ALASKA LEGISLATURE SPECIAL COMMITTEE / SUBJECT FILES 8672
111 SCOMM 9: HOUSE SPEC. COMM. ON PERMANENT FUND 1977-78

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

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.

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

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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

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State of Alaska, Department of Revenue

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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.

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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
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ANCHORAGE, AK. 99501
[POUCH V, JUNEAU, AK. 99811]
(907) 465-3873

House of Representatives

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.

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.

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

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

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,

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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.

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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.

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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.