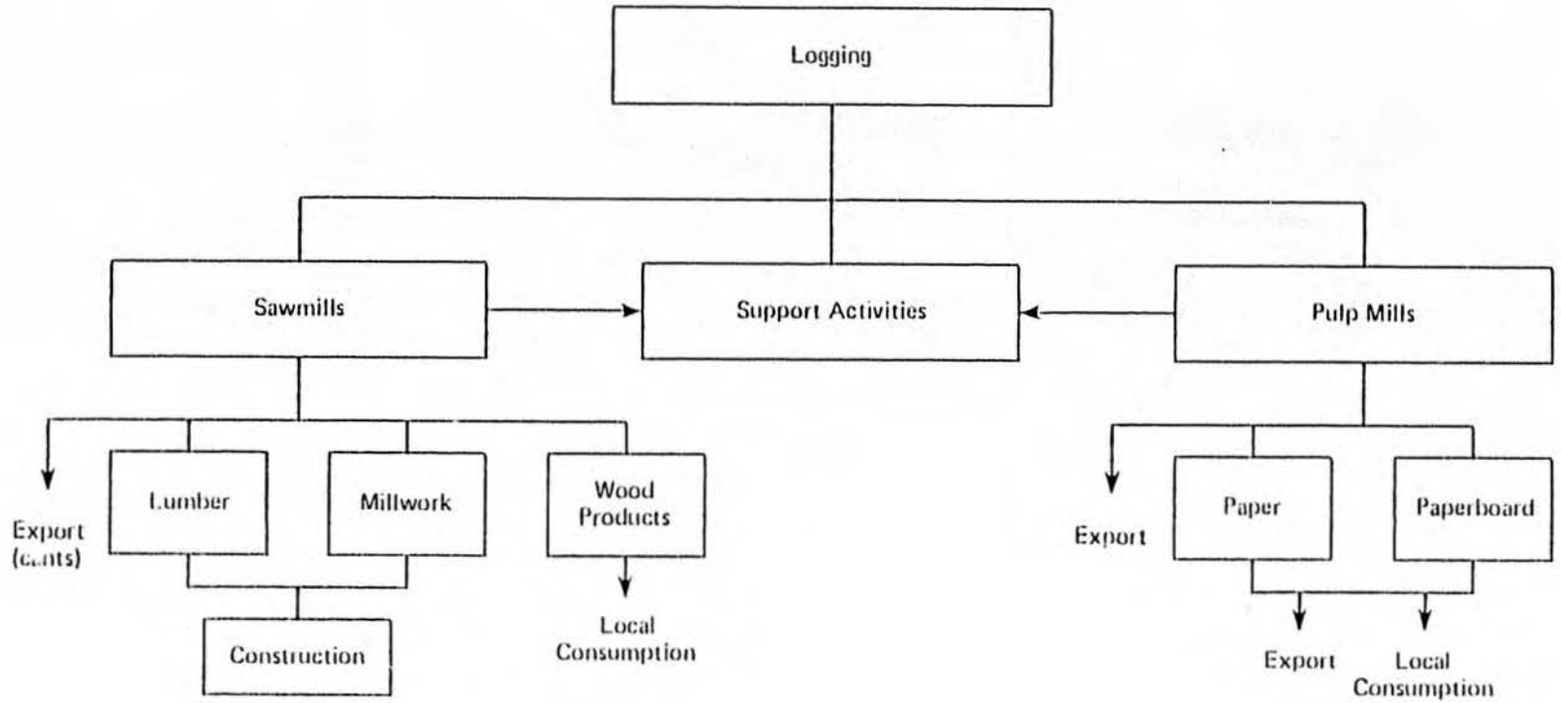


FIGURE III-5 DOWNSTREAM DEVELOPMENT POTENTIAL – TIMBER

Despite the limitations on available timberland, there will be room for some expansion of the industry. With the transfer of nearly 150 million acres of federal lands to the state and to native regional corporations, more land should become available. The potential native land selections under the provisions of the Alaska Native Claims Settlement Act will reclassify about 13 million acres of state and federal timber into private ownership. For example, villages in the Sealaska region may receive timber inventories exceeding five billion board feet and the regional corporation itself may receive over more than four billion board feet.

Additional sawmills and wood finishing plants can be expected to serve growing local and regional markets in Alaska. For example, the Anchorage market may eventually be large enough to support a mill of a size capable of producing first-class products.

Actions necessary for Alaska to expand its existing markets include:

- Classification of land and determination of its future use.
- Completion and update of forest inventories to determine the species, quantity, quality, potential productivity and economic feasibility of forest resources.
- Resolution of controversy over primary processing.

C. FISHERIES

1. Summary and Overview

Fishery products are second only to oil and gas as a contributor to Alaska's economy. In 1975, 442 million pounds of fish were caught in Alaskan waters, with a value of about $125 million. About 8% of the total U.S. commercial catch is taken from Alaskan waters -- mostly from waters off the coast of central Alaska. About 5% of the edible seafood exported from the United States is shipped via the Alaska Customs District, primarily to Japan and Canada. In the last few years, shellfish have become the major target of Alaska fishermen. Fish processing activities in Alaska consist primarily of salmon canning, but freezing fish is becoming increasingly significant. Most canneries in Alaska are owned by out-of-state interests and operated, as they have been historically, by a seasonal labor force recruited from Washington, Oregon, and California

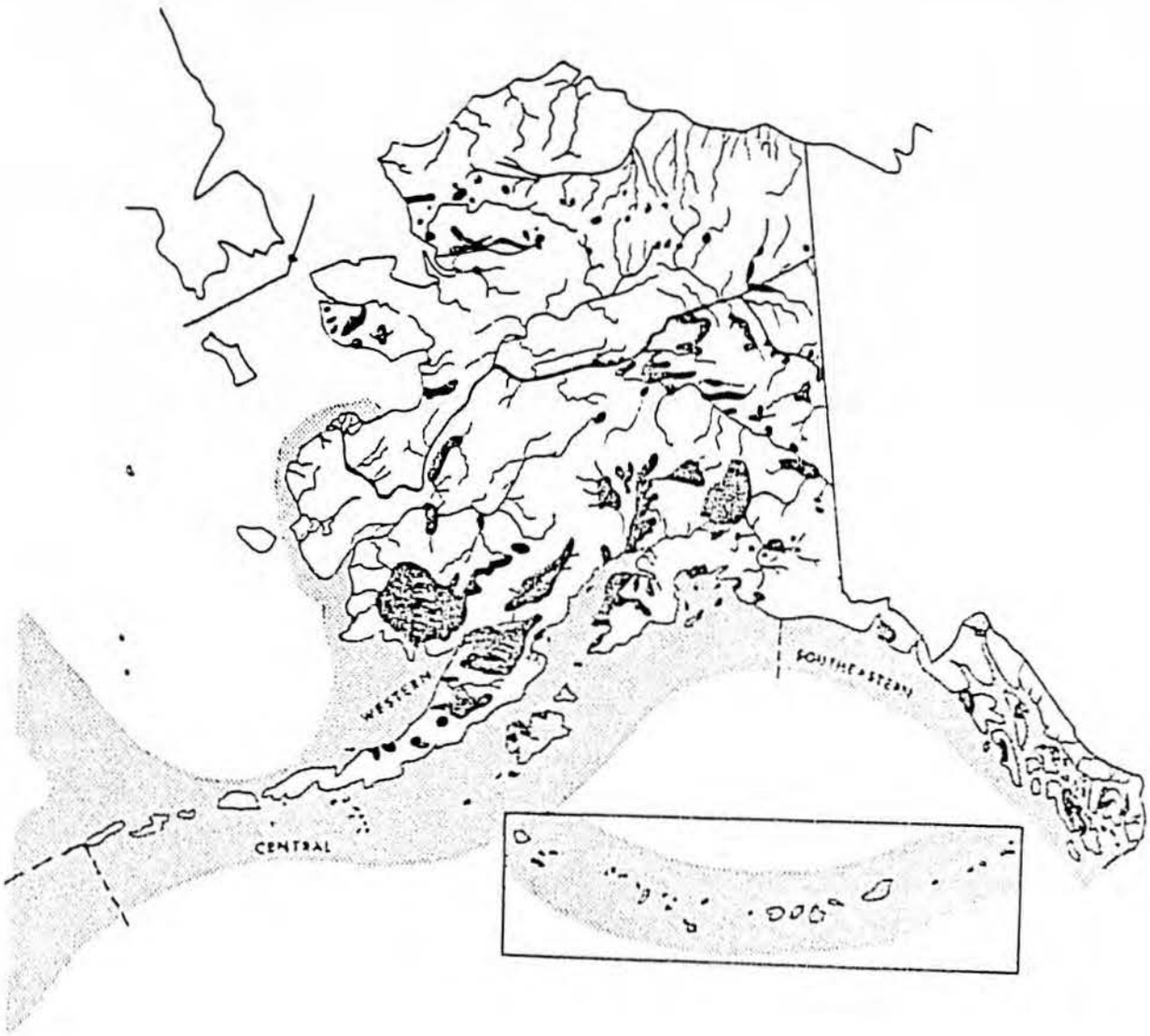
Aside from the high costs of operations for fishing and fish processing in Alaska, the major problem of the industry in the past, and one that will influence its development in the future, is the proper management of fishery resources. This includes the need for limitations on the size of the annual catch so as not to depelete resources, and the development of hatcheries and spawning areas.

The possible pollution of fishing waters from Outer Continental Shelf oil and gas development and other resource and processing activities is causing increasing concern among Alaska fishermen.

The best opportunity for future expansion of the Alaska fishing industry lies in bottomfishing. The extension of U.S. territorial waters to 200 miles will give Alaska fishermen access to a huge supply of bottomfish which have heretofore been taken by Japanese and Russian trawlers. A large market for Alaskan bottomfish would exist in Japan, and to a lesser extent in the United States, and possibly, South America. Alaska bottomfishing would also increase the opportunities for fish processing in Alaska. Bottomfishing would reduce the seasonality of Alaskan fishing because these fish can be taken during winter months.

2. Present Status

Fish products are second only to petroleum as a contributor to Alaska's economy in terms of value of production. In 1975, 442 million pounds of fish were caught in Alaskan waters, with a value of about $125 million. About 58% of the catch, and nearly half the fish value, consisted of fish caught off the coast of central Alaska (Figure III-6 and Table III-3). About 8% of the total U.S. commercial catch comes from Alaskan waters. For several years, Alaska was one of the leading states in terms of value of fish landed, and Kodiak was one of the leading ports in the nation for value paid to fishermen. About 5% of the edible seafood exported from the United States is exported through the Alaska Customs District and is shipped mostly to Japan and Canada.



Fresh water fish areas

Anadromous fish areas

Primary commercial marine fisheries area

Source: Compiled in 1971 by the Federal Field Committee for Development Planning in Alaska from authoritative sources.

FIGURE III-6 DISTRIBUTION AND RELATIVE IMPORTANCE OF ALASKA FISHERIES

TABLE III-3

CATCH AND GROSS VALUE TO FISHERMEN
OF FISH LANDINGS IN ALASKA BY REGION, 1960-75
(catch in millions of pounds, value in thousands of dollars)

	Catch				Value			
	Southeast	Central	Western	Total	Southeast	Central	Western	Total
1960	142.8	126.3	89.4	358.5	$10,240	$15,126	$15,567	$40,933
1965	140.2	195.2	155.1	490.5	19,896	22,252	27,934	70,082
1970	100.2	269.3	164.0	533.5	19,998	40,681	36,818	97,497
1975	62.4	256.8	123.0	442.2	25,313	60,971	42,947	124,931

Sources: Alaska Department of Fish and Game, and the Department of Commerce and Economic Development.

Shellfish have become the principal type of fish caught by Alaskan fishermen (Table III-4). Until the early 1970s, salmon accounted for the largest portion of the total catch. Since then the salmon catch has been declining because of the abnormally high mortality rates for juvenile salmon spawned or reared during the severe winters of 1970-71 and 1971-72. This short-term decline compounds the impact of a long-term decline in the salmon catch for the past 30 years, which resulted from overfishing between 1920 and 1940. In 1976 and 1977, there was a significant increase in the salmon catch. In 1976, the shellfish catch included 106 million pounds of king crab, 81 million pounds of snow crab, and 129 million pounds of shrimp. Other important species of fish caught in Alaska include halibut, with 27 million pounds caught in 1976.

Fish processing is becoming increasingly important in Alaska. More than one-third of Alaska's manufacturing employment is in fish processing. Canning salmon and shellfish is the major processing activity, but freezing is gaining in importance. Most canneries in Alaska are owned by out-of-state interests and are operated, as has been the case historically, by a seasonal labor force, recruited primarily in Washington, Oregon, and California. Thus, the processing of salmon in Alaska is essentially a nonresident activity, while most shellfish is processed in-state by Alaskans.

In 1975, the wholesale value of canned Alaskan fish products was an estimated $108.9 million -- about 88% of which was canned salmon. The wholesale values fluctuate from year to year. The highest value was $139 million in 1970 (Table III-5). The wholesale value of fresh frozen fish in 1975 was approximately $173 million. The largest value was for crab ($99 million) followed by salmon ($32 million). In 1975 an estimated 1.2 million cases (48 one-pound cans) of canned salmon products were produced.

Until statehood, Alaska's commercial fisheries were managed by the Bureau of Commercial Fisheries in the Department of the Interior. Thereafter, management responsibilities were transferred to the State Department of Fish and Game.

3. Problems

The fishing industry in Alaska is affected by economic uncertainties resulting from a limited fishing season, the uncertainty of the size of the annual catch, and fluctuations in the market price for landed fish. The 1972-75 decline in the salmon catch significantly affected employment among fishermen and in fish processing. The high costs of operation in Alaska in the face of low market prices that barely cover operating costs have limited the profitability of fishing activities. The fish processing industry in Alaska is faced with the problem of high operating costs compared with other producers serving export markets. High labor and construction costs limit the competitiveness of certain Alaskan fish products in export markets.

TABLE III-4

TOTAL ALASKA FISHERIES CATCH
AND VALUE TO FISHERMEN, 1960-76
(catch in millions of pounds, value in thousands of dollars)

	Salmon		Shellfish		Other Fish		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
1960	207.1	$ 33,574	42.1	$ 3,138	109.3	$ 4,222	358.5	$ 40,934
1965	274.8	48,274	157.5	14,509	58.2	7,299	490.5	70,082
1970	346.5	67,975	152.1	20,525	35.0	8,997	533.6	97,497
1975	137.6	55,302	246.9	55,272	52.8	14,357	437.3	124,931
1976	243.7	103,769	317.3	n.a.	n.a.	n.a.	n.a.	n.a.

n.a. = not available

Sources: Alaska Department of Fish and Game and the Department of Commerce and Economic Development.

Arthur D Little Inc

TABLE III-5

WHOLESALE VALUE OF ALASKA FISHERY PRODUCTS - 1960-75
(in thousands of dollars)

	Canned	Fresh Frozen	Cured	Other	Total
1960	$ 81,302	$ 12,185	$ 1,973	$1,229	$ 96,689
1965	120,476	42,402	3,207	487	166,572
1970	139,345	61,833	12,748	5	213,931
1975	108,876	172,893	11,411	18	293,198

Sources: Alaska Department of Fish and Game and the Department of Commerce and Economic Development

Arthur D Little Inc

A major problem affecting the past and potential development of the Alaskan fish products industry is the management of fish resources. Effective management of fishery resources requires policies that limit the size of the annual catch so that the resource is not depleted, and that achieve a sustained yield. It also requires development and maintenance of hatcheries and spawning areas.

In an effort to keep salmon stocks from being further depleted, the state enacted a limited entry law in 1973 to limit the number of fishermen permitted in the Alaskan salmon fisheries to the 1972 level. The rationale for this law was that between 1961 and 1973, the number of people harvesting the dwindling stocks had more than doubled. This program probably was of minimal help in solving the problem, because it did not limit the amount of fish that could be caught by each fisherman.

The lack of sufficient information and research on fish resources has hampered effective resource management. For example, king crab and Pacific perch resources were damaged before research information for use in their management could be made available. Federal and state budgetary limitations have hampered such research in the past.

One potential problem facing the industry and one which is increasingly being discussed by Alaska fishermen is the potential effects of pollution from mineral exploration and development on Alaska's fish resources. Increased oil exploration, and eventual production of oil in OCS areas presents a growing risk to fishing areas. This risk includes the potential pollution from pipeline terminals and near-shore petrochemical facilities as well as the risks of large-size oil spills in the earthquake-prone OCS areas. Pollution potential for freshwater fish is also present from activities such as coal mining, canning, logging and pulp operations, and metal extracting and reduction. Little is known about the specific effects of pollutants on fishery resources under the cold environmental conditions that characterize Alaska.

One factor that has heretofore limited the development of Alaska's fishing industry has been the limitation of the U.S. territorial sea, and thereby, the proprietary fishing interests of the State of Alaska, to a three-mile limit. Before enactment of the 200-mile limit, foreign shipping fleets, especially the Japanese and Russian, have caught more than 4 billion pounds of fish annually from Alaskan waters, compared to 800 million pounds caught by U.S. fishermen in the same waters.

4. Outlook and Opportunities

Three recent developments will contribute to the expansion of the Alaskan fishing and fish processing industry:

- Legislation providing for the construction of fish hatcheries,
- Establishment of the Alaska Fisheries Council, and
- Extension of the U.S. territorial sea to 200 miles.

Legislation enacted in 1974 provided for the construction of private nonprofit salmon hatcheries. Guidelines have also been established for the organization of regional associations to institute and coordinate private hatchery development at the local level. The concept of regional organization is patterned after the Prince William Sound Aquaculture Corporation which represents fishermen, processors, native groups, and other resource users in the Cordova area. This organization has undertaken a substantial hatchery development on Evan's Island. In 1976 the state legislature established a $200 million loan fund to support hatchery operators. In January 1977 the state sold $29 million bonds to build additional state hatcheries.

Permits have already been issued to construct private hatcheries and applications are being made by a number of different organizations. Should "proprietary" fisheries created by private hatcheries prove to be financially successful, a salmon farming industry may emerge over the next several years. Such a proprietary fishery conceivably could attain economic importance in its own right, while at the same time contributing substantial numbers of salmon to the common property fishery.

In early 1976 the state established a permanent commission, the Alaska Fisheries Council, to set goals for hatchery production and to direct state assistance to affected individuals and businesses in the event of fishery failures such as the 1975 sharp decline in the pink salmon harvest in the Southeast.

The passage of the U.S. Fishery Conservation and Management Act of 1976 established an exclusive fisheries conservation and management zone 200 nautical miles offshore. Enforcement of this law began March 1, 1977. One purpose of the law is to develop the underutilized bottomfish resources off the Alaskan coast. Under U.S. jurisdiction, foreign ships will continue bottomfishing in Alaskan waters; but under a new licensing system, when U.S. industry is able to undertake production, U.S. producers will receive preferential harvesting allocations. Currently, a number of Alaskan fishermen are investigating the possibility of delivering fish directly to foreign (i.e., Japanese) mother-ships for processing.

The consequences to Alaskans of the passage of this Act are several:

- Through the regional council mechanism, Alaskans will have direct input into the decision-making process regarding the management of fishery stocks,
- The supply of fishery stocks should be increased through proper management in cooperation with state authorities,
- An increasing proportion of the stocks harvested in the North Pacific should be harvested by the domestic fleet, and
- Alaska's fishery plants and operations will be more attractive to foreign investment.

The North Pacific Fishery Managment Council has jurisdiction over fisheries from three miles to two hundred miles offshore in the Arctic Ocean, the Bering Sea, and the Pacific Ocean. The council was created by the Fishery Conservation and Management Act of 1976. The areas of the North Pacific accommodate more than 80% of the foreign fishing activity off the U.S. coast. Interested foreign fleets have been allocated portions of the resources within these fisheries only when the stocks are determined to be surplus to U.S. needs.

The greatest opportunity for future expansion of the Alaska fishing industry lies in bottomfishing. The new 200-mile limit will limit the amount of bottomfish available to foreign ships, giving Alaskan fishermen a vast new source of fish supply. Only about 1% of landings by Alaska fishermen have been bottomfish. In 1976, before the new limit became effective, the Russians and Japanese, as noted above, harvested about 4 billion pounds of bottomfish with an estimated value of $400 million.

Bottomfish production has not been undertaken because of economic risk in the face of competition from good quality, low-cost imports from Japan, Iceland, Denmark, Canada, and Norway. However, many plants and vessels working in the Alaska crab, shrimp, and purse seine fisheries are, with the addition of some new gear and equipment, capable of bottomfish production.

Japan would be the most likely market for Alaskan bottomfish. In recent years, Japan has obtained about one-fifth of its food supply from Alaskan waters. Some of the harvest will probably be reduced to prevent further depletion, but the demand should remain. The lower 48 will be another potential market, but probably a more limited one because of low U.S. demand for bottomfish. In general, the increasing Japanese demand, improving marketing acceptance for bottomfish in the United States, and rising market prices will result in increased harvesting of bottomfish. Alaska's native corporations are a potential source of investment in bottomfish harvesting and processing. Their involvement could help keep the value added from fishing-related industries within the state.

The state has recognized the huge potential for Alaska bottomfishing. The Alaskan Department of Commerce and Economic Development has undertaken a program to stimulate bottomfishing. Under this program, the state will select two firms to negotiate a contract whereby they will be reimbursed up to $150,000 each for bottomfish products sold at less than cost. Detailed production and sales records will be maintained by the contractors and publicly reported in order to provide other potential bottomfishing contractors with adequate information with which to start similar operations.

Expanded bottomfish fishing offers the potential for further development of fish processing in Alaska. Traditional activities such as fish freezing would expand to process the new catch, but additional products such as frozen fish sticks and fish balls are also possible. One question raised by U.S. bottomfishing is whether foreign processors should be allowed to handle U.S.-caught fish in the absence (or even with the availability) of American processing capabilities. One possibility is to sell

the catch to the Japanese for processing on ships off the Alaskan coast. Such an arrangement could adversely affect the potential employment in fish processing activities in Alaska. The existing processing facilities in Alaska for bottomfish are inadequate.

If processing and marketing components of the fishing industry continue to be dominated by the Japanese and by Washington-, Oregon-, and California-based firms, the State of Alaska and its residents will only receive limited benefits from expansion of the industry. Cooperative processing establishments and processing by Alaska's native corporations could alter this trend.

Alaska's freshwater resources should not be overlooked in an appraisal of Alaska's fish potential. Whitefish and other species appear sufficiently abundant to allow for regular carefully controlled harvest, but problems of transportation and marketing have not been analyzed. It will also be necessary to resolve conflicts between the commercial harvest of freshwater fisheries and increasing demands on this resource for sport fishing. The potential of converting the present subsistence use of the fisheries resource by rural Alaska natives to commercial harvesting should also not be overlooked.

The value to the state's economy of Alaska sports fisheries is estimated at $81 million in 1971 by the Alaska Department of Fish and Game. This was measured by receipts from the sale of more than 93,000 licenses and, in addition, the estimated expenditures of the some 79,000 persons who fished for sport in the state, for such things as transportation, food, lodging, boats, motors, and tackle.

Figure III-7 graphically shows development potential for the state's fishery resources.

RESOURCE: FISHERIES

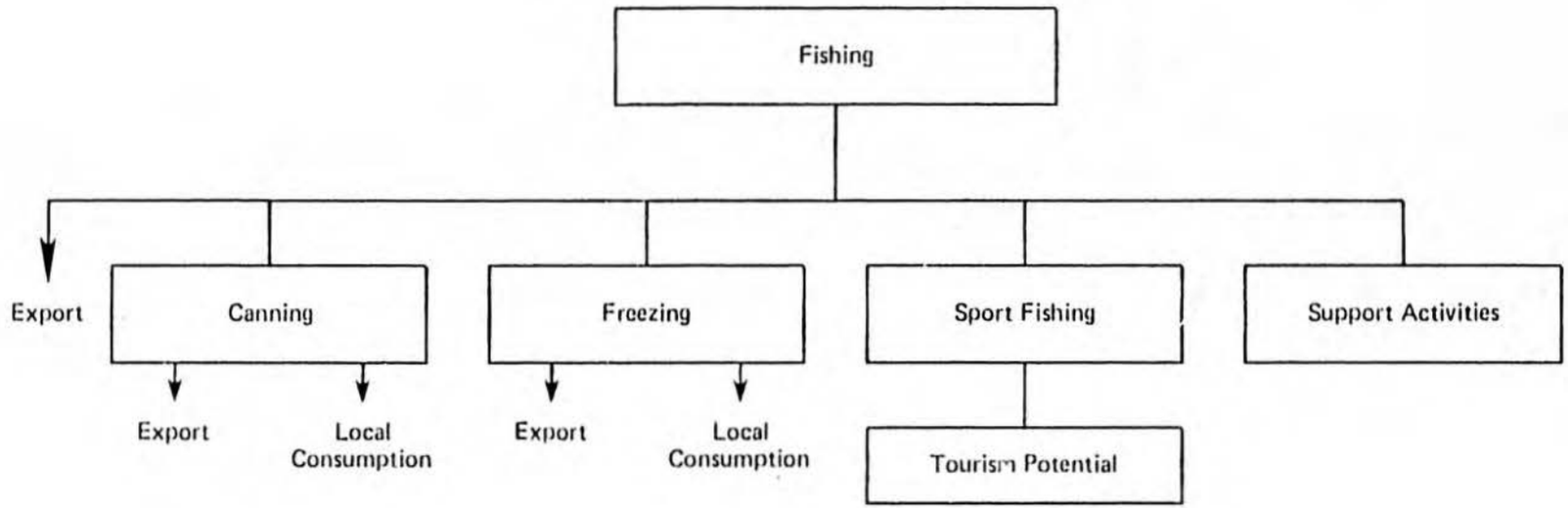


FIGURE III-7 DOWNSTREAM DEVELOPMENT POTENTIAL – FISHERIES

D. OIL AND GAS

1. Summary and Overview

With the recent completion of the trans-Alaska pipeline and the shipment of oil from Alaska's Prudhoe Bay region to the lower 48, oil and gas production is becoming the principal contributor to the Alaskan economy. Oil and gas development is not significant because of its direct employment impact -- the industry is very capital-intensive -- but rather in the revenues it brings to the state and in the potential for oil- and gas-related secondary development in Alaska.

Before the production of oil at Prudhoe Bay, the oil and gas industry was concentrated in the Kenai Peninsula/Cook Inlet area. Since the beginning of oil and gas production in the area in the 1960s, petroleum production ranged from 66-84 million barrels per year. In 1975 Alaska ranked seventh among the oil-producing states, accounting for less than 2.5% of total U.S. crude oil production.

With the beginning of production of Prudhoe Bay oil in 1977, Alaska is assuming a dominant role as an energy supplier to the United States. Prudhoe Bay production is expected to average nearly two million barrels per day by 1980.

Most of the oil and gas produced in Alaska has been exported to the lower 48 or other countries. The low sulfur content of the oil from the Kenai/Cook Inlet fields has been particularly desirable on the U.S. West Coast for the production of low-sulfur fuel oils. Much of Alaska's natural gas has been exported to Japan via a liquefied natural gas terminal on the Kenai Peninsula. Alaska has only about 98,000 barrels per day of refinery capacity.

The greatest uncertainty about future oil and gas development in Alaska is availability of land and offshore areas for future oil and gas development. An estimated 83% of speculative recoverable oil reserves and 86% of speculative recoverable gas reserves are owned by the federal government, with most of these reserves located offshore. Availability of these areas for future development will depend on federal government leasing policies and environmental regulations.

Alaskan oil production may also be affected by the resolution of regulatory issues surrounding the movement of Alaskan oil from the U.S. West Coast to the East and Midwest and to Japan. The high costs of labor, construction, and operation in Alaska may limit the competitiveness of future oil and gas products manufactured in Alaska.

Alaska's huge potential for oil and gas development lies in its vast reserves. It has been estimated that Alaska contains 27 billion barrels of undiscovered recoverable oil reserves and 76 billion cubic feet of undiscovered recoverable gas. The Cook Inlet area is the location for much of these reserves and has been a center of substantial new oil and gas

exploration. The federal leasing policy with respect to the OCS areas in Cook Inlet and Prudhoe Bay will determine the rate at which Alaskan oil reserves will be developed.

In the near term, the development of gas supplies from the Prudhoe Bay field and from South Alaska could constitute the largest investment programs in the U.S. oil and gas industry. The most immediate project is the proposed 4700-mile gas pipeline which will permit movement of gas from Prudhoe Bay to the lower 48.

The state can expect significant direct and indirect economic benefits from expanded oil and natural gas production. It can expect vast revenues from oil and gas royalties. Construction would increase because of the need for pipelines, access roads, storage facilities, and port facilities. The development of a petrochemical industry using royalty oil and gas is also a possibility. The state is currently considering four proposals for the construction and operation of a refinery and petrochemical complex.

Expansion of petroleum-based chemical production in Alaska would produce downstream economic benefits. Supplies which have heretofore been imported -- fertilizers and pesticides for agriculture and asphalt for construction, as examples -- could then be supplied by in-state sources, at a lower cost.

2. Present Status

With the recent completion of the trans-Alaska pipeline and the shipment of oil from Alaska's Prudhoe Bay region to the lower 48, oil and gas production is becoming the principal contributor to the Alaskan economy.

Alaskan oil and gas development has not been significant in its direct employment impact -- the industry is very capital-intensive -- but rather in the revenues it brings to the state and in the potential for oil- and gas-related secondary development in Alaska. Employment in the oil and gas industry was about 3600 in 1976, about 2% of the state's total employment. This amount is only slightly higher than the 3200 employees in 1969 (2.5% of total employment). The number of employees for 1977 and subsequent years will undoubtedly be somewhat higher because the employees who operate and maintain the pipeline will then be included.

Except for a small oil production and refining operation from 1911 to 1931 in the Katalla field on the Gulf of Alaska east of Cordova, there was no significant commercial development of Alaskan oil reserves until the 1960s. The oil industry had directed its attention to the exploration of oil in Texas and Louisiana, where production costs were lower and the climate was less harsh. Technological advances in the industry and the need to develop new sources of domestic oil led to the discovery of oil by Richfield Oil Corporation on the Kenai Peninsula.

TABLE III-6

HISTORICAL ALASKAN OIL
AND NATURAL GAS PRODUCTION

	Production Amount		Production Value	
	Oil (1,000)	Natural Gas (MM cu ft)	Oil ($000s)	Natural Gas ($000)
1960	558	246	1,228	30
1965	11,128	7,255	34,073	1,799
1968	66,204	17,343	186,695	4,388
1969	73,953	50,864	214,464	12,665
1970	83,616	111,576	251,684	27,448
1971	79,494	121,618	257,562	17,878
1972	72,893	125,596	235,444	18,463
1973	72,323	131,007	261,877	19,483
1974	70,603	128,935	347,408	21,919
1975	69,834	160,270	364,630	48,402
1976	65,675	153,499	352,675	53,725

Source: U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook

Before the production of Prudhoe Bay oil and the construction of the trans-Alaska pipeline, the oil and gas industry was concentrated in the Kenai Peninsula/Cook Inlet area (Figure III-8).

Since the beginning of oil and gas production in the Cook Inlet/Kenai Peninsula area in the late 1960s, petroleum production has ranged from 66-84 million barrels per year. Oil production reached a high point in 1970 when 83.6 million barrels were produced. Gas has been produced concurrently with oil. Gas production has increased rapidly since the 1960s reaching a peak of 160 billion cubic feet (cu.ft.) in 1975 (Table III-6). For the past two years annual production has averaged more than 65 million barrels of oil. In 1975, Alaska ranked seventh among the oil-producing states, accounting for less than 2.5% of total U.S. crude oil production.

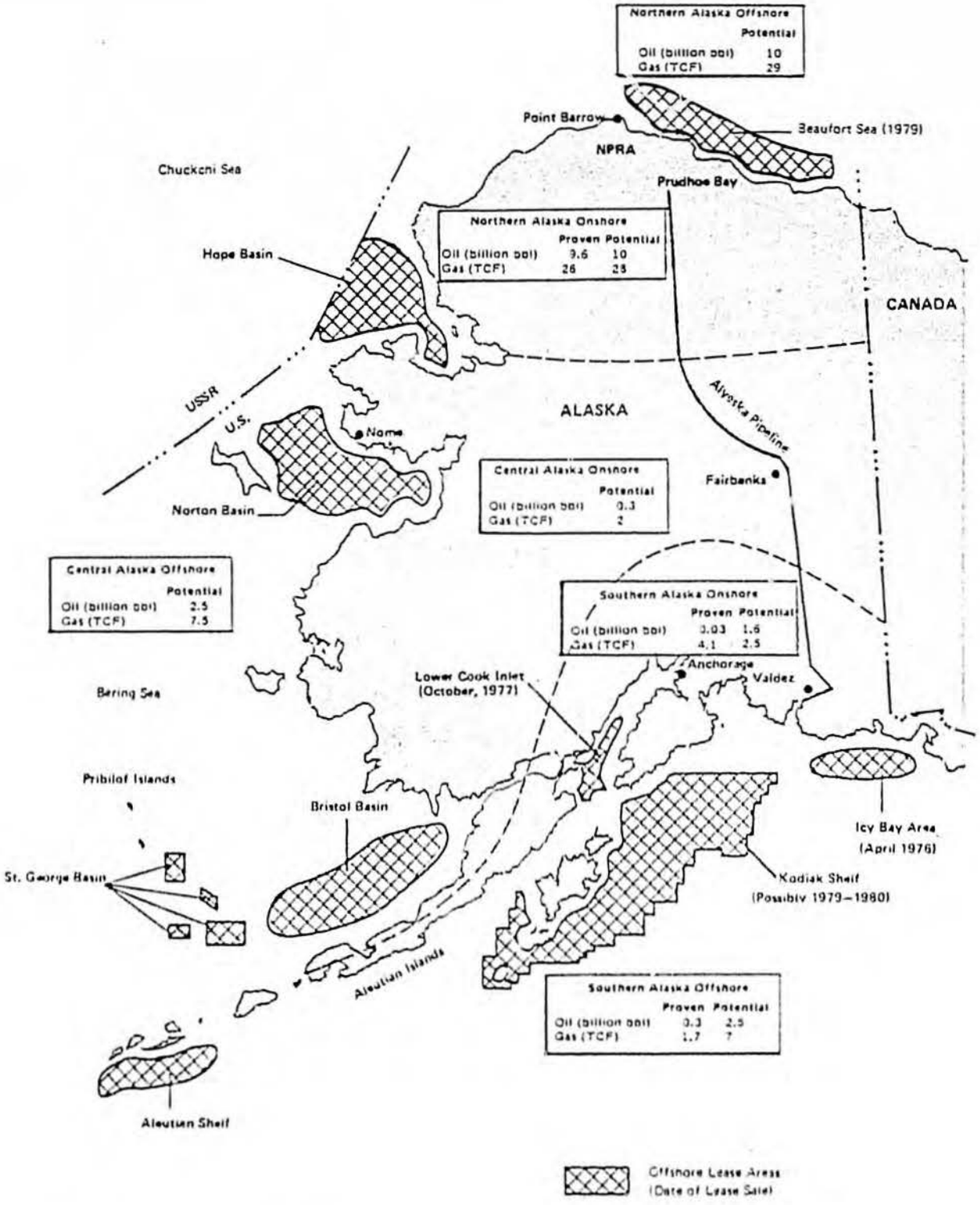
With the beginning of production of Prudhoe Bay oil in 1977, Alaska will assume an increasingly important role as an energy supplier to the United States. Production is estimated to be about 1.2 million barrels per day (bbl/day) by 1978, the first year of the estimated 20-30 year life of the field. Production is expected to increase to about 2 million bbl/day by 1980. By 1978, Alaska will be the third largest oil-producing state in the nation.

Most of the oil and gas produced in Alaska has been exported. The in-state market for oil and gas amounts to only 23 million barrels of oil per year and 72 billion cu.ft. of gas per year. The low sulfur content of the oil from the Kenai/Cook Inlet fields has been particularly desirable on the U.S. West Coast for the production of low-sulfur fuel oils.

Gas has been exported to Japan via a liquefied natural gas terminal on the Kenai Peninsula. In 1975 LNG exports amounted to 65 billion cu.ft. or 25% of total Alaskan gas production. About 9% of Alaskan gas production is used to make ammonia and urea at plants co-located with the LNG terminal. Table III-7 shows that the major use of gas (37%) is to maximize oil production by reinjection.

The development of oil and gas reserves has provided the state with a major source of revenues (Table III-8). The $936.9 million shown for 1970 represents lease payments by the oil companies for drilling rights in the Prudhoe Bay area.

Alaska has about 98,000 bbl day of refinery capacity. Until recently, the state's refining capacity has been located on the Kenai Peninsula. A new 25,000 bbl/day refinery has just been completed at North Pole near Fairbanks to serve Interior markets. ARCO has built a 13,000 bbl/day refinery at Prudhoe Bay to support exploration and production operations on the North Slope. Because the limited in-state market has precluded the inclusion of all types of refined product production, Alaska has had to import a portion of its consumption of refined products. Excess production of crude gasoline has been exported as a blending stock to West Coast refineries.



Sources: United States Geological Survey; Bureau of Land Management; *Oil and Gas Journal*, June 27, 1977, and State of Alaska Division of Oil and Gas.

FIGURE III-8 ALASKAN OIL AND GAS PROVEN RECOVERABLE RESERVES, POTENTIAL RECOVERABLE RESOURCES, AND ANTICIPATED LEASE SALE DATES

TABLE III-7

ALASKAN CONSUMPTION AND USE OF GAS
(millions of cubic feet per year)

	Volume	Percent
Utility Sales	12.6	5%
Electric Power Generation	25.4	10
Unclassified	3.3	1
Petroleum Related	31.0	12
Subtotal-in-state	72.3	28
LNG Exports	64.8	25
Amonia/Urea Exports	23.9	10
Oil Field Reinjection	95.2	37
Total	256.2	100%

Source: Kent Miller and Oliver Goldsmith, Energy Consumption in Alaska, prepared for the Alaska Department of Commerce and Economic Development, January 1977.

TABLE III-8

STATE REVENUES FROM PETROLEUM INDUSTRY - 1961-75

Year	Petroleum Revenues (in millions of current $)	Percent of Total Revenues	Percent Excluding Bonuses
1961	$ 4.2	6.0%	3.9%
1962	26.0	28.7	8.1
1963	27.9	26.6	11.5
1964	15.0	11.4	8.1
1965	16.6	11.0	7.4
1966	21.7	14.2	7.7
1967	21.6	12.8	8.1
1968	43.9	24.2	13.7
1969	34.7	18.5	18.1
1970	936.9	81.7	15.0
1971	47.5	13.3	13.2
1972	49.3	12.9	12.5
1973	50.3	12.7	10.9
1974	90.8	20.9	16.1
1975	80.1	13.4	12.9

Source: State of Alaska, Annual Financial Reports, 1961-1975.

The Collier Chemical Company has established a chemical plant based on methane. Using methane gas received from the Cook Inlet oil field, its facility in Kenai has been producing ammonia and urea for export primarily to the states in the Pacific Northwest. The recent doubling of capacity in both products has had a very positive economic impact in the Kenai area. With the new facility in operation, more than 250 people will be directly employed. This project has stimulated a new cycle of growth in the peninsula city.

3. Problems

The future of oil and gas development in Alaska will depend on (a) the availability of Alaskan land and offshore areas for oil and gas exploration and development, (b) the resolution of regulatory issues concerning movement of Alaskan oil to the U.S. Midwest and East Coast and Japan, and (c) the establishment of a market in the lower 48 or abroad for petrochemicals. Additional factors will include the acceptability of high-sulfur North Slope oil for U.S. refineries and Alaskan and world crude oil prices.

The greatest uncertainty about future oil and gas development in Alaska is the availability of land and offshore areas for oil and gas exploration and production. Most oil and gas reserves are under federal control. The State Division of Geological and Geophysical Survey estimated in 1975 that nearly 83% of speculative recoverable oil reserves and 86% of speculative recoverable gas reserves were owned by the Federal Government. Availability of these areas for future development will depend on governmental leasing policies and environmental regulations.

While most (90%) oil production (including that in Prudhoe Bay) is occurring on state lands, much of the state's richest reserves are on federal lands. One such area is Naval Petroleum Reserve Number 4 (now National Petroleum Reserve). A 26-well exploratory program is now underway at Naval Petroleum Reserve Number 4, known as PET-4, located just west of the North Slope field. The Federal Government has signed a five-year contract with the Husky Oil Company to conduct exploration on PET-4.

In June 1977, the U.S. Department of the Interior assumed jurisdiction over PET-4 with the charge to recommend a development plan to Congress by 1980.

Potentially greater reserves are to be found on the Alaskan Outer Continental Shelf. The nation's official commitment to pursuing greater energy self-sufficiency has placed a high priority on lease sales on the OCS. More than 60% of the U.S. OCS lies off Alaska. The Gulf of Alaska is regarded by the petroleum industry as among those U.S. offshore areas with good potential. The latest offshore oil lease sale in the Gulf of Alaska was held in October 1977 when seven lower Cook Inlet tracts were

won in federal lease sale for almost $400 million. No production is expected from these areas until the 1980s. The rights to OCS oil and gas are held by the Department of the Interior. The department's policies in leasing these areas for exploration and development will help determine the pace of future development. The potential adverse environmental effects of OCS oil exploration and development in Alaska's fishing waters may constrain or delay future OCS lease sales.

The existence of a market for Alaskan oil will also determine the extent of future production. Most of Alaska's current production is being shipped to the U.S. West Coast, although some (about 150,000 bbl/day) is going to the Gulf Coast via the Panama Canal. There is concern among public and private officials that there may be a surplus of about 500,000 bbl/day on the West Coast as North Slope output rises. Unless some means is determined for moving this oil elsewhere, Alaskan production may be affected. Various proposals have been offered for moving Alaskan oil to other sections of the lower 48.

The development of a refinery and petrochemical complex that takes as its feedstock the royalty share of North Slope production is under consideration. The lack of a downstream chemical industry and a limited home market means that most of the new plant's output will have to be exported to foreign markets or the lower 48. The delivered cost of the products to the customer must be competitive with that of other producers. However, Alaskan produced chemicals must bear higher capital, labor, and transportation costs. The attractiveness of creating additional value-added processes from oil and gas will depend on factors largely outside the control of Alaskans, including world petrochemical capacity and prices.

4. Outlook and Opportunities

Alaska's huge potential for oil and gas development lies in its vast reserves. Alaska is and will continue to be one of the preferred areas for oil and gas development.

a. Oil and Gas Reserves

The mean value of U.S. Geological Survey (USGS) estimates of undiscovered recoverable oil and gas resources are some 27 billion barrels of oil: 12 billion onshore and 15 billion offshore. Gas resources are estimated to be 76 trillion cubic feet: 32 trillion cu.ft. onshore and 44 trillion cu.ft. offshore. As shown in Table III-9, there is considerable uncertainty in the estimates, but based on the mean values, Alaskan undiscovered resources of oil and gas might comprise one-third of all U.S. undiscovered oil resources and one-sixth of all gas resources.

TABLE III-9

ESTIMATED ALASKAN UNDISCOVERED RECOVERABLE RESOURCES AS A PROPORTION OF U.S. UNDISCOVERED RECOVERABLE RESOURCES - 1975

	Billions of Barrels of Oil			Trillions of Cubic Feet of Gas		
	Low	Mean	High	Low	Mean	High
Onshore						
United States	37	56	81	264	377	506
Alaska	6	12	19	16	32	57
Alaska Percentage	16%	21%	23%	6%	8%	11%
Offshore						
United States	10	26	49	42	107	181
Alaska	3	15	31	8	44	80
Alaska Percentage	30%	58%	63%	19%	41%	44%
Totals*						
United States	50	82	127	322	484	655
Alaska	12	27	49	29	76	132
Alaska Percentage	24%	33%	39%	9%	16%	20%

*Statistical means are additive; high-low range values are not. Therefore, some distortion is involved in deriving Alaska high-low percentages.

Source: U.S. Geological Survey, Geological Estimates of Undiscovered Recoverable Oil and Gas Resources in the United States, Geological Survey Circular 725, Washington, D.C., June 1975, Tables 4 and 5, pp. 28-31.

b. Oil Developments

When looking to the future of the petroleum industry in Alaska, it should be kept in mind that the Prudhoe Bay project on the North Slope, which holds one-fourth of U.S. proved crude oil reserves and nearly 10% of the nation's proved natural gas reserves, is simply one reservoir in one of Alaska's 15 sedimentary basins. That is, development on the North Slope represents only the beginning as far as potential oil development in Alaska is concerned.

Much of Alaska's undiscovered reserves lie offshore in federal OCS waters adjacent to the known oil reserves of the North Slope and Kenai/ Cook Inlet region. Because exploration and development may span five to seven years, timely approval of lease sales is important to maintain and control production from South Alaska. Before announced lease sales dates, the Department of the Interior receives "nominations," or indications of interest in particular areas from oil companies; these nominations are reviewed by the USGS, which recommends which areas should be leased. Following this review, the Department of the Interior determines the total lease sales acreage and offers it in tracts (mostly in 5760-acre tracts) for bids. The USGS then evaluates the bids and recommends whether or not they should be accepted. The Department of the Interior may reject bids if they are considered too low.

In April 1976, the Gulf of Alaska's Icy Bay area was the subject of the first Alaskan OCS federal lease sale. Twenty companies participated in bidding a total of $382 million on the 10 tracts receiving the highest bids in the sale, out of a total of $572 million bid on 81 tracts. Shell (with 26% of the acreage), Atlantic Richfield (18%), Texaco (14%), and Gulf (13%) have the largest participation in the top 10 tracts. Exploration drilling is underway on several tracts.

Earlier in August 1977, Interior Secretary Cecil Andrus announced the new OCS leasing schedule for 1979-81. This new schedule dropped three of the industry's top five choices as preferred hunting grounds. All three are in Alaska: the Beaufort Sea beyond the barrier islands; Bristol Bay; and the St.George Basin of the Bering Sea. Also dropped from the schedule were the Aleutian Islands sale, Hope Basin, and Chukchi Sea. Table III-10 shows the schedule for Alaskan areas.

The Federal Government controls approximately two-thirds of the state's onshore oil and gas reserves and 90% of the state's offshore oil and gas reserves. The state's native corporations control about 20% of onshore oil and gas reserves (Table III-11).

One of the greatest potential sources of oil and gas revenues remaining on state lands is the shallow Beaufort Sea area immediately north of the Prudhoe Bay field. This is one of Alaska's major oil basins, and studies indicate production can be both economically and environmentally feasible.

TABLE III-10

ALASKA OCS LEASING-SALE PLANNING SCHEDULE 1978-81

	1978	1979	1980	1981
Federal/State Beaufort (near shore)	T	EIS,S		
Gulf of Alaska	C, T	EIS	S	
Kodiak	C	T	EIS, S	
Cook Inlet		T		
Bering Norton		C	T	EIS, S

C - Call for Nominations
T - Announcement of Tracts for Bidding
EIS - Final Environmental Impact Statement
S - Sale

Source: Oil and Gas Journal, August 19, 1977

TABLE III-11

ESTIMATED STATE, NATIVE, AND FEDERAL SHARES OF SPECULATIVE RECOVERABLE OIL AND GAS RESOURCES (percent)

	Oil			Gas		
Ownership	Onshore	Offshore	Total	Onshore	Offshore	Total
State	16.0%	8.0%	10.7%	14.1%	8.1%	9.5%
Native	20.0	-	6.7	18.8	-	4.2
Federal	64.0	92.0	82.6	67.1	91.9	86.3
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: State of Alaska, Department of Natural Resources, Division of Geological and Geophysical Surveys.

c. Gas Developments

In the near term the development of gas supplies from the Prudhoe Bay field and from South Alaska could constitute the largest investment programs in the oil and gas industry. Current gas production from Cook Inlet is liquefied and sold only to Japan because of the historically low regulated price of gas in interstate commerce in the lower 48. Dwindling domestic gas reserves have forced the search for and purchase of higher priced gas and proposals by the Carter Administration, the Congress, and industry for at least an increase in the well-head price of domestically produced gas and a trend to permit rolled-in pricing of gas. Gas supplies from Alaska will be far more costly than existing interstate supplies of natural gas because of the much greater production and transportation expense. Two areas of Alaska constitute the areas of most probable development. One is proven -- the gas supplies of the Prudhoe Bay field of 26 trillion cu. ft. -- and the other is unproven, but believed to have large potential -- the 9.5 trillion cu.ft. in additions to South Alaska's onshore and offshore reserves.

Future Alaskan gas will probably be transported by pipeline. Of three potential routes for the proposed gas pipeline, the Federal Power Commission has recommended and the President has approved the Northwest Pipeline Corporation's proposed route. The proposed pipeline would cover 731 miles in Alaska, 2000 miles in Canada, and about 2000 miles in other U.S. states. It would have a design capacity of 2.6 billion cu.ft./day. The pipeline will cost an estimated $10.3 billion, excluding $2-2.5 billion for gas-gathering facilities at Prudhoe Bay. Gas could begin flowing in 1983 although lack of commitments for investment in gas-gathering facilities may delay the startup.

In addition to the development of North Slope gas reserves, there is a proposal for transporting South Alaska gas to the lower 48. The gas would be produced and liquefied for transport to the proposed Point Conception, California, regasification terminal. However, such a project would depend on finding sufficient reserves to support the plant capacity and the resolution of environmental and safety concerns.

d. Other Industry Developments

The transfer of more than 40 million acres of land from the federal government to Alaska's native corporations may substantially affect oil production. Most of the native corporations which occupy potentially rich oil and gas basins have consummated exploration agreements with petroleum firms (see Table III-12).

The future development of oil and natural gas offers the potential for huge economic benefits to the state. The state will benefit directly from the royalty payment from oil and gas produced on state lands. For example, the 12½% royalty payments may produce annual revenues for the state that by 1980 may exceed the cumulative petroleum-related revenues received by the state during the first 15 years of statehood.

TABLE III-12

NATIVE CORPORATION DRILLING CONTRACTS

Native Corporations	Contracting Companies
Arctic Slope Regional Corporation	Standard Oil Union-Amoco Texaco
NANA Regional Corporation	Standard Oil
Calista Corporation	Shell
Bristol Bay Native Corporation	Phillips
Koniag, Inc	Standard Oil
Doyon, Ltd.	Louisiana Land and Exploration Champlin Asland
Ahtna, Inc.	Amoco
Chugach Natives, Inc.	Phillips

Source: Alaska Pacific Bank.

Other economic benefits will result from the construction of facilities and the development of infrastructure needed to serve the petroleum industry. These would include access roads, storage facilities, port facilities, etc. For example, further petroleum development in the Cook Inlet area can be expected to increase the secondary development that has already taken place. Before the construction of oil production facilities in the upper Cook Inlet in 1967, Kenai was a small fishing village. Today the City of Kenai is the largest community on the Kenai Peninsula, with a population of 6000.

The economic impacts associated with the construction of the Alaskan oil pipeline would also be experienced with the construction of a natural gas pipeline -- but probably to a lesser extent because part of the pipeline route would be in Canada.

Alaska can also be exptected to receive extensive economic benefits from OCS oil and gas production. Rights to OCS oil are held by the Department of the Interior. While the State of Alaska does not derive direct revenues from lease sales, the state does benefit from increased economic activity stimulated by exploration and development of OCS oil. For example, the cities of Seward and Homer are expected to grow substantially as a result of oil-related activity in the Gulf of Alaska. Plans are currently being made by Dresser Industries to establish a barite plant, pipe storage area, and ship repair site in Seward. Exxon will construct a pipe storage yard north of Seward. Other Alaskan cities can be expected to experience a similar escalation in economic activity and growth in value of taxable property as more OCS leases are auctioned.

The value of oil and gas could prove to be even greater if petrochemical facilities are developed.

The State of Alaska owns the oil and gas at Prudhoe Bay and will be receiving a royalty of 12½%. The state is expected to accept its royalty in kind and sell it to firms that agree to process the oil in Alaska and thereby strongly influence expansion of a petrochemical industry in the state.

Four proposals for refinery and petrochemical projects have been submitted, each covering different sites and product mixes. The state Royalty Oil and Gas Advisory Board has selected the ALPETCO proposal for a basic petrochemical complex. Legislative approval will be required for the sale of royalty oil.

Expansion of petroleum-based chemical production in Alaska would produce downstream economic benefits (Figure III-9). Fertilizers and insecticides could become more easily available for use in local agriculture. Many of these supplies have heretofore been imported. Asphalt production could result in a source of supply for the construction industry.

The eventual production of petrochemicals in Alaska will depend on logistic and economic factors. The most obvious supply of the petrochemical feedstock is Prudhoe Bay -- an unlikely location for a petrochemical plant. The more desirable plant locations would be in southeastern Alaska where there would be year-round access to water-borne transport. Current proposals call for tanker transport of oil from Valdez to the plant site selected.

The most significant aspect of the economics of Alaskan petrochemical production is the fact that an Alaskan ethylene complex would have to compete with producers on the U.S. Gulf Coast and Japan where world-scale plants, nearby markets, and deepwater ports in a mild climate add up to an imposing economic advantage.

Increased production of Alaskan oil through 1985 is predicated on timely approval of offshore leases and their successful development, and approval of transcontinental pipeline capacity to deliver West Coast surpluses to the U.S. Gulf Coast and Midwest.

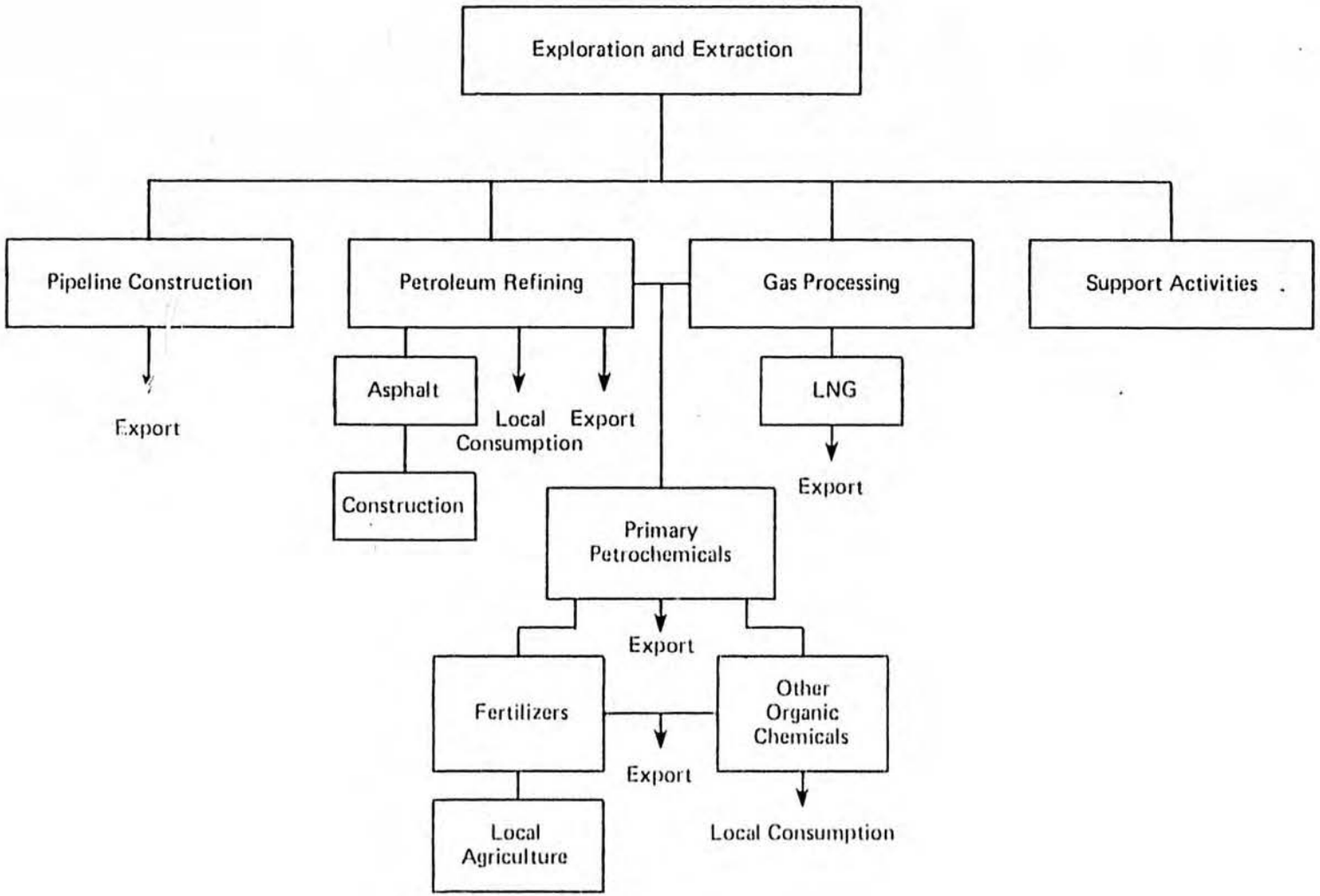


FIGURE III-9 DOWNSTREAM DEVELOPMENT POTENTIAL -- OIL AND GAS

E. COAL

1. Summary and Overview

Coal production in Alaska has been very low. Despite the state's huge coal reserves, most coal produced in Alaska has been consumed in-state, primarily for electric power generation. The principal coal producing area is the Nanana coalfield south of Fairbanks, which produces most of Alaska's 700,000-750,000 short tons of production.

The principal obstacles to increased coal development have been the high cost of transporting coal to export markets and withdrawal by the federal government of potential coal producing lands from development.

Alaska has huge coal resources* -- an estimated 981 billion tons--which comprise nearly two-thirds of the nation's total coal reserves. Most of these resources are located in the Northwest part of the state on land closed to mineral development and too remote to make development feasible. The greatest potential for future coal development is the Beluga field west of Anchorage. This field's access to Cook Inlet makes its development economically feasible because the coal can be exported by ship with minimal land transportation costs. Japan would be the most likely market for Beluga coal. Coal production could also expand to meet increased in-state needs for electric power generation, including mine-mouth generation of electric power.

2. Present Status

Coal production in Alaska has been low, and has changed little since the mid-1960s. Production has ranged from about 550,000-760,000 short tons; in 1976 it totaled 750,000 short tons. The two major producing coal fields in the state have been the Matanuska field, north of Anchorage, and the Nanana field, south of Fairbanks (Figure III - 10). Most of the state's coal production is now concentrated in the Nanana coalfield which produces 700,000-750,000 tons annually. Alaskan coal has a high moisture content, but a low sulfur content which makes it environmentally desirable. Alaskan coals are graded from lignite to bituminous.

Nearly all of the coal produced in Alaska is consumed in the state -- principally for electric power generation. Almost 90% of current consumption of coal occurs in and around Fairbanks (Table III-13). The bulk of that (61%) is used for the generation of electricity. In 1975 coal generated electricity provided 89% of the electricity generated for Fairbanks and 17% of all the electricity generated in Alaska (Table III-14).

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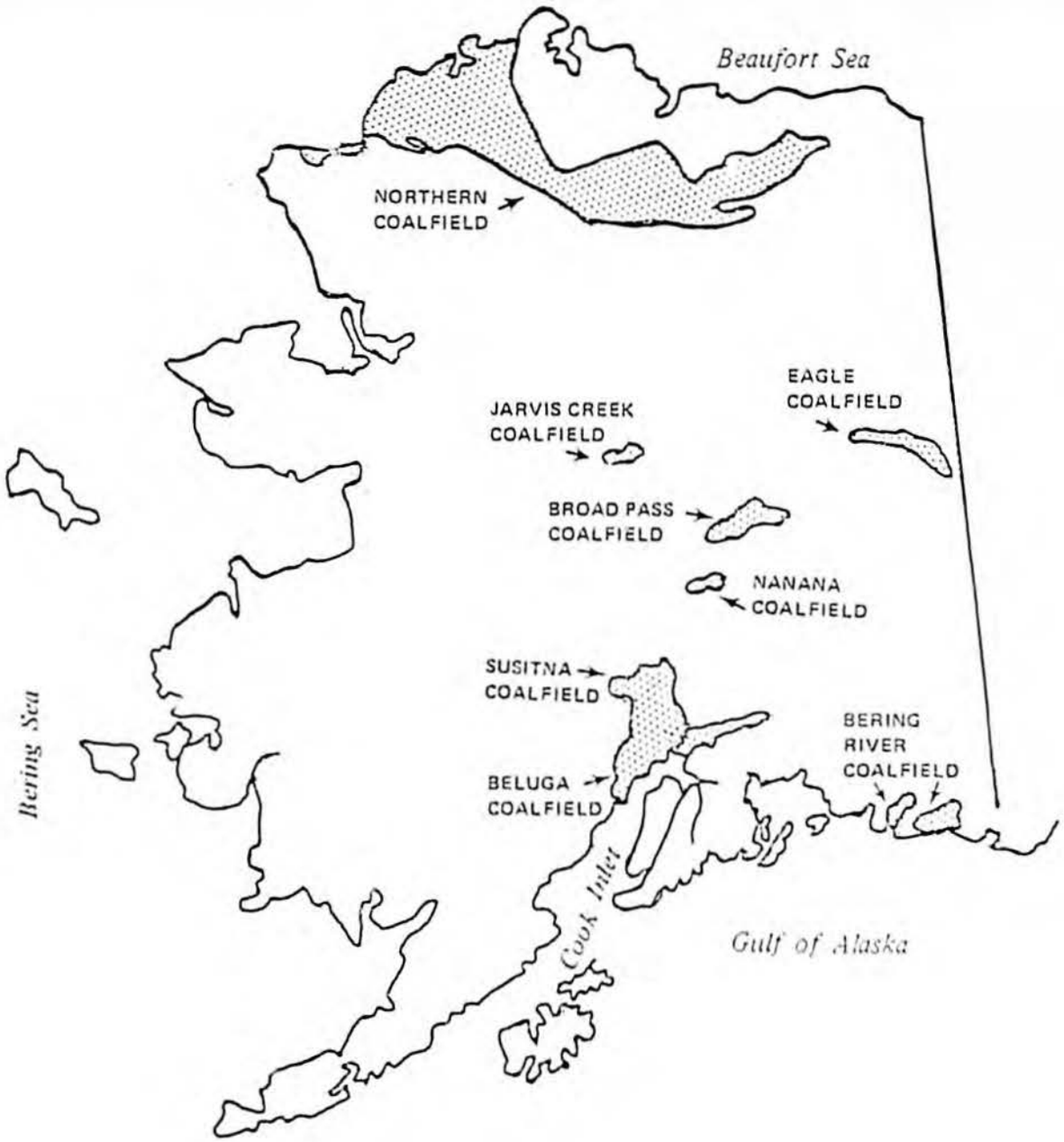
* Resource = The estimated quantity of coal in the ground in such form that economic extraction is currently or potentially feasible.

Reserve = That portion of the identified coal resource that can be economically and legally mined at the time of determination.



Source: Miller, Stefano-Mesplay, and Nera.

FIGURE III-10 MAJOR ALASKAN COALFIELDS

TABLE III-13

ALASKAN COAL CONSUMPTION 1975
(tons per year)

	All Uses	Electricity Generation
Interior	75,000	75,000
Fairbanks	677,200	414,200
Total Alaska	752,200	489,200

Source: Kent Miller and Oliver Goldsmith, Energy Consumption in Alaska. Prepared for State of Alaska Department of Commerce and Economic Development, January 1977.

TABLE III-14

ALASKAN ELECTRICAL GENERATION BY FUEL SOURCE - 1975

Fuel Source	Percent of Total Fuel
Fuel Oil	22%
Natural Gas	53
Coal	17
Hydro	8
Total	100%

Source: Kent Miller and Oliver Goldsmith, Energy Consumption in Alaska.

3. Problems

Despite its huge coal resources, Alaska produces less than 1% of the 670 million tons of coal mined in the United States each year. The principal limitation on expanded coal production has heretofore been transportation costs. Because of the remoteness of much of Alaska's coal reserves, construction of high-cost land transportation facilities would be necessary to bring the coal to port facilities for shipment out of state. As noted elsewhere in this report, the Jones Act adds to the transportation costs of coal exported from Alaska to the lower 48 states because it limits the transport of Alaskan coal to the relatively high-cost ships built in the United States and manned by U.S. crews.

In addition to high transportation and labor costs, another factor inhibiting coal development has been the fact that more than three-fourths of lands on which coal resources are located cannot be leased for coal development. Some of the best coal lands are included in federal reserves that are closed to mineral development. The U.S. Department of the Interior has jurisdiction over the 23 million acre National Petroleum Reserve and could therefore withdraw up to 44% of the state's potential coal producing land from mineral development.

The uncertain status of some Alaska land areas may constrain future coal development at least in the short term. The resolution of native corporation land ownership issues could determine the future use of much of the land on which Alaska's coal resources are located. The withdrawal of the so-called d-2 lands from development by the Department of the Interior could also mean that certain potential coal producing areas would not be available for development.

The potential adverse environmental effects of strip mining could influence state and federal policy on the availability of lands for coal development. Underground mining is not suitable for most coal in Alaska because of its high cost and because steeply dipping coal beds make extraction difficult. Strip pits in areas underlain by permafrost are difficult to rehabilitate because of severe erosion that accompanies the massive degradation of permafrost.

4. Outlook and Opportunities

Alaska's total coal resources are huge. However, the demonstrated reserve base of 6.2 billion tons is only slightly more than 1% of the nation's total coal reserves. Nearly 90% of Alaska's resources are located in the northwestern part of the state, a vast and remote region near the Arctic Ocean (Figure III-10 and Table III-15). The potential for mining coal in this region is small because the area is closed to development by state and federal regulations, and because the high transportation costs

to move the coal to markets make it economically infeasible. Although use of the passage through the Chukchi Sea has increased, shipping costs will likely remain prohibitive.

TABLE III-15

ALASKAN COAL RESOURCES

Region	Major Coalfields	Resources (billion tons)
Anchorage and Southcentral	Matanuska Susitna Beluga	2.8
Fairbanks and Interior	Nanana Jarvis Creek	104.0
Northwest	Northern	874.0
Total		980.8

Source: Adapted from data of the Alaska Department of Natural Resources, Division of Geological and Geophysical Survey.

A more likely location for expanded coal development is the existing coal production areas in the Nanana coalfield near Fairbanks, and development of new fields in Southcentral Alaska. The fields in these areas are on state lands and are available for development. The most likely area for future development within the region is the Beluga coalfield west of Anchorage (Figure III-10). The Beluga coalfield lies some 45-60 miles west of Anchorage near the northwest shore of Cook Inlet. The area contains an estimated 2.1 billion tons of subituminous low-sulfur coal. Potential production levels from the Beluga field are estimated to be about 6 million tons per year. The export of Beluga coal could be economically feasible because the closeness of the field to Cook Inlet minimizes land transportation costs and because the Cook Inlet location would permit water transportation to Japan (seven shipping days to Hokkaido) and the U.S. West Coast (four and one-half shipping days to San Francisco). Ice and high tide problems appear to be resolvable so that shipping could continue year round.

Development of the Beluga field would probably require the following infrastructure facilities:

- A 27-mile railroad or slurry pipeline from the coalfield to a coastal generating or shipping station on Cook Inlet,

- Transmission lines to provide power for the electrical mining equipment,
- Ship loading and storage terminals and port facilities on Cook Inlet,
- A washing plant to upgrade the coal and reduce transportation costs.

Placer Amex holds seven leases in the Beluga area. Future development of the Beluga field will probably have to await a strong commitment from a potential customer before full-scale feasibility studies, exploration, and testing can begin. It is expected that a small new town would develop in the vicinity of the proposed complex once production begins. The best quality coal would be exported with the lower quality used locally.

Expansion of Alaskan coal production will, in part, depend on the growth in demand within the state. This demand growth will depend on the degree of economic and population growth within the state as well as the economic competitiveness of coal with other energy sources such as gas and oil. Coal will still be needed to meet the expanded generating capacity of coal-fired electric utilities.

One alternative for expanded coal production to meet in-state needs is to construct mine-mouth electric power generating plants and distribute power to the growing population and industrial centers in the state. This may be more cost-effective than transporting coal to existing or new electric generating plants near developed areas. If federal limitations on the use of natural gas as a boiler fuel limit further use of natural gas as a fuel for the electric utilities in the Anchorage area, greater use of coal can be expected to meet the increasing power needs in that area.

In general, major development of Alaska's coal reserves will depend on the development of markets that will bear the transportation to an ice-free port in Alaska or the costs of year-round ice-breaking in a more northern location. The Japanese market offers the best potential because of the proximity of Alaska to Japan compared with other sources from which coal can be shipped to Japan. The Japanese have shown an interest in Alaskan coal by financing exploration. Development of the Beluga field with its access to Cook Inlet and resulting low transportation costs offers the greatest potential for capitalizing on the Japanese market for coal.

The potential for exporting coal to the lower 48 is small. The availability of sufficient coal reserves in the lower 48, and lower labor and transportation costs would limit the market for Alaskan coal.

Major spinoff industries resulting from expanded coal production would include increased construction activity to provide infrastructure facilities such as railroads, port facilities, and coal handling facilities. Overall development potential for coal is illustrated in Figure III-11.

RESOURCE: COAL

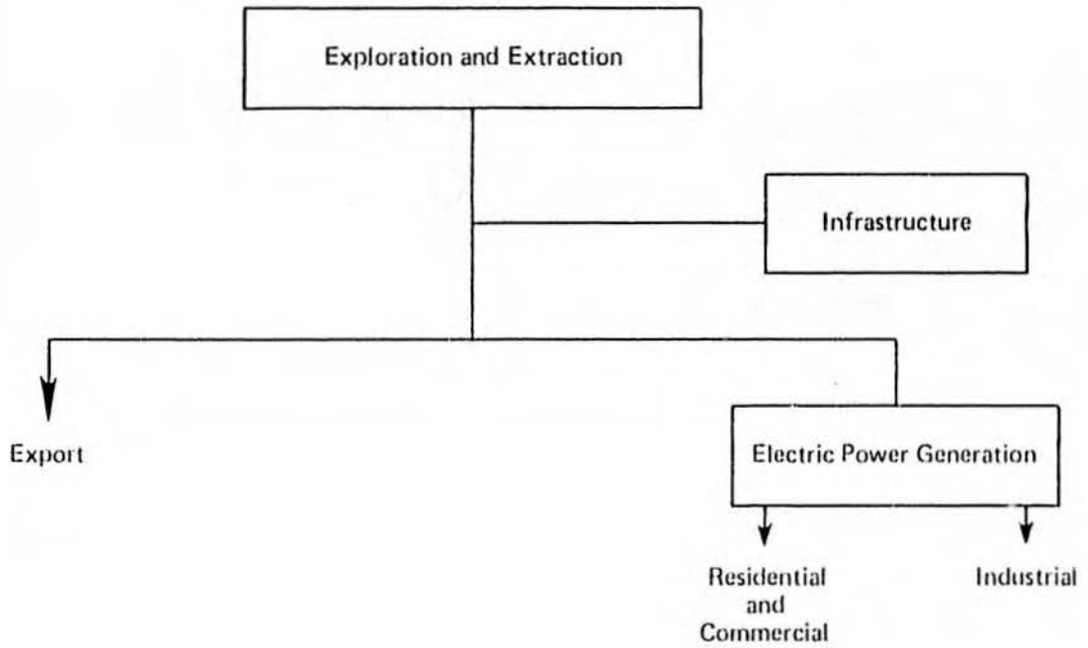


FIGURE III-11 DOWNSTREAM DEVELOPMENT POTENTIAL – COAL

F. HARDROCK MINERALS (excluding coal)

1. Summary and Overview

Mining is presently an insignificant activity in Alaska. Employment in the metal mining industry in Alaska in 1976 was only about 200 people, the same as in 1970. Most of Alaska's mining activity consists of mining for sand and gravel. Historically, Alaska's mining activities have been concentrated in gold and copper. Although mining in Alaska has a long history because of the size and diversity of the state's mineral resources, mineral production has declined over the last 25 years.

Mining activity has declined in Alaska for economic reasons. Costs in Alaska have been too high to make production economically feasible at the world price for the various minerals. Mining costs in Alaska exceed those in the lower 48, primarily because of the remote location of mine sites and because of the absence of infrastructure to support mining operations.

In addition to the need to improve the economics of Alaska mineral production, there is also a need to provide greater knowledge of Alaska's mineral resources. More data are needed on the location, size, and quality of mineral deposits so that potential producers can assess the economic feasibility of future production. Many mineral deposits are yet to be located, and the quality and quantity of a large percentage of identified deposits has yet to be determined.

One factor that may limit future mineral development in Alaska is the future availability of vast areas of potential mineral-producing land. State and federal land use regulations and resolution of issues surrounding the d-2 lands and the native corporation lands will determine future land availability.

Alaska's huge mineral resources offer the state a great potential for large-scale mineral development. The minerals with the greatest likelihood of future development include copper, iron ore, molybdenum, mercury, and limestone. Development of these resources will depend on the future economics of Alaskan production -- specifically the world price and availability of these minerals, and the availability of mineral-rich land for development.

The best opportunity for mineral development in Alaska is in supplying minerals to the lower 48 that are currently being imported from politically unstable areas and are expected to be in short supply in the future. Alaskan mineral development could be an alternative to increasing U.S. reliance on foreign sources of metals needed by industry. Future mineral shortages could lead to price increases which will increase the feasibility of Alaskan mineral production.

Alaska's mineral resources could be the basis for economic development in the state if mineral reduction and/or smelting activities are established. Possibilities include iron ore reduction or pelletizing plants and copper smelting. Natural gas or hydroelectric power could furnish the energy needed for metal reduction activities.

2. Present Status

Mining is presently an insignificant activity in Alaska. Employment in the metal mining industry in Alaska in 1976 was only about 200 people -- the same as in 1970. Minerals represent Alaska's least developed natural resource. Despite its vast resources, Alaska's mineral production has been less than 1/20th as great as that of the average western state. Mineral production in Alaska has declined substantially over the last 25 years. Most of Alaska's mining activity has been for sand and gravel; however, in 1976, sand and gravel production declined because of a reduction in its use for construction of the oil pipeline (Table III-16).

Mining has a long history in Alaska because of the size and diversity of the mineral deposits. Historically, Alaska's mineral production, excluding construction material (i.e., sand, gravel, and stone) has consisted mostly of gold and copper with silver mined as a by-product of gold. Uranium, tungsten, antimony, tin, and mercury production has been very small.

Gold was the first metal to be mined in quantity (in placer deposits and lodes) in the 1870s and 1880s. The gold rushes that occurred in the late 1800s and early 1900s throughout the interior of Alaska resulted in large production levels and the discovery and extraction of other minerals as well.

Copper mining begain in the Southeast, but the largest discovery was in the Wrangell Mountains where production began in 1911. Silver, lead, and tin were also mined during this period.

World War I resulted in some production of strategic materials including tungsten, antimony, chromium, and mercury as well as in increased demands for other minerals. During the war years and the decade of the 1920s, the value of copper mined exceeded that of gold but world economic conditions resulted in the closure of the major copper mine. Gold production increased in the 1930s, Platinum production began in the 1930s.

World War II changed the composition of the mining industry as labor shortages, increasing costs, defense priorities, and finally an Executive Order closed all gold mines. Demand for strategic materials revived production of chromium, asbestos, tungsten, antimony, tin, and mercury. The war also brought the first significant demand for building materials, including sand and gravel.

TABLE III-16

VOLUME AND VALUE OF
ALASKA MINERAL PRODUCTION

	Gold		Sand and Gravel		Other*	
	Volume (troy ounces)	Value ($000s)	Volume (000 short tons)	Value ($000s)	Volume	Value ($000s)
1950	289,272	$10,124	3,050	$ 2,377	N.A.	$ 2,317
1960	168,197	5,887	6,013		N.A.	
1965	42,249	1,479	30,266	34,467	N.A.	5,542
1970	34,776	1,265	83,616	41,092	N.A.	12,723
1975	14,900	2,419	48,145	25,780	N.A.	39,514
1976	17,660	2,172	45,000	24,300	N.A.	37,115

N.A. = not applicable.

*Includes: Barite, bituminous coal, gemstones, lead, silver, copper, mercury, natural gas liquids, platinum group metals, and tin.

Sources: U.S. Department of the Interior, Bureau of Mines, and the Alaska Department of Commerce and Development.

The same pattern occurred during the Korean War, with declines in strategic metals production and expanded gold production in the intervening years of the late 1940s. Since the mid-1950s, production of strategic minerals and gold has declined and the increase in the price of gold has been the only significant positive factor in the Alaska mining industry.

Gold production has increased in the last year, both in volume and value, as a result of the renewed operation of the dredge of the Alaska Gold Company near Nome.

Alaska's mineral deposits are scattered throughout the state, with many located in remote areas (Figure III-12). Increasing attention is being focused on the Brooks Range of the Arctic north the Alaska Range in the central area, and in the southeastern part of the state.

3. Problems

The reason that mining is at such a low level of development in Alaska is economic. High labor and transportation costs and the need for construction of costly transportation facilities (roads, rail lines, etc.) to provide access to remote mineral depositis have limited the utilization of Alaskan mineral resources. The availability of minerals from other sources at a lower cost has limited the competitiveness of Alaska metals in U.S. and world markets. Past fluctuations in the level of mineral production in Alaska show the sensitivity of Alaskan production to the world price for certain metals. Alaska's mining industry has been declining since World War II because in general, most minerals have not commanded a high enough price to pay the wages and other increases in operating costs that have been prevalent in Alaska for the last 25 years.

An interesting example of the disadvantages of an Alaskan location is presented in a recent study which estimates the cost of producing copper and silver from the Kennecott copper mine, assuming the deposits were newly discovered. In spite of the high grade of the copper ore, this operation, which was highly profitable in the early part of this century, would have required a subsidy to be profitable in 1973. This indicates that technological change and changes in relative costs of inputs can work against the mining operation at a distance from market even if the resource is of premium quality.

In addition to improving the economics of Alaskan production, there is a need for greater knowledge of Alaska's mineral resources. More data are needed on the location, size, and quality of mineral deposits so that potential producers can assess the economic feasibility of future production. Reliable examination reports are available on 5% or less of the identified mineral deposits. Parts of the state have not been geographically mapped and much of the state has not been examined by geologists.

Source: Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys.

FIGURE III-12 LOCATION OF ALASKAN MINERAL DEPOSITS

As a result, many mineral deposits are yet to be located, and the reserves and grade of a large percentage of identified deposits have yet to be determined.

Mineral production in Alaska has been deterred by the absence of privately owned land. In 1976, less than 30% of the land in the state was open to mining interests. One factor that may limit mineral development is the future availability of vast areas of state and federally owned potential mineral-producing land. The future pace of exploration and development of Alaska's minerals is heavily dependent upon state and federal land use regulations and, in particular, upon the selection of federal reserved lands under Section 17(d)(2) of the Alaska Native Claims Settlement Act of 1971. At issue in the d-2 lands question is the degree of access which will be allowed on federal lands in Alaska. At one extreme, all activities other than camping, hiking, and fishing could be banned on most federal land. At the other extreme, no restrictions would be placed on land use, other than normal regulatory restrictions on development. Congress has until December 18, 1978, to determine the location and size of any lands to be included in the national parks, national forests, national wildlife refuges, and national wild and scenic river systems.

Establishment of these 83 million acres as recreational lands, however, does not necessarily preclude their development. Wildlife refuges are subject to locatable mineral production "with exceptions," oil and gas development "with restrictions," and timber development "with permits." Petroleum and mineral development in national parks requires Congressional approval. Scenic rivers and national forests are subject to mineral development, oil and gas development, and timber development. Of course, environmental safeguards apply to all of these park classifications.

4. Outlook and Opportunities

Alaska's vast mineral resources offer the state a potential for large-scale mineral development. Alaska may have up to half the nation's uranium reserves, huge copper deposits, and perhaps the richest molybdenum and the largest nickel deposits in the world. Development of Alaska's mineral resources will depend on the future economics of Alaskan production, specifically, the world price and availability of certain metals, and the availability of mineral-rich lands for future development.

Mineral resources which are known or are expected to exist in Alaska in varying amounts and grades include:

- zinc
- lead
- limestone
- nickel
- phosphates
- platinum
- silver
- sulfur
- tin
- titanium
- tungsten
- uranium
- gold
- graphite

- gypsum
- iron
- manganese
- mercury
- molybdenum
- copper
- chromium
- fluorite
- garnet
- antimony
- asbestos
- barium
- beryllium

The resources most likely to be developed are copper, iron ore, molybdenum, mercury, and limestone.

Recent exploration has suggested the potential for Alaska's mineral resources. Inspiration Copper continues to mine copper-nickel deposits on Yakobi Island. The most important undertaking, however, is U.S. Borax's plans to develop a $250 million open pit molybdenum mine in the Tongass Forest 45 miles southeast of Ketchikan. Company officials have confirmed reports of deposits in excess of 100 million tons of molybdenum. When constructed, the facility is expected to employ 500 workers and produce approximately 30,000 tons of ore per day. The company spent about $2 million in 1977 on deep drilling tests. Future development of this ore body will depend in part on the outcome of proposed land withdrawals.

Recently there have been some new copper finds near Ambler River on the Koyukuk Peninsula; some exploration for zinc, copper, and lead at Roe Point near Ketchikan; some silver, lead, zinc, and copper claims staked on Admiralty Island; and major mineral finds near Kotzebue as well as in Mt. McKinley National Park. A barite mine near Haines may begin production late in 1978 to supply barite for drilling mud.

Copper exploration in the vicinity of the Kobuk and Wrangell mountains remains active, and exploration for copper-nickel mineralization on Yakobi Island is expected to continue. Increasing exploration activity is occurring around the long dormant Funter Bay nickel-copper mineralization and at several other locations on Admiralty Island where base metal and silver potential is reported. A high interest in radioactive mineral exploration is also continuing in the Seward Peninsula and in southeastern Alaska.

The foreseeable future suggests several mining possibilities. Officials of the Lost River Mining project, although hampered by a lack of city development, plan eventually to mine the vast deposits of fluorite (estimated at one-third of the world's reserves) and tungsten on the Seward Peninsula. Development studies of the Klukwan project carried out by U.S. Steel and Mitsubishi confirm the economic feasibility of mining the iron ore in this area. Officials suggest that construction of an iron ore mine may begin in 1978.

The best opportunity for expansion of mineral development in Alaska lies in supplying minerals that are currently being imported to the lower 48 states from politically unstable areas. Alaskan mineral development, although high in cost, could be an alternative to the increasing reliance of the U.S. and other industrialized nations on foreign imports of metals essential for industrial processing. U.S. industry already imports much of its supply of the basic minerals needed for industrial production (Table III-17).

TABLE III-17

NET IMPORT RELIANCE AS A PERCENT
OF U.S. DOMESTIC MINERAL CONSUMPTION
1973-77

	1973	1974	1975	1976	1977
Antimony	50%	44%	49%	54%	52%
Asbestos	83	88	82	85	85
Barite	37	38	32	42	40
Copper	8	20	0	12	17
Chromium	91	90	91	89	89
Gypsum	36	37	34	35	35
Iron Ore	35	37	30	29	33
Gold	48	63	52	76	60
Lead	29	19	11	15	14
Mercury	78	86	69	62	46
Manganese	98	98	98	98	98
Nickel	69	72	72	70	70
Peat	33	29	25	25	25
Platinum Group Metals	87	87	83	90	92
Potash	53	58	51	61	66
Silver	66	55	30	50	42
Tin	84	85	84	85	86
Tungsten	66	68	55	54	38
Uranium	0	0	0	0	0
Zinc	64	59	61	59	58

Source: U.S. Department of the Interior, Bureau of Mines Commodity Statement.

The United States is faced with a troublesome mineral situation stemming from three factors. The first is domestic shortages of certain raw materials required by industry including aluminum, chromium, manganese, nickel, tin, and zinc. Second, as the United States relies more heavily on the importance of these and other mineral resources, it will become increasingly vulnerable to the political instability of some foreign countries. Third, shortages will lead to price increases. Each of these factors will tend to increase the economic feasibility of Alaska mineral production.

Alaska has major copper reserves. Alaskan copper should be able to compete at world market prices if transportation costs can be reduced, legal barriers lifted, and if the mine owners feel that the time has come to develop their more politically secure domestic reserves. If the price of uranium rises, it may become economic to produce uranium in Alaska.

Alaska's mineral resources would be the basis for additional economic development in the state if mineral reduction and/or smelting activities are established. Such activities would increase employment in the mining industry as well as increasing employment in construction of reduction facilities and transportation facilities. Unless the raw materials are utilized in Alaska, the economic benefits to the state provided by the mining industry will be limited. Possibilities for further processing include iron ore reduction or pelletizing plants and copper smelting.

Mineral reduction activities require energy. Natural gas production in Alaska could provide the energy required for ore reduction and smelting. Several possible sites have the potential for such development.

Iron ore potential on the Alaskan Peninsula and at Klukwan and at Snettisham, in Southeast Alaska, has been extensively studied. Energy requirements are of major importance in the feasibility of pelletized production. A feasibility study of the Klukwan iron deposit conducted for Iron Ore Company of Alaska lists 105 megawatt power requirements among the necessary conditions for a facility to mine and produce five million tons of iron ore pellets per year.

Sufficient copper to support a smelting operation has been identified in the Kobuk-Shungnak region, with strong indications of additional copper mineralization along the southern flanks of the Brooks Range, in the Lake Clark-Lliamna vicinity and on the periphery of the Wrangell Mountains.

Other base metal potential is indicated in the Mt. McKinley Park vicinity at Mt. Eielson, in the Kantishna district, and in a belt of sediments south of the Alaska Range.

The nickel-copper mineralization at Brady Glacier and on Yakobi and Western Chichagof Islands have been determined to hold excellent potential for important metallic raw materials.

The Klukwan iron pelletization plant along with a nickel-copper smelter to handle ore from the inactive Brady Glacier, Yakobi Island, and West Chichagof deposits, could make possible a smelter-reduction complex located at Haines. Haines is the terminal of the discontinued military oil pipeline to Fairbanks. The pipeline route and operational support facilities could provide a base for a gas feeder line from the trans-Alaska gas line to a major resource-based market. There is also the possibility of processing ore from inactive Canadian mines in the Yukon Territory.

The native corporation lands represent a source of investment in the expansion of mining in Alaska. Much of the native corporation lands have mineral development potential. For example, ASARCO has formed a partnership with the Fairbanks-based native corporation, Doyon Limited, to investigate the potential for mining asbestos deposits located on Doyon lands. Phillips Petroleum has conducted surface geological and geophysical work in cooperation with the Bristol Bay Native Corporation in an effort to find copper near Perryville on the Alaska Peninsula in southern Alaska. Native corporation leaders are expected to pursue mineral development as a major activity.

Downstream development potential for hardrock minerals is described in Figure III-13.

RESOURCE: HARDROCK MINERALS

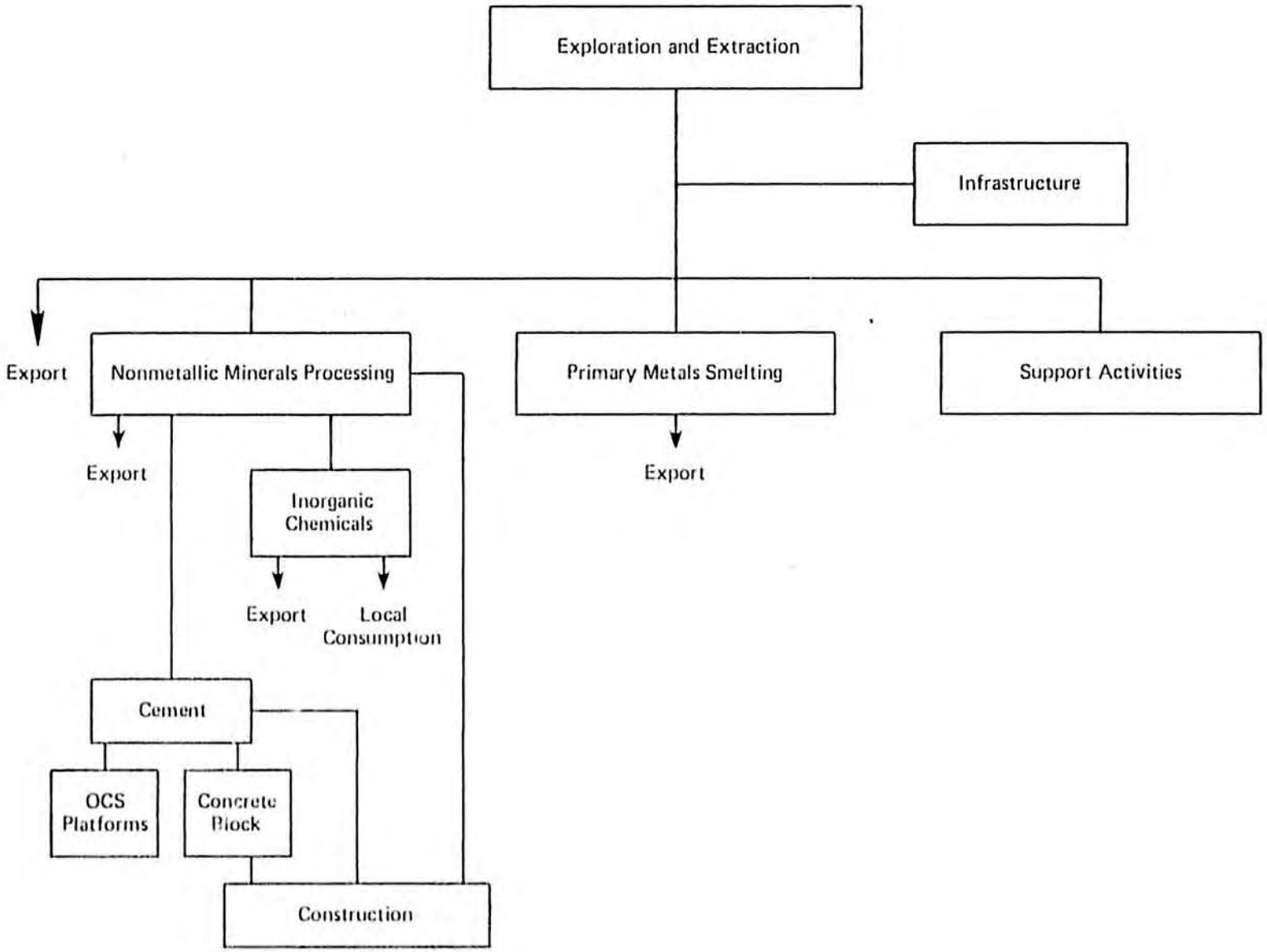


FIGURE III-13 DOWNSTREAM DEVELOPMENT POTENTIAL – HARDROCK MINERALS

G. TOURISM

1. Summary and Overview

Tourism is in an early stage of development in Alaska, but is becoming increasingly important to the Alaskan economy. There has been a significant increase in the number of visitors to Alaska during the last decade because of rising disposable incomes, increases in leisure time, improvements in transportation which have shortened travel time to and from Alaska, and increased business travel. In the past 10 years the number of visitors to Alaska has more than doubled. In 1976 an estimated 270,000 people visited Alaska, the largest number ever. An estimated 8000 people are employed in tourism-related industries.

Alaska tourism relies on three modes of transportation: cruise ship, plane, and highway. The cruise ship market has grown rapidly in recent years.

The Japanese have accounted for a significant share of Alaskan tourism. Japan Air Lines operates 70 scheduled flights a week through Anchorage International Airport and has been actively promoting Alaskan tourism in Japan. The Japanese also own firms operating in the Alaska industry which employ about 250 Alaskans.

Several factors may inhibit the growth of tourism in Alaska. The foremost problem is the high cost of an Alaskan vacation. The high cost of getting to Alaska, especially by plane, and the high cost of accommodations make it difficult for Alaska to compete with other areas for tourist business. The distances between tourist attractions in Alaska, and the time needed to reach them by ferryboat or automobile, result in an extensive time requirement for an Alaska vacation. For the tourist with the time and money, there is a lack of sufficient accommodations and transportation access to remote areas. Alaskan tourism development is also inhibited by the lack of awareness of Alaska as a tourist destination among travel agents and the public. Insufficient state promotional activity has also inhibited tourism development.

The most immediate problem to overcome in increasing Alaska tourism is the high cost of flying to Alaska. The best opportunity for reducing this cost is through use of low-cost air charters or fly/drive tours. Charters, which have been very successful in reducing the cost of flying to Hawaii, could bring the cost of a trip to Alaska to within the reach of a greater number of tourists. Fly/drive tours, which have been extensively used to develop tourism in Europe, in addition to being reasonably priced, offer the tourist a means of getting to Alaska in a reasonable length of time, and an opportunity to visit recreational areas and attractions that are remote from the state's population centers. To make Alaska more attractive as a tourist destination will also require construction of additional tourist accommodations and access roads, and further development of recreation facilities in remote areas.

2. Present Status

Tourism is in its early stage of development in Alaska, but is increasing in importance to the Alaskan economy. There has been a general increase in the number of tourists visiting Alaska during the last decade because of rising disposable incomes, increases in leisure time, improvements in transportation which have shortened travel time to and from Alaska, and increased business travel.

In the past 10 years, the number of visitors to Alaska has more than doubled. In 1976 an estimated 270,000 travelers visited Alaska, the largest volume for a single year. The State Division of Tourism predicts that in 10 years, more than one million tourists per year will be visiting Alaska -- triple the current level. About two-thirds of the Alaskan tourist market is comprised of independent travelers who come to Alaska by ferryliner, highway, or air. There are an estimated 8000 people employed in tourism and visitor-related industries. Tourist expenditures in 1976 were an estimated $100 million.

Alaska's tourism is generated from three modes of transportation: cruise ship, plane, and highway. The cruise ship market has grown rapidly in recent years: for example, there were an estimated 27,800 cruise ship tourists in 1973, 44,000 in 1974, and 48,000 in 1975 -- a 73% gain in visitors since 1972. This increase is due to the rapidly increasing availability of cruise ship space and the increasing interest and rising popularity, nationwide, of cruising to Alaska. Cruise ships operate primarily in the southeastern Alaska area.

The Southeast, Gulf of Alaska, Cook Inlet, Bristol Bay, Kodiak, Upper Yukon-Porcupine, Copper River, and Tanana regions of the state bear most of Alaska's recreational pressure. Within these regions the state transportation network is, although inadequate, more advanced than in the remaining regions. About 85% of the state's population and 98% of the developed tourist and recreation facilities exist in these areas.

National parks are an important tourist attraction in Alaska. The National Park Service manages three natural areas in Alaska -- Mt. McKinley National Park, Katmai National Monument, and Glacier Bay National Monument -- in addition to historically important Sitka National Monument. These areas are complemented by 18 sites in Alaska that are registered National Historic Landmarks, and 15 National Natural Landmarks that are federally, state, or privately owned or administered. Other potential natural landmarks are being studied. In 1970 approximately 49,800 visits were recorded to areas of the National Park System in Alaska. This figure increased by 1976 to 141,330 visits.

The Japanese have accounted for a significant proportion of the recent increase in tourism in Alaska. The inauguration of flights by Japan Air Lines (JAL) between Tokyo and Anchorage increased the flow of Japanese tourists to Alaska. While only one of several carriers flying from Alaska to Japan, JAL is carrying the bulk of the traffic and has spent the most

money in promoting Japanese tourism in Alaska. JAL operates 70 scheduled flights a week through Anchorage International Airport.

Japan also owns firms operating in Alaska's tourist industry which employ about 250 Alaskans. Perhaps the first Japanese investment in the Alaska tourism industry was Alaska Information Services, incorporated in October of 1970, now operating as American and Pacific Tours, Inc. Another Japanese tour company is Alaska-Japanese Enterprises, of Anchorage. It is estimated that this company provides travel assistance for approximately 600-700 Japanese annually.

International In-flight Catering Company, a subsidiary of Japan Air Lines, recently opened a $1.4 million building at the Anchorage International Airport. This facility produces approximately 1500 meals per day and houses some JAL offices. The capacity of the kitchen is 5000 meals per day. The facility employs 90 Alaskans under the direction of a Japanese chef.

Another company operating in association with JAL is Pacific Creative Tours of Hawaii, a subsidiary of Japan Creative Tours, commonly known as JAL-PAK, with ownership equally divided between JAL and a group of large Japanese travel agencies in Japan. This company operates in conjunction with a local agency, Mt. McKinley Tours.

3. Problems

The limitations on past and potential growth in tourism in Alaska include the following:

- The high cost of an Alaska vacation,
- Extensive time requirements,
- The lack of tourism infrastructure facilities, and
- Lack of awareness of Alaska.

The Alaska Division of Tourism has estimated that the average daily cost (including travel) for a visitor to Alaska is $150. Other travel centers competing with Alaska have an average daily cost of $90-100. This high cost, combined with lower excursion fares to other vacation centers, makes it difficult for Alaska to compete with other areas for tourist business.

Most of Alaska's tourists use highway or ferry transportation which, because of the state's size, requires a large amount of time. The greatest inhibitor to increasing the number of highway and ferry visitors is the total trip time, which averages between 16 and 23 days for both modes. For most vacationers, this does not leave much time to travel within Alaska. Paving the Alaska Highway would at best cut only four days from this total

travel time. The long distances between the state's points of interest necessitates a long period for an Alaskan vacation. Since highway and ferry are the dominant modes of intrastate tourist travel, the expansion potential is limited. Short vacations must rely on air travel or on fly/drive combinations which have heretofore received little attention. Cruise tourists, while an expanding share of the tourist market, do not spend much money since their lodging is provided; and generally, they do not spend much time in Alaskan ports.

For the tourists who have the time and money to tour Alaska, the state lacks sufficient infrastructure to accommodate tourist needs. The main deficiency is the lack of private accommodations and transportation access in areas remote from population centers where Alaska's existing and potential recreation areas are located. The availability of first class accommodations is also limited.

In many recreational areas of the state, development of recreational opportunities is limited by lack of access. Private accommodations are scattered and limited. Outside of a few native centers, which receive tourists by regularly scheduled aircraft, the lakes, rivers, and hunting areas of the state are reached by charter or private aircraft. Visitors to these areas often live under primitive conditions with limited conveniences.

The state has done little to expand tourism in the winter season. It lacks a winter resort community, first class hotels (outside of Anchorage), and other amenities sought by many traveling vacationers. The state has only one ski area at Mt. Alyeska; another, Eagle Crest, is being developed with only one chair lift.

The weather will continue to have a significant impact on Alaska's tourist trade. The tourism business is highly seasonal with the peak expectedly in the May-September period. Outside of diversifying into a ski-oriented attraction there seems to be little that can affect the seasonality. Weather conditions outside the state may also play a role in the Alaska tourist business. Extreme winter weather conditions in primary tourist generating areas (Japan and the United States) could lessen the desirability of an Alaskan vacation.

Even the most rapidly growing segment of the tourist industry is limited by facility availability. Ferry line tourism has grown dramatically in recent years, but near-term growth will be limited by lack of sufficient ferry space in the peak season.

Even with the increase in Alaska tourism in recent years, travel agents and the traveling public appear to have little understanding of Alaska and awareness of Alaska as a vacation destination. This stems from a combination of factors including adverse publicity associated with the construction of the Alaska pipeline, incorrect perceptions about Alaska's weather, and inadequate state promotional efforts, especially in foreign markets. State efforts to overcome this lack of awareness have been limited.

State tourism promotion efforts have been small, but are beginning to increase. The Division of Tourism has a budget of about $1.4 million which is too small to support the kind of promotion campaign that would be needed. About 30% of the budget represents salaries, $200,000 is given to local communities to aid their promotional efforts, and about $60,000 is used to help support local visitor information centers. The remainder is used for advertising and promotional efforts.

Future land use consideration will affect the availability of land for recreation and tourism in Alaska. The withdrawal of certain lands from development under section 17 (d)(2) of the Alaska Native Claims Settlement Act will probably preserve the wilderness status or these lands, but may also prevent access to them and the development of facilities for tourists. Some native corporation lands could become available for recreational use, although resource development and processing would probably take precedence for economic reasons. The native corporations can also aid tourism by investing in tourism facilities. The Federal Government owns much of the land on which existing and potential recreational facilities are located.

The Jones Act has a negative effect on tourism in Alaska. The Act prohibits foreign registered vessels from carrying passengers from one American city to another. Furthermore, the U.S. Bureau of Customs port equalization policy states that foreign bottom ships must spend less time in Alaskan ports than in foreign cities. This policy benefits Canada but results in a reduction in the number of Alaskan ports that foreign ships can stop at and the amount of time they spend there.

4. Opportunities and Outlook

The major obstacle to be overcome if the tourism industry in Alaska is to expand is the high cost of getting to Alaska. The best opportunity for reducing this cost is through low-cost air charters and fly/drive tours. If charters to Alaska become available to tourists in the lower 48, as they have to Hawaii, the state could substantially increase its number of visitors. The possibility of more extensive (ITX) tour-basing fares, particularly from gateway cities more distant from Alaska than Seattle, would also decrease the cost of flying to Alaska. The fly/drive arrangement, which can also be sold as a charter package, would provide tourists with a reasonable cost means of traveling to and within Alaska. Under such an arrangement, which has been used extensively in Europe, the visitor flies to the state and rents a car, camper, or motor home for intrastate touring. This type of arrangement in addition to being potentially reasonably priced, offers the tourist a means of getting to Alaska in a reasonable time and an opportunity to visit recreational and tourist attractions that are remote from the state's populaton centers. The fly/drive market has received little attention but is beginning to grow. It is potentially limited by the size of the camper and motor home rental fleet in Anchorage and the lack of camping facilities and other accommodations in the outlying areas.

The ferry liner market has the potential for continued growth. This growth, however, will be limited by the availability in summer of car, camper, and motor home deck space aboard the ferry liners serving Alaska from the gateways of Seattle and Port Rupert. This condition will continue to be a problem as the ferry liner capacity is anticipated to remain relatively constant for the next few years. Consideration should also be given to development of a hydrofoil ferry system. Such a system would probably be capable of transporting tourists more quickly than would be possible by expanding the existing ferry system.

To make Alaska more attractive as a tourist destination infrastructure facilities will have to be expanded. This would include construction of additional tourist accommodations, especially in outlying areas and construction of access roads and further development of recreation facilities in remote areas.

Expansion and improved maintenance of existing facilities is a paramount need if recreational demand is to be met but is not the answer in itself. Even though Alaska is large, use, in recreational terms, is restricted by access. The present highway system limits travel plans, acting like a funnel, and causing egress and ingress to become burdensome. Intensive use of accessible areas inundates the resource quality and may eventually decrease the desire of residents to participate in recreation and the desire of tourists to visit Alaska.

The qualities of Alaska that attract people are reduced as more people visit each year, crowd present campgrounds, overflow into gravel pits or roadside turn-offs, and stand elbow to elbow on favorite fishing streams. Present tourist and recreational facilities are wholly inadequate to support present demand, much less future requirements.

Development of parks and recreation areas would disperse tourist activities. The development of parks and recreation areas fills a twofold need in economic development: it provides a focus for tourism since just the fact that a national or state park, a refuge area, or recreational area exists, provides the traveler with a reason for visiting a locality; and secondly, the development of facilities, roads, and lodgings at or near these parks provides an economic stimulus that can be important in those years when private development is slow in an area.

Recent developments in Alaska point to further development of Alaska's tourist accommodations. In the spring of 1978, the Hotel Captain Cook will open its new 250-room addition in downtown Anchorage. The other new major Anchorage hotel which was to open also in 1978 may be delayed due to financing problems. The hotel, owned by the Calista Native Corporation, is to be managed by Sheraton. In Southeast Alaska, Shee Atika has begun work on a $7 million, 107-room hotel in downtown Sitka to open in May 1978. Sheffield Enterprises intends to open a new Sitka hotel in January 1978, and plans to expand its Kodiak facility in 1978. In Ketchikan, Cape Fox Village Corporation plans to let a management contract bid soon for construction of a new hotel complex there.

These facilities are located primarily in the southeastern part of the state. To "open-up" Alaska's outlying areas will probably necessitate construction of tourist accommodations.

The state is actively working to encourage tourism in Alaska. It has recently undertaken a major multi-media million dollar tourism marketing campaign produced with both industry and state funding. The greatest need for promotion is in foreign markets such as Japan and Australia.

The Japanese market offers the best opportunity for expansion of Alaskan tourism and should be the target of much of the state's promotional activities. The promotion of Alaska in Japan is centered around the theme of an unspoiled environment and the vastness of recreational land available in Alaska, in contrast with Japan where environmental problems abound and there is a lack of recreational land.

An increase in the convention trade offers another opportunity for expansion of tourism in Alaska. The convention business is relatively new to Alaska. Convention business would reduce the seasonality of Alaskan tourism somewhat by increasing business in the spring and fall months. The likely convention market would be Japan and the West Coast of the United States. Additional convention space and accommodations will be needed if the convention business is to increase.

The development potential for tourism is described graphically in Figure III-14.

RESOURCE: TOURISM

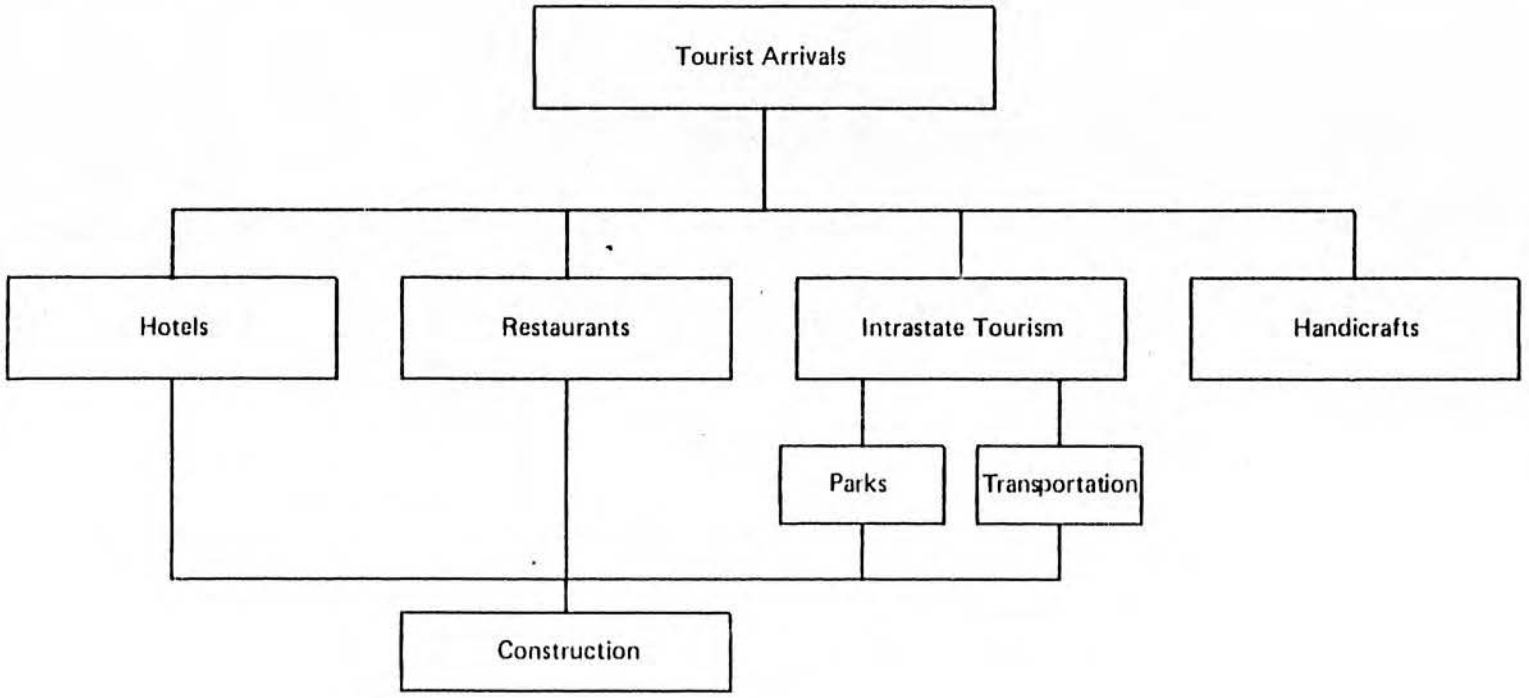


FIGURE III-14 DOWNSTREAM DEVELOPMENT POTENTIAL – TOURISM

H. TRANSPORTATION

1. Summary and Overview

For a state of its size, Alaska has a very limited transportation network. The vast size of the state, the concentration of its small population in one section of the state, and the severe Alaskan weather have all contributed to a situation where the state lacks a strong transportation infrastructure that is necessary for economic development.

Alaska's lack of adequate transportation facilities is most evident in its highway network. Many of Alaska's communities are not served by year-round surface transportation. Current state transportation policy emphasizes upgrading the existing system before new roads are built.

The Alaska Marine Highway system serves the principal population centers of Southeast and Southcentral Alaska that are not connected to the main highway network. Besides filling a transportation void for Alaska residents, it also serves tourists by offering an alternative route from the Alaska Highway.

Alaska has two railroads -- the federally owned Alaska Railroad and the White Pass and Yukon Railroad which is largely owned by Canadian interests and in Alaska, serves only the town of Skagway.

Air transportation has played an increasingly important role in Alaska. The increase in the number of passengers can be attributed to increased tourism as well as to increased business traffic.

About 30,000 Alaskans -- 90% of whom are natives living in western arctic Alaska -- are not regularly served by the above transportation modes. They are served by air carrier or air taxi once or twice a month, and one or two ships a year if on the seacoast. This lack of service is a consequence of the isolation of the native communities and the high cost of service based on low utilization.

The major reasons for the lack of a transportation infrastructure include the following:

- Arctic and sub-arctic environment,
- A small and scattered population,
- Physical access barriers including mountains and rivers,
- High operation and maintenance costs, and
- Limited state financial resources.

The most immediate improvement in the state's transportation system is expected to be the improvement of the existing highway system. The state's transportation plan does not have provision for the construction of new highway links that could become the basis for further economic development (e.g., tourism and resource extraction). The airport section of the state plan includes runway extension and reconstruction proposals and proposals for new airports in rural areas.

One important highway link around which considerable controversy has developed is the North Slope Haul Road that was built to allow movement of equipment and supplies for construction of the trans-Alaska oil pipeline. The state will be given the road but there is much opposition to opening the road for general use. The Governor's policy statement says that the road will be opened only for use by industrial and mining interests who will have to pay to use it.

The outlook for railroad transportation in Alaska depends in part on the future ownership of the Alaska Railroad and the development of a rail link with the lower 48. The Legislature has appropriated $50,000 for a study of this potential rail link.

Further development of Alaska's oil, mineral, timber, fish, and other resources will depend to a great extent on adequate marine transportation and the provision of port facilities that will enable cargo to be transferred at minimum cost.

Extensive work is required at many of the state-owned airports in western Alaska before they will be suitable for jet operations. Eventually, all communities will be linked by road to a medium hub airport. This will make it possible to provide low-cost air freight service at frequent intervals to the bulk of the state's 223 communities.

2. Present Status

For a state of its size, Alaska has a very limited transportation network. The vast size of the state, the concentration of its small population in one section of the state, and the severe Alaskan weather have all contributed to a situation where the state lacks a strong transportation infrastructure that is necessary for economic development. The following transportation-related constraints to economic development have been identified elsewhere in the report:

- Limited movement of minerals from remote inland areas to coastal shipment or processing facilities,
- Limited movement of agricultural products to markets and supplies to farmers, and
- Limited movement of tourists into Alaska and to points of attraction that are remote from the principal population centers.

Transportation employment in Alaska in 1976 was nearly 8000 -- about 3000 more than in 1970. More than half of the total transportation employment is in air transportation.

Alaska's lack of adequate transportation facilities is most evident in its present highway network. Because of its vast size and modest amount of road and street mileage, many of Alaska's communities are not served by year-round surface transportation. Although some of these communities are located on islands and, therefore, are by technical necessity isolated because of their location, many others have been forced to remain in this condition simply because of inadequate financial resources. This situation is a sharp contrast to national standards under which all significant population centers have been connected by roads since about 1930.

Based on the past experience in transportation demands of the other states, the availability of other modes of transportation will not eliminate the desirability of providing highway routes to all significant traffic generators. Each mode has its own particular set of advantages but none can equal highway transport in flexibility of scheduling and function, economy for short-haul distances, providing land access, and affording opportunities for recreation. Highways, therefore, tend to complement rather than replace other transportation modes.

The state now has 4500 miles of highways and a total road mileage of 7110 miles, including local roads and city streets. Of this total, 3490 miles are federal aid primary and secondary systems. Many of the state's highways are substandard. It has been estimated that it would take more than $1.5 billion just to upgrade the existing system. Current state transportation policy appears to emphasize upgrading the existing system before new roads are built.

The Alaska Marine Highway system serves the principal population centers of Southeast and Southcentral Alaska that are not connected to the main highway network. It also provides an alternate route from the Alaska Highway for auto travelers with service to Prince Rupert and Vancouver, British Columbia, and Seattle. (See Table III-18.)

The Marine Highway generated great controversy in Alaska before its inception, but it has proven to be a most successful innovative means of filling a difficult transportation requirement. Besides filling a transportation void for Alaska's residents, it provides a highly popular tourist attraction and makes it possible for the state to attract motorists who would otherwise not travel to Alaska on the 1300 miles of gravel road of the Alaska Highway.

TABLE III-18

POINTS SERVED BY ALASKA MARINE HIGHWAY SYSTEM

Location	Scheduled Trips Per Week* (Summer)	(Winter)
Seattle	1	2
Vancouver	0	1
Prince Rupert	6	3
Ketchikan	7	4
Wrangell	7	4
Petersburg	7	4
Juneau	7	4
Haines	7	4
Skagway	7	4
Sitka	3	1
Valdez	5	2
Cordova	2	2
Seward	1	1
Homer	2	1
Seldovia	2	1
Kodiak	3	2
Anchorage	2	-
Whittier	4	0

*Trips are counted one way only. Seven trips is 7 northbound or 7 southbound, for example.

Source: State of Alaska Department of Public Works.

Alaska has two railroads -- the federally owned Alaska Railroad and the White Pass and Yukon Railroad (WP&YR), which is largely owned by Canadian interests. The Alaska Railroad serves Alaska's most populous area and gives it its common name -- the Railbelt. The railroad was completed in 1921 to serve as a link to the gold mining areas of Interior Alaska and to provide access to the coalfields of central Alaska. Little change occurred along the Railbelt for 20 years, except for the creation of Anchorage as a small railroad company town of 2500 population.

When World War II threatened, the major military bases were located near the railroad. These bases required large civilian workforces, and created the economic impetus that caused the population of Greater Anchorage to climb from 2500 to more than 120,000 in 30 years, and Fairbanks from 3000 to over 45,000 in the same time span.

The WP&YR serves only the town of Skagway in Alaska. Tonnages on this line have increased more than 300% in the past decade due to the mining boom in Canada's Yukon Territory. The tourists who leave he cruise ships at Skagway to ride the railroad to Whitehorse are an important impetus to the town's economy.

Air transportation has played an increasing role in Alaska. The increase in the number of passengers can be attributed to increased tourism as well as to increased business traffic.

The increased use of large jets for passengers and cargo generally has resulted in an increase in employment, cargo, and number of passengers. The continued preponderance of air transportation as an employer and common carrier of passengers clearly points out the inadequacy of other transportation modes.

Air transportation has played a significant role in the development of North Slope activity and has greatly stimulated the economies of the supporting communities, namely, Fairbanks and Anchorage. Numerous airstrips were constructed to support exploratory and production drilling. Most were temporary and have been abandoned.

Most of the airports in Alaska are publicly owned (mostly state with a few municipal) and it is these airports that need the greatest development. Airline service in Alaska varies from several times daily competitive schedules on modern jet aircraft to one weekly flight of single-engine planes.

About 30,000 Alaskans -- 90% of whom are natives living in Western arctic Alaska -- are not directly served by any of the above modes. They are served by air carrier or air taxi once or twice a month, and one or two ships a year if on the seacoast. This lack of service is a consequence of the isolation of the native communities and the high cost of providing service based on low utilization.

3. Problems

The major reasons for the lack of a transportation infrastructure in Alaska include the following:

- Arctic and sub-arctic environment,
- A small and scattered population,
- Physical access barriers to ground transportation including mountains and rivers,
- High operation and maintenance costs, and
- Limited state financial resources for transportation facilities.

These factors tend to limit the construction of new facilities and to make construction and operating costs of new facilities very high. In general, the development of transportation in Alaska has been made in response to the needs of existing communities (e.g., the main highway system and international airports at Anchorage and Fairbanks) rather than being based on an overall plan to use transportation facilities as a means of promoting additional economic development.

Alaska's climate presents several obvious problems with respect to transportation. The snow cover in much of the state precludes the development of an extensive highway network -- especially to the remote areas.

In several areas, sea ice forms a barrier to navigation for a substantial part of the year. The Bering and Chukchi Seas north of 58 degrees latitude in the Arctic Ocean and upper Cook Inlet are examples of such areas.

The small population in Alaska, scattered in a few small areas, often at great distances from each other, has heretofore limited the need for an extensive road transportation network. The high cost of constructing road links, the huge distances that highways would have to cover, the need to overcome physical obstacles such as rivers and mountains, and the limited seasonal use of roads has made the benefits of new highways seem small when viewed in light of the limited traffic they would carry.

The lack of funds has limited the development of a highway system in Alaska. Because of the state's sparse population and undeveloped economic base, all major highway construction must be financed with federal oil apportionments. Extremely modest in terms of total mileage, the existing system which was largely inherited from the Federal Government at the time of statehood was almost totally inadequate in 1960 by present-day standards. Although a substantial investment in highway improvements has been made, only approximately 460 miles of new highways have been added to the system since 1960. Compared with this amount, substantial improvements have been made to 1430 miles of existing roadway during the same period. Approximately 50% of existing mileage is still considered deficient. Other factors which tend to compound this problem include higher construction costs per mile caused by difficult terrain and higher price levels, and higher expenses for road maintenance due to harsh climates.

The main problem affecting Marine Highway transportation in Alaska is the same one that affects many other segments of Alaska's economy -- i.e., seasonality. The capacity of the ferries is strained during the summer, which imposes a limitation on tourism activity, but the system operates at only a small fraction of capacity in winter. Sixty percent of the annual passengers use the ferries over a four-mounth period from June through September. Only 20% use the system over the six-month period from October through March.

While use of the ferries has grown at an annual rate of 10% for passengers and 17% for vehicles, there has been no amelioration of the seasonal effects brought about by the increase in trade.

Another major problem is the lack of marine ways and shipyard facilities for large vessels. The nearest suitable facilities are in Seattle, which makes maintenance of Alaska-based vessels difficult and expensive. One of the difficulties in maintaining an icebreaker in Alaska is the lack of proper maintenance facilities. Ships operating in ice normally require more frequent visits to shipyards to repair damaged rudders, propellers, and hulls.

The lack of port facilities and the shallow coastal waters have made the Bering and Arctic coasts historically difficult to serve. Most locations require lightering cargo from ship to shore, which can increase costs 30% over what dockside handling would entail. The small volume of cargo for most ports has made it difficult to justify large investments for port facilities.

Responsibility for maintenance of the necessary infrastructure for waterborne commerce is diffused among several state and federal agencies. No one agency has direct responsibility for overall planning of a deep draft port system for the state, or the ancillary services necessary for the maintenance of a more effective shipping industry and fishing fleet.

The Jones Act affects the Marine Highway by preventing it from using low-cost foreign shipyards to meet its needs. The Merchant Marine Act of 1920 (the Jones Act) was passed to protect and stimulate the American Merchant Marine and U.S. shipbuilding by requiring that maritime trade between all states be transported in U.S.-made ships.

Historically, river (and canal) transport has provided the most economical means of moving bulk cargoes such as coal, mineral ores, and grain. The present tonnage moved over Alaska's rivers totals less than 50,000 tons annually, the bulk being deliveries of fuel and supplies to military installations on the Naknek, Kuskokwim, and Yukon Rivers. In Alaska, with its 15 major river systems, and over 3500 miles of navigable inland waters, the lack of backhaul cargoes and the paucity of population centers to demand or use large unit deliveries of non-bulk goods works against what, by logic, should be a low-cost transportation system. So little attention has been devoted to the full transportation potential of Alaskan rivers that little is even known of river characteristics beyond the approximate length, and in few cases, the annual flow. Even seasonal navigability is known only to the few pilots who ply the rivers, and at best, is unpredictable and undocumented.

Since petroleum, minerals, and timber comprise bulk cargoes of the type most apt to complement the economic advantages of river transport, the lack of development or even basic knowledge concerning the rivers presents an immediate problem in the field of transportation. Charting

of the rivers, collection of hydrologic data regarding river flows, training of river pilots, and employment of sophisticated river craft such as air cushion vehicles or hydrofoils for transport of people and cargo should be considered basic priorities in the comprehensive planning of an integrated transportation system for Alaska.

The bulk of Alaska's exports are petroleum, wood, and fish products. There is also substantial movement of ore from the Yukon Territory through Skagway. Unfortunately, exports and imports have not been compatible in their transportation requirements, and do not provide backhaul to a significant degree. As long as natural resources moving in bulk -- oil and ore -- comprise the majority of exports, this situation will prevail.

A final problem is that much of Alaska's trade is not certificated. Common carriers providing year-round service must publish tariffs and are regulated, while seasonal cargo is carried by companies which lease ships for a one-time operation and thus "skim the cream" from the total need for transportation, resulting in higher costs for the year-round shippers.

For the inland areas not served by the state highway system, transportation is limited to high-cost and infrequent air service. For cities such as Juneau, Anchorage, and Fairbanks, frequent jet service has resulted in keeping fares down. Most other communities rely on small aircraft that have high operating costs for service. High operating costs result from infrequent service, scattered population, and low use.

4. Outlook and Opportunities

a. Highways

The most immediate improvement in the state's transportation is expected to be the existing highway system. In 1977, the state published its annual six-year transportation plan. The plan includes proposals for construction and improvement of land and marine highways and airports. It outlines how the state proposes to allocate and spend funds for transportation facilities, and identifies projects and transportation facilities that can be provided with existing resources. The plan points out that the program will not completely meet all of the state's critical transportation needs because sufficient resources will probably not be available.

The priorities for highway construction were developed on the basis of first improving the existing roadway system, and removing safety hazards, and then performing major reconstruction or new construction where conditions are most critical. The main activities will be reconstruction, paving, and bridge replacement. The plan does not discuss priorities or have plans for the construction of new highway links that could become the basis for further economic development.

A recent study by the Department of Highways indicated an additional need for about $300 million for highway reconditioning and preservation to keep the state's highways from deteriorating further due to oil pipeline related construction activity.

Early in 1970, in conjunction with the National Highway Needs and Classification Study, the Governor's Transportation Task Force established the goal of reaching all population centers of 1000 or more (1990 estimate) with highway connections wherever technically feasible by the year 1990. In addition, it was determined that the configuration of the resulting network should take maximum advantage of the state's natural resources and provide opportunities wherever possible for enjoying scenic panoramas.

One important highway link around which considerable controversy has developed is the North Slope Haul Road that was built to allow movement of equipment and supplies for construction of the trans-Alaska oil pipeline. The state will be given the road by the Alyeska Pipeline Company. The issues surrounding the question of opening the road for use by tourists and other industries include possible adverse environmental effects and the costs to the state of improving and maintaining the road.

The Governor's policy statement on the road says that the road will be opened only for use by industrial and mining interests, who will have to pay for the use of it. In 1976, Alyeska's road use charge was $1.05 per mile and that covered only the maintenance cost. The statement indicates that the social, environmental, and fiscal costs of completely opening the road are too high. Residents near the road are against opening it and do not want it to become part of the state's public highway system. The Governor indicated that state policy concerning the road will be reviewed yearly.

Several potential highway links have been discussed that would greatly improve the state's transportation network.

If a highway to the Kobuk were constructed, a continuation to the lower Kobuk Valley and the Seward Peninsula would assume a high priority. This road would open up Eskimo inhabited areas to auto tourists for the first time. It would serve areas of high mineral potential and provide a surface transportation link for another 11,000 Alaskans.

A road from the west side of Cook Inlet to Bristol Bay is also given a high priority by the state among the total highway needs. A ferry link to Homer would connect to the main highway network. A main advantage of such a road would be the provision of year-round surface freight service to Bristol Bay through the ice-free ports on lower Cook Inlet. Unsurpassed sports fishing areas would be more readily accessible to residents and non-residents, and the area shows high potential for mineral development.

The U.S. Forest Service has long planned an Inter-Island Highway System for the Tongass National Forest. It would be designed to connect the main communities and also serve as a main spine road for the harvesting of the Tongass timber and mineral resources. Its greater value, however, would lie in the recreational opportunities it would open.

The highway would rely on small ferries for inter-island connections. It would not compete with the through service provided by the large ferries of the Marine Highway, but would complement it. Ultimate costs for the Inter-Island Highway are now estimated at $314 million for 455 miles of road to connect from Haines to Ketchikan.

Congress has authorized the President to open negotiations with Canada for paving the Alaska Highway. The benefits to the State of Alaska from paving the highway would be quite significant and would include increased tourism, lower transportation costs for trucking, increased ease of access for Alaskans in travel to other states, and enhancement of the Marine Highway System. The Marine Highway has proven to be an extremely attractive method of travel to date, but many who would otherwise travel in one direction by water and the other by highway have been deterred because of surface conditions on the Alaska Highway. Highway-based visitors offer especially high potential for economic benefits since this type of traveler is more likely to spend significant periods in remote areas, provided access is available.

There is also a need for roads linking small communities with their airports. The role of development roads to aid in the harvesting of resources has been hotly debated in Alaska. The main argument is whether government or industry should bear the costs, or in what proportion they should be shared. Totally different programs are followed for timber, minerals, and oil.

The Forest Service has a long-range program for developing an access road and trail system that is aimed at areas of high timber potential and also those of recreational promise. Timber producers on state and other federal lands must build their own roads. The Forest Service prefers to control its road program as a prime method of limiting environmental damage for the lands under its control.

The oil industry has constructed roads to serve its needs, with no particular desire for government subsidy ever expressed. Extensive access road systems exist on the Kenai Peninsula, the west side of Cook Inlet, and the North Slope as a result of oil development. The state has taken some of these roads into the state system when a public need in addition to that of the oil industry became apparent.

The mining industry, which could be a significant factor in the state's economic development, has been in a general state of decline since World War II. The lack of adequate transportation facilities has been a major contributing factor. Not only does the lack of these facilities cause increased costs for equipment and ore shipments, but the isolation of bush areas causes high operating costs for any commercial or industrial activity. Although many minerals in high demand in the United States are found in abundant supply in Alaska, transportation costs have inhibited detailed and intensive exploration in many cases and have caused otherwise profitable proposed operations to become unattractive investment opportunities. The state, recognizing this problem, has from time to time conducted programs

for financing mineral development access roads, but funds available have been extremely small in quantity. Generally, these funds have been sufficient to only cover relatively short connections to the existing system and have not been of sufficient magnitude to develop signigicant highway corridors.

The Alaskan situation is in complete contradiction to that in Canada where an active program of building roads to develop northern resources is underway in the Yukon and Northwest territories. The Canadian Federal Government is making substantial investments in high-quality roads as a major incentive for resource-based industries.

b. Railroad Transportation

The outlook for railroad transportation in the state depends in part on the future ownership of the Alaska Railroad, and the development of a rail link with the lower 48. The Federal Government has offered the railroad for sale to either the state or a private buyer. There have been no offers from private sources.

The state has shown little interest in the line up to now. If it becomes possible to finance the northern extension by changing ownership to the state, it might be possible, but at present there is no evident benefit that would make the state want to pay $100 million to obtain a service it is already receiving.

In Canada, there are active plans to extend the Pacific and Great Eastern Railroad northward from Prince George to Whitehorse in the Yukon Territory. This would provide a rail connection to the WP&YR and the continental rail network. Approximately 600 miles of track would be necessary to extend the Alaska Railroad to Whitehorse. Advantages would primarily accrue to eastern Alaska's mining industry by making possible direct shipment of ore to the smelters in the midwestern United States. Presently, Yukon ores are sent by truck to Whitehorse, by WP&YR to Skagway, by ship to Vancouver, and by rail to the smelter at Trail, B.C.

A proposed rail link connecting Alaska and Canada would connect Alaska by rail with the lower 48. In 1975, the Alaska legislature passed a resolution asking the Governor to call a conference to consider the connection of Alaska and Canada by an all-rail land route leading to the midwestern and eastern manufacturing centers. The conference held in April 1976 reached conclusions that (1) Alaska was far behind the Yukon Territory and Northern Canada in its research on the potential for a rail route, and (2) the concept of rail connection between Canada and Alaska looked promising and should be pursued at this time. The legislature appropriated $50,000 for a study of this potential.

The new railroad would generally parallel the Alaska Highway from Tetlin into Fairbanks. The proposed route would require 297 miles of track in Alaska, 568 miles in the Yukon, and 100 miles in British Columbia. The land area for the entire route in Alaska may be selected through the eminent domain authority of the Alaska Railroad. Construction costs are estimated at about $1.2 million per mile.

In attempting to estimate the future volume of such a rail route, potential shippers were contacted (131 in the United States and Canada). The responses indicated that the railroads could be an important factor contributing to further mineral development in Alaska.*

The report estimates that one million tons could flow across the route by 1985, given competitive service and no new development.

Proposals to improve railroad transportation in Alaska include the extension of the Alaska Railroad to the Kobuk copper deposits and to the oil fields at Prudhoe Bay.

c. Marine Transportation

The development of Alaska's resources has been largely dependent upon marine transportation, and this situation will probably continue in the foreseeable future. Fairbanks is the only major population center not located on the seacoast. The development of Alaska's oil, mineral, timber, fish, and other resources will depend to a great extent on adequate marine transportation and the provision of port facilities that will enable cargo to be transferred at minimum cost.

Besides port facilities for handling cargo ships, the state must support an extensive system of small boat harbors to serve the needs of its fishing fleets and its many citizens dwelling along its 33,904 miles of tidal shoreline that use the sea as a basic means of transportation or recreation.

The development of large icebreaking tankers and supply vessels that will be able to operate in the icebound seas with a minimum of icebreaker assistance appears to be essential to achieve year-round transportation of resources by sea from northern and western Alaska. The economic practicability of each proposed operation in the Arctic or in the ice of the near Arctic, however, must be considered and analyzed separately since the economic planning factors vary in each instance of use.

Year-round navigation to Anchorage, Alaska's leading general cargo port, and Drift River and Nikiski, the ports from which Cook Inlet petroleum products are shipped, is a recent development. There are indications that conventional deep-draft icebreakers are not suitable for the shallow waters and swift currents of Cook Inlet and that a specialized icebreaker should be developed.

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*Alaska Department of Commerce and Economic Development, Division of Economic Enterprise, Alaska-Canada Transcontinental Rail Connection to Contiguous United States, January 1977.

Studies are underway by the State of Alaska and the Corps of Engineers to determine what ports should be developed to serve Alaska north of the Aleutian Chain. Regional ports are being evaluated at Bethel, St. Michael, and Port Clarence at present.

The upgrading of marine navigational aids along northern coasts and in the Valdez area is receiving high priority. Radar reflectors and radar transponders were installed during 1971.

A large increase in shipping, primarily in tankers operating from Valdez and other ports, will require more sophisticated navigation if schedules are to be maintained in bad weather, especially during periods of reduced visibility. The planned national navigation system, which is intended for use by aircraft or ships, could meet this need if it can be implemented before the tanker traffic begins to peak.

The economies of size will be difficult to achieve in the limited Alaskan market if there are too many participants. Up to this time competition in marine transportation has proven beneficial. As competition expands into areas of low cargo generation, it may have a deleterious effect on the industry, and make consolidation necessary as has occurred in the intra-Alaska air services during the past decade.

The Federal Maritime Commission in its 1968 Alaska Trade Study recommended the following courses of action to improve waterborne commerce in Alaska:

- Comparative freight rate studies,
- Containerization of cargo,
- Modernization of cargo vessels and handling facilities,
- Development of resources to provide backhaul cargo,
- Institution of developmental freight rates to encourage resource development and extractive industries,
- Rehabilitation and expansion of wharfing, warehousing, and drayage facilities,
- Establishment of centrally located redistribution ports, and
- Improvement of river and harbor facilities.

Some progress has been made in all areas but those dealing with rate studies. A comparative rate study which incorporated a comparison of rates that would be possible without the limitations imposed by the Jones Act would provide a substantive base from which to further modernize Alaska's maritime trade.

If major port facility improvements are to be made at the various ports throughout Alaska, it will be necessary for the Federal Government and the state to participate with the cities in providing the modern facilities required. It is doubtful if many of the seaport communities could "go it alone" on such an expansion program.

The question of obtaining enabling legislation to provide for the development of a port authority should be investigated. Previous studies of the problem have indicated that until Alaska's Constitution is amended allowing port authorities the right of taxation for the support of bond issues, a port authority would be quite helpless in attempts to finance programs. There is no doubt that improvements must be made to many of the ports of Alaska.

The state, in cooperation with the Federal Government, should assure that the land areas which will be required for port development in the future will be retained in public ownership for that purpose. Except in special cases, private ownership of port areas should be discouraged.

The cost advantages of the Marine Highway to the state were graphically shown in the 1969 report to the Alaska legislature, which showed capital costs of $34 million for the present southeastern system versus $410 million for land highways to serve the same area.

Future improvements to the Marine Highway envision the use of air cushion vehicles or hydrofoils as technological improvements make these high-speed systems cost competitive. Such improvements will probably be limited to new routes until the present fleet is amortized.

Air transportation will continue to grow in Alaska because of its advantage for an undeveloped, large, sparsely settled region. It can provide flexible, reliable transportation with a minimum capital investment. High fares and cargo rates will continue to be inhibiting factors in the upgrading of the economy in these areas relying on air transportation.

Air fares and freight rates between Alaska's main terminals and overlying areas are the most expensive parts of the system. The places most impacted by air transportation costs are those most in need of service. This problem cannot be solved by improving the infrastructure because the small, widely scattered communities will never be able to generate the cargo or passenger flows that will generate economies of scale.

Extensive work is required at many of the state-owned airports in western Alaska before they will be suitable for jet operations. Airport requirements for jet aircraft are costly and time consuming. It is imperative that an area or statewide plan be implemented to forecast and provide the necessary developments to permit the efficient utilization of equipment.

Eventually all communities will be linked by road to a medium hub airport. This will make it possible to provide low-cost air freight service at frequent intervals to the bulk of the state's 223 communities.

I. ELECTRIC UTILITIES

1. Summary and Overview

About 90% of Alaska's population has reasonably reliable electric power. Only about 10% of the state's retail electric power customers are served by private utilities. In all regions except the Southeast, electric power use has grown faster than the national average rate of 7% annually.

Electricity prices in Alaska are generally higher than the national average and show a large variation from community to community. Anchorage, the region of largest demand, has enjoyed the lowest electricity rates in the state because of the availability of low-cost gas from the Kenai Peninsula.

The Alaska regions vary in the composition of their generating capacity. The largest electric power generating capability is in the Anchorage and Southcentral region. More than two-thirds of the region's 394.6 megawatt (Mw) capability is gas turbine generated. In the Fairbanks area, coal-fired steam turbine plants account for about 60% of the region's 180.0 Mw capability. Hydroelectric power is significant only in the Anchorage-Southcentral region (11% of total capability) and the Southwest region (43%).

The major problem facing utilities in Alaska is the high cost of electric power. Operating costs are high because of high construction costs and because the construction of small scattered plants to serve low growth increments has prevented the utilities from realizing economies of scale.

Electric utility generating requirements in Alaska are expected to grow at a greater rate than in the lower 48. The greatest increase is expected to be in the Anchorage area and the smallest in the Northwest and Southwest regions.

Alaska has abundant fuels to meet future generating capacity requirements. Future fuel use and availability will depend on the outcome of certain regulatory and pricing issues including:

- The availability and pricing of residual fuel oil,
- Federal regulations on the use of natural gas by utilities, and the pricing of natural gas, and
- Coal mining and development costs.

Alaska has a huge untapped potential for hydroelectric development but the remoteness of the sites from load centers, and the high construction costs, may limit their development. The development of Alaska's hydroelectric power potential would make power available for electricity-intensive industries such as metal reduction, aluminum production, and cement manufacturing.

2. Present Status

Four basic sources supply Alaska's electrical power:

- Industry - 108 Mw
- Military - 218 Mw
- Private home generators (no figures)
- Utilities - 738 Mw

The first two of these, industrial and military electrical power, are insignificant since they are essentially independent of state population and income levels. And while privately generated power for home use is important because of incomplete utility coverage, its use is declining, and existing programs of rural electrification will continue this trend. Therefore, the largest component of electrical power in the state is that generated by utilities. And, because military requirements will not expand appreciably and population increases will be concentrated in urban areas, utilities in the future are expected to supply an even larger proportion of the state's electricity. In 1970, approximately 87% of Alaskan households were connected to electric utilities. Those not connected included villages, households with access to electricity but no desire to consume, and households isolated from any power source or community.

Alaska's electric power industry has traditionally been oriented toward mining operations, fish canneries, lumber mills, and trading posts. For many communities, industrial and commercial power installations were the only source of electricity. Some of Alaska's present utility systems are derivatives of these earlier commercial and industrial enterprises. In contrast to other states where substantial amounts of generating capacity are privately owned, in Alaska only about 10% of retail customers are served by private utilities. About 90% of Alaska's population has reasonably reliable electric power.

In all regions except the Southeast, growth in electric power sales has exceeded the long-run national average of 7%. Individual utilities have experienced much more rapid growth. Of the state's largest utilities, Golden Valley Electric Association in Fairbanks grew most rapidly -- more than 20% annually.

Differences in growth rates of electricity use are only partially explained by differences in the rates of population increase. In addition, percent of population served by electric utilities has also been increasing, and consumption per customer has been increasing at different rates in different regions. Table III-19 shows the number of customers and consumption per customer for the commercial and industrial sectors.

Residential prices for electricity, which are generally a decreasing function of the quantity consumed, show a large variation from community to community within the state. The 1974 cost of 500 kilowatt-hours (kwh) per month varied between $13 in Anchorage and $131.94 in Deadhorse (2.6

TABLE III-19

AVERAGE ANNUAL COMMERCIAL AND INDUSTRIAL
ELECTRICITY USE PER CUSTOMER

	1965		1970		1974	
	Number of Customers	Average Annual Mwh per Customer	Number of Customers	Average Annual Mwh per Customer	Number of Customers	Average Annual Mwh per Customer
Southeast Commercial	1,608	20,345	1,761	25,117	1,359	28,852
Southeast Industrial	-	-	57	457,912	13	1,401,385
Southcentral Commercial/ Industrial	1,575	35,594	2,447	49,412	2,839	53,583
Anchorage Commercial/ Industrial	3,035	46,997	4,093	63,260	5,132	85,395
Fairbanks Commercial/ Industrial	1,318	25,181	1,717	62,087	2,073	71,449

Source: University of Alaska, Institute of Social and Economic Research, Electric Power in Alaska, 1976-1995, August 1976.

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cents versus 26.4 cents for one kwh). Anchorage, the region of largest demand, has enjoyed the lowest electricity rates in the state because of the availability of low-cost gas from the Kenai Peninsula.

Compared to prices nationally, the average for Alaska is high, but during the decade of the 1960s, it fell in real terms and also relatively. The Alaska average in 1960 was 4.32 cents/kwh, while nationally, it was 2.47 cents/kwh. By 1972, the Alaska average was 3.33 cents/kwh. To a large extent, this downward trend reflects the price of electricity in Anchorage, since more than half of the state's electrical consumption occurs in the Anchorage area. More recently, the downward trend in prices has reversed as a result of increasing costs of fuel, construction, and capital.

Prices for commercial and industrial consumers, when different from residential rates, are generally lower and trends have tended to follow those of the residential sector.

The Alaska regions vary in the composition of their generating capacity. The largest electric power generating capability is in the Anchorage and Southcentral region. The region has a total generating capability of 394.6 Mw of which 68% is gas turbine generated. In Anchorage gas turbines are used as baseload units (peaking units elsewhere) because of the availability of low cost gas. In the Fairbanks region, coal-fired steam turbine plants account for about 60% of the region's 180.0 Mw capability. Many of the coal-fired plants are located at the mine-mouth 108 miles from the city. In the Southeastern region and in rural Alaska diesel generation accounts for 57% and 93%, respectively, of total generation capability. Hydroelectric power is significant only in the Anchorage and Southcentral region (11%) and the Southeast region (43%) (see Table III-20).

3. Problems

Utility costs in Alaska are high compared with those in the lower 48. Although Alaska has plentiful amounts of fuel for use in electric power generation, operating costs are high because numerous small scattered plants have been built to serve low growth increments. Consequently, the utility plants have been unable to achieve economies of scale that would be possible for plants serving large populations. High costs make it difficult to bring electric power to remote areas. High construction costs and the isolation of demand centers will probably continue to contribute to the high cost of electric power in Alaska.

4. Outlook and Opportunities

Electric utility generating requirements in Alaska are expected to grow at a greater rate than in the lower 48. The greatest increase will be in the Anchorage area and the smallest in the Northwest and Southwest regions (see Table III-21).

TABLE III-20

ELECTRIC UTILITY GENERATION CAPABILITY BY REGION AND COMPOSITION

	Anchorage and Southcentral Region	Fairbanks Region	Southeast Region	Rural Alaska
Total Capability (Mw)	394.6	180.0	192.5	23.0
Largest Unit Type	269.5 (gas turbine)	108.8 (coal-fired steam turbine)	57.7 (hydro)	3.0 (diesel)
Composition (Mw)				
Steam Turbine	14.5	108.8	-	-
Gas Turbine	269.5	7.2	-	1.5
Hydro	45.0	-	82.3	
Diesel	65.6	64.0	110.3	21.5
Average Utility Size (Mw)				
Steam Turbine	14.5	108.8	-	-
Gas Turbine	269.5	7.2	-	1.5
Hydro	45.0	-	11.8	-
Diesel	6.6	9.1	3.1	0.5

Source: University of Alaska Institute of Social and Economic Research, Electric Power In Alaska, 1976-1995.

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TABLE III-21

ELECTRICITY REQUIREMENTS IN ALASKA, CAPACITY ADDITIONS
(megawatts)

	Low	High
Anchorage and Southcentral Alaska		
1974-1985	506	1,133
1985-1995	938	2,768
Fairbanks		
1974-1985	79	221
1985-1995	122	380
Southeast Alaska		
1974-1985	48	48
1985-1995	45	72
Northwest and Southwest Region		
1974-1985	1	13
1985-1995	2	23

Source: University of Alaska Institute of Economic and Social Research, Electric Power in Alaska, 1976-1995.

Alaska has resources in abundance to generate electric power to meet its future requirements (oil, gas, coal, or falling water). The availability of the resources to load centers, the thin transportation infrastructure, and the isolation of major centers has produced such anomalous situations as burning natural gas in gas turbines in Anchorage, burning low Btu coal in conventional steam electric plants in oil and gas-free Fairbanks, and shipping diesel fuel to villages near sites with enormous hydroelectric potential.

Any planning for future fuels availability will have to acknowledge considerable uncertainty and problems:

- Geologic fortune in regards to discovering more natural gas in South Alaska.

- The availability and pricing of residual fuel oil. To date residual fuel has not been burned to a significant extent. A federal ban on natural gas burning in utilities and natural gas pricing may change that.

- Federal regulations on the use of natural gas by the utilities and the pricing of natural gas. Gas use may be banned outright and the gas distributed to higher priority residential or industrial users. Even if utility gas burning is not banned outright, if the price of natural gas is greater than an alternative fuel source such as coal, natural gas may be diverted to better use. One use would be conversion to ammonia and urea for export.

- Coal mining and development costs. Coal would appear to show the greatest long-term price stability and is forecast to cost less than gas and oil on a cents per million Btu basis when available.

Uncertainty in the growth rates of Alaska's relatively small load centers and the diversity of the load centers accentuate the difficulty of meeting future electrical demand without serving as a brake on the economy. Only for Anchorage, and if intertied to Anchorage, Fairbanks, will it be possible to construct highly efficient conventional steam-electric plants. However, a slowdown in demand growth could reduce system reliability by placing too much reliance on a single large plant. Providing more capacity by gas turbines may prove to be a better match of capacity to demand at the price of less fuel efficiency and potentially higher cost over the life of the units. Development of large hydroelectric projects for the two regions is attractive because fossil fuel resources would not be burned to generate electricity, but the capital cost is very high and dependence on such a large single source via long distance high voltage lines may be unacceptable.

In the Southeast part of Alaska, small towns and villages are dispersed over a large and rugged region. New electrical demand would be best met by development of nearby hydroelectric sites and the installation of low-speed diesels or regenerative gas turbines.

The remaining areas of Alaska, the Northwest and Southwest, have a very low level of electricity demand are forecast to grow very slowly. The cost of financing electrical units has historically been a serious burden and will remain so because of the small units required. High-speed diesels provide virtually all the electricity for the region and probably continue to do so. Regenerative gas turbines fueled by diesel fuel would be competitive with long-life but higher-cost low-speed diesels.

Hydroelectric development has been limited to relatively small units serving nearby local centers. Alaska has 31 hydroelectric plants -- 2% of U.S. total. Installed hydroelectric capacity is 123,000 kw -- 0.2% of the U.S. total. Although Alaska has many undeveloped hydroelectric sites, the remoteness of the sites from load centers has constrained and may continue to constrain their development. Large hydroelectric projects may make long distance transmission of electricity feasible, but the project may incur unacceptable environmental damage. Large hydroelectric projects are very expensive and will take a long time to implement. The proposed 1,568 Mw Susitna Project is estimated to cost $1.2 billion and take 6-11 years to complete. By comparison, a conventional steam electric plant or gas turbine would be only about one-half or one-third as expensive. The principal advantages of all hydroelectric plants are their simplicity in operation, very low operating costs, and reliabilty.

Alaska has the potential for vast hydroelectric development (see Figure III-15). Alaska contains over 40% of the hydroelectric power potential of the United States. The 89 undeveloped potential sites have a potential capacity of 33.3 million kw -- 29.3% of the U.S. total potential hydroelectric capacity. The development of this potential would make power available for electricity-intensive industries, including metal reduction, aluminum production, and cement manufacturing. The following five hydroelectric plants have been proposed, each having a long construction period:

1.	Thomas Bay Hydroelectric Project	Petersburg
2.	Bradley Lake Hydroelectric Project	Homer
3.	Watana Hydroelectric Project	Susitna River
4.	Devil's Canyon Hydroelectric Project	Susitna River
5.	Rampart Hydroelectric Project	Yukon River

RESOURCE: HYDROELECTRIC POWER

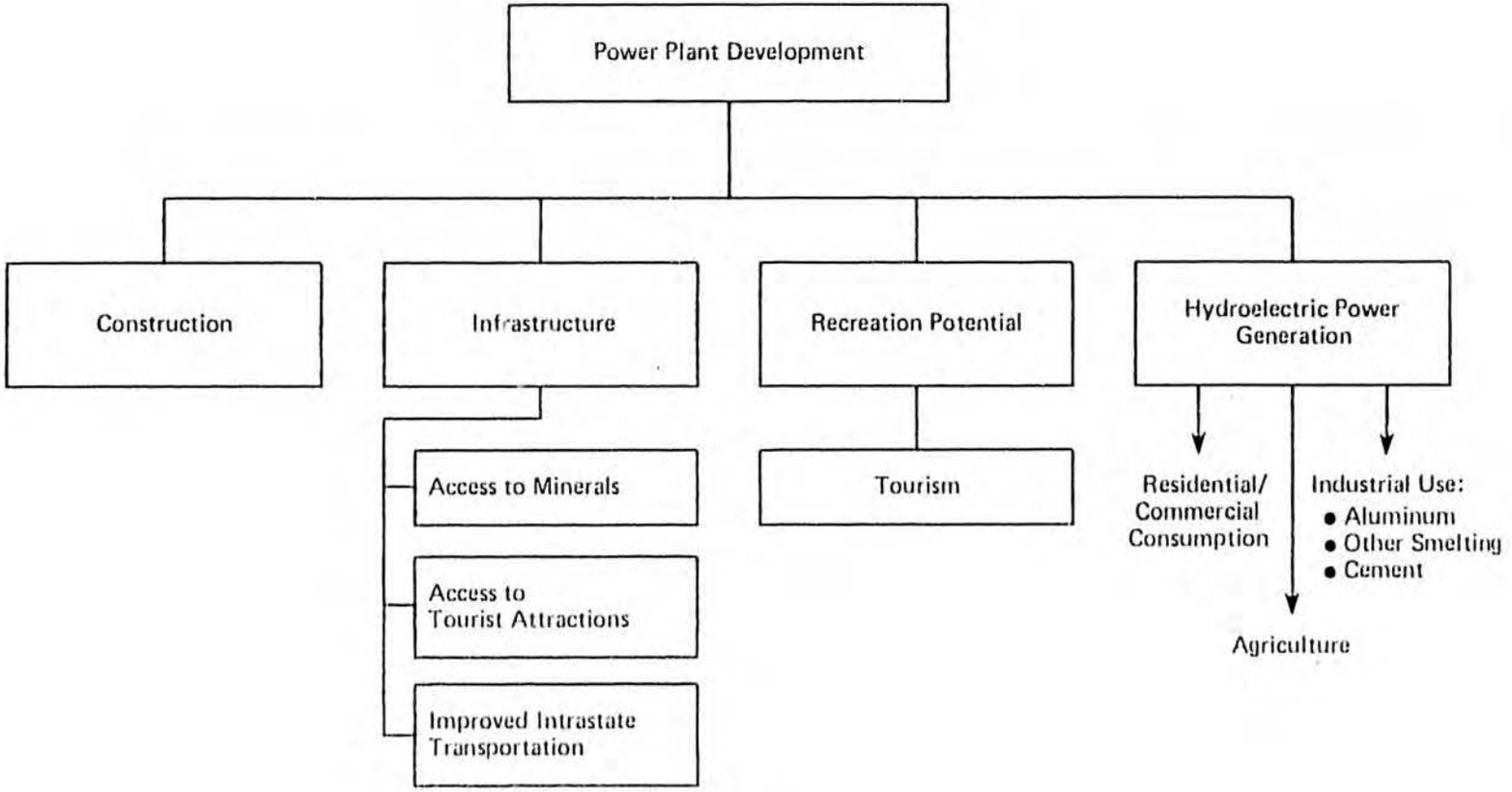

FIGURE III-15

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

Country	Value (millions of current dollars)	Percentage Share of Total
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	25.5	8.6
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

Commodity	Value (millions of current dollars)	Percentage Share of Total	Exports to Japan as a Percentage of Total Alaskan Exports of the Commodity
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	2.8	1.3	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

Commodity	Value (millions of current dollars)	Percentage Share of Total
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	11.5	16.7
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 IMP RTS 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	11.7	
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

Commodity	Value (millions of current dollars)	Percentage Share of Total
Foodstuffs	$ 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	987.8	9.9
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 Export Value (millions of current dollars)	Percentage of Total U.S. Exports of Commodity to Japan	Percentage of 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.

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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 data back to the mid-1960s or earlier.

TABLE IV-8

JAPANESE FOREIGN INVESTMENT IN ALASKA

U.S. Company	Location of Facilities	Japanese Owner	Percentage Ownership (1975)	Date of Initial Investment
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 Hogei 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

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TABLE IV-8 (Continued)

U.S. Company	Location of Facilities	Japanese Owner	Percentage Ownership (1975)	Date of Initial Investment
Adak Aleutian Processors, Inc.	Adak	Nichiro Gyogyo, Japan	30	1973
Orca 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 Philips 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.

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TABLE IV-9

JAPANESE-OWNED MANUFACTURING PLANTS IN ALASKA - 1975

City/U.S. Company	Industry/Product	Employment
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)

City/U.S. Company	Industry/Product	Employment
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)

City/U.S. Company	Industry/Product	Employment
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 Hogei, 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 Artic 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 197[illegible] 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			Projected GNP Growth Rates - 1977-90		
1970-74	1974-76	1976 GNP (billions of constant 1970 dollars)	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)

Sector	Growth Rate 1965-75	Growth Rate 1976-90
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 Unites 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.

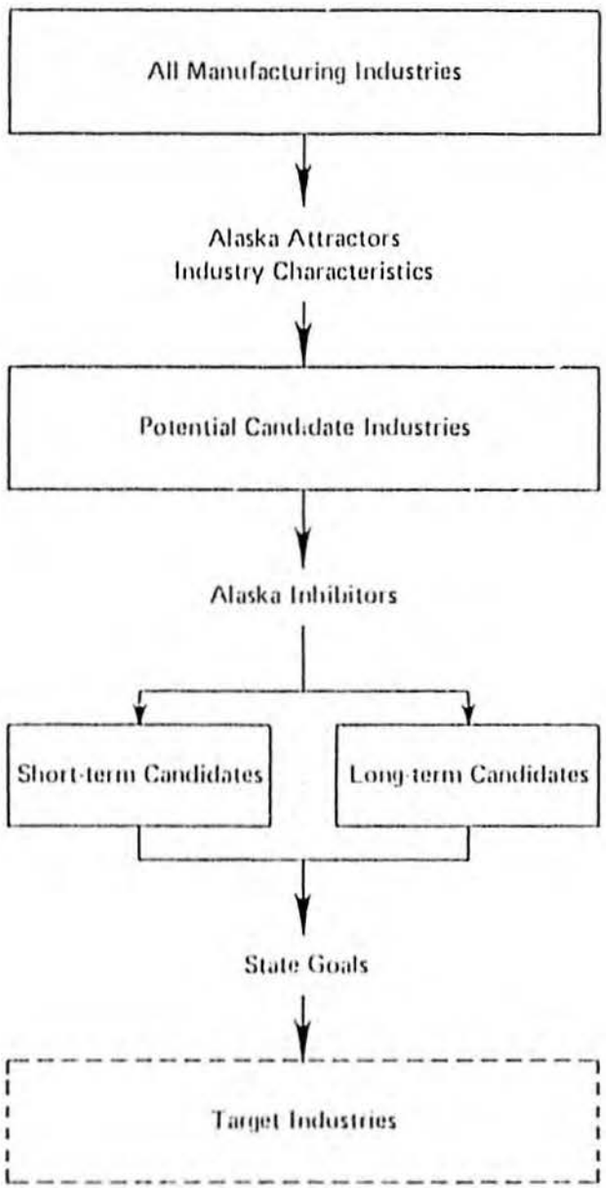
The principal factors which a firm considers in its location decision are those which are likely to reduce operating costs and therefore increase competitiveness and profits. These include proximity to suppliers or markets to reduce shipping costs, access to labor, access to appropriate transportation 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	2%	7%	11%	4%	8%	59%	2%	7%
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	3
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	3
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	42	2	1
283	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	3	17	31	3	6
301	Rubber Products	9	6	14	2	12	52	1	4
307	Miscellaneous Plastics Products	5	7	14	2	16	51	1	2
311	Leather Tanning and Finishing	2	9	7	2	13	57	1	9
312	Leather Products, Except Footwear	2	10	17	2	8	58	1	2
313	Footwear	1	4	13	1	8	70	1	2

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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
333	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	3	8	1	19	56	2	2
372	Aircraft and Parts	28	3	13	1	25	28	1	1
373	Ship and Boat Building and Repairing	10	3	9	1	49	22	1	5
374	Other Transportation Equipment	6	4	10	1	28	41	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.

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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 intrastate 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 Alskan 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 severence 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 upsteam 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 o 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 expectes 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 paperboard 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:
	Raw Materials	Industrial Market	Consumer Market	Highly-skilled Labor	Other Labor	Transportation	Distribution	Power	Fuel	Water	Site	X = Yes
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	

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TABLE V-4

KEY CHARACTERISTICS OF INDUSTRIES

Candidate Industries	Characteristics: High Environmental Impact Potential	Labor-intensive	Capital-intensive	Economies of Scale	Special 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	National Growth Outlook 1977-90
Canned Seafood	X	X				X		X								X	X				X	X	3.4%
Fresh/Frozen Seafood	X					X		X								X	X				X	X	3.4
Logging	X	X				X	X									X		X			X		2.2
Sawmills		X				X	X									X		X			X		1.9
Specialty Sawmills		X				X	X									X					X		1.9
Millwork						X			X					X		X	X				X		1.5
Wood Containers		X					X		X			X				X		X		X			2.3
Wood Preserving		X				X	X									X		X	X		X		3.2
Miscellaneous Wood Products		X			X		X		X					X		X	X				X		3.2
Pulp Mills	X		X	X		X	X							X				X	X		X		2.3
Paper Mills	X		X	X		X	X							X				X	X		X		3.1
Paperboard	X		X	X		X	X							X				X	X		X		3.3
Cyclic Intermediates	X		X	X		X	X					X	X	X				X	X		X		5.3
Organic Chemicals	X		X	X		X	X					X	X	X				X	X		X		6.0
Inorganic Chemicals	X		X	X		X	X					X	X	X				X	X		X		4.5
Fertilizer	X		X			X	X					X	X		X			X	X	X	X		3.2
Fertilizer Mixing	X		X			X	X					X	X		X			X	X	X	X		3.2
Agricultural Chemicals	X		X			X	X					X	X		X			X	X	X	X		3.9
Petroleum Refining	X		X	X		X		X				X		X	X			X	X	X	X		4.7
Asphalt			X	X		X		X				X		X				X	X	X	X		2.6
Cement	X		X	X		X	X					X			X			X		X	X		1.5
Concrete Block and Brick		X				X	X		X						X	X		X		X			1.7
Other Concrete Products		X				X	X		X							X		X		X			2.8
Ready-mixed Concrete			X			X	X		X						X			X		X			1.7
Nonmetallic Minerals Processing	X		X				X				X	X			X		X				X		4.0
Copper Smelting	X			X		X	X		X					X				X	X		X		2.3
Lead Smelting	X			X		X	X		X					X				X	X		X		1.6
Zinc Smelting	X			X		X	X		X					X				X	X		X		0.2
Aluminum Smelting	X			X		X	X		X					X				X	X		X		4.0
Other Nonferrous Smelting	X			X		X	X		X					X				X	X		X	X	3.3

Key: X = Yes

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TABLE V-5

IMPORTANCE OF ALASKAN INHIBITORS TO CANDIDATE INDUSTRIES

Candidate Industries	Alaskan Inhibitors: Infrastructure	Labor Costs/Skills	Transportation Costs	Remoteness	Limited Local Market	Utilities	Institutional/ Regulatory	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 establishement 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 that 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 inhibtors 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 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 built 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 nonferrous 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 cyclicality.

- 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 cyclicality.

- 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 ouside 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 Cyclicality	Import Substitution	Regional Diversification	Additional State Revenues	Reliance on Renewable Resources	Minimum Environmental Impact
Canned 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	M	L	M	L	L	H	H
Millwork	M	M	H	M	M	H	M	L	H	L	L	H	H
Wood Containers	M	L	H	M	M	M	M	L	L	L	L	H	H
Wood Preserving	L	L	H	M	L	M	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	L	M	M	H	L
Paper Mills	H	H	H	M	H	H	H	H	M	M	M	H	L
Paperboard Mills	H	H	H	M	H	H	H	H	M	M	M	H	L
Cyclic Intermediates	H	M	M	M	M	M	H	H	M	L	M	L	L
Organic Chemicals	H	H	M	M	M	H	H	H	M	L	M	L	L
Inorganic Chemicals	H	H	M	M	M	H	H	H	M	M	M	L	L
Fertilizer	H	M	H	M	M	M	H	H	H	L	M	L	L
Fertilizer Mixing	H	L	H	M	H	H	H	H	H	L	M	L	L
Agricultural Chemicals	H	M	H	M	H	H	H	H	H	L	M	L	L
Petroleum Refining	H	H	M	M	H	H	H	H	H	L	H	L	L
Asphalt	M	M	M	M	M	H	H	H	H	L	M	L	L
Cement	M	M	H	H	H	M	H	L	H	L	M	L	L
Concrete Block and Brick	M	L	H	H	M	H	H	L	M	M	L	L	H
Other Concrete Products	H	M	H	H	H	H	H	L	M	L	L	L	H
Ready mixed Concrete	M	L	H	H	L	H	H	L	M	L	L	L	H
Nonmetallic Minerals Processing	H	M	H	M	M	M	M	M	L	M	M	L	L
Copper Smelting	H	H	H	M	H	M	H	H	H	L	H	L	L
Lead Smelting	M	M	H	M	M	M	H	H	L	L	L	L	L
Zinc Smelting	M	H	H	M	M	M	H	H	L	L	M	L	L
Aluminum Smelting	H	H	H	L	H	M	H	H	M	L	H	M	L
Other Nonferrous Smelting	H	M	H	M	M	M	H	H	L	M	M	L	L
Nonmanufacturing													
Agriculture	H	M	H	H	H	M	L	H	H	M	L	H	M
Fisheries	L	L	H	H	H	L	L/M	H	L	L	L	H	H
Tourism	M	H	H	H	H	M	L	H	L	H	M	H	L
Oil and Gas	L	L	L	L/M	M	L	M	H	L	H	H	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	H	H	L	L
Special Projects Construction													
Gas Pipeline	L	H	H	L	M	L	L	L	L	M	M	L	L
Capital Move	L	H	H	H	H	L	L	L	L	L	L	L	L
Hydroelectric Development	L	H	H	M	M	L	L	L	L	M	L	L	L

Key:
L = Low
M = Medium
H = High

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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 cyclicality 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 cyclicality 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 1982s. 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.

1981-85

1. Tourism - dzs in 3/5 yrs. trans. costs ↓
   some public invest. - infra
2. Fishing - 1st in need + potential
3. Agric. - Barley alot of potential - may really be there for export mkt. - grain. Use of oil
4. coal - dev. ops. - elect. for rail/alt w/ industry export
5. cement - need alot of nat. gas.
6. asphalt - small scale no infra. needed, } s.t. major projects

1985-200

1. Aluminum reduction - Bus. Week 3/6 - story on aluminum
   Power big prob. - Bonneville shutting off - Susitna! Import bauxite, need or con deep water port
   ENORMOUS PROJECT - joint hydro/aluminum
2. Iron Ore Reduction - Fits Ak. - reduce ore to sponge, then to crude steel - export Japan.
3. Chemical intermediates - upgrade petrochem. (royalty 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) Do feas. planning - 2) joint invest. ops. w/ Natives
3) infrastructure - not subsidized but long term
winners - dams or deep water ports

File #19

Alaska State Legislature

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REP. BILL MILES
REP. LEO SCHAEFFER
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

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